

MEMORANDUM TO: Office of the Secretary

FROM: Paul Friedman, FERC staff

SUBJECT: Mountain Valley Project

CP16-10

DATE: November 21, 2017

Please place this document in the public files for the project proposed by Mountain Valley Pipeline LLC in Docket No. CP16-10-000:

 Copy of Biological Opinion produced by the U.S. Fish & Wildlife Service on November 21, 2017, to comply with Section 7 of the Endangered Species Act.

The document was sent to staff. The document is NOT confidential.

Paul Friedman

From: Troy Andersen <troy_andersen@fws.gov>
Sent: Tuesday, November 21, 2017 1:37 PM

To: James Martin

Cc: Cindy Schulz; Walker, William T Jr CIV USARMY CENAO (US);

erika_vaughan@ios.doi.gov; Paul Friedman; tabing@fs.fed.us; Adams, Jennifer - FS; Tignor, Keith (VDACS); Hypes, Rene (DCR); ERNIE.ASCHENBACH@dgif.virginia.gov;

Brown, Clifford L; Dawley, Joseph; Stahl, Megan D.

Subject: Mountain Valley Pipeline, ŁLC; Docket Number CP16-10-000 - Biological Opinion

Attachments: 20171121_letter_Service to FERC_MVP BO SIGNED.pdf

Mr. Martin:

The signed subject document is attached.

Wishing everyone a safe and happy holiday season.

V/R Troy

Endangered Species/Conservation Planning Assistance Supervisor

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United States Department of the Interior



FISH AND WILDLIFE SERVICE

Virginia Field Office 6669 Short Lane Gloucester, VA 23061

November 21, 2017

Ms. Kimberly Bose, Secretary Federal Energy Regulatory Commission 888 First Street NE, Room 1A Washington, D.C. 20426

Attn: James Martin, Branch Chief

Re: Mountain Valley Pipeline, LLC; Docket Number CP16-10-000; Project #05E2VA00-2016-F-0880 and #05E2WV00-2015-F-0046

Dear Ms. Bose:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (Opinion) based on our review of the referenced project and its effects on the federally listed species in Table 1 in accordance with Section 7 of the Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA).

Table 1. Species considered in this Opinion.

Species Common Name	Species Scientific Name	ESA Status	State
Small whorled pogonia (SWP)	Isotria medeoloides	threatened	West Virginia (WV)
Virginia spiraea (VASP)	Spiraea virginiana	threatened	WV
Roanoke logperch (RLP)	Percina rex	endangered	Virginia (VA)
Indiana bat (Ibat)	Myotis sodalis	endangered	VA, WV
Northern long-eared bat (NLEB)	Myotis septentrionalis	threatened	VA, WV

Your July 10, 2017 request for formal consultation was received on July 10, 2017.

This Opinion is based on information provided in the June 23, 2017 Final Environmental Impact Statement (FEIS) (Federal Energy Regulatory Commission [FERC] 2017a), July 10, 2017

Biological Assessment (BA) (FERC 2017b), telephone conversations, field investigations, and other sources of information. The consultation history is located after the Literature Cited. Because the project traverses 2 states under the geographic jurisdiction of the 2 Service Field Offices in Gloucester, VA (VAFO), and Elkins, WV (WVFO), each maintain their geographic portion of the administrative record in their respective Field Office.

FERC, under Section 7 of the Natural Gas Act, is required to consider, as part of its decision to authorize interstate gas facilities, all factors bearing on the public convenience and necessity. This includes any "nonjurisdictional" facilities that do not come under the jurisdiction of FERC but may be integral to the project objective. Nonjurisdictional facilities that lie outside the footprint of jurisdictional facilities were not included in the analysis of impacts to federally listed species provided to the Service by FERC. Therefore, any effects to and incidental take of listed species associated with nonjurisdictional facilities may not be covered in this Opinion. The nonjurisdictional facilities associated with this project are summarized in Appendix W of the FEIS and further discussed in Sections 2.2 and 4.13 (FERC 2017a).

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

As defined in the ESA Section 7 regulations (50 CFR 402.02), "action" means "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas." The "action area" is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action."

Mountain Valley Pipeline, LLC (Mountain Valley) has requested the FERC to authorize the construction and operation of a total of approximately 303.5 miles of natural gas transmission pipeline and associated facilities in WV and VA, known as the Mountain Valley Project (MVP) (Figure 1) (FERC 2017a, 2017b).

The following is a summary of the proposed action and a detailed description can be found in FERC's MVP and Equitrans Expansion Project FEIS (FERC 2017a) and BA (FERC 2017b) for MVP.

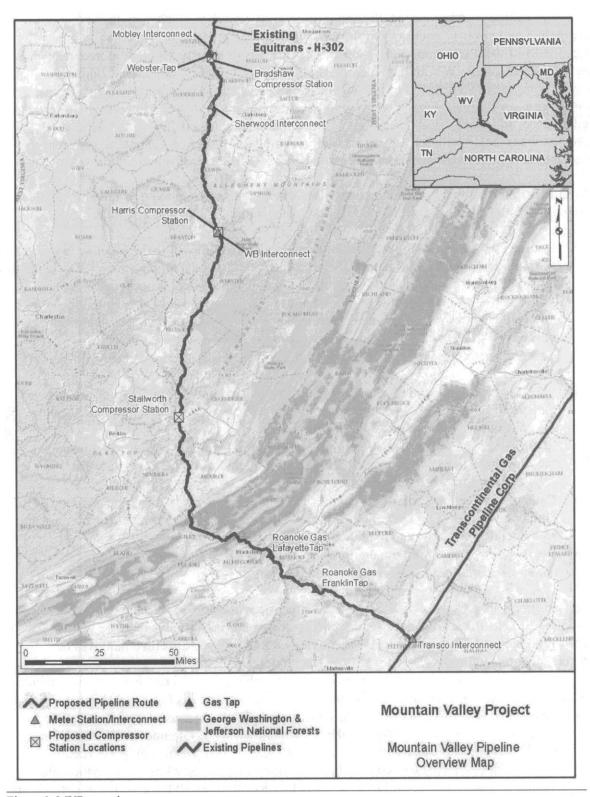


Figure 1. MVP overview.

Proposed Facilities – As proposed, the approximately 303.5 miles of 42-inch diameter natural gas pipeline will cross 17 counties within WV and VA. The pipeline route begins at an interconnection with Equitrans, L.P.'s existing H-302 pipeline at the Mobley Interconnect and Tap in Wetzel County, WV and proceeds to the Transcontinental Gas Pipeline Company's existing compressor station 165 in Pittsylvania County, VA. Additional components include 3 new compressor stations, 4 meter and regulation (M&R) stations (i.e., interconnects), 3 taps, 8 pig launchers and receivers at 5 locations, 36 new mainline valves (MLVs), and 31 cathodic protection beds. MVP will deliver up to 2 billion cubic feet (ft) per day of natural gas from the Appalachian Basin to markets in the Mid-Atlantic and Southeastern United States.

A brief description of the 7 types of above-ground facilities proposed to be installed is included below. Additional details describing the facilities are included in Section 2.1 of the FEIS (FERC 2017a) and Section 3.1 of the BA (FERC 2017b).

- Compressor stations utilize engines to maintain pressure within the pipeline to deliver the contracted volumes of natural gas to specific points at specific pressures. Designed to attenuate noise and allow for operation and maintenance (O&M) activities.
- M&R stations measure the volume of gas removed from or added to a pipeline system
 at receipt and delivery interconnects. Consist of a small graveled area with a small
 building(s) that enclose the measurement equipment.
- Taps connect the MVP pipeline with other natural gas systems operated by other companies.
- MLVs consist of a small system of aboveground and underground piping and valves
 that control the flow of gas within the pipeline and can also be used to vacate, or blowoff,
 the gas within a pipeline segment, if necessary.
- Pig launchers and receivers facilities where internal pipeline cleaning and inspection tools, referred to as "pigs," can be inserted or retrieved from the pipeline. Generally consist of a segment of aboveground piping.
- Cathodic protection systems systems that help prevent corrosion of underground pipeline facilities. Typically include a small, aboveground transformer-rectifier unit and an associated anode ground bed located underground.
- Very small aperture terminal equipment provides telecommunication services at all compressor stations, M&R stations, and MLV sites.

Land Requirements – Construction of the MVP pipeline will disturb approximately 6,363 acres of land (FERC 2017b). Following construction, approximately 2,118 acres will be maintained for O&M of the pipeline. The remaining approximately 4,245 acres of disturbed land will be restored and allowed to revert to former use. A brief description of the 6 types of land requirements is included below. Additional details describing the land requirements are included in Section 2.3 of the FEIS (FERC 2017a) and Section 3.2.3 of the BA (FERC 2017b).

- Pipeline right-of-way (ROW) The construction ROW consists of 2 portions, the temporary construction ROW and the permanent ROW. The temporary construction ROW will be restored or will revert to former use; a 50-ft permanent ROW (i.e., operational easement) will be maintained and utilized for O&M purposes. Mountain Valley will generally use a 125-ft construction ROW to install the pipeline in uplands and a 75-ft construction ROW through wetlands.
- Additional temporary workspace (ATWS) additional space required in particular areas

necessary to complete construction of the pipeline. Examples include, but are not limited to, areas adjacent to crossings of roadways, railroads, waterbodies, wetlands, or other utilities; areas requiring extra trench depth; certain pipe bend locations; truck turnarounds or equipment passing lanes; staging and fabrication areas. ATWS will be used only during construction; after pipeline installation, all ATWS will be restored to their preconstruction condition and use.

- Aboveground facilities used for construction of aboveground facilities, except cathodic
 protection areas. Temporary work areas used during construction of the aboveground
 facilities will be restored to their pre-construction condition and use after the facilities are
 built.
- Contractor and storage yards (yards) used to temporarily store pipe, materials, and equipment; set up offices; and mobilize workers. After pipeline installation, all yards will be restored to their pre-construction conditions and use.
- Cathodic protection areas used for installing cathodic protection rectifiers and groundbeds.
- Access roads (ARs) necessary to gain access to the construction ROW and aboveground facilities. Many of the proposed ARs are existing roads and virtually all of the existing ARs will require improvements for pipeline construction traffic.

Construction Procedures – Mountain Valley will design, construct, operate, and maintain the MVP pipeline and facilities in accordance with U.S. Department of Transportation regulations under 49 CFR 192 and other applicable federal and state requirements. Mountain Valley will comply with siting and maintenance requirements under 18 CFR 380.15 and other applicable federal and state regulations and implement various forms of mitigations as defined in 40 CFR 1508.20. They will adopt FERC's general construction, restoration, and operational mitigation measures as outlined in FERC's Upland Erosion Control Revegetation and Maintenance Plan (FERC Plan) (FERC 2013a) and Wetland and Waterbody Construction and Mitigation Procedure (FERC Procedures) (FERC 2013b). Construction plans include some modifications to FERC Procedures and more details can be found in Section 2.4.1.1 of the FEIS (FERC 2017a). Specific mitigation plans for National Forest lands have been determined in consultation with the U.S. Forest Service (USFS).

A brief description of the 8 types of typical construction procedures associated with the project is included below. Additional details describing the typical construction procedures are included in Section 2.4.2 of the FEIS (FERC 2017a). These construction techniques will generally proceed in an assembly line fashion with construction crews moving down the construction ROW as work progresses. Once trees are cleared, construction and restoration at any point along the pipeline route will take about 3 weeks to complete; although progress could be delayed by topography, weather, or other factors (FERC 2017a, 2017b). Within 20 days of backfilling the trench (10 days in residential areas) all work areas will be graded. The proposed construction schedule can be found in Section 2.5 and Table 4.9.2-1 of the FEIS (FERC 2017a).

- Surveying and staking marking of the limits of the construction ROW, centerline, ATWS, other approved work areas, and environmentally sensitive areas using temporary flagging or tape.
- Clearing and grading removal of trees, shrubs, brush, roots, and large rocks from the construction work area and leveling of the construction ROW to allow for operation of

construction equipment.

- Trenching digging of pipeline trench by removal of soil and rock by track-mounted excavator/backhoe or similar equipment. Tractor-mounted mechanical rippers or rock trenchers may be used to fracture rock prior to removal. Blasting may be used in specific areas where hard bedrock is close to the surface.
- Pipe stringing, bending, welding, and coating transportation of pipe segments to the
 construction ROW or yards and bending of pipes to fit contours of the trench. Pipeline
 segments are aligned and welded together. Welds are inspected and covered with
 protective coating.
- Lowering-in and backfilling lowering of pipe using side-boom tractors and backfill of trench with suitable excavated material using track-hoes, bulldozers, graders, or backfilling machines. In rocky areas, protective materials may be placed in trench to protect pipe. Trench breakers (sandbags or foam) will be installed in the trench on slopes prior to backfilling to prevent subsurface water movement along pipeline.
- Hydrostatic testing and pipe cleaning hydrostatic testing to ensure the system is capable
 of withstanding the operating pressure for which is it designed. Additional details
 describing hydrostatic testing are included in Section 3.1.6 of the BA (FERC 2017b).
 Afterwards, the pipeline will be cleaned and dried with pressurized air.
- Commissioning verifying that equipment has been properly installed and is working, verifying that controls and communication systems are functioning, and confirming that the pipeline is ready for service. As a final step, the pipeline will be purged of air and loaded with natural gas.
- Cleanup and restoration grading and restoration of all work areas to pre-construction topographic contours as closely as possible.

Specialized construction methods are required when the pipeline is installed across waterbodies, wetlands, roads, railroads, foreign utilities, steep slopes, residences, agricultural lands, and other sensitive environmental resources. A brief description of the specialized construction methods is included below. Additional details describing the specialized construction methods are included in Sections 2.4.2.9 through 2.4.2.18 of the FEIS (FERC 2017a).

- Waterbody crossings (all dry open-cut crossings)
 - Flume construction method diversion of streamflow through flume pipes and placement of dam structures to exclude water flow from trench area.
 - Dam-and-pump construction method diversion of stream flow using pumps and hoses and placement of dam structures to exclude water flow from trench area.
 - Cofferdam method installation of a temporary diversion structure from 1 bank of the waterbody to the approximate midpoint of the waterbody crossing to isolate that section of the stream from the remainder of the waterbody, creating discrete dry sections around which water flows unimpeded.
- Wetland crossings construction ROW through wetlands are typically 75 ft wide with ATWS located in upland areas a minimum of 50 ft from wetland edge, unless granted site-specific approval for a reduced setback. Mountain Valley has requested a ROW greater than 75 ft wide in wetlands at several specific locations as listed in Appendix G of the FEIS (FERC 2017a). Sediment barriers such as silt fence and staked straw bales will be utilized during clearing and construction. Wetlands will be crossed by wet or dry open trench lay, or open ditch push-pull methods.

- Road and railroad crossings railroads and paved roads will generally be crossed by boring beneath the road or railroad. Most gravel, dirt, and grass roads will be crossed by open-cut method; traffic will be maintained during construction by the use of steel plates or detours.
- Residential construction implement measures to minimize construction-related impacts on all residences and other structures located within 50 ft of the construction ROW following site-specific *Residential Construction Plans* included in Appendix H of the FEIS (FERC 2017a).
- Foreign utilities buried pipelines and utilities will be identified and crossed without damage by implementing multiple measures, including using One-Call systems.
- Agricultural areas identify and flag existing irrigation systems and drainage tiles; any
 damaged irrigation and drainage systems will be repaired or replaced. A minimum of 12
 inches of topsoil will be segregated from the construction ROW in agricultural lands, in
 accordance with the FERC Plan (FERC 2013a).
- Rugged topography temporary and permanent controls measures such as silt socks, reinforced "super" silt fence, slope breakers, trench breakers, trench drains, erosion control matting, and hydro-mulching will be put in place to minimize erosion and sedimentation. In areas where the pipeline route crosses laterally along a slope, "twotone" construction techniques may be used. Equipment on steep slopes will be suspended from a series of winch tractors.
- Karst terrain crossing of karst terrain will follow the project-specific construction, restoration, and mitigation methods, summarized in Section 4.1.2.5 in the FEIS (FERC 2017a) and described in the *Karst Mitigation Plan* (Draper Aden Associates 2016).
- Winter construction specialized construction methods or procedures will be utilized to protect resources during the winter season as described in the *Winter Construction Plan* (Mountain Valley 2016).

<u>Monitoring and Post-Approval Variances</u> – Mountain Valley has developed procedures for construction monitoring and quality control, environmental inspection, compliance monitoring, and post-approval variances. A brief description of the procedures is included below. Additional details describing the procedures are included in Section 2.4.4 of the FEIS (FERC 2017a).

- Coordination copies of all applicable environmental permits, construction drawings, and specifications will be provided to construction contractors.
- Environmental inspection and training trained environmental inspectors (EIs) will be
 employed to ensure that construction complies with construction and mitigation plans and
 environmental conditions imposed by FERC and other regulatory agencies and conduct
 environmental training for company employees. EIs will have the authority to
 immediately "stop-work" for all activities and to take corrective actions to remedy
 instances of non-compliance.
- FERC compliance monitoring in additions to EIs, a third-party compliance monitoring program will be funded to provide daily environmental monitoring services during construction and daily reports to the FERC Project Manager. Other federal, state/commonwealth, and local agencies may also monitor the project to the extent determined necessary by the agency.
- Post-approval variance process variance requests for minor modifications within the
 previously surveyed corridor that will not impact sensitive resources, and have landowner

- acceptance, will be submitted to the third-party compliance monitor for review and approval. Larger or more complex variance requests will be submitted to FERC staff for review and final determination.
- Post-construction monitoring follow-up inspections and monitoring of all disturbed upland areas will be conducted for at least the first and second growing seasons to determine the success of restoration, including until revegetation thresholds are met, temporary erosion control devices are removed, and restoration is deemed complete.
- Monitoring the ROW grant for federal lands the USFS and U.S. Corps of Engineers
 will monitor implementation of the MVP mitigation measures on federal lands to assure
 that the terms and conditions of the ROW Grant issued by Bureau of Land Management
 are carried out (40 CFR 1505.3) and that negative impacts from construction and
 operation of the pipeline on federal lands are minimized to the extent possible.

Operation and Maintenance – MVP pipeline and aboveground facilities will be operated and maintained in accordance with U.S. Department of Transportation regulations in 49 CFR 192, FERC's regulations at 18 CFR 380.15, and the maintenance provisions found in the FERC Plan (FERC 2013a) and Mountain Valley's modified FERC Procedures (FERC 2013b, 2017a). A brief description of the O&M details is included below. Additional details describing O&M are included in Section 2.6 of the FEIS (FERC 2017a) and Section 3.2 of the BA (FERC 2017b).

- Pipeline facility O&M an O&M plan and an emergency plan will be established that
 include procedures to minimize the hazards in a natural gas pipeline emergency.
 Vegetation removal and maintenance within the 50-ft permanent ROW will be conducted
 in accordance with the FERC Plan (FERC 2013a). Regular patrols, inspection, and repair
 of the pipeline will be conducted.
- Aboveground facility O&M all equipment at aboveground facilities will be routinely inspected and maintained by Mountain Valley. Routine maintenance checks will include equipment and instrumentation calibration and safety equipment testing. The aboveground facilities will be unmanned, with start/stop capabilities controlled from corporate headquarters. When the safety system or alarms are activated, personnel are notified and dispatched.

<u>Future Plans and Abandonment</u> – Mountain Valley may seek to expand or modify its facilities in the future if market conditions change. Any future expansion will require filing an amendment to its application or a new application to FERC.

<u>Conservation Measures</u> – Conservation measures proposed as part of the action (measures that will avoid, minimize, and mitigate effects of the proposed action on the species and/or benefit the species as a whole) are referred to as avoidance and minimization measures (AMMs) in this Opinion. AMMs are provided in the FEIS (FERC 2017a) and BA (FERC 2017b) and discussed, as applicable, in Appendix B.

Action Area

The action area is defined (50 CFR 402.02) as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The Service has determined that the action area for this project is all lands in VA and WV affected directly or

indirectly by the project's components described in Description of Proposed Action.

STATUS OF THE SPECIES

Per the ESA Section 7 regulations (50 CFR 402.14(g)(2)), it is the Service's responsibility to "evaluate the current status of the listed species or critical habitat."

To assess the current status of the species, it is helpful to understand the species' conservation needs which are generally described in terms of reproduction, numbers, and distribution (RND). The Service frequently characterizes RND for a given species via the conservation principles of resiliency (ability of species/populations to withstand stochastic events – numbers, growth rates), redundancy (ability of a species to withstand catastrophic events – number of populations and their distribution), and representation (variation/ability of a species to adapt to changing conditions) (collectively known as the three Rs).

Small whorled pogonia — As described in Service (2008), the SWP conservation needs include "resolving data gaps and assessing the conservation potential for populations on private lands." Currently, as a whole, the rangewide status of the species is stable (Service 2008). From 1985-2007, the populations in WV remained low but stable (Service 2008). The primary factors influencing the status include risks posed by land development; however these activities are diffuse across the species' range and do not constitute an acute threat to SWP survival and recovery (Service 2008). For a more detailed account of the species description, life history, population dynamics, threats, and conservation needs, refer to: https://ecos.fws.gov/ecp0/profile/speciesProfile.action?spcode=Q1XL.

<u>Virginia spiraea</u> – As described in Service (1992), VASP conservation needs include preserving existing populations by minimizing human disturbance and controlling invasive species. Currently, as a whole, the rangewide status of the species is stable (Service 2008). From 1992-2007, population numbers in WV remained stable (Service 2008). The primary factors influencing the status include risks posed by a limited range with increasing amounts of fragmentation, a lack of genetic variation, a lack of natural habitat succession, invasive species, application of herbicides, and disturbance by humans leading to "changes in hydrology by impoundment and by impact from recreational use, hydroelectric facilities, and run-off debris" (NatureServe 2017). For a more detailed account of the species description, life history, population dynamics, threats, and conservation needs, refer to: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q2R1.

Roanoke logperch – As described in Service (2007), the RLP conservation needs include solving data gaps that limit an accurate assessment of population abundance, maintaining the health and vigor of present populations by addressing sediment loading at the watershed level and preserving ecological processes, increasing connectivity of populations by identifying and eliminating barriers, and preventing and reducing the risk of catastrophic extirpation from toxic spills. Currently, as a whole, the rangewide status of the species is improving, although the geographic range remains small. The populations in VA seem to be stable or increasing (Service 2007). The primary factors influencing the status include risks posed by large dams and reservoirs, small dams and barriers, watershed urbanization, agricultural and silvicultural

activities, channelization, roads, toxic spills, riparian/woody debris loss, and water withdrawals (Service 2007). For a more detailed account of the species description, life history, population dynamics, threats, and conservation needs, refer to: <a href="https://ecos.fws.gov/ecp0/profile/speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile?speciesProfile

Indiana bat – As described in Service (2016), the Ibat conservation needs include assessing and offsetting adverse impacts to the species and promoting recovery. Currently, as a whole, the rangewide status of the species is declining (Service 2016) and the degree of threat to the continued existence of the species is high (Service 2009). The primary factors influencing the status of the species include risks posed by White-Nose Syndrome (WNS), habitat loss and degradation, forest fragmentation, winter disturbance, environmental contaminants, climate change, and collisions with manmade objects (Service 2009, 2016). For a more detailed account of the species description, life history, population dynamics, threats, and conservation needs, refer to: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A000.

Northern long-eared bat – The NLEB conservation needs include protecting and reducing disturbance of hibernacula, summer roosts, and the buffer zone known as "WNS zone" (81 FR 1900-1922). Currently, as a whole, the rangewide status of the species is declining (81 FR 1900-1922). The primary factors influencing the status include risks posed by WNS, tree removal, disturbance around roosts during the summer months, and disturbance at the entrance and interior of hibernacula. "This includes the physical or other alteration of the hibernaculum's entrance or environment when bats are not present if the result of the activity will impair essential behavioral patterns" (81 FR 1900-1922). For a more detailed account of the species description, life history, population dynamics, threats, and conservation needs, refer to: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A0JE.

STATUS OF CRITICAL HABITAT

No critical habitat has been designated for: SWP, VASP, RLP, or NLEB.

Critical habitat for Ibat has been designated at Hellhole Cave, Pendleton County, WV; however, this action does not affect that area.

ENVIRONMENTAL BASELINE

Regulations implementing the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all federal, state, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated and/or ongoing impacts of all proposed federal projects in the action area that have undergone Section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress.

Status of the Species within the Action Area

Small whorled pogonia – No SWP were found within the accessible parts of the action area during 2015 and 2016 plant surveys in WV (Environmental Solutions & Innovations, Inc. [ESI]

2015, 2016). Due to restricted land access, 0.22 mile of the construction ROW in Greenbrier County, WV, has not been surveyed (T. Pankiewicz, ESI, letter to T. Andersen, T. Lennon, J. Schmidt, Service; S. Hypes, VA Department of Conservation and Recreation [VDCR]; C. Stihler, B. Sargent, WV Division of Natural Resources [WVDNR], August 2, 2017). Based on GIS desktop analyses, suitable habitat for SWP was identified within this 0.22 mile area (FERC 2017b). FERC is assuming presence of SWP in this unsurveyed area (FERC 2017a, 2017b) based on this information and because SWP colonies occur in Greenbrier County. The 8.1 acres (0.22 mile x 300 ft survey corridor) of unsurveyed area includes 3.5 acres in the construction ROW and areas downslope (4.6 acres) on both sides of the construction ROW (M. Stahl, EQT, email to J. Stanhope and T. Lennon, Service, October 17, 2017).

A published, peer-reviewed methodology to determine the number of SWP stems (i.e., individuals) at a particular site with potential suitable habitat has not been developed. The number of stems observed in known SWP colonies in WV is variable (1 to 30 stems) and changes within a colony annually because stems may not emerge every year (M. McCormick, Smithsonian Environmental Research Center, email to J. Stanhope, Service, October 11, 2017). There is also not a consistent relationship between stem count and area of a colony or potential suitable habitat. To calculate the number of SWP stems in the action area, we used the best available data of the average number of stems observed in SWP colonies in WV. For 8 colonies monitored in 2016 and 2017, the average number of stems observed was 6 and 7 stems, respectively (M. McCormick, Smithsonian Environmental Research Center, email to J. Stanhope, Service, October 11, 2017). Based on this monitoring data, we estimate that approximately 7 SWP stems occur in the action area with 3 stems in the construction ROW and 4 stems downslope of the construction ROW.

Based on aerial imagery, the construction ROW is a forested area and is upslope from a cleared field and multiple homes on a gravel/stone road, more than 400 ft and 1,300 ft away, respectively (DigitalGlobe 2017, WV Department of Transportation 2017). The unsurveyed area is on private land and we are not aware of specific activities that have occurred that benefit or adversely affect the species.

<u>Virginia spiraea</u> – The proposed action crosses portions of the Gauley, Greenbrier, and Meadow Rivers, in Nicholas and Summers Counties, WV, which provide habitat for VASP (https://www.fws.gov/westvirginiafieldoffice/PDF/Aquatic%20Habitats%20Supporting%20Federally%20Listed%20Species%20-%20April2017.pdf). VASP surveys were completed near these rivers across a 300 ft wide environmental study corridor (a total of 3.64 acres along 0.14 mile) (ESI 2015) in 2015 and no VASP was found (ESI 2016).

Due to restricted access, 2.3 acres within the construction ROW, ARs, and ATWS in close proximity to the Greenbrier River in Summers County was not surveyed. Mountain Valley will complete surveys for VASP if access is granted during the time of year when surveys for VASP can be conducted (FERC 2017b). Potentially suitable habitat for VASP has been identified in the 2.3-acre area based on the VASP habitat model (WVDNR 2017). VASP is a clonal shrub found among large boulders, flatrock, and flood debris along scoured streamsides and rivers, as well as roadside wet areas and wet marshy meadows. VASP requires periodic flood scouring to eliminate taller woody competitors and to create river-wash deposits and early successional

habitats. Because VASP occurs along rivers, streams, and wetlands, we used National Wetlands Inventory maps to confirm that the 2.3 acres contain suitable habitat. Thus, for the purposes of this Opinion, presence of VASP suitable habitat is assumed within the 2.3 acre unsurveyed area.

To estimate the extent of VASP within the 2.3 acres, we used 1996-2010 VASP occurrence data from the Greenbrier River (Table 2). This data was collected from 3 VASP occurrences (WVDNR 2011), which together are considered 1 population (the Greenbrier River population). More recent data is available for these occurrences. The more recent data was collected using the stem count method, instead of the extent of VASP coverage method used in previous years. Because of the difficulty in using this new data to determine extent of coverage, we are utilizing the 1996-2010 data. The more recent surveys indicate the occurrences appear to be healthy and comparable in size to previous years (J.J. Hajenga, WVDNR, phone call to T. Lennon, Service, October 10, 2017; P.J. Harmon, WVDNR, email to T. Lennon, Service, October 11, 2017).

Based on the survey data collected from the Greenbrier River population, the extent of VASP coverage averaged 221.33 square meters (m) (0.05 acre) (Table 2). Therefore, we are assuming the extent of VASP coverage within the 2.3 acres is 0.05 acre, and that the VASP on this 0.05 acre is 1 occurrence, which is also part of the Greenbrier River population.

Table 2. Estimated extent of VASP coverage on the Greenbrier River (WVDNR 2011).

Year	Extent of Coverage (m ²)	
1996	205.31	
1997	183.00	
2001	226.37	
2003	226.37	
2005	233.07	
2007	237.61	
2010	237.61	
Average	221.33	

Since VASP is a species that occurs along rivers, streams, and wetlands, we are assuming that the 0.05 acre of VASP is along a 288.6 linear ft reach of an unnamed tributary of the Greenbrier River (milepost [MP] 170.4-170.6) that overlaps with the construction ROW, ARs, and ATWS (Figure 2).

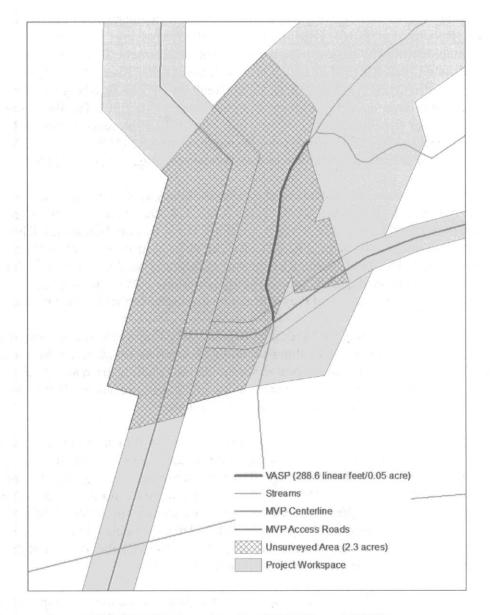


Figure 2. Unsurveyed area and VASP within the construction ROW, ARs, and ATWS.

We are not aware of specific activities that have occurred in the action area adversely affecting VASP. Potential threats within the action area include: invasive species, such as Japanese knotweed (*Fallopia japonica*) and purple loosestrife (*Lythrum salicaria*) that compete with VASP; changes in water flow regimes from weather related factors; and construction of boat docks or other streambank modifications (Service 2008). All of these threats may affect the amount of habitat available for the species along the streambanks in the action area.

Roanoke logperch – Presence/absence surveys for RLP were not conducted for the proposed action. RLP presence is assumed where suitable habitat was identified within potential habitat and in areas known to support RLP. Genetic analysis (Roberts et al. 2013) of RLP indicated a

dispersal extent of up to 80 river kilometers (rkm); however, median lifetime dispersal distance is 6-24 rkm (Roberts et al. 2016). The following waterbody crossings were categorized as suitable habitat identified by desk-top analysis or in-situ assessment: Bradshaw Creek 1 (MP 230.9), Bradshaw Creek AR (MP 231.6), North Fork Blackwater River (MP 249.8), Teels Creek 4 (MP 262.4), Little Creek 1.5 (MP 262.7), Little Creek 2 (MP 263.4), Maggodee Creek 1 (MP 269.4), Blackwater River 3 (MP 269.8), and Harpen Creek 1 (MP 290). The following waterbody crossings were categorized as known to support RLP-presence assumed: North Fork Roanoke River AR1 (MP 227.4), North Fork Roanoke River AR2 (MP 231.7), North Fork Roanoke River (MP 227.4), Roanoke River (MP 235.6), and Pigg River (MP 289.2).

To date survey efforts have not documented RLP in the Blackwater River drainage, which includes the North Fork Blackwater River, Teels Creek 4, Little Creek 1.5, Little Creek 2, Maggodee Creek 1, and Blackwater River 3 crossings. However, the Blackwater River mainstem is large enough to potentially support RLP (FERC 2017b). No instream work will occur at these crossing from March 15 - June 30, the RLP spawning season. Based on the lack of documented occurrences in the watershed and the time-of-year restriction (TOYR), no impacts to RLP are anticipated from these crossings and they will not be discussed further in this Opinion.

The North Fork Roanoke River AR2 crossing, Montgomery County, VA, is known to support RLP. RLP presence is assumed and habitat suitability was not assessed. Reese Mountain Road, an existing road that includes a paved bridge across the river, will be used as the AR to reach the construction site; therefore, no instream construction impacts or impacts to RLP will occur at this crossing and it will not be discussed further in this Opinion.

Bradshaw Creek AR crossing, Montgomery County, VA, is 5.8 rkm above the confluence of Bradshaw Creek with the Roanoke River and contains suitable RLP habitat based on the in-situ assessment (ESI 2016). North Fork Roanoke River AR1 crossing, Montgomery County, VA, is known to support RLP. Mountain Valley has committed that no temporary fill placement will occur at the temporary ARs. They will be crossed by a temporary single span bridge (M. Stahl, EQT, email to S. Hoskin, Service, November 9, 2017). These crossings will be used to reach the construction site, no instream construction impacts or impacts to RLP will occur at these crossings, and they will not be discussed further in this Opinion.

At each of the remaining crossings discussed below the proposed action will impact 1,000 m (200 m above and 800 m below each crossing) plus the construction ROW.

Bradshaw Creek 1 crossing, Montgomery County, VA, is 2.5 rkm above the confluence of Bradshaw Creek with the Roanoke River and contains suitable RLP habitat based on the in-situ assessment (ESI 2015). At this crossing Bradshaw Creek was classified as moderately low gradient with narrow and shallow riffles. The construction ROW is 22.86 m wide at this crossing, the wetted width is 6 m. The Anderson (2016) model identifies this crossing as potential RLP habitat. Based on the creek width and proximity to the Roanoke River, we expect RLP will use Bradshaw Creek when water levels are high; therefore we anticipate RLP numbers are low in this creek. Since we do not anticipate fish to disperse far up Bradshaw Creek from the Roanoke River we considered documented occurrences 6 rkm from the crossing, the lower end of the RLP lifetime dispersal distance. Seven RLP occurrences are documented within 6 rkm of

the crossing, all in the Roanoke River (VA Fish and Wildlife Information Service 2017). We added a correction factor since mark-recapture data indicates that only about 10% of RLP are actually detected during surveys (P. Angermeier, U.S. Geological Survey VA Cooperative Fish and Wildlife Research Unit, email to Service, February 2, 2012). To incorporate the detectability correction factor we multiplied the 7 RLP by 10 and estimate that approximately 70 RLP occur within 6 rkm of this crossing. We expect a small portion of those fish (10%) or 7 RLP will disperse up Bradshaw Creek and occur at this crossing.

Harpen Creek 1, Pittsylvania County, VA, is 2.3 rkm above the confluence with the Pigg River and contains limited suitable RLP habitat based on the in-situ assessment (ESI 2015). At this crossing Harpen Creek was classified as low gradient with shallow riffles that exhibit heavy embeddedness and siltation. The construction ROW is 22.86 m wide at this crossing, the wetted width is 5 m. Based on the creek width and proximity to the Pigg River, we expect RLP would use Harpen Creek when water levels are high; therefore we anticipate RLP numbers are low in this creek. Since we do not anticipate fish to disperse far up Harpen Creek from the Pigg River we considered documented occurrences 6 rkm from the crossing, the lower end of the RLP lifetime dispersal distance. Two RLP occurrences are documented within 6 rkm of the crossing, both in the Pigg River (VA Fish and Wildlife Information Service 2017). To incorporate the detectability correction factor we multiplied the 2 RLP by 10 and estimate that approximately 20 RLP occur within 6 rkm of this crossing. We expect a small portion of those fish (10%) or 2 RLP will disperse up Harpen Creek and occur at this crossing.

North Fork Roanoke River crossing, Montgomery County, VA, is known to support RLP. It is a VA Department of Game and Inland Fisheries (VDGIF) designated RLP threatened and endangered species waters, which "identifies streams and rivers that contain documented occurrences of federal/state- or state-listed threatened or endangered species and their associated habitat." RLP presence is assumed and habitat suitability was not assessed. The construction ROW is 22.86 m wide at this crossing, the wetted width was not measured since a habitat assessment was not conducted. We expect the wetted width at this crossing is comparable to the wetted width of the Blackwater River (22 m) because the rivers are of similar size at the crossings. The Anderson (2016) model identifies this crossing as potential RLP habitat. Ferguson et al. (1994) surveyed 27 sites in the North Fork Roanoke River. The estimated number of RLP per 100 m at sites above and below the crossing was 0.4-1.9; 1 RLP was the most common number captured; average was 10 RLP per rkm. The length of impacts to this waterbody is 1,022.86 m (the construction ROW at the crossing plus the 1,000 m stream length at each crossing); therefore there are an estimated 10.2 RLP at this crossing. To incorporate the detectability correction factor we multiplied the 10.2 RLP by 10 and estimate that 102 RLP occur at this crossing.

Roanoke River crossing, Roanoke County, VA is known to support RLP. It is a VDGIF designated RLP threatened and endangered species waters. RLP presence is assumed and habitat suitability was not assessed. The construction ROW is 22.86 m wide at this crossing, the wetted width was not measured since a habitat assessment was not conducted. We expect the wetted width at this crossing is comparable to the wetted width of the Blackwater River (22 m) because the rivers are of similar size at the crossings. The Anderson (2016) model identifies this crossing as potential RLP habitat. In 2010, 84 RLP were documented 1 rkm downstream of the crossing

(Roberts and Angermeier 2010), in a reach of similar length to the action area. To incorporate the detectability correction factor we multiplied the 84 RLP by 10 and estimate that 840 RLP occur at this crossing.

Pigg River crossing, Pittsylvania County, VA, is known to support RLP. It is a VDGIF designated RLP threatened and endangered species waters. RLP presence is assumed and habitat suitability was not assessed. The construction ROW is 22.86 m wide at this crossing, the wetted width was not measured since a habitat assessment was not conducted. We expect the wetted width at this crossing is comparable to the wetted width of the Blackwater River (22 m) because the rivers are of similar size at the crossings. The Anderson (2016) model identifies this crossing as potential RLP habitat. Since this area is known to support RLP we considered documented occurrences 24 rkm from the crossing, the upper end of the RLP lifetime dispersal distance. Two RLP occurrences are documented within 24 rkm of the crossing (VA Fish and Wildlife Information Service 2017). To incorporate the detectability correction factor we multiplied the 2 RLP by 10 and estimate that approximately 20 RLP occur within 24 rkm of this crossing. RLP are documented in the Pigg River at low numbers and we expect a portion of those fish (30%) or 6 RLP occur at this crossing.

In summary, 7 RLP are estimated to occur at the Bradshaw Creek 1 crossing; 2 at the Harpen Creek 1 crossing; 102 at the North Fork Roanoke River crossing; 840 at the Roanoke River crossing; and 6 at the Pigg River crossing. A total of 957 RLP are expected to occur in the action area.

In the Anderson (2016) model, RLP potential habitat covers approximately 2,552 rkm in VA, of which 1,581.83 rkm are in the Roanoke River basin. The proposed project crosses 5 waterbodies (Bradshaw Creek, Harpen Creek, North Fork Roanoke River, Roanoke River, Pigg River) known or with potential to support RLP. The action area represents approximately 0.32% of the total RLP potential habitat in the Roanoke River basin and 0.20% of the total RLP potential habitat in VA.

RLP decline in the action area is primarily the result of destruction and modification of habitat and fragmentation of the species range. Primary causes of RLP habitat degradation include chemical spills, non-point runoff, channelization, impoundments, impediments, and siltation; and the Roanoke River and tributaries were added to VA's impaired waters list in 2002.

Indiana bat – The action area (279,077.2 acres) is within the Ibat Appalachian Mountain Recovery Unit (RU) (Service 2007) and encompasses 52,064 acres in VA and 184,222.2 acres in WV. Approximately 42,791 acres of the action area in VA fall outside of the Appalachian Mountain RU. The Appalachian Mountain RU covers 8,762,586 acres in VA and 15,506,210 acres in WV. The action area is within 0.6% of the Appalachian Mountain RU in VA and 1.2% in WV. The construction ROW is approximately 303.5 miles in WV and VA. The action area contains 6 categories of Ibat habitat: suitable unoccupied summer habitat in VA and WV; known use summer habitat in WV inknown use summer habitat in VA and WV; known or presumed occupied hibernacula in VA and WV; unknown use spring staging/fall swarming habitat in VA and WV.

Suitable unoccupied summer habitat is defined as forested/wooded habitats in an Ibat RU in which survey results per the level of effort outlined in the Range-wide Indiana bat Summer Survey Guidelines (Service 2017b) suggest probable absence during the summer months. Approximately 484.4 acres in VA and 764.2 acres in WV (94.26 miles in total) proposed for clearing are classified as suitable unoccupied summer habitat. This includes an estimated 2 miles of construction ROW in suitable unoccupied summer habitat that will be cleared for the Atlantic Coast Pipeline and Supply Header Project, Doddridge and Harrison Counties, WV, for which a non-jeopardy biological opinion was issued by the Service on October 16, 2017. Mist-net surveys were conducted at 338 net sites (1,953 complete and 426 partial net nights) within the action area in VA and WV during the 2015 and 2016 mist-net survey season and no Ibats were captured (FERC 2017b). Therefore, adverse effects to Ibats are not expected from clearing suitable unoccupied summer habitat.

Known use summer habitat is defined as areas within a 5-mile radius (home range) of a pregnant female or juvenile capture or within 2.5 miles of a known roost tree. None occurs in the VA portion of the action area (Table 3). Approximately 10.3 miles of construction ROW and 10.3 miles of ARs (a total of 228.4 acres) will be cleared within known use summer habitat in WV (Table 3) (FERC 2017b). Potential roost tree surveys were conducted in known use summer habitat in WV and documented 413 potential roost trees, of which 74 were potential primary trees and 339 were potential secondary trees (M. Stahl, EQT, email to T. Lennon, Service, November 8, 2017).

Table 3. Ibat habitat categories in VA and WV with adverse effects to Ibats (M. Stahl, EQT, email to T. Lennon, Service, November 8, 2017).

Walker Colors	Acres of Tree Removal		
Habitat Category	VA	wv	Total
Known use summer habitat	0	228.4ª	228.4
Unknown use summer habitat	78.6	1,807.9	1,886.5
Unknown use spring staging/fall swarming habitat	526.2	279.1	805.4
Known use spring staging/fall swarming habitat	138.8	171.3	310.1

^aThis value differs from the total in the BA (227.8 acres) (FERC 2017b). The difference is due to a review of updated aerial imagery that provided more accurate information (M. Stahl, EQT, email to T. Lennon, Service, November 8, 2017).

Unknown use summer habitat is defined as areas that contain suitable maternity habitat where presence/probable absence mist-net surveys were not conducted and FERC has elected to assume Ibat presence. Mist-net surveys were not conducted along approximately 128.9 miles (42.4%) of the construction ROW and 102.3 miles (50%) of ARs in WV and VA (ESI 2015a, 2015b). Approximately 97.5 miles of construction ROW (4.9 in VA and in 92.6 WV) and 56.4 miles of ARs (1.1 in VA and 55.3 miles in WV), a combined total of 1,886.5 acres (78.6 in VA and 1,807.9 in WV), will be cleared within unknown use summer habitat (Table 3). Potential roost tree surveys in unknown use summer habitat in WV documented 2,505 potential roost trees, of which 460 were potential primary trees and 2,045 were potential secondary trees. Potential roost

tree surveys in unknown use summer habitat in VA documented 47 potential roost trees, of which 10 were potential primary trees and 37 were potential secondary trees (M. Stahl, EQT, email to T. Lennon, Service, November 8, 2017). Approximately 2,686 acres in WV and 330 acres in VA were not surveyed for potential roost trees in unknown use summer habitat. As part of the potential roost tree surveys completed in known and unknown use summer habitat, a total of 321 primary (1 in VA and 320 in WV) and 1,319 secondary (50 in VA and 1,269 in WV) roosts were documented within close proximity, but outside of, the construction workspace.

Known or presumed occupied hibernacula are defined as suitable caves/mine portals which are occupied, or presumed to be occupied, by hibernating Ibats. Potential hibernacula surveys for Ibat were conducted within the action area in VA and WV between November 2014 and January 2017 (FERC 2017b). Initially, potential hibernacula surveys yielded a total of 134 suitable caves/mine portals within 5 miles of the action area. Of these, 86 were determined to be suitable based on field survey results or information provided by a team of karst specialists with demonstrated experience in karst and karst hydrogeology in southern WV and southwestern VA. Of those that are suitable, 16 are within the action area (M. Stahl, EQT, email to T. Lennon, Service, November 9, 2017). Mountain Valley has elected to assume that these 16 suitable caves/mine portals within the action area are occupied by Ibat. The action area is within 5 miles of 3 known Ibat hibernacula, 1 in VA and 2 in WV, and the most recent Ibat population estimates for each are summarized in Table 4. However, only 1 known hibernaculum (Tawney's Cave) is within the action area. In total, there is 1 known hibernaculum (Tawney's Cave) and 16 presumed occupied hibernacula within the action area in VA and WV. We do not anticipate adverse effects to bats in this habitat category based on the protections included in the Karst Mitigation Plan provided in the FEIS (FERC 2017a) and the information provided in the November 9, 2017, Potentially Suitable Hibernacula within the Action Area table (M. Stahl, EQT, email to T. Lennon, J. Stanhope, and S. Hoskin, Service, November 9, 2017).

Table 4. Known Ibat hibernacula within 5 miles of the action area (Powers et al. 2015; Service 2007; WVDNR 2013, 2015, 2016).

County, State	Hibernaculum Name	Approximate Distance (miles) to Project a	Hibernaculum Priority Number ^b	WNS Status (date)	Ibat Population Estimate (date)
Monroe, WV	Greenville Saltpeter Cave	2 (AR)	3	Confirmed ^c (2012)	16 (2012) 4 (2016)
Monroe, WV	Patton Cave	5 (AR)	4	Confirmed (2010)	2 (2013) 0 (2017)
Giles, VA	Tawney's Cave	0.04 (ROW)	4	Confirmed ^d	14 (2007)

^aROW - construction ROW; AR - access road.

(2009)

Unknown use spring staging/fall swarming habitat is defined as areas within a 5-mile radius of a potentially suitable hibernaculum that have not been surveyed and FERC has elected to assume

0 (2013)

^bPriority 1 is highest priority, and most essential to recovery of the species. Priority 4 is least important to recovery (Service 2007).

^cB.D. Sargent, WVDNR, email to T. Lennon, Service, October 19, 2017.

^dhttps://microbiology.usgs.gov/documents/Swezey Garrity 2011.pdf.

Ibat presence. There are 86 caves/mine portals that FERC is assuming are occupied hibernacula within 5 miles of the action area. Approximately 805.4 acres proposed for clearing are classified as unknown use spring staging/fall swarming habitat, 526.2 acres in VA and 279.1 in WV (Table 3).

Known use spring staging/fall swarming habitat is defined as areas within a 5-mile radius of priority 3 and 4 hibernacula or a 10-mile radius of priority 1 and 2 hibernacula. There are 3 known Ibat hibernacula within 5 miles of the action area (Table 4). Approximately 310.1 acres proposed for clearing are classified as known use spring staging/fall swarming habitat, 138.8 acres in VA and 171.3 acres in WV (Table 3).

In certain areas known and unknown use summer habitat and spring staging/fall swarming habitat overlap and determining the quantity of that overlap is difficult. Thus, for the purposes of this Opinion, total habitat removed will be classified as either summer habitat or spring staging/fall swarming habitat not both (Table 3).

The Service (2017a) estimates the 2017 hibernating Ibat population is 425 in VA and 1,076 in WV; these numbers indicate an 8.4% decline in VA and a 54.7% decline in WV since the 2015 census. WNS was first detected in VA and WV during the 2008/2009 winter hibernacula surveys (Stihler 2012, Powers et al. 2015). VA and WV hibernacula surveys indicate Ibat populations have decreased at least 95% since the discovery of WNS (https://www.fws.gov/midwest/endangered/mammals/inba/pdf/2017IBatPopEstimate5July2017.pdf).

Northern long-eared bat – This Opinion is for effects to the NLEB not addressed by the January 5, 2016 programmatic biological opinion implementing the final 4(d) rule (https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/BOnlebFinal4d.pdf).

There are 3 known hibernacula in the action area: Canoe and Tawney's Caves, Giles County, VA, and PS-WV3-Y-P1, Braxton County, WV. Hibernacula surveys documented 1 NLEB in Canoe Cave in 1982 and 1 NLEB in Tawney's Cave in 2011, 2009, 1990, and 1986 (R. Reynolds, VDGIF, email to S. Hoskin, Service, October 30, 2017). Harp net surveys captured 1 NLEB at PS-WV3-Y-P1 (FERC 2017b). Hibernacula surveys are not good indicators of total number of NLEBs hibernating because NLEB are found in small crevices or crack in the walls or ceiling, often only their noses and ears are visible, and they are easily overlooked (78 FR 61046-61080). While we acknowledge hibernacula surveys likely underestimate winter abundance, we do not have an estimate of how the counts might correlate to the number of bats hibernating in that particular hibernaculum.

Mountain Valley has committed to providing a site-specific plan to the Service for review and written approval prior to initiating any construction activities within 0.5 mile of portal PS-WV3-Y-1 (M. Stahl, EQT, email to P. Friedman, FERC, and J. Stanhope, Service, November 17, 2017). The site-specific plan will ensure no alteration, physical or otherwise, of the portal's entrance or environment that will adversely affect its use by federally listed bats, including those hibernating within the portal. In the event that the Service determines the site-specific plan cannot ensure that construction activities are not likely to adversely affect federally listed bats, Mountain Valley will consider a realignment of the pipeline within the range of possible

alternatives such that all activities are at least 0.5 mile away from portal PS-WV3-Y-1. In certain instances, conducting some activities within 0.5 mile of portal PS-WV3-Y-1 may not adversely affect federally listed bats; however, Mountain Valley will receive Service review and written approval of all activities within 0.5 mile of portal PS-WV3-Y-1 prior to initiating such activities. Based on this AMM, we do not anticipate adverse effects to NLEB from impacts to this hibernacula. Effects to the NLEB from tree removal within 0.25 mile of PS-WV3-Y-1 are analyzed below.

Mountain Valley conducted a hydrologic and geologic analysis of the risk of the pipeline to Canoe and Tawney's Caves. In summary, they determined that the catchment area for Canoe Cave is topographically higher than and upgradient of the pipeline and the pipeline is approximately 900 ft from the nearest entrance and 800 ft from the nearest mapped passage. Similarly, the pipeline will be on an opposite ridge west of Tawney's Cave, topographically higher, and below the known cave passages (FERC 2017b).

WNS was first detected in VA and WV during the 2008/2009 winter hibernacula surveys (Stihler 2012, Powers et al. 2015). Since that time, WNS has been confirmed in all areas of VA and WV where NLEB hibernacula are known to occur (Stihler 2012, Powers et al. 2015).

EFFECTS OF THE ACTION

Direct effects are the direct or immediate effects of the project on the species, its habitat, or designated/proposed critical habitat. Indirect effects are defined as those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02). An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. Direct and indirect effects of the proposed action along with the effects of interrelated/interdependent activities are all considered together as the "effects of the action."

To standardize the effects analysis, the proposed action was divided into discrete actions described as subactivities. Defining subactivities allows for easier interpretation and consideration of complex activities. The project subactivities are defined in the species effects tables (Appendix B Tables 1-5).

Small whorled pogonia – The potential effects of the proposed action are described in Appendix B Table 1. The project subactivities unlikely to result in any impacts to SWP are described in Appendix B Table 1; no effect (NE) subactivities. For those subactivities of the proposed action that are determined to result in NE to SWP, there will be no further discussion in this Opinion.

The project subactivities that may affect, but are not likely to adversely affect (NLAA), the SWP are described in Appendix B Table 1; NLAA subactivities. For those subactivities of the proposed action that are determined NLAA SWP, there will be no further discussion in this Opinion.

There are other subactivities of the project that are likely to adversely affect (LAA) SWP

(Appendix B Table 1; LAA subactivities). For some components of the proposed action that may affect SWP, AMMs have been incorporated to ameliorate those effects and those are also noted in Appendix B Table 1. These subactivities are LAA SWP by physically impacting individual plants and/or altering and degrading SWP habitat.

In the construction ROW, the proposed vehicle operation, foot traffic, and vegetation clearing subactivities will crush and kill all SWP stems. SWP depend on mycorrhizal fungi for nutrition, growth, and survival. We do not anticipate SWP re-establishing in the permanent ROW post-construction due to removal of trees and mycorrhizal fungi that require host trees (e.g., oaks [Quercus spp.], hickories [Carya spp.], and beech [Fagus grandifolia]) (McCormick et al. 2015), both of which are essential components of SWP habitat.

SWP downslope of the construction ROW will be affected because multiple subactivities occur in the SWP's upslope drainage area (i.e., the SWP's watershed includes the construction ROW). Ground disturbing and vegetation clearing/management subactivities will result in soil compaction and vegetation removal in the construction ROW. The impacts to the upslope drainage area are anticipated to increase surface water flow and downslope erosion rates and alter surface and subsurface hydrology in the watershed, causing changes in evapotranspiration rates and soil moisture downslope of the construction ROW near the SWP. Some of these subactivities will also redistribute and loosen soils in the construction ROW, which will cause sedimentation downslope towards the SWP. These stressors will affect both the mycorrhizal fungi relied on by SWP and individual SWP, decreasing SWP fitness and reproductive success and possibly killing individual plants. Depending on the degree of surface water runoff and sedimentation, SWP habitat is anticipated to be degraded and individual stems will be buried. Blasting will also loosen large rocks, which is anticipated to fall and crush SWP.

The vegetation clearing, management, and trimming subactivities that remove and thin mid- and over-story canopy trees will alter SWP habitat in the areas downslope of the construction ROW by increasing direct and ambient light. Increased light availability may increase SWP flowering and population size (Dibble et al. 1997; Dibble 2000a, 2000b; Brumback et al. 2011; McCormick et al. 2015). However, increased light availability above an unknown threshold is anticipated to degrade SWP habitat by increasing soil temperature, drying soils, and changing evapotranspiration rates, which will cause decreased fitness and reproductive success and possibly death of individual stems. Increased light levels will also facilitate germination and development of other herbaceous and/or woody species, including invasive species, which could compete with SWP. Significant changes to the sunlight regime and potential competition due to increased vegetation are anticipated to cause decreased fitness and reproductive success and possibly death of SWP individuals.

AMMs (e.g., FERC Plan [FERC 2013a], Restoration and Rehabilitation Plan [Mountain Valley 2017]) are anticipated to reduce surface water runoff and sedimentation, on average 79% sediment containment, but not to insignificant levels (ESI 2017). Methods described in the Exotic and Invasive Species Control Plan (Mountain Valley 2016) will minimize effects due to invasive species in the construction ROW, but will not address herbaceous and invasive vegetation growing outside of the construction ROW and near the SWP stems due to increased light. In the Restoration and Rehabilitation Plan (Mountain Valley 2017), Mountain Valley

proposes to apply woody seed mixes to the temporary construction ROW. Approximately 25-35 years after seed application, canopy trees (e.g., eastern white pine [Pinus strobus]) are expected to provide some mid-story shade (Burns and Honkala 1990), which may contribute to partially restoring the SWP habitat in the areas downslope of the construction ROW. Mountain Valley has committed to baseline (e.g., before and during construction) and 10 years of post-construction monitoring, conducted annually, to assess SWP colony status and potential threats to continued success (M. Stahl, EQT, letter to J. Stanhope, Service, November 8, 2017). Monitoring assessments before, during, and post-construction will include measurements of light, soil moisture, and temperature. The applicant will develop the monitoring plan in coordination with the WVFO and WVDNR and submit it to them for review and approval. The AMMs will minimize some effects (Appendix B Table 1); however we expect that a few SWP stems downslope of the construction ROW will have decreased fitness and reproductive success and/or will be killed.

<u>Virginia spiraea</u> – The potential effects of the proposed action are described in Appendix B Table 2. The project subactivities unlikely to result in any impacts to VASP are described in Appendix B Table 2; NE subactivities. For those subactivities of the proposed action that are determined to result in NE to VASP, there will be no further discussion in this Opinion.

The project subactivities that may affect, but are NLAA, the VASP are described in Appendix B Table 2; NLAA subactivities. For those subactivities of the proposed action that are determined NLAA VASP, there will be no further discussion in this Opinion.

There are other subactivities of the project that are LAA VASP (Appendix B Table 2; LAA subactivities). For some components of the proposed action that may affect VASP, AMMs have been incorporated to ameliorate those effects and those are also noted in Appendix B Table 2. These subactivities are LAA VASP by physically impacting individual plants and/or altering or degrading its habitat.

Subactivities related to vehicle operation, vegetation and shrub/tree clearing, AR grading and graveling, and stream and wetland crossings (for the construction ROW, ARs, and ATWS) will kill VASP stems, bury seeds, and alter/degrade VASP habitat (Appendix B Table 2). Vehicle operation and vegetation and shrub/tree clearing will cause individual VASP to experience decreased fitness (e.g., from competition with introduced invasive species), decreased reproductive success (e.g., from physical damage, competition with introduced invasive species, habitat disturbance), and crushing or death (e.g., from cutting, digging up, burying, soil compaction). Stream and wetland crossings will cause soil compaction and sedimentation and hydrological changes that will degrade and alter habitat. As a result, plants and seeds will be buried and reestablishment of VASP in the construction ROW, ARs, or ATWS post-construction is not expected. Placement of fill and gravel for ARs will cause habitat loss in all permanently maintained areas, preventing reestablishment of VASP post-construction. The combined effects from these subactivities will result in the permanent removal of all VASP plants, seeds, and habitat in the 0.05 acre.

AMMs have been included in the proposed action that will minimize the extent and significance of adverse effects on VASP. These AMMs include: implementing sediment and erosion control

measures during and after construction; ensuring restoration of pre-existing topographic contours after any ground disturbance; restoring native vegetation (where possible); developing plans and procedures for invasive species management; expediting construction within any waterbody, effectively reducing disturbance to the streambed and adjacent soils and the quantity of suspended sediments; prohibiting construction equipment, vehicles, hazardous materials, chemicals, fuels, lubricating oils, and petroleum products from being parked, stored, or serviced within a 100 ft radius of any wetland or waterbody; and avoiding the use of herbicides and pesticides to maintain any portion of the construction ROW. While these AMMs may initially minimize the extent and significance of adverse effects on VASP, effects from the subactivities described above will result in the permanent removal of all plants and habitat in the 0.05 acre.

If VASP is found within the construction ROW, ARs, or ATWS, MVP has committed to relocate individuals outside of the affected area in coordination with the Service. However, the sequencing of construction and the time of year when VASP surveys can effectively be conducted make it unlikely that plants will be found and relocated prior to construction. Therefore, the analyses in this Opinion do not consider such relocations.

Roanoke logperch – The potential effects of the proposed action are described in Appendix B Table 3. The project subactivities unlikely to result in any impacts to RLP are described in Appendix B Table 3; NE subactivities. For those subactivities of the proposed action that are determined to result in NE to RLP, there will be no further discussion in this Opinion.

The project subactivities that may affect, but are NLAA, the RLP are described in Appendix B Table 3; NLAA subactivities. For those subactivities of the proposed action that are determined NLAA RLP, there will be no further discussion in this Opinion.

There are other subactivities of the project that are LAA RLP (Appendix B Table 3; LAA subactivities). For some components of the proposed action that are anticipated to affect RLP, AMMs have been incorporated to ameliorate those effects and those are also noted in Appendix B Table 3. These subactivities are anticipated to result in a loss of prey items and/or an ability to see the prey, temporarily remove habitat, entrain RLP, or result in habitat degradation and loss due to vegetation removal, pump around, placement of cofferdams, and/or altering water quality.

Immediately prior to instream work at each crossing RLP will be removed and released approximately 50 ft downstream of the construction area. Once cofferdams are in place, fish depletion surveys will be conducted within the area isolated by cofferdams. Relocating RLP will minimize effects from instream work (e.g., stream diversion, cofferdam placement) that occur immediately after fish relocation. The fish removal/relocation portion of the action will be conducted by individuals with state (VDGIF) permits that are issued as part of the Cooperative Agreement for Management of Endangered Species between the Service and VDGIF, thus no additional effects analysis is required. If RLP remain in the crossing area after removal/relocation efforts we anticipate they will be entrained. Because we anticipate that the majority of RLP will be removed from the area, we expect only a few individuals will be entrained.

Instream structure placement and removal will result in temporary loss of habitat and will create

a sediment plume that will increase sediment/turbidity downstream, to include the areas where relocated RLP are released. RLP are sight feeders and flip rocks to expose invertebrates (Rosenberger and Angermeier 2002). Sediment deposited on the waterbody bottom will interfere with the ability of RLP to feed (Robertson et al. 2006). Increased sedimentation is anticipated to result in a loss of prey items and/or an ability to see the prey. We expect all RLP to move to areas with cleaner substrate until the structures are removed and turbidity returns to baseline levels. Changing foraging areas will cause decreased fitness to the majority of RLP that moved from the crossing areas. After removal of structures and a return to baseline turbidity conditions, we anticipate that RLP will resume use of crossings.

Streambank vegetation clearing/trimming and trenching during O&M subactivities will alter RLP habitat. Decreased riparian vegetation is expected to increase light and water temperature at the crossings, and increase sedimentation and turbidity. Changes in light regime and water temperature may affect the RLP prey base and make the habitat less suitable for RLP. We expect all RLP will move from cleared areas to areas with vegetative cover. Removal of vegetative cover is permanent along a 10 ft corridor of the ROW centered over the pipeline and we do not expect RLP to return to these areas. As a result of this temporary and permanent habitat loss, we anticipate the majority of RLP will experience a decrease in individual fitness. We expect increased sedimentation and turbidity will make the waterbodies unusable to RLP for foraging in the immediate vicinity of the crossings. Increased sedimentation is anticipated to result in a loss of prey items and/or an ability to see the prey. However, prey items are anticipated to recolonize the areas within a few days to months (Brooks and Boulton 1991, Matthaei and Townsend 2000) after sedimentation and turbidity have returned to baseline levels. Increased sedimentation and turbidity are also expected to temporarily lower dissolved oxygen (DO) levels at the stream crossings and for the extent of the sediment plume. Darters and shiners in the Roanoke River exhibited sensitivity to abrupt changes in DO levels (Matthews and Styron 1978). We expect RLP to move to areas with cleaner substrate/less turbid water and higher DO to allow for foraging. After a return to baseline turbidity conditions, we anticipate that RLP will resume use of crossings. As a result of this habitat shift, we anticipate the majority of RLP will experience decrease in fitness.

The duration of effects depend on the AMMs (e.g., TOYRs, fish removal and relocation, FERC Plan [FERC 2013a], and Restoration and Rehabilitation Plan [Mountain Valley 2017]), which are anticipated to reduce surface water runoff and sedimentation, on average 79% sediment containment, but not to insignificant levels (ESI 2017). The Restoration and Rehabilitation Plan states that herbaceous and woody seed mixes native to the area will be applied to the temporary construction ROW. Herbaceous seeds are assumed to take approximately 4 weeks to establish, 6 months to develop, and 1 year to become a maturing crop. A minimum of 6 tree species (bareroot saplings) and 4 shrub species will be planted at each stream crossing. We expect the effects from sedimentation and turbidity will last from 0.5-1 year. The effects of removal of streambank vegetation on sedimentation rates are expected to continue for 3-5 years as streamside vegetation develops to provide streambank stabilization (FERC 2017b). We expect effects from increased light to be minimized in 3-5 years. While implementation of AMMs is expected to significantly reduce the likelihood of mortality or injury and reduce adverse effects from habitat alteration, all impacts to RLP will not be avoided or minimized.

<u>Indiana bat</u> – The potential effects of the proposed action are described in Appendix B Table 4. We did not reach a NE determination for Ibat for any of the subactivities.

The project subactivities that may affect, but are NLAA, the Ibat are described in Appendix B Table 4; NLAA subactivities. For those subactivities of the proposed action that are determined NLAA Ibat, there will be no further discussion in this Opinion.

There are other subactivities of the project that are LAA Ibat (Appendix B Table 4; LAA subactivities). For some components of the proposed action that are likely to affect Ibats, AMMs have been incorporated to ameliorate those effects and those are also noted in Appendix B Table 4. These subactivities, all of which involve tree removal, will temporarily or permanently remove a total of 3,230.4 acres of suitable habitat in the Ibat Appalachian Mountain RU within 4 habitat categories. We expect the TOYRs (Table 5) to limit the magnitude and duration of adverse effects to Ibats from these subactivities.

Table 5. Tree clearing by Ibat habitat category.

Habitat Category	TOYRs	Season/Months when Tree Clearing will Occur
Known use summer habitat	Trees will be removed between November 15 and March 31, when Ibats will not be present	winter
Unknown use summer habitat	Trees will not be removed between June 1 and July 31, when young cannot fly	winter, April, May, August, September
Unknown use spring staging/fall swarming habitat	Trees will be removed between November 15 and March 31, and potentially in April, May, August, and September	winter, April, May, August, September
Known use spring staging/fall swarming habitat	Trees will be removed between November 15 and March 31, when Ibats will not be present	winter

Known and unknown use summer habitat – We expect effects to Ibats from tree clearing will occur in known and unknown use summer habitat. Approximately 2,114.9 acres (107.1 miles of construction ROW and 76.5 miles of AR) of known use summer habitat (228.4 acres) and unknown use summer habitat (1,886.5 acres) in VA and WV will be cleared. We anticipate tree clearing will impact current Ibat home ranges; however, not all 2,114.9 acres are expected to be occupied. Ibat home ranges vary in size from 205.1-827.8 acres (Menzel et al. 2005, Sparks et al. 2005, Watrous et al. 2006, Kniowski and Gehrt 2014, Jachowski et al. 2014). The 2,114.9 acres of known and unknown use summer habitat to be cleared represents 3-12 home ranges that will be removed if tree clearing were to occur in large blocks. However, the proposed action is linear and is not anticipated to remove entire potential home ranges rather, sections of potential home ranges. Worst case scenario is potential home ranges will be centered along the 183.6 miles of the construction ROW/ARs every 5 miles, affecting 22 potential home ranges. This is not a reasonable scenario for several reasons. First, Ibat home ranges are not linear, so it is likely that the 125-ft wide construction ROW will only displace Ibats from a small portion of their home range, not their entire home range. Second, forest cover in the counties in action area is 55-86% (https://www.fia.fs.fed.us/tools-data/), which means that if bats are displaced from their habitat there will likely be alternative habitat available within the action area.

Tree removal in known use summer habitat (outside of the active season) – Tree removal in known use summer habitat during the winter is likely to alter roosting and travel habitat. This

will result in displaced Ibats expending additional energy seeking out alternate roosts and travel corridors when they return the following season.

Roost trees, although ephemeral in nature, may be occupied by a colony for a number of years until they are no longer available (i.e., the roost has naturally fallen to the ground) or suitable (i.e., the bark has completely fallen off of a snag). Although loss of a roost (e.g., blowdown, bark loss) is a natural phenomenon that Ibats have adapted to, the loss of multiple roosts likely stresses individual bats, affects reproductive success, and impacts the social structure of a colony (Service 2007). Removal of an Ibat primary roost tree (that is still suitable for roosting) in winter is expected to result in disruption of maternity colony cohesion and temporary or permanent colony fragmentation. Smaller colonies may be expected to provide less thermoregulatory benefits for adults and non-volant pups in cool spring temperatures. Also, removal of a primary roost is expected to result in increased energy expenditures for affected bats. Female bats have tight energy budgets, and in the spring need to have sufficient energy to keep warm, forage, and sustain pregnancies. Increased flight distances or smaller colonies are expected to result in some percentage of bats having reduced pregnancy success and/or reduced pup survival. Removal of multiple alternate roost trees in winter is expected to result in similar effects.

One area of known use summer habitat in WV will be crossed by the proposed action. Rangewide, the Service (2007) estimates that less than 10% of existing Ibat maternity colonies have been detected. Therefore, some risk exists that primary roosts or multiple alternate roosts will be removed. Tree removal in known use summer habitat is likely to limit roosting options or necessitate roost tree switching when Ibats return the following season. Because maternity roost trees are ephemeral, Ibats have evolved to relocate roosts at the beginning of the season if needed. Because trees will be removed outside of the active season when the roost trees are not in use, the stress on an Ibat is decreased. Ibats have primary and secondary roosts and will shift between sites during a season (Humphrey et al. 1977, Gardner et al. 1991, Callahan 1993, Kurta et al. 1993, Romme et al. 1995). There is substantial roosting habitat remaining in the action area, and although we expect a small number of individuals will experience death or injury from loss of roost trees, we expect the majority of Ibats will relocate roosting areas with minimal effects to individuals.

We anticipate some areas that will be cleared during the winter are currently used as a travel corridor between hibernacula and roost trees and that effects will be greatest to pregnant females that expend additional energy to seek alternate travel corridors as a result of tree clearing. If pregnant females dramatically alter their travel corridor they will divert their energetic demands to seek new corridors and will likely give birth to smaller pups, which could decrease pup survival. Ibats consistently follow tree-lined paths rather than cross open areas (Murray and Kurta 2004) and, depending on the amount of forested habitat in the surrounding area, tree removal may fragment the habitat such that Ibats traveling through the area will be more vulnerable to predation, resulting in injury or death.

In summary, we anticipate that effects of tree removal in known use summer habitat (outside of the active season) will result in predation, reduced pregnancy success, and/or reduced pup survival for a small percentage of Ibats. These effects will be greatest the first season after tree removal has occurred. We expect the same types and extent of effects will occur from tree

removal outside of the active season in unknown use summer habitat as those described above for known use summer habitat.

Tree removal in unknown use summer habitat (during the active season) – Tree removal in unknown use summer habitat during the active season (April, May, August, and September) is expected to affect Ibats using undocumented occupied roosts and Ibat foraging areas. AMMs (most tree removal will occur during winter; trees will not be removed between June 1 and July 31 when young cannot fly) will minimize effects from loss of undocumented occupied roosts. If an occupied roost tree is cut down, bats will stay in the tree and be injured or killed (non-volant pups) or will fly out (adults or volant pups) (e.g., Belwood 2002) and be more susceptible to predation (e.g., by raptors). The risk of injury or death is greater for adults during cooler weather when bats periodically enter torpor and will be unable to arouse quickly enough to respond if the tree they are roosting in is felled. The likelihood of potential roost trees containing large number of bats is greatest during pregnancy and lactation (April-July) (Barclay and Kurta 2007). Some tree removal will occur (April, May) when Ibat colonies are most concentrated (largest colony counts in fewer trees) and young bats occupy roosts. We anticipate a small percentage of Ibats (adults and volant young) present within unknown use summer habitat will be injured or killed from the felling of undocumented occupied roost trees.

The forested habitat within the action area provides suitable foraging habitat for Ibats. Removal of foraging habitat when bats are present is expected to disrupt bat foraging patterns. During tree clearing, some individual bats may avoid crossing the cleared area. Bats will expend additional time and energy searching for new foraging areas. Due to the availability of suitable foraging opportunities in the surrounding landscape, bats will have little difficulty locating new foraging areas. Bats crossing through cleared areas will have an increased risk of mortality from predation. We anticipate a small percentage of Ibats present within unknown use summer habitat will experience reduced pregnancy success and/or reduced pup survival associated with increased energy expenditure from the loss of foraging habitat, and injury or death as a result of predation.

Known and unknown use spring staging/fall swarming habitat -

Tree removal in known use spring staging/fall swarming habitat (outside of the active season) – Tree removal in known use spring staging/fall swarming habitat during the winter will remove foraging and roosting areas for a concentrated number of Ibats in an abbreviated season (i.e., spring emergence or fall swarming). Bats use the area around hibernacula to build fat reserves prior to hibernation and to socialize and mate in the fall. In the spring, bats spend a few hours or days around hibernacula or migrate immediately to summer habitat. Clearing trees around hibernacula will permanently decrease foraging and roosting habitat, requiring bats to spend more time searching for food, which could result in bats entering hibernation with less fat reserves resulting in decreased overwinter survival or poorer spring body condition or result in less time on social interactions, which could result in decreased breeding success. The spring emergence period (April through May) is also a sensitive time period for bats because WNS affected bats that do not die during hibernation may be weakened by the effects of the disease and may have reduced fat reserves and damage to wing membranes. WNS affected bats may have difficulty flying and may be less likely to survive long-distance migrations to summer areas. They may also emerge from hibernation sites earlier and may be more likely to stay closer

to the hibernation site for a longer time period following spring emergence. We anticipate that effects will be greatest to WNS affected bats emerging in the spring the first season after tree removal has occurred.

We do not anticipate Ibats will be present during tree removal activities in known use spring staging/fall swarming habitat and no impacts are anticipated to Ibat hibernacula or hibernating bats. However, tree clearing will result in temporary or permanent habitat loss, which we expect will cause decreased breeding success and survival (of WNS affected bats) of a small percentage of Ibats.

We expect the same types and extent of effects will occur from tree removal outside of the active season in unknown use spring staging/fall swarming habitat as those described above for known use spring staging/fall swarming habitat.

Tree removal in unknown use spring staging/fall swarming habitat (during the active season) – Tree removal in unknown use spring staging/fall swarming habitat may occur during the active season, which will disrupt bats engaging in fall swarming, spring staging, and roosting behavior. Bats could be killed, injured, or forced to flee if an occupied roost tree is cut. During spring staging/fall swarming, bats often roost individually rather than in groups, typically have numerous suitable day-roosts available, and frequently roost-switch. Therefore, there is less potential to affect a tree being used by multiple bats or a large bat colony, and effects are likely restricted to smaller groups of bats or individual bats. We expect the same types and extent of effects will occur from tree removal during the active season in unknown use spring staging/fall swarming habitat as those described for unknown use summer habitat above.

To ameliorate effects to Ibats within unknown use spring staging/fall swarming habitat, a 121-acre property was acquired in Braxton County, WV. The parcel contains mature, upland deciduous forest dominated by mostly oak, hickory, and red maple (*Acer rubrum*). There are numerous travel/foraging corridors and snags for bats throughout the property. Approximately 860 ft of the construction ROW crosses the eastern portion of the property. After project completion, approximately 106 acres will remain as interior forest and will be maintained as such in perpetuity. Protection of this property may provide habitat, immediately adjacent to the project area, for bats displaced during construction activities. Due to the property's proximity to the construction ROW, displaced bats will only need to travel a short distance to locate alternative spring staging/fall swarming habitat. It is anticipated that the availability and protection of this property may reduce adverse effects on returning bats; however, bats have not been detected on this property as of the date of this Opinion.

Northern long-eared bat – The potential effects of the proposed action are described in Appendix B Table 5. We did not reach a NE determination for NLEB for any of the subactivities.

The project subactivities that may affect, but are NLAA, the NLEB are described in Appendix B Table 5; NLAA subactivities. For those subactivities of the proposed action that are determined NLAA NLEB, there will be no further discussion in this Opinion.

There are several project subactivities that may affect (MA) the NLEB. Some of these have

effects that have been previously addressed in the Service's January 5, 2016 programmatic biological opinion implementing the final 4(d) rule (https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/BOnlebFinal4d.pdf) and are described in Appendix B Table 5; MA subactivities. For those subactivities, no detailed effects analysis discussion is required.

There are other subactivities of the project that have not been addressed in the Service's January 5, 2016 programmatic biological opinion implementing the final 4(d) rule (Appendix B Table 5; LAA subactivities). Each of these subactivities involves tree clearing within 0.25 mile of hibernacula: Canoe Cave, Tawney's Cave, and PS-WV3-Y-P1. For some components of the proposed action that are LAA NLEB, AMMs have been incorporated to ameliorate those effects and those are also noted in Appendix B Table 5.

For context, 542.5 acres of tree removal is proposed within 5 miles (anticipated spring staging/fall swarming range) of Canoe Cave, Tawney's Cave, and PS-WV3-Y-P1 (Table 6).

Table 6. Tree removal within 5 miles of NLEB hibernacula^a.

	Acres of Tree Removal		
Feature	Within 5 miles	Within 0.25 mile	
Canoe Cave	72.1 ^b	0.5	
Overlap area within both Canoe and Tawney's Caves	97.4	N/A	
Tawney's Cave	135.9 ^b	2.4	
PS-WV3-Y-P1	237.1	13.9	
Total	542.5	16.8	

^aM. Stahl, EQT, email to S. Hoskin, Service, October 30, 2017.

Tree clearing will impact foraging and roosting areas for a concentrated number of bats in an abbreviated season (spring emergence or fall swarming). Bats use the area around hibernacula to build fat reserves prior to hibernation and to socialize and mate in the fall. In the spring, bats may spend a few hours or days around hibernacula or migrate immediately to summer habitat. A TOYR (trees will be removed between November 15 and March 31, when NLEBs will not be present) will be implemented within 0.25 mile of the hibernacula.

Clearing trees around hibernacula will permanently decrease foraging and roosting habitat, requiring bats to spend more time searching for food, which could result in bats entering hibernation with less fat reserves resulting in decreased overwinter survival or poorer spring body condition or result in less time on social interactions, which could result in decreased survival or breeding success of a small percentage of NLEBs. The spring emergence period (April through May) is also a sensitive time period for bats because WNS affected bats that do not die during hibernation may be weakened by the effects of the disease and may have reduced fat reserves and damage to wing membranes. WNS affected bats may have difficulty flying and

^bMinus 97.4 acres of overlap within 5 miles of both Canoe and Tawney's Caves.

may be less likely to survive if their summer areas require a long-distance migration. They may also emerge from hibernation sites earlier and may be more likely to stay closer to the hibernation site for a longer time period following spring emergence which could result in decreased survival or breeding success of a small percentage of NLEBs. We anticipate that effects will be greatest to bats emerging in the spring the first season after tree removal has occurred, especially those affected by WNS. NLEBs not affected by WNS are expected to acclimate to this change and shift to alternative habitat.

In addition, NLEBs may have summer maternity colonies around Canoe Cave, Tawney's Cave, or PS-WV3-Y-P1. Individual NLEB home ranges have been minimally estimated at 148.8-173.7 acres (Owen et al. 2003, Lacki et al. 2009). The proposed clearing of 542.5 acres represents a loss of up to 3 individual home ranges. However, the proposed action is linear and therefore tree clearing is not anticipated to remove an entire potential home range, rather sections of potential home ranges. Depending on the resulting level of habitat fragmentation, tree clearing will make the remaining forest less suitable for future roosting or foraging. We expect NLEB will avoid the permanently cleared areas and start exploring undisturbed areas for future roost sites. This will cause a small percentage of NLEBs to expend more energy searching for alternative roosting or foraging sites, which will delay their ability to gain post-hibernation weight resulting in decreased survivorship.

To ameliorate effects to NLEB within known use spring staging/fall swarming habitat, a 121-acre property was acquired in Braxton County, WV. Five NLEBs were captured 4 miles north of the property and 1 NLEB was captured about 3 miles south of the property. The parcel contains mature, upland deciduous forest dominated by mostly oak, hickory, and red maple. There are numerous travel/foraging corridors and snags for bats throughout the property. Approximately 860 ft of the construction ROW crosses the eastern portion of the property. After project completion, approximately 106 acres will remain as interior forest and will be maintained as such in perpetuity. Protection of this property may provide habitat, immediately adjacent to the project area, for bats displaced during construction activities. Due to the property's proximity to the construction ROW, displaced bats will only need to travel a short distance to locate alternative spring staging/fall swarming habitat. It is anticipated that the availability and protection of this property may reduce adverse effects on returning bats; however, bats have not been detected on this property as of the date of this Opinion.

The majority of effects described above have been previously addressed in the Service's January 5, 2016 programmatic biological opinion implementing the final 4(d) rule and any incidental take that may occur further than 0.25 mile from a hibernacula is not prohibited under the final 4(d) rule (50 CFR §17.40(o)). However, any anticipated take of NLEB that may occur within 0.25 mile of a hibernaculum requires separate incidental take authorization (see Incidental Take Statement).

CUMULATIVE EFFECTS

Cumulative effects are those "effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area" considered in this Opinion (50 CFR 402.02).

<u>Small whorled pogonia</u> – The Service is not aware of any future state, tribal, local, or private actions that are reasonably certain to occur within the action area at this time; therefore, no cumulative effects are anticipated.

<u>Virginia spiraea</u> – The Service is not aware of any future state, tribal, local, or private actions that are reasonably certain to occur within the action area at this time; therefore, no cumulative effects are anticipated.

Roanoke logperch — While the Service is not aware of any specific proposed projects scheduled to occur immediately within the action area, RLP is likely currently being affected by a variety of actions and activities such as habitat alteration, as described in the Environmental Baseline section above. RLP habitat destruction, modification, and fragmentation from chemical spills, non-point runoff, channelization, impoundments, impediments, and siltation is expected to continue to occur, resulting in declines in RLP abundance.

<u>Indiana bat</u> – The Service is not aware of any future state, tribal, local, or private actions that are reasonably certain to occur within the action area at this time; therefore, no cumulative effects are anticipated.

Northern long-eared bat – The Service is not aware of any future state, tribal, local, or private actions that are reasonably certain to occur within the action area at this time; therefore, no cumulative effects are anticipated.

JEOPARDY ANALYSIS

Section 7(a)(2) of the ESA requires that federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

Jeopardy Analysis Framework

"Jeopardize the continued existence of' means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). The following analysis relies on 4 components: (1) Status of the Species, (2) Environmental Baseline, (3) Effects of the Action, and (4) Cumulative Effects. The jeopardy analysis in this Opinion emphasizes the rangewide survival and recovery needs of the listed species and the role of the action area in providing for those needs. It is within this context that we evaluate the significance of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Analysis for Jeopardy

Small whorled pogonia

Impacts to Individuals – The proposed action includes vehicle operation, foot traffic, herbaceous vegetation and ground cover clearing, tree and shrub clearing, tree side trimming, grading, trenching, blasting, regrading/stabilization, vegetation management, and permanent ROW repair/regrading. As discussed in the Effects of the Action, potential effects of the action include effects to SWP present within the action area year-round. All individual SWP in the construction ROW are anticipated to be crushed and killed by vehicles, foot traffic, and vegetation clearing subactivities. For SWP downslope of the construction ROW, effects include decreased fitness and reproductive success and death of individual SWP due to degradation and loss of habitat caused by altered hydrology, changes in soil moisture, downslope erosion, sedimentation, changes to sunlight regime, competition, and crushing by rocks from blasting. The AMMs (e.g., FERC Plan [FERC 2013a], Restoration and Rehabilitation Plan [Mountain Valley 2017], Exotic and Invasive Species Control Plan [Mountain Valley 2016]) are anticipated to reduce effects from surface water runoff and minimize competition from invasive plants. In summary, there will be impacts to individual SWP in their reproductive success and survival rates.

Impacts to Populations – As we have concluded that individual SWP are likely to be killed or experience some reductions in their annual or lifetime reproductive success, we need to assess the aggregated consequences of the anticipated losses of the exposed individuals on the population to which these individuals belong.

One colony of SWP is assumed to be present in the action area and represents 1 population. We expect that multiple project subactivities (Appendix B Table 1) will permanently affect this SWP population because of permanent habitat loss and degradation and long-term changes in sunlight regime. We anticipate that the long-term viability of the SWP population will be reduced significantly due to decreased fitness, reproductive success, and death of individual SWP and the population will have a lower number of SWP individuals permanently, but will likely not be extirpated. The affected population represents 11% of SWP populations in WV.

Impacts to Species – As we have concluded that the population of SWP is likely to experience reductions in its fitness, we need to assess the aggregated consequences of the anticipated losses and reductions in fitness of the exposed population on the species as a whole.

To understand the consequences of population-level effects at the species level, we need to understand the RND needs of the species. As discussed in the Status of the Species, the SWP conservation needs include "resolving data gaps and assessing the conservation potential for populations on private lands" (Service 2008). Prior to this project, the rangewide status of the species was considered stable. To meet the recovery objectives of SWP, the following must be met: 1) a minimum of 61 sites (or populations) (75% of number of sites known in 1992) must be permanently protected and distributed proportionately among the 3 geographic centers and the outliers; 2) these sites must represent at least 75% of the known self-sustaining, viable populations as determined at the time of reclassification, including a total of 20 sites having 80 stems or more (self-sustaining, viable population defined as showing a geometric mean of 20 emergent stems, over a 10-year period); 3) establishment of appropriate habitat management programs for occupied SWP habitat or protection of sufficient amount of unoccupied habitat adjacent to existing populations (Service 1992). As of 2007, 150 extant SWP populations were documented rangewide; however few SWP populations are monitored annually and some

populations may only be visited once every 5 to 10 years, therefore it is difficult to fully assess population viability. Since 2007, 6 additional populations have been found in WV. With the addition of this population assumed to be present in the action area, the total rangewide is approximately 157 SWP populations.

The proposed action is anticipated to cause a permanent reduction in fitness of 1 population, affecting 0.6% of SWP populations rangewide. Due to the presence of 157 populations throughout its range, the reduced fitness of 1 population is not anticipated to change the status of the species.

Virginia spiraea

Impacts to Individuals – The proposed action includes vehicle operation, vegetation and shrub/tree clearing, AR grading and graveling, and stream and wetland crossings subactivities. As discussed in the Effects of the Action, potential effects of the action include effects to VASP present within the action area year-round. Effects generally include decreased fitness, decreased reproductive success, or death of individual VASP due to physical damage, competition with introduced invasive species, habitat disturbance, crushing, cutting, digging up, burying, or soil compaction. Additionally, these activities are expected to permanently alter and degrade habitat such that conditions are no longer favorable for VASP re-establishment post-construction. The AMMs will initially minimize some of these adverse effects, but we expect that all VASP individuals in the 0.05 acre will be killed. In summary, there will be impacts to individual VASP in their annual survival.

Impacts to Populations – As we have concluded that individual VASP are likely to be killed, we need to assess the aggregated consequences of the anticipated losses of the exposed individuals on the population to which these individuals belong.

We expect that the population level impacts from decreased fitness, decreased reproductive success, death of individual VASP, and habitat degradation and loss will be relatively minor because the proposed action only affects 1 occurrence of VASP. This occurrence is 1 of 4 that comprise the Greenbrier River population. The other 3 occurrences will not be affected by the proposed action and based on 2017 survey information these 3 occurrences appear healthy. Therefore, the loss of this 1 occurrence will not affect the stability and recovery of the Greenbrier River population as a whole.

Impacts to Species – As we have concluded that the population of VASP is unlikely to experience reductions in fitness, there will be no harmful effects (i.e., there will be no reduction in RND) on the species as a whole.

Roanoke logperch

Impacts to Individuals – The proposed action includes instream structure placement and removal, streambank vegetation clearing/trimming, and trenching during O&M subactivities. As discussed in the Effects of the Action, potential effects of the action include effects to RLP present within the action area year-round. Effects to individual RLP are expected to include injury or death from pump around. Temporary reductions in RLP foraging are expected as a result of cofferdams preventing access to foraging areas and moving to new habitat to avoid sedimentation. As

previously mentioned, sediment deposited on the waterbody bottom will interfere with the ability of RLP to feed (Robertson et al. 2006). Sediment plumes and increased turbidity will also temporarily lower DO levels. In response to sediment plumes, most RLP are anticipated to cease feeding and move to clearer water until sediment levels return to background levels. Individuals will expend more energy to seek out different foraging areas. A TOYR (March 15 - June 30) to protect RLP during their spawning season will be implemented, which will minimize the potential for effects from sedimentation. Permanent removal of riparian vegetation in a 10 ft corridor centered over the pipeline is expected to decrease fitness of a small portion of RLP individuals. In summary, there will be impacts to individual RLP in their annual survival rates.

Impacts to Populations – As we have concluded that individual RLP are likely to be killed or experience some reduction in their annual survival rate, we need to assess the aggregated consequences of the anticipated losses of the exposed individuals on the population to which these individuals belong.

We expect that the population level impacts from injury, death, and foraging disruption to the RLP will be relatively small because the proposed action affects a small number of individuals in 0.32% of the RLP potential habitat within the Roanoke River basin, which is a small portion (0.20%) of the entire RLP potential habitat in VA. Following completion of each action that results in adverse effects to RLP, we expect that the RLP population, given no other major stressors, will recover within 3-5 years assuming that most RLP in the action area experience temporary impacts. Similarly, habitat impacts are minor compared to the overall amount of RLP habitat available. The effects of the proposed action are expected to be primarily temporary; in general, RLP habitat will recover to a suitable condition following temporary impacts; and RLP are expected to continue to occupy waterways within the action area. Therefore, we conclude that the effects from the proposed action do not pose a significant risk to the RLP and will not result in permanent population declines.

Impacts to Species – As we have concluded that populations of RLP are unlikely to experience reductions in their fitness, there will be no harmful effects (i.e., there will be no reduction in RND) on the species as a whole.

Additionally, as part of the proposed action, funds will be provided to continue and expand restoration efforts along the North Fork Roanoke River and expand on an existing successful, landscape approach that tangibly benefits the RLP within its known, occupied range (FERC 2017b). While providing funds to implement restoration will likely provide conservation benefits for the RLP, its potential beneficial impact was not considered in the above analysis or the below conclusion because the nature and extent of that benefit is not determinable at this time. Further, support will be provided for proper stream restoration activities within the distributional range of RLP and other sensitive riparian areas within the pipeline corridor (FERC 2017b). Proper stream restoration activities can provide a multitude of environmental and economic benefits including, but not limited to, the following: improved water quality; augmentation of habitat diversity; reestablishment of critical watershed functions; increased property and aesthetic values; and reduction of flood damages and riparian property loss. Targeted restoration activities in or near waterbodies will take place at 55 stream crossing locations along the action area. While supporting stream restoration activities will likely provide conservation benefits for the RLP, its

potential beneficial impact was not considered in the above analysis or the below conclusion because the nature and extent of that benefit is not determinable at this time.

Indiana bat

Impacts to Individuals – The proposed action includes removal of a total of 3,230.4 acres of Ibat habitat (Table 3). As discussed in the Effects of the Action, potential effects of the action include effects to Ibat present within the action area year-round. Tree removal in known use and unknown use summer habitat during winter will alter roosting and travel habitat. Displaced Ibats will expend additional energy seeking out alternate roosts and travel corridors when they return the following season. Tree removal during winter in known use and unknown use summer habitat will result in predation, reduced pregnancy success, and/or reduced pup survival for a small percentage of individual Ibats. These effects will be greatest the first season after tree removal has occurred.

Tree removal in April, May, August, and September in unknown use summer habitat is expected to affect Ibats using undocumented occupied roosts and foraging areas. Most tree removal in unknown use summer habitat will occur during winter and trees will not be removed between June 1 and July 31 when young cannot fly. We anticipate a small percentage of individual Ibats present within unknown use summer habitat will be injured or killed (adults and volant young) from the felling of undocumented occupied roost trees, will experience reduced pregnancy success and/or reduced pup survival associated with increased energy expenditure from the loss of foraging habitat, and injury or death as a result of predation.

Tree removal in known use and unknown use spring staging/fall swarming habitat during winter will remove foraging and roosting areas for a concentrated number of Ibats in an abbreviated season (i.e., spring emergence or fall swarming). We do not anticipate Ibats will be present during tree removal activities in known use spring staging/fall swarming habitat and no impacts are anticipated to Ibat hibernacula or hibernating bats. However, tree clearing will result in temporary or permanent habitat loss, which we expect will cause decreased breeding success and survival (of WNS affected bats) of a small percentage of individual Ibats.

Tree removal in unknown use spring staging/fall swarming habitat during the active season will disrupt bats engaging in fall swarming, spring staging, and roosting behavior. A small percentage of individual Ibats present within unknown use spring staging/fall swarming habitat will be injured or killed (adults and volant young) from the felling of undocumented occupied roost trees; will experience reduced pregnancy success and/or reduced pup survival associated with increased energy expenditure from the loss of foraging habitat; and will be injured or killed as a result of predation. To minimize impacts to individual Ibats, 121 acres of suitable forested habitat within Braxton County, WV, will be permanently protected. While this property will likely provide habitat for Ibats, it does not avoid all impacts to individual bats.

In summary, there will be impacts to individual Ibats in their survival or reproductive rates.

Impacts to Populations – As we have concluded that individual Ibats are likely to experience some reduction in their lifetime survival or reproductive success, we need to assess the aggregated consequences of the anticipated reductions in fitness of the exposed individuals on

the population to which these individuals belong.

There are known maternity colonies scattered throughout VA and WV and we expect there are undocumented maternity colonies in the action area. The AMMs (Appendix B Table 4) will minimize adverse impacts to known and unknown maternity colonies such that we do not expect direct impacts to known colonies when bats are present (November 15 - March 31) and to unknown colonies when lactating females and non-volant pups are present (June - July). This will avoid significant reductions in population numbers and reproductive rates in affected maternity colonies. For known and unknown colonies, given the linear nature of the proposed action and small acreage of known and unknown use summer habitat affected (2,114.9 acres) within the Appalachian Mountain RU in VA and WV (24,268,796 acres), we do not anticipate significant areas of habitat (roosting, foraging areas, travel corridors) (0.009%) will be removed or affected. Therefore, we conclude that adequate habitat will remain to maintain numbers, reproduction, and viability for any given maternity colony.

There are 3 known hibernacula and 86 presumed occupied hibernacula within 5 miles of the action area. Of these, 1 known hibernaculum (Tawney's Cave) and 16 presumed occupied hibernacula occur within the action area. We anticipate impacts to Ibat colonies present within known and unknown use spring staging/fall swarming habitat from tree clearing activities. These impacts are primarily expected in unknown use spring staging/fall swarming habitat during the active season, with more limited impacts at known use spring staging/fall swarming habitat outside of the active season. Due to TOYRs we expect that most tree removal activities will occur when Ibat colonies are not present. Most effects will occur during the first fall swarm after tree clearing. Ibat colonies are expected to acclimate to this change and shift to alternative habitat within the known and unknown use spring staging/fall swarming habitat. We do not expect a long-term reduction in any hibernating populations because a significant portion of the known and unknown use spring staging/fall swarming habitat will remain. Given the linear nature of the proposed action and small acreage of known and unknown use spring staging/fall swarming habitat affected (1,115.5 acres) within the Appalachian Mountain RU in VA and WV (24,268,796 acres), we do not anticipate significant areas of habitat (0.005%) will be removed or otherwise lost (staging, swarming, roosting, foraging areas, travel corridors). We expect that adequate roosts will remain to maintain numbers, reproduction, and viability of the staging/swarming populations. Thus, we conclude that overall long-term health and viability of spring staging/fall swarming populations will not be negatively impacted.

Impacts to Species – As we have concluded that populations of Ibats are unlikely to experience reductions in their fitness, there will be no harmful effects (i.e., there will be no reduction in RND) on the species as a whole.

Furthermore, in collaboration with the VA and WV state environmental agencies, a mitigation model has been developed for federally listed bats. The mitigation model utilizes interior forest as the benchmark to which habitat impacts are compared. The goal of the model is to identify the quantity of acres required to fully offset forest impacts from the project. Although negotiations with the state agencies are ongoing, Mountain Valley has agreed to place funds in an interest bearing account for the purchase of optimal bat habitat that is essential to the recovery of the species, throughout VA and WV. The amount of acreage will be determined in coordination with

the Service and applicable state agencies. A Memorandum of Understanding with the agencies is being developed to establish criteria for ensuring the funds from the conservation escrow account are disbursed in accordance with the final mitigation proposal. While implementation of this mitigation model will likely provide additional conservation for the Ibat, its potential beneficial impact was not considered in the above analysis or the below conclusion because the nature and extent of that benefit is not determinable at this time.

Northern long-eared bat

Impacts to Individuals – The majority of impacts to NLEB have been previously addressed in the Service's January 5, 2016 programmatic biological opinion implementing the final 4(d) rule. Some effects to NLEB associated with impacts to habitat surrounding Canoe Cave, Tawney's Cave, and PS-WV3-Y-P1 have not. The proposed action includes the permanent removal of 542.5 acres of forest around 3 NLEB known hibernacula, of which 16.8 acres are not addressed by the programmatic opinion. This area may be used as roosting/foraging habitat in the fall or spring or by maternity colonies. No direct effects are anticipated but individual NLEB will be temporarily affected by loss of fall swarming, spring staging, and summer habitat resulting in reduced overwinter survival or reproductive success. To minimize impacts to individual NLEBs, 121 acres of suitable forested habitat within Braxton County, WV, will be permanently protected. While this property will likely provide habitat for NLEBs, it does not avoid all impacts to individual bats.

Impacts to Populations – As we have concluded that individual NLEB are likely to experience some reduction in their lifetime survival or reproductive success, we need to assess the aggregated consequences of the anticipated reductions in fitness of the exposed individuals on the population to which these individuals belong.

Bats are expected to acclimate to this permanent habitat removal by shifting to alternative habitat. All impacts are expected to be limited and short-term in nature. We do not expect a long-term reduction in the Canoe Cave, Tawney's Cave, or PS-WV3-Y-P1 populations or potential maternity colonies because the NLEB is adapted to ephemeral environments and a significant portion of the spring staging/fall swarming winter habitat or potential maternity colony habitat will remain. Therefore, we conclude that the effects from the proposed action will not result in permanent population declines.

Impacts to Species – As we have concluded that populations of NLEB are unlikely to experience reductions in their fitness, there will be no harmful effects (i.e., there will be no reduction in RND) on the species as a whole.

Furthermore, in collaboration with the VA and WV state environmental agencies, a mitigation model has been developed for federally listed bats. The mitigation model utilizes interior forest as the benchmark to which habitat impacts are compared. The goal of the model is to identify the quantity of acres required to fully offset forest impacts from the project. Although negotiations with the state agencies are ongoing, Mountain Valley has agreed to place funds in an interest bearing account for the purchase of optimal bat habitat that is essential to the recovery of the species, throughout VA and WV. The amount of acreage will be determined in coordination with the Service and applicable state agencies. A Memorandum of Understanding with the agencies is

being developed to establish criteria for ensuring the funds from the conservation escrow account are disbursed in accordance with the final mitigation proposal. While implementation of this mitigation model will likely provide additional conservation for the NLEB, its potential beneficial impact was not considered in the above analysis or the below conclusion because the nature and extent of that benefit is not determinable at this time.

CONCLUSION

Small whorled pogonia – We considered the current overall stable status of the SWP and the similar condition of the species within the action area (environmental baseline). We then assessed the effects of the proposed action and the potential for cumulative effects in the action area on individuals, populations, and the species as a whole. These types of effects of the proposed action are currently considered primary factors influencing the status of the species. While they may compound those factors, as stated above, we do not anticipate any reductions in the overall RND of the SWP. It is the Service's Opinion that authorization to construct and operate the pipeline, as proposed, is not likely to jeopardize the continued existence of the SWP.

<u>Virginia spiraea</u> — We considered the current overall stable status of VASP and the similar condition of the species within the action area (environmental baseline). We then assessed the effects of the proposed action and the potential for cumulative effects in the action area on individuals, populations, and the species as a whole. These types of effects of the proposed action are currently considered primary factors influencing the status of the species. While they may compound those factors, as stated above, we do not anticipate any reductions in the overall RND of the VASP. It is the Service's Opinion that authorization to construct and operate the pipeline, as proposed, is not likely to jeopardize the continued existence of the VASP.

Roanoke logperch — We considered the current overall improving status of the RLP and the stable condition of the species within the action area (environmental baseline). We then assessed the effects of the proposed action and the potential for cumulative effects in the action area on individuals, populations, and the species as a whole. These types of effects of the proposed action are not currently considered primary factors influencing the status of the species. While they may compound those factors, as stated above, we do not anticipate any reductions in the overall RND of the RLP. It is the Service's Opinion that authorization to construct and operate the pipeline, as proposed, is not likely to jeopardize the continued existence of the RLP.

Indiana bat — We considered the current overall declining status of the Ibat and the similar condition of the species within the action area (environmental baseline). We then assessed the effects of the proposed action and the potential for cumulative effects in the action area on individuals, populations, and the species as a whole. These types of effects of the proposed action are currently considered primary factors influencing the status of the species. While they may compound those factors, as stated above, we do not anticipate any reductions in the overall RND of the Ibat. It is the Service's Opinion that authorization to construct and operate the pipeline, as proposed, is not likely to jeopardize the continued existence of the Ibat.

Northern long-eared bat – We considered the current overall declining status of the NLEB and the similar condition of the species within the action area (environmental baseline). We then

assessed the effects of the proposed action and the potential for cumulative effects in the action area on individuals, populations, and the species as a whole. These types of effects of the proposed action are currently considered primary factors influencing the status of the species. While they may compound those factors, as stated above, we do not anticipate any reductions in the overall RND of the NLEB. It is the Service's Opinion that authorization to construct and operate the pipeline, as proposed, is not likely to jeopardize the continued existence of the NLEB.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering (50 CFR § 17.3). Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by FERC so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in Section 7(o)(2) to apply. FERC has a continuing duty to regulate the activity covered by this incidental take statement. If FERC: (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of Section 7(o)(2) may lapse. To monitor the impact of incidental take, FERC must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

On January 14, 2016, the Service published a final species-specific rule pursuant to Section 4(d) of the ESA for the NLEB (50 CFR §17.40(o)), which became effective February 16, 2016. The Section 4(d) rule defines prohibited take of the NLEB, which is limited to certain circumstances and activities within the full suite of prohibitions otherwise applicable to threatened species under 50 CFR §17.31. The majority of incidental take of the NLEB that may occur from the proposed action is not considered prohibited take under the NLEB 4(d) rule. Therefore, that incidental take does not require exemption from the Service. However, any incidental take associated with 16.8 acres of habitat removal within 0.25 mile of the hibernacula is addressed below.

Section 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plants species. However,

limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed <u>endangered</u> plants or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service analyzed the effects to the species above.

Roanoke logperch – To estimate incidental take, we calculated the area of RLP habitat at each crossing (i.e., wetted width of the waterbody by the total of the construction ROW width and the 1,000 m stream length at each crossing) as follows: Bradshaw Creek 1 (6 m)(22.86 m + 1,000 m) = 6,137.16 m²; Harpen Creek 1 (5 m)(22.86 m + 1,000 m) = 5,114.3 m²; North Fork Roanoke River (22 m)(22.86 m + 1,000 m) = 22,502.92 m²; Roanoke River (22 m)(22.86 m + 1,000 m) = 22,502.92 m²; and Pigg River (22 m)(22.86 m + 1,000 m) = 22,502.92 m². Total = 124,788.92 m². Then we calculated the subset of the action area (i.e., wetted width of the waterbody by the construction ROW width) for cofferdam placement and removal: Bradshaw Creek 1 (6 m x 22.86 m) = 137.16 m²; Harpen Creek 1 (5 m x 22.86 m) = 114.3 m²; North Fork Roanoke River (22 m x 22.86) = 502.92 m²; Roanoke River (22 m x 22.86 m) = 502.92 m²; and Pigg River (22 m x 22.86 m) = 502.92 m². Total = 1,760.22 m². The area affected by stream diversion and cofferdam dewatering comprises approximately 1.4% [(1,760.22 m²/124,788.92 m²)(100)] of the action area. This 1.4% of the action area is the same area from which we anticipate the majority of RLP will be removed and relocated downstream. The anticipated take is described in Table 7 below.

Table 7. RLP amount and type of anticipated incidental take.

Species	Amount of Take Anticipated	Life Stage when Take is Anticipated	Type of Take	Take is Anticipated as a Result of
RLP	2	Adults or juveniles	Injury or Kill	Entrainment due to stream diversion and cofferdam dewatering.
RLP	955	Adults or juveniles	Harm or Harass	Habitat alteration from instream structure placement and removal, streambank vegetation clearing/trimming, and trenching during O&M subactivities.

Indiana bat – The Service anticipates incidental take of the Ibat will be difficult to detect for the following reasons: species has small body size, finding a dead or impaired specimen is unlikely, and species occurs in habitat (forest and caves) that makes detection difficult. However, the following level of take of this species can be anticipated by loss of 3,230.4 acres because this area contains suitable Ibat habitat. To account for differences in Ibat use of the habitat categories (unknown use habitat vs. known use habitat), a multiplier of 0.5 was used to estimate Ibat use for unknown use summer habitat and unknown use spring staging/fall swarming habitat. The anticipated take is described in Table 8 below.

Table 8. Ibat amount and type of anticipated incidental take.

Species	Amount of Take Anticipated	Life Stage when Take is Anticipated	Type of Take	Take is Anticipated as a Result of
Ibat	Small percent of individuals present within 228.4 acres of known use summer habitat	Adults or pups	Harm, Harass, Injure, or Kill	Relocating roosting areas and travel corridors will result in predation, reduced pregnancy success, and/or reduced pup survival.
Ibat	Small percent of individuals present within 943.25 acres of unknown use summer habitat	Adults or pups	Harm, Harass, Injure, or Kill	Felling undocumented occupied roost trees will result in the injury or death of adults and volant young. Relocating roosting/foraging areas and travel corridors will result in predation, reduced pregnancy success, and/or reduced pup survival.
Ibat	Small percent of individuals present within 402.7 acres of unknown use spring staging/fall swarming habitat	Adults or pups	Harm, Harass, Injure, or Kill	Felling undocumented occupied roost trees will result in the injury or death of adults and volant young. Relocating foraging areas will result in predation, reduced pregnancy success, and/or reduced pup survival. Temporary or permanent habitat loss will cause decreased breeding success and survival of WNS affected bats.
Ibat	Small percent of individuals present within 310.1 acres known use spring staging/fall swarming habitat	Adults	Harm, Harass, or Kill	Temporary or permanent habitat loss will cause decreased breeding success and survival of WNS affected bats.

Northern long-eared bat – The majority of effects have been previously addressed in the Service's January 5, 2016 programmatic biological opinion implementing the final 4(d) rule and any incidental take further than 0.25 mile from Canoe Cave, Tawney's Cave, and PS-WV3-Y-P1 is not prohibited under the final 4(d) rule (50 CFR §17.40(o)). The Service anticipates incidental take of NLEB will be difficult to detect for the following reasons: species has small body size, finding a dead or impaired specimen is unlikely, and species occurs in habitat (forest and caves) that makes detection difficult. However, the following level of take of this species can be anticipated by the loss of 16.8 acres of habitat because this area is within 0.25 mile of Canoe Cave, Tawney's Cave, and PS-WV3-Y-P1. The anticipated take is described in Table 9 below.

Table 9. NLEB amount and type of anticipated incidental take.

Species	Amount of Take Anticipated	Life Stage when Take is Anticipated	Type of Take	Take is Anticipated as a Result of
NLEB	Small percent of individuals present within 16.8 acres	Adults	Harm or Harass	Habitat loss will decrease survival and breeding success, particularly to WNS affected bats.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take.

Roanoke logperch -

- Provide information to individuals involved in project construction on how to avoid and minimize potential effects to the RLP.
- Conduct construction in a manner that minimizes disturbance to RLP.

Indiana bat -

- Provide information to individuals involved in project construction on how to avoid and minimize potential effects to the Ibat.
- Finalize the Braxton County conservation property preservation and the Memorandum of Understanding regarding federally listed bat mitigation.

Northern long-eared bat -

• Finalize the Braxton County conservation property preservation and the Memorandum of Understanding regarding federally listed bat mitigation.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the ESA, the FERC must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

Roanoke logperch -

- Prior to initiation of on-site work, notify all prospective employees, operators, and
 contractors about the presence and biology of the RLP, special provisions necessary to
 protect the RLP, activities that may affect the RLP, and ways to avoid and minimize
 these effects. This information can be obtained by reading RLP-related information in
 this Opinion or a fact sheet containing this information can be created and provided by
 FERC or the applicant.
- 2. Use the most non-lethal technique first when removing fish from the instream workspaces.

- 3. Construct cofferdams (North Fork Roanoke River, Bradshaw Creek, Roanoke River, Pigg River, and Harpen Creek) using non-erodible materials. Remove cofferdams in their entirety upon project completion.
- 4. Fill any sandbags used in cofferdams with clean sand and no other materials. All sandbags must be new with no prior use and must be removed at the time of cofferdam removal.
- 5. Build cofferdams to a height, strength, and configuration to resist no less than normal peak daily flows. All construction must take place outside of the RLP TOYR.
- 6. Minimize instream (North Fork Roanoke River, Bradshaw Creek, Roanoke River, Pigg River, and Harpen Creek) foot traffic during construction.
- 7. Vehicles or construction equipment may not enter North Fork Roanoke River, Bradshaw Creek, Roanoke River, Pigg River, and Harpen Creek, except within cofferdams.
- 8. Inspect all vehicles for leaks immediately prior to instream or cofferdam work (North Fork Roanoke River, Bradshaw Creek, Roanoke River, Pigg River, and Harpen Creek). Repair any leaks and clean construction vehicles thoroughly to remove any residual dirt, mud, debris, grease, motor oil, hydraulic fluid, coolant, or other hazardous substances from construction vehicles. Inspections, repairs, cleaning, and/or servicing will be conducted either before the vehicle, equipment, or machinery is transported into the field or at the work site within the staging area. All wash-water runoff and/or harmful materials will be appropriately controlled to prevent entry into the waterbody, including the riparian zone.

Indiana bat -

- Prior to initiation of on-site work, notify all prospective employees, operators, and
 contractors about the presence and biology of the Ibat, special provisions necessary to
 protect the Ibat, activities that may affect the Ibat, and ways to avoid and minimize these
 effects. This information can be obtained by reading Ibat-related information in this
 Opinion or a fact sheet containing this information can be created and provided by FERC
 or the applicant.
- 2. A mechanism for preservation of the Braxton County conservation property must be in place prior to completion of project construction or on a date mutually agreed upon by the Service. Contact the WVFO (tiernan lennon@fws.gov) regarding Service approval.
- 3. Finalize the Memorandum of Understanding regarding federally listed bat mitigation prior to the completion of project construction. Contact the WVFO (tiernan_lennon@fws.gov) and VAFO (sumalee_hoskin@fws.gov) regarding Service review and approval.

Northern long-eared bat -

- 1. A mechanism for preservation of the Braxton County conservation property must be in place prior to completion of project construction or on a date mutually agreed upon by the Service. Contact the WVFO (tiernan_lennon@fws.gov) regarding Service review and approval.
- 2. Finalize the Memorandum of Understanding regarding federally listed bat mitigation prior to the completion of project construction. Contact the WVFO (tiernan_lennon@fws.gov) and VAFO (sumalee_hoskin@fws.gov) regarding Service review and approval.

MONITORING AND REPORTING REQUIREMENTS

Care must be taken in handling any dead specimens of proposed or listed species to preserve biological material in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure that evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the ESA. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure that the terms and conditions are appropriate and effective. Upon locating a dead specimen, notify the Service's VA Law Enforcement Office at 804-771-2883 and VAFO at the phone number provided below or at 804-693-6694.

Roanoke logperch -

- 1. Any high water event that disturbs the construction site, including failure or overtopping of cofferdams, must be reported to the Service at the contact phone number/email address below within 24 hours.
- 2. Any spills of motor oil, hydraulic fluid, coolant, or similar fluids, not contained before entry into the action area, must be reported to the Service at the contact number/email provided below and National Response Center (800-424-8802) immediately.
- 3. Conduct a RLP survey and habitat assessment at North Fork Roanoke River, Bradshaw Creek, Roanoke River, Pigg River, and Harpen Creek crossings 6 months the to assess the status of the RLP. Survey/habitat assessment will be conducted 200 m upstream and 800 m downstream of each crossing site by a qualified surveyor(s) with a valid VDGIF Permit for these activities. Provide a report containing raw data and summarized information from the surveys and habitat assessments at each site to the VAFO (sumalee_hoskin@fws.gov) within 30 days of completion of the survey/habitat assessment.

Indiana bat -

1. Monitor Ibat activity around Greenville Saltpeter Cave and Tawney's Cave to determine effects to Ibats in the fall swarming/spring staging areas. Two weeks prior to the start of tree clearing place acoustic monitors outside the entrance of each cave. Monitors will remain in place until completion of 2 hibernating seasons post-construction. Provide a report including the raw acoustic data every year on January 30 to the WVFO (tiernan_lennon@fws.gov) and VAFO (sumalee_hoskin@fws.gov).

Northern long-eared bat –

1. Monitor NLEB activity around Canoe Cave, Tawney's Cave, and PS-WV3-Y-1 to determine effects to NLEBs in the fall swarming/spring staging areas. Two weeks prior to the start of tree clearing place acoustic monitors outside the entrance of each cave. Monitors will remain in place until completion of 2 hibernating seasons post-construction. Provide a report including the raw acoustic data every year on January 30 to the WVFO (tiernan_lennon@fws.gov) and VAFO (sumalee_hoskin@fws.gov).

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Small whorled pogonia -

- Utilize an alternative pipeline route to avoid effects to the SWP colony and protect its upland drainage area.
- If an alternative pipeline route is not feasible, work with the WVFO (tiernan_lennon@fws.gov) to develop an experimental design to transplant the SWP stems in the construction ROW to protected suitable habitat or to utilize these plants for research purposes.
- Conduct SWP surveys within suitable habitat in the area surrounding the SWP colony to determine if additional colonies are present.

Virginia spiraea –

- Remove VASP plants by hand prior to construction and maintain them at a Serviceapproved facility during construction. After MVP is complete, plant VASP plants and
 any propagules within the action area where they are most likely to thrive. Contact the
 WVFO (tiernan lennon@fws.gov) for specific recommendations.
- Monitor any documented occurrences of VASP within and adjacent to the action area and conduct surveys in WV to locate additional populations.
- Permanently protect habitat for the Greenbrier River VASP population.
- Assist with breeding ecology (seed viability/pollinators/compatibility) and genetic diversity research efforts.
- Develop a site-specific exotic/invasive species management plan to be implemented at sites occupied by VASP.

Roanoke logperch -

- Fund or conduct projects to identify and remove manmade barriers to fish passage that will benefit RLP.
- Continue to work with the VAFO (<u>sumalee_hoskin@fws.gov</u>) to identify appropriate restoration efforts.

Indiana bat -

- Fund research on understanding/controlling and mitigating the effects of WNS.
- Fund research to improve knowledge of Ibat use of suitable habitat in VA and WV.
- Plant native trees with exfoliating bark in the temporary construction ROW to replace those that were cleared. Contact the VAFO (<u>sumalee_hoskin@fws.gov</u>) and WVFO (<u>tiernan_lennon@fws.gov</u>) for area-specific recommendations.
- Conduct mist-net surveys and telemetry studies within 5 miles of the location of the pregnant female Ibat captured in Wetzel County, WV to identify occupied roost trees.
- Implement habitat enhancement measures (e.g., erect artificial roost structures, create vernal pools, girdle trees, etc.) on the Braxton County conservation property. Develop a

site specific plan for the conservation property that includes: a description of the quality of the habitat; extent and location of on-site enhancements; and a long-term management plan. Conduct bat monitoring on the property to document use by bats. Contact the WVFO (tiernan lennon@fws.gov) for specific recommendations.

Northern long-eared bat -

Fund research on understanding/controlling and mitigating the effects of WNS.

For the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Except as specifically noted, any modifications to the proposed action made since the issuance of the FEIS (FERC 2017a) and BA (FERC 2017b) were not considered as part of this Opinion. The Service strongly recommends that any changes or modifications to the various construction, restoration, and mitigation plans listed in table 2.4-2 of the FEIS be summarized and provided to the Service to ensure reinitiation is not necessary prior to commencing work.

If you have any questions regarding this Opinion or our shared responsibilities under the ESA, please contact Troy Andersen of this office at (804) 824-2428 or via email at Troy Andersen@fws.gov.

Sincerely,

Cindy Schulz Field Supervisor

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Virginia Ecological Services

Enclosures

cc: Corps, Norfolk, VA (Attn: William Walker)
DOI, Washington, DC (Attn: Erika Vaughan)
FERC, Washington, DC (Attn: Paul Friedman)
USFS, Atlanta, GA (Attn: Timothy Abing)
USFS, Roanoke, VA (Attn: Jennifer Adams)
VDACS, Richmond, VA (Attn: Keith Tignor)
VDCR-DNH, Richmond, VA (Attn: Rene Hypes)
VDGIF, Richmond, VA (Attn: Ernie Aschenbach)
WVDNR, Elkins, WV (Attn: Cliff Brown)
MVP, Pittsburgh, PA (Attn: Joseph Dawley)
MVP, Pittsburgh, PA (Attn: Megan Stahl)

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Appendix A.

CONSULTATION HISTORY

10-13-14	The Service received an introductory letter from Mountain Valley regarding MVP.
11-10-14	Mountain Valley met with the Service in Elkins, WV, to formally introduce MVP.
04-03-15	VAFO provided formal comments on MVP.
04-17-15	The Service received FERC's Notice of Intent to prepare an EIS for MVP.
06-28-15	The Service received FERC's Notice of Schedule for Environmental Review of MVP.
09-09-15	VAFO met with Mountain Valley, ESI, and VDGIF regarding the overall project scope and consultation to date.
09-10-15	WVFO met with Mountain Valley regarding the overall project scope and consultation to date.
10-23-15	The Service received notification from FERC that Mountain Valley filed its certificate application and received the EIS schedule.
11-13-15	Mountain Valley submitted official notification of intent to initiate formal consultation to the Service.
11-23-15	WVFO met with Mountain Valley to discuss the BA.
02-18-16	Mountain Valley submitted the draft BA to the Service.
03-08-16	VAFO submitted a letter to ESI providing recommendations for MVP and surveys in VA.
04-07-16	The Service met with Mountain Valley and ESI to discuss the draft BA.
04-07-16	WVFO provided comments to Mountain Valley on the draft BA.
04-20-16	ESI submitted a letter to VAFO responding to the Service's March 8, 2016 letter.
06-24-16	Mountain Valley submitted the updated BA to the Service.
09-16-16	The Service received FERC's Notice of Availability of the Draft EIS for the proposed MVP.
09-28-16	The Service received FERC's Draft EIS.

10-25-16	Mountain Valley submitted the updated BA to the Service.
12-08-16	The Service met with Mountain Valley and ESI to discuss the BA.
01-18-17	The Service provided comments on the draft BA.
03-14-17	Mountain Valley submitted the draft BA to FERC and the Service.
03-23-17	Mountain Valley, ESI, the Service, and The Nature Conservancy met to discuss Mountain Valley's mitigation model, summary of revisions in the BA, and updates to the Migratory Bird Conservation Plan.
03-31-17	The Service received FERC's Notice of Revised Schedule for Environmental Review of MVP.
04-10-17	The Service received FERC's Administrative Draft FEIS.
05-16-17	The Service received Mountain Valley's final Migratory Bird Conservation Plan.
05-18-17	Mountain Valley filed responses to comments received on the BA.
06-23-17	The Service received FERC's Notice of Availability of the FEIS for MVP.
06-28-17	VAFO, Mountain Valley, and ESI met to discuss Mountain Valley's voluntary conservation measures and MVP schedule.
07-05-17	The Service received FERC's FEIS for MVP.
07-10-17	FERC submitted the BA to the Service and requested initiation of formal consultation.
07-20-17	The Service, WVDNR, Mountain Valley, and ESI met to discuss Mountain Valley's voluntary conservation measures, remaining plant surveys, and MVP schedule.
07-27-17	The Service received Supplemental Information to the BA from Mountain Valley.
08-04-17	The Service submitted a letter to FERC initiating formal consultation.
09-05-17	The Service received Mountain Valley's Upland Forest Impact Assessment and Voluntary Mitigation Plan.
09-08-17	The Service sent a letter to FERC regarding Mountain Valley's final Migratory Bird Conservation Plan.

11-08-17

The Service received a letter from Mountain Valley providing avoidance and minimization measures for small whorled pogonia and Virginia spiraea.

Appendix B. Species-Specific Effects Tables.

Tables 1-5 are color coded as follows:
NE rows are light green
NLAA rows are light yellow
LAA are light red

	Subactivity	Envisormental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response		Deningraphic	or LAA	Comments
New Disturbance - Construction	Vehicle Operation and Foot Traffic	physical impacts to individuals, habitat degradation	crashing, competition, collection, chemical contaminants	introduction of invasive species, posching, exposure to chemicals from surface water runoff	habitat, population, individuals	mjury, death	reproduction, nutrition, habitat	numbers, reproduction	N N	This subscitory will creat and possibly hill SNP atoms in the construction ROW. For SNP developes of the construction ROW. AMAG (e.g., propriate from the contraction of the construction ROW and the contraction and statement and Maintenance Plan (PERC 2013a), Evolte and Invastre Spocase Control Plan (Montain will Alley) 2017) are anticipated to relative exposure to chemicals and competition from invasars plants to a veid the ground result of the contraction client ROW was increased and competition from invasars plants conduction. The contraction client ROW was increased in formal in a factor (SVF WIRE the Otto Invasing and death. However, AMAG in maining tharmers such as rights, efforces, gates, vegetation, or boulders along the construction ROW to accordance are of ORK or ROW to avoid light access will minimize ORV effects such that it is RLAA. We anticipate that a portion of SVP seans will be embed in the construction ROW.
New Disturbance	Clearing - harbacoous vegetables and ground	physical impacts to individuals, habitat degradation	crushing, soil compaction, altered bydology, changes to bydology, changes to mid soil moisture, downslope erosion, sedimentation, burnil, competition.	removal of vegetation, labeline, erestion, spread of herbecoust pepulation, and invasive plant species individuals individuals.	habitat, population, individuals	injury, death	reproduction, nutrition, labitat	reproduction	LAA	in substitivity will cruck, nervoe, and hill SWP stems in the construction (SW SWP) develope of the construction ROW will be afficied by this substitivity will carried, nervoe, with all is SWP stems in the construction and increase surface water flow and downshope crosson rates and after surface and submitted by choicing in the watershed, causing changes in evaporamption rates and of montern End SWP stems and control and after surface and submitted by choicing in the watershed, causing changes in evaporamption rates and on incontince by choicing in the watershed, causing changes in evaporamption rates and submitted by the construction and submitted man for an expension of the construction of the construction ROW. These reasons are well affect both the supcortain lung related on by SWP and individual SWP decreasing fitness and reproductive success and pounds by litting individual pater. This subsectivity will also relaterable and individual SWP decreasing fitness and individual states will be burned. As Mill a construction and submitted man are an engaged to be changed and individual states will be burned. As Mill a gradient from the submitted in the Eurock control to reduce suffer when well and submitted man be well as the construction of the submitted described in the Eurock engaged control. Then the construction ROW will be burned for the approach of SWP stems of submitted in the Eurock and reconstruction ROW and a few SWP stems downshope.
Now Disturbance - Construction	Clearing - trees and denths	physical impacts to individuals, habbat degradation	ventile, changes to smalled regime, and compaction, altered the objection altered holding, increased soil demperature, comportemeptation metes and in notifier, downshope revision. competition	removal of over- and mid- story suggestion, crosson, spend of harbscoots and mysave plant species	habitat, populaton, mdvvdaais	injury, death	reproduction, individual multificent, habitet	reproducton	,	inchabeting with critical and Hill Hilly Petens in the contribution, ROW was allow effect by that an arbitrary and Hill Hilly Petens in the contribution ROW was the active by the manner and submitted that the contribution of the contribution and channel of very detailed by the manner and advantage entropy and active active active and active and active activ
New Disturbance - Construction	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	physical impacts to individuals, habitat degradation	competition, crushing	spread of herbaceous and invasive plant species	NA	NA	NA	NA	NLAA	Instructive with occur in the construction ROW, which has disached between statements and no longer provides similable habitat for SWP, For SWP downships of the construction ROW, shipped brank will not be blown off of the construction ROW into survicementally sensitive invasive survivin ROW, and the Ecotic and Invasive Species Control Plan (Mountain Valley 2016) will munimize impacts due to invasive survivin
New Disturbance -	Vegetation Disposal (upland) - brush pile	neutral	none	NA	NA	NA	NA	NA	NE	This subservity will occur in the construction ROW, which has already been disturbed by previous activities and no longer provides suitable habitat for SWP.
Construction		physical impacts to individuals, habitat degradation	changes to smilght regme, increased soil temperature, changes to evapotemepiration rates and soil mosture, competition	rimming of over- and mid- sory vegetation, spread of bethoeoous and invasive plant species	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	numbers, reproduction	LAA	This adhestivity will occur in the conditionation (ROW, which has already been dainfueded by persons activities and no hanger provides similable habitual recrease SWP Trimming of mile, and over-droy trees will accesse direct and unbrind light in the reas adjacent to the construction ROW, which may increase SWP Rowering and population size of the NPR deviation ROW. Beyond an unknown threshold, an increase in direct and mathent light in a unknipsed to the global SWP habitable to the construction ROW. Beyond an unknown threshold, an increase in direct and mathent light in single SWP habitable to the construction ROW. Beyond an unknown threshold, an increase in direct and mathent light in a single soft of the construction ROW. More that address infrastors to second and present every approximately and the ROW. Per details of the construction ROW, and the set SWP details due to increased light. Invisive species will compare with ROW for the light, space, and of the construction ROW will have decreased fitness and perpoductive success.
New Distriction	Grading, crosion control devices	physical impacts to individuals, habitat degradation	crushing, soil compaction; altered bildrolly; changes to soil notsture. downslope eroston, sedimentation, burnal	erosion	habtar, population, individuals	mjury, death	reproduction,	numbers, reproduction	LAA	This athesticity will docum in the construction ROW which has already been disturbed by precisions servicine and no longer provides suitable labritat for RNF 3WP downslope of the construction ROW will be affected by this substitutivity. Soil compaction and ground disturbance in the supplex disturbance and suitable and the construction and the surface and substitutivity and suitable states are suitable and of surface with Public downslope of the construction ROW Public and public ROW and individual SVP, decreasing fitness and reproductive success and possibly belling individual plants. This subscriptivity will also redistribute and loosen soils, which will cause sedimentation downslope towards the ROW Depending on the degree of surface construction, and Maintenance Plant (RESC 2014), Redension and Reinbilliation Plant (Poundam Wiley 2017), are atticipated to reduce ROW Public Broston on a suscipated to reduce a reduce the ROW Public Broston (SWP Public ROW). The subscription of a semperate Poundam SWR construction and sufficient and the surface and the reduced ROW public Broston of the subscription and sufficient and sufficient and the subscription and sufficient and sufficient and the sufficient of these and reproductive success.
New Disturbance	Tonching (digging, blasting, denstering, open treach, solimentation)	physical impacts to individuals, habitat degradation	orushing, altered bydrology, changes to soil moisture, downslope erosion, sedimentation, burial	erosion, movement of soil and larger material (e.g. boulders) when blasting	habitat, population, individuals	injury, death	reproduction, nutrition, labitat	nunibers, reproduction	LAA	for SWP, SWP downships of the countriction ROW, which has already been disturbed by persions assivities and no langer provides similable habitat for SWP SWP downships of the countriction ROW will be affected by this subscrive; (Frend disturbance in the upplyor drainage area will increase surface water flow and downships excess make and alternative and subscribes bythology in the watershot causing changes in evaporational states and stall memoriate downships of the construction ROW. These stresses will affect be this the mycorfizinal fungi related on by SWP and individual SVP, decreasing filters and reproductive necess and possibly killing individual plants. This subscrively will also relatativate and and individual SVP, decreasing filters and reproductive necess and possibly killing individual plants. This subscrively will also relatativate and habitative and and alternative downships provide and the subscription of the construction ROW will have decreased fitness and reproductive success and or will be killed.
New Disturbance -	Pipe Stringing - bending, welding, coating, radding and backfilling	neutral	none	NA	NA	NA	NA	NA	NE	This subactivity will occur in the construction ROW, which has already been disturbed by previous activities and no longer provides suitable habitat for SWP.
w Disturbance -	Hydrostatic Testing (water withdrawal and	neutral	none	NA	NA	NA	NA	NA	NE	Subactivity not proposed near the SWP colony.

Table 1. A	Table 1. Analysis of effects on small whorled pogonia	whorled pog	onia.							
Project Activity	Subactivity	Environmental Impact or Threat	Sfressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE, NLAA, of LAA	Сапрана
New Disturbance - Construction	Regrading and Stabilization - restoration of corndor	physical impacts to márvidads, habdat degradation	soil compaction, altered bydrology, changes to soil moisture, downslope erosion, sedimentation, burial, competition, increased nutrients, chemical confaminants	vigrading, erosion, spread of radinecesis and invasive bullen species, exposure to unfertible from surface water month (fertilizers, feconsposed vegetation), exposure to chemicals from avagoure to chemicals from white	habitat, population, individuals	mjury, death	reproduction,	numbers, reproduction	LAA	This subactivity will occur in the construction ROW, which has already been disturbed by previous activities and an longer provides suitable hat for NPB. SPACE developed the construction ROW while he directly their subscripty. Occurn disturbance in the uppergree disease rear will part their water flow used downstope crosson rates and alter surface and subscribe by while waterfaced, causing changes in exportragations are superfused by the superfused causing changes in exportragations are superfused by the superfused causing changes in exportragation and subscript by the subscript by the distribution and problem of the construction ROW. These researces will affect both the revocribing ling; related on by and individual subscript by the desired and individual supervises. The subscription, and Maniferance (FBRZ 2013a), Restoration and Redubilitions Plan Motuntain vallety 2017) are unterpreted to the described in the Except FBRZ 2017a. The unterpreted to the changes will not be undergreated and individual stress will be brused, and the described the Except for
New Disturbance - Construction	- Facilities - noise, lights	neutral	none	NA	NA	NA	NA	NA		sanctone are set set seen to be constituted from will have accretised lines and reproductive success. Facilities not proposed near the SWP colony.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent - grading graveling	neutral	none	NA	NA	NA	NA	NA	NE	No temporary or permanent access roads proposed near SWP colony,
New Disturbance - Construction	Access Roads - upgrading existing roads, new	neutral	none	NA	NA	NA	NA	NA	NE	No temporary or permanent access roads proposed near SWP colony.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent - tree frimming and free removal	neutral	none	NA	NA	NA	NA	NA	NE	No temporary or permanent access roads proposed near SWP colony.
New Disturbance -	Stream Crossings, flume	neutral	none	NA	NA	NA	NA	NA	NE	SWP is not an aquatic species and not found in streams and welland areas.
New Disturbance -	Stream Crossings, dam & pump	neutral	none	NA	NA	NA	NA	NA	NE	SWP is not an aquatic species and not found in streams and welland areas.
New Disturbance - Construction	Stream Crossings, cofferdam	neutral	none	NA	NA	NA	NA	NA	NE	SWP is not an aquatic species and not found in streams and welland areas.
New Disturbance - Construction	Stream Equipment Crossing Structures	neutral	none	NA	NA	NA	NA	NA	NE	SWP is not an aquatic species and not found in streams and welland areas.
New Disturbance - Construction	Crossings, wetlands and other water bodies	neutral	none	NA	NA	NA	NA	NA	NE	Subscrivity not proposed near the SWP colony.
New Disturbance - Construction	BORDON.	neutral	none	NA	NA	NA	NA	NA	NE	Subsctivity not proposed near the SWP colony.
New Disturbance - Construction	12000	neutral	none	NA	NA	NA	NA	NA	NE	Subactivity not proposed near the SWP colony.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - pipe stringing	neutral	none	NA	NA	NA	NA	NA	NE	Subactivity not proposed near the SWP colony.
Operation &	Facilities - vehicles, foot traffic, noise	neutral	none	NA	NA	NA	NA	NA	NE	Facilities not proposed near the SWP colony.
Operation & Maintenance		physical impacts to individuals, habitat degradation	soil compaction, altered hydrolyc, changes to verportanspiration rates and soil moisture, downslope erosion, burial, competition	emoval of vegetation, spread in farbuseous and invasive dant species	habitat, population, individuals	mjury, death	reproduction,	reproduction	IAA	This subscitivity will occur in the permanent ROW, which has already been desturbed by previous activities and no longer provides stainable habit SWP. We do not antacipate SWP re-destabilishing and growing the permanent ROW and per-constitution due to removed to both treas and mycorfing that require libral trees (SWP re-destabilishing and growing the permanent ROW will be affected by the subscription, growth, and survival SWP downspipe of the permanent ROW will be affected by the subscription, growth, and survival SWP downspipe of the permanent ROW will be affected by the permanent ROW and and removal of vegetation in the upstoper during extent will interess surface water flow and downspipe ensour rates and after surface and mysome physical downspipe of the permanent ROW. The surface water flow and downspipe reasons rates and passibly stressors will affect both the nycorfinal integer the experiment flow and proving related to the SWP and advivals SWP, decreasing fitness and reproductive success and spossibly stressors will affect both the nycorfinal integer lead to the SWP and advivals SWP decreasing fitness and reproductive success and spossibly will monthly the constructed to the EVP construction and the permanent ROW. Vising will monthly the construction ROW and the responsing research following construction to allow for surface decreased from the removal representation or others and removal views and removal removal forms and removal remo
Operation & Mainfeasance		Privide imposts to individuals, habitat degradation.	regime, southight regime, soil compaction, altered compaction, altered soil compaction, soil compactine, competine, competition burial, competition	removal of over- and muk- carry vegetation, spraced of herbucons and invasive plant species	habitat, population, individuals	injuy, death	reproduction, industriane, indu	reproduction	3	This subsectivity will occur in the permanent ROW, which has already been disturbed by previous activities and no longer provides statished high and statement of the control of the control of the forest and myconfing; 8NP downstope of the permanent ROW will be affected by this statestivey. Soil compaction and removal of vegetation in the uploope data seas will uncertain all from the uploop of the agreement for which of the control of the permanent ROW. These stressors will affect both the succentrial fixed evaluation rates and soil monitors in ROW habited considered excussing changes exponentiation rates and soil monitors. BOW habited considered excussing the expectation of the permanent ROW. These stressors will affect both the succentrial fixed the advantage of the permanent ROW. These stressors will affect both the succentrial fixed the advantage of the permanent ROW. These stressors will affect both the succentrial fixed the stress and evaluations of wasteries and evaluation of wasteries and evaluation that the succession and resolution of the stressor of the secure of the succession of the stress and evaluation of wasteries of the secure of
Operation & Maintenance	md,	physical impacts to individuals, habitat alteration	chemical contaminants	а				NA	NLAA	This subscrives will score in the permanent ROW, which has already been disturbed by previous activities and no longer provides suitable habit SWP. We do not anticipate SWP. We establishing and growing in the permanent ROW possessment and no termoral for the test and mycord fing it for SWP downshop of the permanent ROW, herbicides will not be used, except on a lotal sach based on request from thindwarer or it management expected (Monthair Allay 2016, FERC 2017), Selective treatments using a retroated as the based on reclustral testment will be used in variety or noxious species. If therefore, are applied, its use will be retricted within 100 for SWP.
Operation & Maintenance		habitat degradation	etition	ad of herbaceous and usive plant species				NA	NLAA	This subscivity will occur in the permanent ROW, which has already been disturbed by previous activities and no longer provides suitable habit SWP. We do not anticipus CWP re-establishing and growing in the permanent ROW post-construction due to removal of both trees and anyour ling. For SWP downslope of the permanent ROW, methods described in the Exotic and Invasive Species Control Plan (Mountain Valley 2016) minimize imposts due to invasive species.
Operation & Maintenance	Vegetation Disposal (upland) - brush pile burning	neutral	none	NA	NA	NA N	NA	NA	NE	This subactivity will occur in the permanent ROW, which has already been disturbed by previous activities and no longer provides suitable habit SWP.

Table 1.	I able 1. Analysis of effects on small whorled pogonia.	whorsed pog	oma.							
Project Activity	Subactivity	Environmental	Stressor	Stressor Pathway (optional	f Exposure	Range of	Conservation Need	Demographic	NE NIAA	Continents
		Impactor Threat			(Resource Affected)	Respunse	Affected	Сопящиенсея	or LAA	
Operation & Maintenance	ROW repair, regrading, revegetation (upland) - hand, mechanical	physical impacts to individuals, habitat degradation	soil compaction, altored bydrology, changes to soil moisture, downslope erosion, burial, sedimentation	regrading, crosion	habitat, population, undividuals	injury, death	reproduction, habitat	numbers, reproduction	LAA	Insulverity will cave un the permeanent ROW, which has already been distincted by previous extitutions und to impact against he hashed for This hashed the form that the contract of the permeanent ROW and the contract of the permeanent ROW. These assessors and new reached contracts and alter additional tracts and alter additional ROW. These assessors will after the both the substitution and individual stores and the requirement reached and individual stores and the requirement reached and individual actions. The substitution and the results are recommended to the representation of the permeanent ROW and alter additional to the results and the results are additional and the substitution and additional actions and the results and the results and the results and the results and the substitution and results and the results and reproductive success.
Operation & Maintenance	ROW repair, regrading, revegetation (wetland) - neutral hand, mechanical	- neutral	none	NA	NA	NA	NA	NA	NE	SWP is not an aquatic species and not found in streams and welland areas.
Operation & Maintenance	ROW repair, regrading, revegetation - instream stabilization and/or fill	neutral	none	NA	NA	NA	NA	NA	NE	SWP is not an aquatic species and not found in streams and wetland areas.
Operation & Maintenance	Access Road Mantenance - grading, graveling	neutral	none	NA	NA	NA	NA	NA	NE	No temporary or permanent access roads proposed near SWP colony.
Operation & Maintenance	Access Road Maintenance - culvert replacement neutral	t neutral	none	NA	NA	NA	NA	NA	NE	No temporary or permanent access roads proposed near SWP colony.
Operation & Maintenance	General Appurtenance and Cathodic Protection Construction - Off ROW Clearing	neutral	none	NA	NA	NA	NA	NA	NE	Subsactivity not proposed near the SWP colony.
Operation & Maintenance	General Appurtenance and Cathodic Protection Construction - trenching, anode, bell hole	neutral	none	NA	NA	NA	NA	NA	NE	Subactivity not proposed near the SWP colony.
Operation & Maintenance	Inspection Activities - ground and aerial	neutral	none	NA	NA	NA	NA	NA	NE	This subactivity will occur in the permanent ROW, which has already been disturbed by previous activities and no longer provides suitable habitat for SWP.

Table 2. Analysis of effects on Virginia spiraea.

Comments	This subactivity will crush and possibly kill VASP plants and buy seeds in the construction ROW and ATWS. These activities will alter/degrade suitable habitat (changing lydrology, compacting soil, softmentain only the softmentain of VASP in the construction ROW and ATWS. AMMs (e.g., Upland Erosion Control, Revegedation, and Maniteannee Plan [FREC 2013], Exocia and Invasive Species Control Plan [Mountain Valley, 2016]. Restoration and Rehabilitation Plan [Mountain Valley 2015]. Solicy and proper soil of the construction and nivasive plants due to vehicle operation. We anticipate that a portion of VASP stems will be crushed and VASP seeds will be buried in the construction ROW and ATWS.	This subactivity will cut, dig up, bury, and/or crush VASP plains and seeds in the construction ROW and ATWS. These activities will alter/degrade suitable habitat (compacting soil, introducing invasive species, changing why plotoley, sedimentation proventing reestablishment of VASP in the construction ROW and ATWS post-construction AMMs (e.g., Upland Erosion Control, Revegetation, and Maintenance Plain FERC 2013a], Restoration and Rehabititation Plan (FMO main Valley 2017) has anticipated to reduce surface water truoff and sedimentation, on average 79% sediment containment (ESI 2017). Methods discerbed in the Exotic and thrustye Species Control Plan (Mountain Valley 2016) will maninize impacts due to invasive species. We anticipate that a portion of YASP sension will be builed in the Construction ROW and ATWS.	This subactivity will cut, dig up, bury, and/or crush VASP plants and seeds within the construction ROW and ATWS. These activities will alter/degrade suitable habitat (compacting soil, introducing invasive species, changing the drodey; sedimentation) preventing resetablishment of VASP in the construction ROW and ATWS post-construction. AMMS (e.g., Liphan Eforsion Cortio, Revegetation, and Maintenance Plan [FERC 2013a], Restoration and Rehabilitation Plan [FMC 2013a], Restoration Plant [ESI 2017). We anticipate that a portion of VASP setems will be blinded and VASP seeds will be buried in the construction ROW and ATWS.	VASP is a riparian/wetland species and is not found in upland areas. No impacts to riparian/wetland habitats are anticipated from this subactivity	VASP is a nparian/wetland species and is not found in upland areas. No impacts to riparian/wetland habitats are anticipated from this subactivity	This subactivity will occur in the construction ROW and ATWS. Methods described in the Exotic and linvasive Species Control Plan (Mountain Valley 2016) will minimize impacts due to invasive species. VASP is not a shade tolerant species; overtopping from above a species will eventually eliminate VASP. Effects from side trimming along the ROW will range from discountable to beneficial over an extended period of time.
NE, NLAA, or LAA	PAY	FAA		B	NE.	NEAA
Demographic Consequences 1	reproduction	reproduction	reproduction			
Conservation De	nutriion, habitat reproduction,	nutriion, habitat rep	nutrition, habitat rep	NA	NA	N Company
Range of Co Response Ne	injuny, death rep aut	injuny, death rep	injuny, death rep	AN A	NA NA	discountable - NA
Exposure (Resource Affected)	habitat, population, individuals	habitat, population, individuals	habitat, population, individuals	Y.	NA	4X
Stressor Pathway (optional)	vehicles	AA A	NA N	NA	NA	Y.
Stressor	compaction	burying, soil compaction, introduction of invasive species, cutting, diagning up, and crushing	crushing, digging up, cutting	none	none	altered sunlight
Environmental Impact or Threat	physical impacts to individuals, habitat alteration and/or degradation		physical impacts to individuals, habitita alteration and/or degradation	neutral	neutral	degradation
Subactivity	Vehicle Operation and Foot	Clearing - herbaceous vegetation and ground cover		Vegetation Disposal (upland) - idragging, chipping, hauling, piling, stacking	Vegetation Disposal (upland) - 1 brush pile burning	Vegetation Clearing - tree side trimming by bucket truck or helicopter
Project Activity	New Disturbance Construction	New Disturbunce Construction	New Disturbance -	New Disturbance - Construction	New Disturbance - Construction	New Disturbance - Construction

Table 2. Analysis of effects on Virginia spiraea.

Project Activity	Subactivity	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE, NLAA, or LAA	Comments
New Disturbance - Construction	Grading, erosion control devices	physical impacts to individuals, habitat alteration and/or degradation, temporary loss of habitat	crushing, burying, cutting roots	A A	A	A Z	Ą	V	NLAA	This subactivity will occur in the construction ROW and ATWS. Soil compartion and ground disturbance will increase surface water flow and erosion rates and alter surface and subsurface hydrology in the watershed, further degrading VASP habitat. AMMs (e.g., Upland Erosion Control, Revegetation, and Maintenance Plan [FERC 2013a], Resonation and Rehabilitation Plan [Notamism valley 2017]) are amticipated to reduce surface water ranoff and sedimentation, on average 77% sediment containment (ESI 2017). We anticipate no adverse effects.
New Disturbance - Construction	Treaching (digging, blasting, dewatering, open trench, sedimentation)	physical impacts to individuals, habitat alteration and/or degradation, temporary loss of habitat	crushing, burying, cutting roots	NA	2	МА	AN A	NA	NLAA	This subactivity will occur in the construction ROW. Digging, blasting, dewatering, open trench, and sedimentation will increase surface water flow and erosion rates and alter surface and subsurface. Inductions in the watersthed, further degrading VASP habitat AMMs (e.g., Upland Erosian Control, Revegeation, and Manitenance Plan [FERC 2013a], Restoration and Rehabilitation Plan [Mountain Valley 2017]) are anticipated to reduce surface water ranoff and sedimentation, on average 70% sediment containment (ESI 2017). We anticipate to adverse effects
New Disturbance - Construction	Pipe Stringing - bending, welding, coating, padding and backfilling	neutral	none	NA	NA AN	NA	NA	NA	NE	This subactivity will occur in the construction ROW, which has already been disturbed by previous activities and no longer provides suitable habitat for VASP.
New Disturbance - Construction	Hydrostatic Testing (water withdrawal and discharge)	neutral	none	NA	NA	NA	NA	NA	NE	The water used during hydrostatic testing will be stored, finesessary, at the dischage location. The dischage location is on the other side of the river, in an upland area not suitable for VASP.
New Disturbance - Construction	Regrading and Stabilization - restoration of corridor	neutral	none	NA	NA	NA	NA	NA	N	This subactivity will occur in the construction ROW, which has already been disturbed by previous early each of longer provides suitable habitat for VASP.
New Disturbance - Construction	Facilities - noise, lights	neutral	none	NA	NA	NA	NA	NA	NE	Subactivity not proposed within VASP habitat
New Disturbance -	Access Roads - upgrading existing roads, new roads temp and permanent - grading. graveling	physical impacts to individuals, habitiat alteration and/or degradation, temporary or permanent loss of habitat	crushing, changes in hydrology, orotaminants, burying, digging up	₹	habitat, population, individuals	injury, death	reproduction,	reproduction	ΓΑΑ	This subactivity will cut, dig up, bury, and/or crtssh VASP plains and seeds in the access road footprint. These activities will alter/degrade suitable habitat (compacting soil, introducing invasive species, changed in the colors preventing reestablishment of VASP in the access road footprint post-construction. AMMS, (e.g., Upland Erosion Control, Revegetation, and Maintenance Plan [FERC 2013a], Restoration and Rehabilitation Plan [HOurism Valley 2017] are anticipated to reduce surface water runoff and sodimentation, on average 779% sediment containment (ESI 2017). Methods described in the Exocia cand hivasive Species. Wo anticipate that a portion of VASP stems will be killed and VASP seeds will be buried in the access road footprint.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent - culvert installation	neutral	none	NA	NA	NA	NA	NA	NE	Subactivity, not proposed within VASP habitat.

Table 2. Analysis of effects on Virginia spiraea.

roject Activity	Subactivity			Pathway (optional)	(Resource Affected)	Response	Need Affected	Consequences	LAA	
New Disturbance Construction	Access Roads - upgrading existing roads, new roads temp and permanent tree trimming and tree removal	habitat alteration and/or degradation	altered sunlight	NA NA	NA	discountable - beneficial	W	NA	NLAA	This subactivity will occur along access roads. VASP is not a shade tolerart species, overtopping from arboreal species will eventually eliminate VASP. Effects from side trimming along access roads will range from discountable to beneficial over an extended period of time.
New Disturbance - Construction	Stream Crossings, flume	neutral	none	NA	NA	NA	NA	NA	NE	Subactivity not proposed within VASP habitat.
New Disturbance - Construction	Stream Crossings, dam & pump	neutral	none	NA	NA	NA	NA	NA	NE	Subactivity not proposed within VASP habitat.
New Disturbance - Construction	Stream Crossings, cofferdam	neutral	none	NA	NA	NA	NA	NA	NE	Subactivity not proposed within VASP habitat.
New Disturbance -	Structures Structures	habitat alteration and/or degradation	sedimentation, soil compaction	¥	limited to some habitat, population, few to some individuals	injury, death	reproduction, nabitat	reproduction reproduction	LAA	This subactivity will alter/degrade suitable habitat (compacting soil, introducing invasive species, changing by drology, sedimentation) preventing reestablishment of VASP in the access road footprint and ATWS post-construction. AMMs (e.g., Upland Erosion Control, Revegetation, and Maintenance Plan IFERC 2013a], Restoration and Rehabitiation Plan IMournata Valley 2017] has anticipated to reduce surface water runoff and sedimentation, on average 79% sediment containment (ESI 2017). Methods described in the Exote and Invasive Species Control Plan (Mountain Valley 2016) will minimize impacts due to invasive species. We anticipate that a portion of VASPs great will be builed in the access road footbrint and ATWS.
New Disturbance -	Crossings, wetlands and other water bodies (ron- riparim) - clearing	physical impacts to individuals, habitat alteration and/or degradation	burying, soil compaction, introduction of invasive species, cutting and crushing	¥	habitat, population, individuals	injury, death	reproduction, nutrition, habitat	reproduction	LAA	This subactivity will alter/degrade suitable habitatic (comparings onl, introducing invasive species, changing by drology, sedimentation) preventing reestablishment of VASP in the construction ROW, access road hopping, and ATWS post-construction. AMAs (e.g., Upland Eroston Control, Revegetation, and Maintenance Plan [FERC 2013a]. Restoration and Maintenance Plan [FERC 2013a]. Restoration and Methabilitation Plan [Mounian Valley 2017]) are anticipated to reduce surface water morif and enticipated to reduce surface water morif and fluwasive Species Control Plan (Mounian Valley 2017). Methods described in the Exotic and Invasive Species Control Plan (Mounian Valley 2016), will imminze impact due to invasive species 2016) will imminze impact due to invasive species We anticipate that any remaining VASP stems will be bursed in the
New Disturbance - Construction	Crossings, wetlands and other water bodies (non- riparian) - tree side trimming	habitat alteration and/or degradation	none	NA	NA	NA	NA	NA	NE	This subactivity will occur in the construction ROW, access road footperin, and ATWS, which have already been disturbed by previous activities and no longer provide suitable habitat for VASP.
New Disturbance - Construction	Crossings, wellands and other water bodies (non- riparian) - grading, trenching, regrading	physical impacts to individuals, habitat alteration and/or degradation	none	NA	NA	NA	NA	NA	NE	This subactivity will occur in the construction ROW, access road footprint, and ATWS which have already been disturbed by previous activities and no longer provide suitable habitat for VASP.
New Disturbance Construction	Crossings, wetlands and other water bodies (non- riparian) - pipe stringing	neutral	none	NA	NA	NA	NA	NA	NE	This subactivity will occur in the construction ROW, which has already been disturbed by previous activities and no longer provides suitable habitat for VASP.
Operation & Maintenance	Facilities - vehicles, foot traffic, noise	neutral	none	NA	NA	NA	NA	NA	NE	Subactivity not proposed within VASP habitat.

Table 2. Analysis of effects on Virginia spiraea.

NE, NLAA, or Comments LAA	NE This subactivity will occur in the permanent ROW, which has already been disturbed by previous activities and no longer provides suitable habitat for VASP. We do not anticipate VASP re-establishing and growing in the permanent ROW post-construction due to removal of plants, seed, and alternion/removal of habitat.	NE Subactivity not proposed within VASP habitat	NE Subactivity not proposed within VASP habitat.	NE VASP is a nparian/wetland species and is not found in upland areas. No impacts to riparian/wetland habitats are anticipated from this subactivity.	NE IN UPASP is a nparian/wedland species and is not found in upland areas. No impacts to nparian/wedland habitats are anticinated from this culturativity.	NE VASP is a riparian/welland species and is not found in upland areas. No impacts to riparian/welland habitats are enticioned from this subactivity.	NE This subactivity will occur in the permanent ROW, which has already been disturbed by previous activities and no longer provides suitable habitat for VASP. We do not anticipate VASP re-establishing and growing in the permanent ROW post-construction due to removal of plants, seed, and alteration/removal of habitat.	NE This subactivity will occur in the permanent ROW, which has already been disturbed by previous activities and no longer provides suitable habitat for VASP. We do not anticipate VASP re-establishing and growing in the permanent ROW post-construction due to removal of plants, seed, and alternation/removal of habitat.	NE This subactivity will occur along access roads, which has already been disturbed by previous activities and no loneer provides suitable habitat for VASP.	NE This subactivity will occur along access roads, which has already been disturbed by previous activities and no loneer provides suitable habitat for VASP	NE VASP is a riparian/wetland species and is not found in upland areas. No impacts to riparian/wetland habitats are anticipated from this subactivity	NE VASP is a riparian/welland species and is not found in upland areas. No impacts to riparian/welland habitats are anticipated from this subactivity	
Demographic Consequences	NA	NA	NA	NA	NA	NA	NA A	NA A	NA	NA	NA	NA	Company of the Compan
Conservation Need Affected	NA	NA	NA	NA	NA	NA	NA.	NA A	NA	NA	NA A	NA V	CONTROL OF THE PARTY OF THE PAR
Range of Response	NA	NA	NA	NA	NA	NA	K Z	N.	NA	NA	NA	NA	
Exposure (Resource Affected)	NA	NA	NA	NA	NA	NA	A.A.	NA	NA	NA	NA	NA	The second secon
Stressor Pathway (optional)	NA	NA	NA	NA	NA	NA	A A	NA A	NA	NA	NA NA	NA	
at Stressor	none	none	none	none	none	none	none	поле	none	none	none	none	The second secon
Environmental Impact or Three	physical impact to individuals	neutral	neutral	neutral	neutral	physical impacts to individuals, habitat alteration and/or degradation	physical impacts to individuals, habitat alteration and/or degradation, temporary or permanent loss of habitat	physical impacts to individuals, habitat alteration and/or degradation, temporary or permanent loss of habitat	neutral	neutral	neutral	neutral	
Subactivity	Wegetation Management - mowing	Vegetation Management - chainsaw, tree clearing, tree side trimmine	on Management - s - hand, vehicle aerial applications	- 0	oosal (upland) -	ROW repair, regrading, revegetation (upland) - hand, h mechanical	ı (wetland) - hand,	ROW repair, regrading, prevegetation - instream h stabilization and/or fill p	Access Road Maintenance - n grading, graveling	Access Road Maintenance - n culvert replacement	General Appurtenance and Cathodic Protection Construction - Off ROW Clearing	General Appurtenance and Cathodic Protection Construction - trenching, anode, bell hole	The state of the s
Project Activity	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	The second secon

Синисть	No impacts to stream habitats are anticipated from this action. Will not introduce sediment or contaminants into the streams or rivers.	Mountain Valley will implement AMMs to minimize sedimentation (e.g. The Uplan Passos) control, Revegatation, and Maintenance Plan IPREZ C.311 sla and Restoration and Relabilitation Plan Mountain Valley. 2017 outline the use of ensisten control measures and restoration of graded areas) but not to insignificant levels. Increased sedimentation and high turbidity areas will be unassible to RLP for foraging in the immediate vicinity of the crossing Increased sedimentation is anticipated to result in a loss of prey items and/or an ability to see the prey. We expect RLP to move to area with cleaner substantless turbid water to allow for foraging. Loss of streambank vegation is expected to result in increased water temperature and light regime in small areas. Changes in water to allow for foraging. Loss of streambank move from cleaned areas to areas with vegatative cover. Reamoral of vegetative cover from cleaned areas to areas with vegatative cover. Reamoral of vegatative cover is permanent and a presentative cover. Reamoral of vegetative cover is permanent shorts.	to interaction with the control acres will be unasoble to RLP for foraging interaction and dight through areas will be unasoble to RLP for foraging the interaction and the introduction areas will be unasoble to statistically of the consensity. Increased scaline and not a strainforth to a reast with cleaner substanteless turbid water to allow for foraging. Loss of strainbank vegetation is expected to result in interacted whater temperatures and tight regimn may affect the RLP proy base and make the habitat less satisable for RLP. We expect all RLP will move from cleaned areas to areas with vegetative cover; Removal of vegetative cover is permanent along a 10 it corridor and we do not expect RLP to return a not of the control and RLP covers in the result of the RLP for the result of the resu	No impacts to stream habitats are anticipated from this action. Will not introduce sediment of contaminants into the streams or rivers.	No impacts to stream habitats are anticipated from this action. Will not introduce sediment or contaminants into the streams or rivers.	Temperature increases from vegetation removal will be slight. The construction RON at waterbody, crossings is aurowed to 75 ft to minimize clearing of trees and riparian vegetation. Post construction, a 10 ft wide ROW will be maintained, which will further Isssen impacts from vegetation removal. Therefore, effects from this habitat change are expected to be insignificant.	We do not anticipate this subactivity will generate a large amount of rediment and AMAs will minimize sedimentation (e.g., The Upland Enssion Control, Revegetation and Mantineannes of any IPERC '2013] and Resourcion and Rehabilitation File (Mountain Valley 2017) outline the use of crossion control measures and restoration graded areas). Therefore, effects from this habitat change are expected to be insignificant.	This subscrivity occurs behind cofferdams and impacts to RLP from the placement and removal of cofferdams are discussed below. Effects from any noise generated from activity behind the cofferdam are expected to be insignificant. If blasting is necessary it will be conducted once the area has been isolated and RLP have been relocated; therefore we expect effects from blasting to be discountable.
NEAA.	R	IAA	TAN	NE NE	SE SE	NEAA	NEAA	MLAA
Demographie Consequences	NA	Numbers, reproduction, distribution	Numbers, reproduction, distribution	NA	NA	4 _N	NA NA	≱ .
Conservation Need Affected	NA	Breeding, Sheltering	Breeding, Feeding, Sheltering	NA	NA	NA	NA	NA
Range of Response	NA	Haras, Harn, Kill	Harass, Harm, Kill	NA.	NA	NA	NA	NA
Exposure (Resource Affected)	NA	Habitat, Population, Individuals	Habitat, Population, Individuals	NA	NA	NA	NA	NA
Stressor Pathway (optional)	NA	demeding bank, grubbing with heav, equipment, disturbing soil, water quality degradation since vegetation no longer provides stormwater filter or shade to stream	demiding bank, grubbing with heavy equipment, with the eavy equipment, disturbing soil, water quality degradation since vogestion to longer provides shade to sifream	NA	NA	habitat and water quality degradation since vegetation no longer provides shade to stream	Stormwater erosion	near, in-stream, and tributary earth disturbance may result in increased sedimentation, altered flow result in increased sedimentation and short return ungoundment, contaminant spills from equipment located in-stream and tributary, noise from in water work.
Stressor	None	Sedimentation, Increase in Water Temperatures, Decrease of dissolved oxygen	Sedimentation, Increase in Water Temperatures, Decrease of dissolved oxygen	None	None	Increase in Water Temperatures, Decrease of dissolved oxygen	Sedimentation	Sedimentation, Short-tern altered flow. Contaminants
Environmental Impact or Threat	Neutral	Habitat degradation and water quality degradation, Stress on individuals, Reduction in prey population	Habriat degradation and Sedimentation and Sedimentation Increase in Vagerdation Stress on Temperature individuals, Reduction in Decrease of prey population dissolved ox	Neutral	Neutral	Habitat degradation and water quality degradation, Stress on eggs	Temporary loss of habitat. Habitat degradation, Physical impacts to individuals, Reduction of prey population	Temporary loss of habitat, Water quality habitat, Water quality degradation, Physical impacts, Reduction of prey population
Subactivity	Vehicle Operation and Foot Traffic	Clearing - herbacoous vegetation and ground cover	Clearing - trees and shrubs	Vegetation Disposal (upland) - dragging, chipping, hauling, piline stackine	osal (upland) - ng	Vegetation Clearing - tree side trimming by bucket truck or helicopter	Grading, erosion coatrol devices	Trenching, (digging, blasting, dewatering, open trench, sedimentation)
Pipeline Activity	New Disturbance - Construction	8	New Disturbance - Construction	New Disturbance - Construction	New Disturbance - Construction	New Disturbance - Construction	New Disturbance - Construction	New Disturbance - Construction

	Commens	This subactivity occurs after the stream crossing has been isolated behind cofferdan and mipners to ELP from the pleatment and entervol of cofferdans are discussed below. Effects from any sediment that may leak through the cofferdan or noise generated from behind the cofferdan are expected to be insignificant.	Municipal water sources will be used for this subactivity. Discharge water will be discharged through sediment filters in vegetated uplands away from waterbodies as wellands. Therefore, we expect any effects to be discountable.	This suboctivity occurs behind cofferdams and impacts to RLP from the placement and removal of cofferdams are discussed below. Effects from any noise generated from behind the cofferdam are expected to be insignificant.	No impacts to stream habitats are anticipated from this action. Will not introduce sediment or contaminants into the streams or twens.	AR crossings will be spanned or existing crossing will be used. Effects from any instream impacts are expected to be discountable. Mountain Valley will implement TOYR March 15 - June 30.	This is not proposed at RLP crossings.
	MAA, or LAA	NLAA	NLAA	NLAA	92	NLAA	R
	cNeed Demographic Consequences	4	X	X X	NA	X.	NA
	Conservation Affected	A A	NA	NA	NA	₹X	N A
	Kangy of Response	NA.	NA	N N	NA	A	NA
		NA .	NA	NA	NA	Y _N	NA
	Stressor Pathway (optional)	near. in-stream, and tributary earth disturbance may result in increased sedimentation, allered flow result in increased sedimentation and short-term impoundment, contaminant split from and tributary, noise from in water work.	Withdrawal and discharge of water	tributary and/or near stream earth disturbance can cause minor increase in sedimentation. Stormwater revegetation can cause algae blooms which will lower dissolved oxygen.	NA	near, in-stream, and tributary earth disturbance may result in increased sedimentation, altered flow result in increased sedimentation and short-term impoundment, contaminate spalls from and tributary, noise from in water work.	tributary and instream earth disturbance can cause increase in sedimentation and turbfully. Equipment located in stream or tributary can increase chance of spills, allered flow velocities and temporary impoundment from in water work, minor noise from construction activities in water.
berch.	Siressor	Sedimentation, Short-term altered flow, Confaminants	Minor sedimentation, Altered flow	Minor sedimentation, Loss of prey, Contaminants	None	Sedimentation, Short-tern altered flow. Constitution of Loss of pression of Englishment of Spawrung, Crushing or removal of eggs	Sedimentation, Contaminants, Altered flow.
Roanoke log	Environmental Impact or Threat	Temponary loss of habita. Water quality degradation. Physical impacts, Reduction of prey population	Temporary loss of habitat, Habitat degradation	Permanent or temporary loss of habitat. Habitat degradation. Water quality degradation, Physical impacts to individuals, Reduction of prey	Neutral	Temporary loss of habitat, Water quality degradation, Physical impacts, Reduction of prey population	Permanent or temporary hoss of hebital, Habital degradation, Physical impacts to individuals, Reduction of prey population
Table 3. Analysis of effects on Roanoke logperch.	Subactivity	Pipe Stringing - bending, welding coams, padding and backfilling	Hydrostatic Testing (water withdrawal and discharge)	Regrading and Stabilization - restoration of corridor	Facilities - noise, lights	Access Roads - upgrading existing roads, new roads temp and permanent - grading, graveling	Access Roads - upgrading existing roads, new roads temp and permanent - culvert installation
Table 3. A	Pipeline Activity	New Disturbance - Construction	New Disturbance - Construction	New Disturbance - Construction	New Disturbance - Construction	New Disturbance - Construction	New Disturbance - Construction

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	Table 4 Anglycic of attacts on Mognolya lognowh	Table 3. Analysis of effects on Koanoke logoerch.

Сиппеця	Loss of streambank vegetation is expected to result in increased water temperatures and changes in light regime in small areas. Changes in water temperature and light regime may affect the RLP prey base and make the labinal less suitable for the RLP. We expect all RLP will move from areas where tree trimming and tree enroval occurs to arress with vegetative cover. Removal of vegetative cover is permanent along a 10 floorfidors and we do no expect RLP to return to these areas. No instream work will occur at RLP constant from March 15 – June 30.	This suboctivity occurs behind coffeedams and impacts to RLP from the placement and removal of coffeedams are discussed below. Effects from any noise generated from behind the coffeedam are expected to be insignificant. Any RLP upstream not relocated in the removal-brokaciani official might seek that the statement which when water is relocated in the removal-brokaciani official might be tearning when water is cleamacled through the flume, however this is extremely unlikely to occur. No instream work will occur at RLP crossing from March 15 – June 30.	Prior to instream disturbance (e.g., cofferdam installation, dowalering areas, instream oosstruction acceptate, dam renterness 75th from the instream disturbance area will be removed and released a minimum of 50 ft (15.24 m) downstream. Faid depiction surveys will be condended within the solited area now code an structures are in place. Relocating RLP, will minimize direct impacts. This portion of the action will be conducted by individuals with state permits and thus no additional clicica analysis is required If RLP upstream are not relocated in the removal/relocation efforts we unicipate they will be entrained when the stream is a divorted by pumping around the constitute place additionation and removal will result as a sediment/urbuildy downstream, increased additionation is anticipated to result in a the remonal post of mistream addition and will rease a sediment plume that will increase sedimentumbuild downstream increased additionation is anticipated to result in a the set opposite to an additional and will extend a sediment plume that will increase solutionation between the entire and the set of the prop. We expect RLP to move to area with cleaner substrain and such anticures are netword and undight pretures to be bestion levels. Effects from any sediment that may lest through the dam structures are expected to be integrated and with the contrast RLP crossing from March 15 – June et al.	Prior to instream disturbance (e.g., coffeedam installation, dewatering areas, instream ooustruction activities including bissings); fish from the instream disturbance area will be removed and released a minimum of 50 ft (15.24 m) downstream. Fish depletion streets will be conditioned within the isolated area once offerdams are in place. Redocining RLP will minimize durici impact. This portion of the action will be conducted by Individuals with state permits and thus no additional effects analysis is required. If RLP paperson are not relocated in the removal/alteocation efforts we analysis to required. If RLP paperson are not relocated in the removal/alteocation of from sun anticipant hely will be entrained when coffeedams are dewatered. Coffeedam and removal will result in the temporary 50 os finatema habitat and will recease sedimentality to see the proc. We expect RLP to move to acres with cleaner abstract until the instruming structures are removed and turbulay returns to baseline locks. Effects from any sediment that may less the through the cofferdam structures are expressed to be a substructural from the instrumination of the substructural from the support of the instrumination of the surface of the contract of the support of the substructural from the surface of the s	This is not proposed at R.L.P crossings.	Subactivity is not located in streams or rivers. In addition, if non-riparian then activity will not be adjacent to occupied babitat.	Subactivity is not located in streams or rivers. In addition, if non-riparian then activity will not be adjacent to occupied habitat.
NE. NLAA. of LAA	LAA	NLAA	LAA	LAA	B	NE NE	NE NE
Demographic Consequences	Numbers, reproduction, distribution	NA	Numbers, reproduction, distribution	Numbers, reproduction, distribution	NA	NA	NA
Conservation Need Affected	Breching, Feeding, Sheltering	NA	Breding, Feeding, Sheltering	Breeding, Feeding, Sheltering	NA NA	NA	NA
Range of Response	Harass, Harm. Kill	NA	Hanss, Barm, Kill	Harass, Harm, Kill	NA	NA	NA
Exposare (Resnurce Affected)	Habitat, Population, Individuals	V V	Habitat, Population, Individuals	Habitat, Population, Individuals	¥	NA	NA
dressor Pathway (optional) E	denuding bank, grubbing Harlin Bank, grubbing with heavy equipment. Perfect Bank Bank Bank Bank Bank Bank Bank Bank	distrubance and distrubance and distrubance can cause increase in sedimentation and murbdity. Edupment located in stream or tubulance cause of spills, and increase chance of spills, and elected flow velocities and temporary impoundment from in-water work, minor noise from construction activities in water.	stream nay result entation settl in tation, from in am could tream tes, noise c	rehutary and near stream earth disturbance may result in increased sedimentation increased sedimentation, contaminant spills from equipment located in ributary stream, dan could restrict updowns stream movement of species, roise from in water work.	in thousy and in stream earth of disturbance can cause increase in sedimentation and increase chains can cause in action and any action and are any explains and increase chains and increase chains and from in various from in various from in construction activities in water.	NA	NA
Stressor	edimentation, nerease in Water emperatures, becrease of issolved oxygen	Sedimentation, of Altered flow in	Sedimentation, or Configuration, in the configuration of the configurati	Sedinomation, if it is in the first flow, in impoundment, at no lise of the first flow, in the flow, in the first flow, in the	Sedimentation, drawning in Altered flow, Notice in	None	None
Environmental Impact Society or Threat	Habitat degradation and State quality I degradation. Stress on Individuals, Reduction in prey population	Permanent or temporary Stone and Indiana Gegradation, Physical impacts to individuals. Reduction of prey population	Temporary loss of States o	Temporary loss of cocupted habitat, a occupted habitat, a habitat, a consideration of medivalents. Habitat in degradation, and water naturally degradation, and water population of prey population.	Permanent of temporary Stoss of hashitat Hapiotat degradation, Physical Impacts to Individuals, Reduction of prey population	Neutral	Ncutral
Pipelme Activity Subactivity Environmental Impact Stressor or Threat	Access Roads - upgrading existing I- roads, new roads temp and we permanent - tree trimming and di- tree removal	Stream Crossings, flume	Stream Crossings, dam & pump P		Structures Structures d d H H H P	Crossings, wetlands and other water bodies (non-riparian) - clearing	Crossings, wetlands and other water bodies (non-riparian) - tree side trimming
Pipeline Activity	New Disturbance - Construction		- Construction	(ACTION OF THE OWNERS OF THE O	Now Disturbance 19	New Disturbance Construction	New Disturbance Construction

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ne Activity	Pareline Activity Environmental Impact Stressor or Threat	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE. NEAA.or LAA	Comments
New Disturbance - Construction	Crossings, wetlands and other water bodies (non-riparian) - grading, trenching, regrading	Neutral	Монс	NA	NA	NA	NA	NA	昱	Subactivity is not located in streams or rivers. In addition, if non-riparian then activity will not be adjacent to occupied habitat.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non-riparian) - pipe stringing	Neutral	None	NA	NA	NA	NA	NA	NE NE	Subactivity is not located in streams or rivers. In addition, if non-riparian then activity will not be adjacent to occupied habitat.
Operation & Maintenance	Facilities - vehicles, foot traffic, noise	Habitat degradation, Water quality degradation	Sedimentation, Contaminants	Stormwater runoff from pollution generating pavement, Stormwater erosion	NA	NA	NA	NA	NLAA	Subactivity is not located in streams or rivers.
Operation & Maintenance	Vegetation Management -	Neutral	None		NA	NA	NA	NA	NE	No impacts to stream habitats are anticipated from this action. Will not introduce sediment or contaminants into the streams or rivers.
Operation & Maintenance	Vegetation Management - chainsaw, tree clearing, tree side trimming	Habitat degradation and water quality degradation, Stress on individuals, Reduction in prey population	Sedimentation, Increase in Water Temperatures, Decrease of dissolved oxygen		NA NA	NA	NA	NA	NLAA	Post construction, a 10 ft wide ROW will be maintained, which will further lessen impacts from vegetation removal. Effects from this habitat change are expected to be insignificant.
Operation & Maintenance	Vegetation Management - herbicides - hand, vehicle mounted, aerial applications	Habitat degradation and water quality degradation, Stress on individuals, Reduction in prey population	Contaminants	exposure to chemicals pills and stormwater	NA	NA	NA	NA	NLAA	Herbicides use will be on a local scale after a request from the landowner or land management agencies. Effects from this subactivity are expected to be insignificant.
Operation & Maintenance	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	Neutral	Мопе	NA	NA	NA	NA	NA	别	No impacts to stream habitats are anticipated from this action.
Operation & Maintenance	Vegetation Disposal (upland) -	Neutral	None	NA	NA	NA	NA	NA	恩	No impacts to stream habitats are anticipated from this action.
Operation & Maintenance	ROW repair, regrading, revegetation (upland) - hand, mechanical	Habtut degradation, Water quality degradation	Minor sedimentation, Lowered dissolved oxygen, Contaminants	tributary and/or near stream earth disturbance can cause minor increase in sedimentation, Stormwater runoff, fertilizers used in revegetation can cause algae blooms which will lower dissolved coxygen	NA.	NA	NA	NA	NLAA	We do not anticipate this subactivity will generate a large amount of sediment and AMAs will minimize sedimentation (e.g., The Upland Erosion Couron), Revegetation, and Maintenance Plan [FERC 20134] and Restoration and Redabilitation Plan [Moountain Valley 2017] outline the use of crosion control measures and restoration of graded areas). Therefore, effects from this habitat change are expected to be insignificant.
Operation & Maintenance	ROW repair, regrading, revegetation (welland) - hand, mechanical	Permanent or temporary loss of habitat. Habitat degradation, Water quality degradation, Physical impacts to individuals, Reduction of prey	Minor sedimentation, sedimentation, Contaminants: Contaminants:		NA	NA	NA	Y _N	NLAA	AMMs will minimize contaminant spill (e.g., Spill Prevention, Control, and Countermeasure Plania and sedimentation (e.g., The Upland Ensoin Counto), Revegetation, and Maintenance Plani [FERC 2013a] and Restoration and Retubilitation Plani [Mountain Valley 2017] outline the use of teosion control measures and restoration of graded areas) impacts, we do not anticipate this subscrivity will generate a large amount of sediment. Therefore, effects from this habitat change are expected to be insignificant.
Operation & Maintenance		Permanent or temporary loss of habitat, Habitat degradation, Water quality degradation, Physical impacts to individuals, Reduction of prey	sedimentation, Johanniants, Altered flow	7 7	NA .	NA	NA	NA N	NLAA	Seeding and planting native bare-root seedlings (strubs and tree saplings) at RLP crossing will Estilize orpansa stellization and resortion. Seeding will cocur promptly after construction is complete; if ground conditions delay restoration, a Winter Construction Plan will be implemented. Therefore, effects from this habitat change are expected to be insignificant.
Operation & Maintenance	Access Road Maintenance - grading, graveling	Temporary loss of habitat, Habitat degradation, Physical impacts to individuals, Reduction of prey population	Sedimentation	m earth e ition	NA	NA	NA	NA	NLAA	Vegetation maintenance will be limited in the 50 ft adjacent to waterbodies, maintening ground and vegetation distrubence. AbbAts (e.g., the Jephan Eroson Control, Revegetation, and Maintenance Plan [FRRC 2013a], Restoration and Rehabilitation Plan [Mountain Valley 2017]) outline the use of erosion control measures and restoration of graded areas, we do not anticipate this subactivity will generate a large amount of sediment. Therefore, effects from this habitat change are expected to be insignificant.

Pipeline Activity Subactivity	Pycline Activity Subscrivity Environmental Impact Stressor or Threat	Environmental Impact Stressor or Threat	Stressor	Stressor Puthway (optional) Exposure (Resource Affected)	(Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE. NLAA, or LAA	Синисаля
Operation & Maintenance	Access Road Maintenance - culvert replacement	Pernament or temporary loss of habitat. Habitat degradation, Physical impacts to individuals, Reduction of prey population	Sedimentation, Contaminans, Altered flow	tribunay and in stream earth disturbance can cause increase in sedimentation and urbdidity. Equipment located in stream or tribunay can increase chance of spills, altered flow velocities and temporary impoundment from in . water work, minor noise from construction.	₹ Z	NA A	X	NA	E N	Culvert placement will not occur at RLP crossings.
Operation & Maintenance	General Apputenance and Cathodic Protection Construction - Off ROW Clearing	Habitat degradation and Sedimentativ water quality degradation, Stress on Temperature individuals, Reduction in Decrease of prey population	Sedimentation, Increase in Water Temperatures, Decrease of dissolved oxygen	activities in water, denuding bank, grubbing with heavy equipment, disturbing soil, water quality degradation since vegetation no longer provides shade to stream	NA	NA	NA	NA	EZ .	No impacts to RLP stream habitats are anticipated from this action. Will not introduce sediment or contaminants into the streams or rivers.
Operation & Maintenance	General Appurenance and Calhodic Protection Construction - trenching, anode, bell hole	Temporary loss of habitat, Water quality degradation, Physical impacs, Reduction of prey population	Sedimentation, Short-tern altered flow, Contaminants	near, in: stream, and tributary earth disturbance may result in increased sedimentation, altered flow result in increased sedimentation and short each sedimentation and altered flow result and tributary, noise from in waters work.	Habiat, Population, Individuals	Harass, Harm. Kuli	Breding, Feeding, Sheltering	Numbers, reproduction, distribution	PA .	Trenching will increase sedimentation. Increased sedimentation is anticipated to result in a loss of prey items and/or an ability to see the prey. We expect RLP to move to areas with cleaner substrate until the turbidity returns to baseline levels.
Operation & Maintenance	Inspection Activities - ground and Neutral	1 Neutral	None	NA	NA	NA	NA	NA	NE NE	No impacts to stream habitats are anticipated from this action. Will not introduce sediment or contaminants into the streams or rivers.

CHARLES SECTION 1	t abic 4. Analysis of circus on indiana bat.	on indiana bat.		The second secon						
Pipeline Activi	Subactivity	Environmental Impact or Phreat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Comtervation Need Affected	Demographic Consequences	NE NLAA. or LAA	Comments
New Disturbance	vehicle Operation and Foot Traffic		daytime arousal	human presence	all life stages, spring-fall	NA	NA	NA	NLAA	Effects of noise from this activity are anticipated to be insignificant and from adjacent roost trees.
New Disturbans - Construction	Cleaning - herbaceous vegetation and ground cover	Wegetation removal, human activity, and disturbance	alteration of summer roosting/foraging habitat & staging/swarming habitat, daytine arousal	vegelation romoval. human presence	all life stages, spring-fall	NA	NA	NA	NEAA	Effects of rosse from this activity are unitejasted to be insignificant and I then a alsocapt root trees or disturb historialing bits. Mowing berbacoous bits are present in hinkal is expected to effect the quality, quantity, and resources, knowever, the effect on bits foraging is anticipated to be insignificant area of impact within a buff s-2.5 mile home range.
- Constitution	Clearing - tross and alrubs	Tree transvol, loss or alteration of forcested habitist, imman distarbance	allection of sunting the state of sunting the state of st	presence	all Me stages, spring "fall	kuli, njuwe, hurm.	brooking, sholtering	reproduction	LAA.	These removed during winter in known use and unknown use summer halo predation, nether depressions access, and or reduced pup aurey stocks and or chain control for an invitability of the country of the analysis of the country of the analysis of the analys
New Disturbance - Construction		Human activity and disturbance, obstructed hibernacila entrances or vents:	loss or alteration of hibernation conditions, hibernacula no longer suitable, daytime arousal	alteration of water or air flow in/out of hibernacula, human presence	all life stages, all seasons	V.	NA	NA	NLAA	AMMs avoid potential impacts to hibermontal, effects from noises are anti- magnificant and not flush but from adjacent root trees. We do not suffi- buts when they are hibermating based on the protections included in the K- Plain provided in the PEIS (FEEC, 2017) and the information provided it Suitable Hibermoule within the Action Area table (M.D. Stahl, EQT, en J. Stainbop, and S. Hoskin, Service, November 9, 2017). Additionally, as 2017b).
New Disturbance - Construction	e Vegestoro Disposal (upland) - brush pile burang	Human activity and disturbance, smoke	alteration of hibernating conditions, daytine arousal	smoke, human prosence & poise	all life stages, all seasons	NA	NA N	NA	NLAA	When barming bruth piles whitm C25 mile of Drown or premated security from August 15-46 by 15, tends piles will be no larger than 25-61 by 25-41 (10-44) gard, and the first of larger than 25-61 by 25-41 (10-44) gard, and located at least 10-44 from liberancolal entirmees and a largiboles, fixenes, or other kards features. Effects to last from this smok anticipated to be tanganificant. Adults will prevent smoke from entering anticipated to be tanganificant. Adults will prevent smoke from entering protections included in the Karth Militagione Plan provided in the Prematulity Business Plan provided in the Prematulity Smith Birthemscale within the birth Militagione Plan provided in the Prematulity Smith Ellipsemscale within the birth Militagione Plan provided in the Armal 10-71. Learnon, J. Stambope, and S. Hoskin, the Vorenthe Q. 20). Additionally, we do not anticipate impose to Tawne by Archivente and soulouse markers (PRRO 2017).
New Disturbance - Construction	e Vegetation Clearing - tree side transming by bucket truck or helicopter	Human activity and disturbance	daytime arousal	human presence & noise	all life stages, spring-fall	NA	NA	NA	NLAA	Tree removal, linb frimming, or pruning will be conducted between Nov Merch 51s avoid disturbance to busk, except in neases of human sidely. It restriction cannot be met, a qualified but biologist will investigate the two bust to avoid adverse affects (coordination with the Service will occur profile fraction from noise are anticipated to be insignificant and not findicate roces trees.
New Disturbance - Construction		12-21-41-11-7-41-11-11-11-11-11-11-11-11-11-11-11-11-	altered water flow & humidity in hibernacula	altered water flow	all life stages, all seasons	NA	NA	NA	NLAA	Effects from noise are anticipated to be insignificant and not flush buts for trees. AMMs will prevent discharge of a significant amount of water into of known inbernacula. We anticipate effects to inbernating buts from floor insurancent.
New Disturbance - Construction	e Terretning (digging, blasting, devastering, open treach, sedimentation)	Human activity, ground disturbance, instream and riparian disturbance, temporary devalering	loss or alteration of Inhermental, devensed aquatic invertebrates, daytime arousal	loss or alteration of hibermouth, insteam hibermouth, insteam sedimentation & water flow disruption, human presence & noise	all life stages, all seasons	NA	NA	NA	NLAA	AbMos inmi potential impacts to inherracula by restricting biasting with harmonia. APP SPDESE permit (WV) and Protes Specific Standards Plan (VA) are expected to limit the foss of aquatic invertebrates. Therefore that my foss of Plan front gas will be minor and effects. to linst will be impact not anticipate impact to belts when they are hibernating based on the pro- toveded in the Potentially Statistical Plenancial within the Astica Area EQT, email to T. Lemon, J. Stanhope, and S. Hoskin, Service. Novembe seedologic analysis (FFRC 2017).
New Disturbance - Construction	e Pipe Stringing - bending, welding, coating, padding and backfilling	Hunan activity	daytime arousal	human presence & noise	all life stages, spring-fall	NA	NA	NA	NLAA	Effects from noise are anticipated to be insignificant and not flush bats fruces.

	Comments	Telles from most we are anticipated to be insignificant and not flush bat from adjacent roots trees. AMAG will prevent discharge of a significant amount of water this the recharge are of known hiberancial. We anticipate effects to hiberanting bats from flooding will be imagedirean MVPs NPIDEs print (WV) and Profest Specific Similarité & Specifications Plant (VA) are expected to limit the loss of aquates inventories. Therefore, we anticipate that any loss of Bat fornige will be minor and effects to leats will be maganificant.	AMAKs will avoid potential impacts to hibernacula. Effects from noise are anticipated to be imaginificant and not fulls had from adjacent roots theres. We do not anticipate impacts to has when they are hibernating based on the protections included in the Karst Mingaton with a part of the protections included in the Karst Mingaton and the protections included in the Potentially Suitable Hibernacula within the Action Area table (AM D. Stah, EGT, cannil or T. Lenron, J. Stamboge, and S. Hoskin, Servoe, November 9, 2017), Additionally, we do not minimpate impacts to Tawney's Cave based on hydrologic and geologic analysis (FERC, 2017).	Effects from noise are anticipated to be insignificant and not flush buts from adjacent roost trees Effects from lighting will be minimized by inclinting a 7.00 a.m. to 7.50 p.m. work day and utilizing "full cut-off" lighting fixtures to maximize shielding to prevent unintentional labring of surrounding areas.	Q go a u u u u o r	AMA6s limit potential impacts to hibernacula. Effects from noise are anticipated to be impagingtent and not that has the imaginacine and an unticipien impact to has swhen they are hibernating based on the protections included in the Karst Mingaton bas when they great hibernating based on the protections included in the Karst Mingaton and an arranged and the Professional Conference on the Protection of the Amazon of Amazon of the Ama	The ermonel dering winter in larows use and valocom use animate habital will result in prodution, to aboded proguners macests, and/or reduced ups survival for a small presenting of individual lates. These effects will be prateed the first source after the small presenting of individual lates. These effects will be prateed the first source after the small presenting of court off. These removal in April, May, August, and September in unknown use summer habitat is removed between falls used under the construction of the sustain quadratic and the season after the small presenting of individual lates present with unknown use summer habitat will not be removal in unknown use summer habitat will be majured or appearance and order to the sustain discounted the court by We among these summer habitat will be impured on microson of individual lates present with unknown use sammer habitat will be impured on the removal in unknown uses among the impured of prediction. These removal in Latown uses and unknown use spring staking/full swarming habitat during whiter will tempor foreigning and organized with manufacturing the summer and abhrenium of the control of prediction. These removal in Latown uses and unknown use spring staking/full swarming habitat during whiter will tempor foreigning and organized with manufacturing the lates and abhrenium and in the control of the properties of the summer of the single manufacturing the lates and protections included in the Kara Mingatone Plan provided in the Planting (Hall swarming habitat and no impacts are animpated to Data phonom use spring staging/full swarming habitat during the Manufacturing and geologic analysis (PERC 2017). However, the other interprets of the summer was pring staging, for summer lates and the summer and summer and summer and survived (Or WNSS affected busy) of a small percentage of individual lates present with unknown use spring staging/full swarming behalts during of an understance of the summer and and oroning delaying full or decision and source will d	MΔΔΔ will provent discharge of a significant amount of votate into the recharge area of froom hieranceals and limit bising activities on the farst features will not be laired or deseroyed. Effects from noise are antiquated to be insignificant and not flush thus from allocate control affects from noise are antiquated to be insignificant and not flush thus from a capacide to easier impacts to statem float will be emprioury, instanced, and boatfized and not expected to easier suprofessible decrease in his foraging. We do not anticipate fleets to be the winter they are therefore the protections anticipate and many flush they are the protections anticipated in the Karst Matigation Plus provided in the PEIS (FERC 2017) and the information provided in the remainflush with the Action that a label (AI). Tree removal of the deep remainflush substitutive associated with this subscivity are analyzed in the subscivity. *Crossings.* wellands and other water bedues (non-inparium) - clearing.*
	OF LAA	NLAA	NLAA	NLAA	NLAA	NLAA	3	MAA
	Demographic Consequences	NA	NA	NA	NA.	NA N	numbers, reproduction	NA
	Convervation Need Affected	NA	VV	NA	NA	NA	breeding, sheltering	NA.
	PROTEIN		all life stages, all seasons NA	all life stages, spring-fall NA	all irie stages, all seasons NA	all life stages, all seasons NA	all life stages, spring-fall kitl, myure, harm. harrass	all ife stages, all seasons NA
	(lea	BOOK AND DESCRIPTION OF THE PARTY OF THE PAR	alteration of water or air flow a injout of hibernacula, human presence			sirean sedimentation & arter flow disruption, human resence & noise	spelation removal, himan removal, himan removal, himan	vogedation removal, instrem a sedimentation & vater flow disruption, human presence & noise
	Stressur	2 a	loss or alteration of hibernation conditions, daytime arousal		, & 1e	altered vater flow & humidity in thermacula, decreased aguatic invertebrates, daylime arousel	alteration of summer roosing/foraging habitat, & p spring sugarg/full svarming habitat, daytime arrousal	alteration of summer of su
n Indiana bat.	Environmental Impact or Threat	Withdrawal/discharge of water into aquatic habitats, human activity	Human ectivity and disturbance, obstructed hibermacula entrances or vents			Human activity, ground disturbance, instream and riparian disturbance, temporary devadering	Toes removal, loss or alteration of forested habitat, human disturbances	Tree removal, loss or alteration of freedom of a freedom of the freedom of the freedom of the freedom of temperary devolering state of the freedom of temperary devolering
fable 4. Analysis of effects on Indiana bat.	Subactivity	Hydrostatic Testing (water withdrawal and discharge)	Regrading and Stabilization - restoration of corridor	Facilities - noise, lights			A Access Konding existing roads, now reads temp and permanent 'too trimming and the removal	Stream Crossings, flume
Fable 4. A				Vew Disturbance Construction	Vew Disturbance Construction	ew Disturbance Construction	Construction	Construction

forces	Tree removal, loss or alteration of forested habitst, human disturbance, instream and riparian disturbance, temporary dewatering	alleration of summer roosing/foraging habitat, & spring stagmag/fall swarming habitat, daytime arousal, decreased aquatic invertebrates, altered water flow & humidity in	vegetation removal, instream sedimentation & water flow disruption, human presence & noise	All life stages, all seasons	Response	NA .	NA NA	NEAA	Comments AMAS will prevent discharge of a significant amount of water into the recharge area of Known inhermocial and initio blasting activities so that kars features will not be altered or destroyed. Effects from noise are antiqued to be insignificant and roll that has from adjectory to exist impact to aream before will be temporary. Insined, and localized and not expected to cause any noticeable decrease in Des fronging. We do not anticipate effects to have when they are inhermants besed on the proceedings andeled in the Karst Mingaton Plan provided in the FISIS (FERC 2017), and the information provided in the
Tree removal, loss or foreste habitat, huma instream and riporian temporary devatering	Tree removal, loss or alteration of forested habitet, human disturbance, instrum and ripturbance, temporary devatering	hibernacula alternion of summer roosingforeaging habitat, & 1 genrag sagging fall svarming labitat, daytime strong, decreased appatic moracle decreased appatic flow & humidity in hibernacula	vegotation removal. instream sedimentation & veter flow distription, human presence & noise	all life stages, all scasous	X	¥X	NA	NLAA	Poentially Suitable Hieranculas which the Action Area table (ALD Stabil, EOT; entail to articulate Stabil S
ios sted habitat, l'eam and ripa orary dewate	Tree removal, loss or alteration of forested habitat, human disturbance, instream and reparint disturbance, temporary develoring	alteration of summer received the state of second sec	vegetation removal, instream sedimentation & vaser flow disruption, human presence & noise	all life stages, all seasons	NA	NA	₹.	NLAA	activities associated with this subsectivity the stantyces of the subsectivity. Crossings, wedinnis and other water bodies (non-riparian) - clearing. And/As will percent dischange of a significant amount of water into the recharge area of hardward information of the control
removal, lo sted habitat,	Tree removal, loss or alteration of forested labitat, human disturbance.	alteration of summer roosing/foraging habitat, & 1 governing angarge/foraging swurming labitut, daytime arousal	presence	all life stages, spring-full	koll injure, harm, haras	breeding, sheltering	g numbers, g reproduction reproduction	3	Tree removal during winter in known use and unknown use summer habitat will result in predation, reduced pregnatery success, and/or reduced pay autival for a small percentage of individual loats. These effects will be greatest the first season after tree removal has occurred. The removal in Agril, May, August, and September in unknown use summer habitat is repected to affect buts using unbocumented occupied noots and foraging areas. Most tree removed between June 1 and July 31 when young canned filty. We mitchigate sea mail percentages of individual lesses present with unknown use summer habitats will be inputed or Richard in language for the season of the season of the season and the removed between June 1 and July 31 when young canned filty. We mitchigate sea mail percentage of individual lesses present with unknown use summer bathats will be inputed or Milled (duths and volunt young) from the felling of an undocumented occupied voint increased orenge expenditure from the less of foraging habital, and ningty or death as a result of predation. The remove foraging area for a concentrated number of libate in an abhericated states of the season of the presentation of the season of the presentation of the season of the presentation was getting statisfied an united pated their such that is a subject pole libate.
									will be present during the removal activities in Known he spring allagorial is systeming babbilist and no impacts are anticipated to like inhermouls of thermouls but based on the protections included in the Karn Mightion Plan provided in the ENGEN 2017), and the information provided in the Potentially Statishe Hibermouls within the Action Area table (KD Stall, PCC), and in V. I cromen. J. Statishes, and S. Hosbilis, Service. Nocember 9, 2017) Additionally, we do not anticipate impacts to Travalys's Carlo contribution and proper and polopieg, and polopieg, and polopieg and polopieg and any of a major is CA 2017by. However, tree clearing will result in themporary or permanent labitations, which we expect will cause decreased breeding success and survival (of WNS affected buts) of a small perventage of individual librits.
									Tree removal in unknown use spring staging/full swamming habitat during the active season will disrupt their engaging in its lawarming, pating staging, and cooking behavior. A mail percentage of indvokala Bont present with unknown use apring staging/full swamming habitat will be injured or leftled (duling and chaint young) from the felling of mulcountented coupled cost thee, will repetitione reduced pregamely success and/or frontees by un parvival accounted to the control for the control f
or alteration an disturbance	Loss or alteration of forested habitat. human disturbance	alteration of summer roosting/foraging habitat, & spring staging/fall spring swarming bablist, daytine arousal, roost abandomient, increased predation due to daytime activity	alteration of summer vegetation removal, human roosing/foreignig abitat, & disturbance apring signing/all septing septing signification of the continuous and septing	all life stages, spring-fall	NA.	NA	₹ _N	NLAA	Another minimize potential effects to buts from vogetation removal. Effects to buts from allentiments to travel controls and foreigng hisbit are anticipated to be unsignificant alleftest from notice and entitivity or anticipated to be unsignificant and not cause buts to flatflest from notice and entitivity or anticipated to be insignificant and not cause buts to flatflest from notices and entitivity or anticipated to be insignificant and not cause buts to limit for order to conducted between hovember 15 and March 31 to avoid disturbance to buts, ovcept in cases of human safety. If the sussonal restriction cannot be mel, a qualified but biologically will investigate the trees for the presence of the size to avoid adverse affects (coordination with the Service will occur note to this effort).
ration of surfitation remova and disturban	Alteration of surface water flow, vegetation removal, human activity, wedland disturbance	flooding hibernacula, decreased aguatic invertebrates, alteration of spring slaging/fall swammig habitat and sumner roosting and foraging habitat, daytime	removal of welland vegetation, a water disruption, alteration of water or ar flow in/out of hiberneoila, human presence & noise	all life stages, all seasons	¥.	KX	NA A	NLAA	AbMs will limit potential impacts to hibernacula. Effects from noise are articipated to be impagnificant and not flush bats from adjacent rooss trees. Impacts to welland holes will be temporary, limited, and localized and not expected to cause any noticeable decrease in But foreging.

Pipeline Activit	Pipeline Activity Subactivity Environmental Impact of	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exporure (Resource	Range of	Conservation Need	Demographic	NE, NLAA,	Comments
New Disturbance - Construction	The state of the s	Human activity	daytime arousal	human presence & noise	all life stages, spring-fall	NA	NA	NA	NLAA	Effects from noise are anticipated to be insignificant and not flush bats from adjacent roos trees.
Operation & Maintenance	Facilities - vehicles, foot traffic, noise	Increased human activity and disturbance	daytime arousal	human presence	all life stages, (not hbernation)	NA	NA	NA	NLAA	Effects from noise are articipated to be insignificant and not flush buts from adjacent ross trees or impact foraging bats or buts using travel corridors. NOTE vehicle impacts for all Okek subscribings are evaluated bere (i.e., vehicle impacts will not be considered under the remaining Okek adulectricities).
Operation & Maintenance	Vegetation Management - mowing	Vegetation removal, human activity, and disturbance	alteration of summer roosting/foraging habitat & staging/swamning habitat, daytime arousal			NA	NA	NA	NLAA	Effects from noise are anticipated to be insignificant and not flust bats from adjacent roost to see or impeti Cingago blas of his using travel cardiora. Moving therebecaus vegetation while but are present in labrial is expected to effect the quality, quantity, and timing of the personances, bowever, the effect on but foreign is anticipated to be insignificant due to the small area of impact within a but s.2. Stink bone names.
Operation & Mauritenance	Organizon Management: chainsaw, tree clearing, and tree side trimming	Tree removal, loss or alteration of forested labritut, human disturbance	alteration of travel controllers, summer prooring/foreaging habitat, & segring skiging field that & syring skiging field that the syring skiging field abitation in the syring skiging field fie	disturbance	all life singes, spring-fall le	harass	breeding, sheltering	nunbers, respondacion,		produktivity reduced programsy success, and/or reduced pape, assiving the relution produktivity reduced programsy success, and/or reduced pape assiving to consider the reduced programsy success, and/or reduced pape assiving for a small percentage occurred for individual hats. These effects will be greatest the first season after tree removal in April, May, August, and September in unknown use summer habitat is successed to a first design guests. Most tree removal in achieves the state using middle content for design guests. Most tree removal in achieves us a manner habitat vall occur during winter and trees will not be removal in the state using middle removal in such content of the state of the st
Operation & Maintenance	Vegetation Management - herbicides - hand, vehicle mounted, aerial applications	Chemical contamination, vegetation loss	lethal or sublethal exposure to toxins alteration of travel corridors, summer roosting/foraging habital, & spring staging/fall swarming habitat			NA	NA	NA	NLAA	Implementation of AMMs makes potential impacts to inhermating but extremely utilisely to occur, the amount of stare to be trested that could be Diet roseling, foregang, or traveling habitat is very small; making exposure extremely unlikely to occur. Acrial spraying will not be utilized for invasive species control along the ROW.
Operation & Maintenance	Vegetation Disposal (upland) - dragging, chipping, hauling, pling, stacking	. Or	loss or alteration of hibernation conditions, hibernacula no longer suitable, daytine arousal	alteration of water or air flow invoit of hibernacula, human presence		NA	NA	A X	NLAA	AMMs avoid potential impacts to hibernacula. Effects from noise are anticipated to be buggifficant and roft flash bit from adjacent root trees. We do not anticipated impacts to bast when they are hibernating based on the protections included in the Karst Mitgation bast when they are hibernating based on the protections included in the Karst Mitgation Suitable provided in the FIG 1878 (2778) and the formation provided in the FO centality Suitable privated as PHER (1878 CATO) and at table (ALD Statis), EQT, Camal to T. Lennon, J. Stambope, and S. Hoskim, Service, November 9, 2017). Additionally, we do not enterplace impacts to Tawney's Cave based on hydrologic and geologic analysis (FERC 2017).
Operation & Maintenance	Vegetation Disposal (upland) - brush pile burning	Human activity and disturbance, smoke disturbance	smoke inhalaton during hbernaton, increased arousal, daytine distributione, roost distributione, roost predation due to destributione activity degrine activity	smoke un hibermacula or roosting habitat	all life stages, all seasons ?	NA	NA N	NA	MAA	Ambar burming bytes with no 25 min et factows or presumed ecoughed thermodal from August 15 - May 15, brub piles will be no larger than 75-ft by 25-ft, spaced at least 110-ft, part, and located at least 100-ft from historical entrances and sesociated at least studyholes, fisusus, or other larst features. Effects to be the from this smole in summer anticipated to be insegnificant. Alables will prevent smoke from entering historicanian to the protections are included in the Karst Mingation Plan provided in the PEIS (PERC 2017) and protections are included in the Karst Mingation Plan provided in the PEIS (PERC 2017) and the formation provided in the Perchantily Studied believance with the Action Area table (ALD Stall, EGT, email 10°T, Lemon. 1. Stumbops, and S. Hoshan, Service, where the 2.0.7). Additionally, we do not anticipate impacts to Tawnery's Cave based on hydrologic and prologic analysis (PERC 2017).
Operation & Maintenance	ROW repair, regrading, revegetation (upland) - hand, mechanical	Vogetation removal, loss or alteration of forested labitist, human disturbance	alteration of summer roosting/forgang habitat, & spring stagma/fall swarming habitat, daytime arousal	vegetation removal, human disturbance	all ife stages, spring-fall }	¥x	NA	V Z	NLAA	Effects from noise are anticipated to be integnificant and not flush but from adjacent roots trees. In accordance with FERC'S Upland Ecosion Control, Revegetation, and Manineanove Plan, vegetation manineanoverbemoval will ribe the done more frequently than every 3 years. Plan, vegetation manineanoverbemoval will ribe the done more frequently than every 3 years (PECC 2013a), Who choos and reflects from vegetation removals because trees will not be large enough to support bas. The removal, limb transming, or pramag will be not being enough to support bas. The removal, limb transming, or pramag will be caseed a formation of the conditional cases of imman safely. If the seasonal restriction cannot be met, a qualified bat hologats with the vest for the pressure of beta to a void adverse effects (coordination with the Seasonal Technicology and adverse effects (coordination with the Seasonal Technicology and adverse effects (coordination).

Table 4.	Table 4. Analysis of effects on Indiana bat. Parties Activity Sobactivity	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposury (Resource	Sango of	Convervation New	f Demographic	NE NEAA.	Crimments
Operation & Maintenance	ROW repair, regrading, revegestion (wetland) - hand, mechanical	Vegetation removal, loss or alteration of forested labilate, human disturbance		alteration of summer rootingforegang habitat. & disturbance spring staggang/all arousal arousal	all life stages, spring-fall	NA NA	NA	≤ X	NLAA	Effects from noise are articipated to be insignificant and not flush that from adjacent roost reves his accordance with FRICs's Upland Frosion Control, Reveigation, and Manthenance Piran, vogetation maniferance/errorout will not be done more thequatry than every 3 years (FRICs') 53, 38, 46 and on attaiguse effects from vegetation removal because trees will me be large enough to support bast. Tree removal, limb trainming, or pruning will be confuseded between November 15 and March 31 to sook distantance to their sceept in cases of human sidey. If the assessing returned cannot be made a qualified bat biologist will investigate the tree for the presence of bast to avoid adverse effects (coordination, with the Service will scent prior to this effort).
Operation & Maintenance	ROW repair, regrading, revegetation - instream subilization and or fill	Vogestion trenoval, loss or altertion of freested labitat, immar disturbance, instream and riparian disturbance	Allectrison of summer roses and summer spring shapital, & d spring shapital, & d symme shapital, All swamming biblish, daytime emousal, detectused squatic invertebrates	Vegetation removal, human disturbance	all life stages, spring-fall N	NA	NA	**	NLAA	Effect from noise or ancignated to be insegnificant and not flush bast from edjacent rootst frees. In accordance with FERC's Upland Forsion Control, Revegetation, and Manireamoe Plean, vegetation manieramochemotal will not be done more frequently than every 3 years (FERC 2013a). We do not anticipate effects from vegetation removal because tress will not be large enough to support bast. Tree removal, lamb transmig, or pruning will be conducted between November 15 and March 3 10 around disturbance to 8 stage, accept in cases of human safety. If the seasonal restriction ermot be mat, a qualified but biologist will investigate the trees for the presence of bats to novial deverse effects (coordination with the Service will cocur parto the fact of NAFP NAFES permit (VA) and Project Specific Standards & Specifications Plant (VA) are expected to limit the loss of aquather investedenties. Therefore, we anticipate that any loss of Past forage will be minor and effects to Bast will be insignificant.
Operation & Maintenance	Access Road Maintenance - grading, graveling	Vegetation removal, loss or alteration of forested habitat, human disturbance	alteration of summer roosing/foraging habitat, & spring staging/fall swarming habitat, daytime arousal	vegetation removal, human dishurbance	all life stages, spring-fall	NA	NA	₹	NLAA	Effects from noise are unicapsed to be insignificant and not flush that from adjacent rootal ruses. In accordance with FFRCs Upliand Foreign Control, Revegation, and Manhenaroo Plan, vegetation maintenance/reservoir will not be done more flequently dans every 3 years (FFRC 507 183, We do not antique of feeds from vegetation removal because trees will not be large enough to support bast. Tree removal, land transmig, or pranting will be conducted between November 15 and March 31 to sook distributions of basts, except in cases of human sticky If the seasonal restriction cannot be must, a qualified but biologist will investigate the tree for the presence of bast to avoid adverse effects (coordination with the Service will scent roots to this effort).
Operation & Maintenance	Access Road Maintenance - culvert replacement	Vegetation removal, loss or alteration (foreisted half), imma disturbance, instream and ripating disturbance, temporary dewatering	decreased aquatic precreterates, daytine arousal	vegodakon removal. instrum sedimentakon, & vuker flov disrupton, human disturbance	all life stages, spring-fall ?		NA	V V	NLAA	Effects from noise are anticipated to be insignificant and not flush bats from adjacent roost trees. In accordance with FECCs by plant Brosson Control, Revegation, and Manhemano Plan, vogetation maniferance/trenoist with 180 for done more frequently than every 3 years (FERC 2013s). We do not simplested feels from vogetation removal because trees will not be large enough to support bast. Tree removal, into trimming or pruning will be conducted between November 15 and Mench 31 to so, one of disturbance of bast, except in cases of human safety. If the seasonal restriction cannot be met a qualified but biologist will investigate the trees for the presence of bast to avoid adverse effects (coordination with the Service will cour prior to his facility APPE 25 permit (WV) and Project Specific Standards & Specifications Plant (VA) are expected to limit the loss of aquatic methods that surplies of blast will be minor and effects to Dast will be minor and
Operation & Maintenance	Carrent Appartenance and Cabodie Protestive Construction - Off ROW Clearing	Tree removal, loss or alteration of forested habitat, human disturbance	alterston of summor recenting foraging habitat, & sporing staging full swarming habitat, daytime arrossal	presence burning presence	il life stages, sparing, and the stages, sparing, spar	kill, tijuve, karm,	brooking, abeliering	numbers, reproduction	W	Tree removal dungs worten in known use and unknown use summer behalts will lested in proceeding. Receipt in proceeding, needing in known to a set of merch behalt will lested in the processing of inching all place processing and the place of inching all place in the place of inching and in Agri. May, August and September in unknown use summer behalts is expected to after their susta unknownented occupied roots and foreigng mean Anisa trees removal in unknown use summer hibitat is expected to after their susta unknownented occupied roots and foreigng mean Anisa tremoval in unknown use summer hibitat will eventure of hilled coldusts and violage areas Anisa trees will not be preceding of inchivabal flats present with unknown use summer thibitat will be injured or falled coldusts and violage unyously from the folse of the summer thibitat will be injured or falled coldust and violage uyoung flower the falling of an unknownented occupied roots tree, will experience related programsy success and/or reduced pup survival associated with unknown will experience related programsy associated on the related of the summer thibitat and injury or death as a result of prodution. There removal in howen use and unknown use spring staging/fall swarming labeltal during wings will remove footing and routing areas from the following tree promogenes or fall swarming. We do not anticipate flush will be present during free princy allowings from the spring staging/fall swarming habitat during the present during free princy allowings of the present during free princy allowings of the present during the articy of main to T. Lerinor, J. Standards, and St. Renat. Anisa to the falled of the Processing and staging/fall swarming phale the falled of the Processing during the second programs of the processing processing processing processing of individual losts. Tree removal in unknown use spring assigna/fall swarming public during the early of members of programs and survival (of WNS affected bas) of a saniaghest may all generates of individual
Operation & Maintenance	General Appurtenance and Cathodic Protection Construction	Human activity and disturbance	daytime arousal	human presence	all life stages, spring-fall	NA	NA	NA	NLAA	Ordang, the most are stated to be insignificant and not flush bats from adjacent roost trees or impact foraging bats or bats using travel corridors.
Operation &	Inspection Activities - ground	Human activity and disturbance	daytime arousal	human presence	all life stages, spring-fall	NA	NA	NA	NLAA	Effects from noise are anticipated to be insignificant and not flush bats from adjacent

ipeline Activity	Pipeline Activity Environmental Impact of Threat	Environmental Impact or Threat	Stressor	Siressor Pathway (optional)	Exposure (Resource Affected)	Response	Conscitation Need Affected	Demographic Consequences	MA, or LAA	Сиппент
New Disturbance - Construction	Vehicle Operation and Foot Traffic		daytime arousal	human presence	all life stages, spring-fall	NA	NA	NA	NLAA	These effects have been previously addressed in the Service's programmatic biological sprincin amplementing the final 4(d) rule dated January 5, 2016. Additionally, effets of noise from this activity are anticipated to be insignificant and not flush bust from adjacent roost bress.
New Disturbance - Construction	Clearing - herbaceous vegetation and ground cover	man	alteration of summer roosting habitat, & staging/swarming habitat, daytime arousal	egetation remov resence	all life stages, spring-fall	NA	NA	NA	MA	Effects from tree clearing beyond 0.25 mile of a hibernacula have been previously addressed in the Service's sprogrammatic biological opinion implementing the final 4(4) rule dated January 5, 2016.
New Distarbance - Construction	Clearing - trees and shribs		alderation of summer rooting labitat, & v y adapting swaming labitat, daytime particular	vegedation temoval, human	all tic anges.	kell, harm, harass	brooting, sheltering,	numbers, reproduction	4	Effects from this activity will occur within 0.25 mile of 3 known hibermacula, clame Carlos Chem. A largery 2 feet, and 18-WW-14-24, and their is not example by the final 40 rule Approximately 16.8 acres of forest cleaning will occur within 0.23 mile of the helemenials, advantage of the control of the con
New Disturbance -	Vogetation Disposal (upland) - dragging, chipping, hauling, pilling, studying, pilling, studying, pilling, pill	Human activity and disturbance, Obstructed hibernacula entrances or vents	loss or altention of inhemation conditions, inhemecia no longer suitable, daytime arousal	alteration of water or air flow inout of hiverments. Iteman presence	all life stages, all seasons	NA N	×	e Z	MA	Effects from two electric between 1 states of a hibernacula have been previously addressed in the Service's apparaments beloggiest opinion implementing the final addressed in the Service's apparaments beloggiest opinion implementing the final 4(3) rite dated January 5, 2016. Additionally, AMMs avoid potential impacts to hibernacelus, toose created from this scrivic is anticipated to be insignificant and would not result in the fluating of best from adjucent roost trees. We do not anticipate impacts to belts from when they are hibernaturg based on the protections included in the X-rat Mingingon Plun provided in the Fills (EREC 2017) and the AMM regarding Plan provided in the Fills (EREC 2017) and the AMM regarding Plan Pay-V-1 (At Salat). EQT, remail to P. Frichman, P.R.C. and J. Stanthope, Service, Movember 17, 2017). We do not anticipate impacts to Canno and Tawney's Cave based on hydrologic and geologic analysis (FERC 2017).
New Disturbunce -	Vogesaico Disposal (upland) - brush pile burning	Human activity and disturbance. Obstructed hibernacula entrances or vents	onditions of information conditions, hierarcula to longer suitable, daytune strougal	altention of vaster or air flow protestes	all tife stages,	∀ X	ž	Λ.	4.00.00 VM	Effect from tree clearing beyond 0.55 mile of a labormacula have been previously distracted from tree clearing beyond 0.55 mile of a labormacula have been previously distracted in the Service of programmatic hoogist of upinum majorenaming the first 400 rist dated Jamus 5, 2010. When burning breast piles within 0.25 mile of known or presented occupated hierarchical first August 5, 2010, 200 miles of the proposed at least 100-th paper, and focused at Abde 8 with major when the provided in the FERS CERC 2017) and the information provided in the November 2, 2017, Potentially Standard Berthermacula mile and the Abdrowned Additionally, we do not anticipate impact to hierarchical ES-WY3-Y-1-based on the Abdrograph gray Way-Y3-Y-1 (M. Salla) EQT, cannel 10 P. Frendam, FERC, and 1. Standage, Service, November 17, 2017. We do not anticipate impacts to cause and geologic analysis (FERC 2017) and 1. Standage, Service, November 17, 2017. We do not anticipate impacts to the Town of the Abdrograph Repart 17, 2017. We do not anticipate impacts to the Town of the Abdrograph Repart 17, 2017. We do not anticipate impacts to the Town of the Abdrograph Repart 100-th
New Disturbance - Construction	Vegetation Clearing - tree side trimming by bucket truck or helicopter	human activity	daytime arousal	human presence & noise	all life stages; all seasons	NA	NA	NA	MA	Effects from tree elearing beyond 0.25 mile of a hibernacula have been previously addressed in the Service's programmatic biological opinion implementing the final Affa nie clated lammer 5, 2016.
New Disturbance -	Grading, erosion control devices	alteration of water flow, vegetation removal; human activity	altered woter flow & humidity in hibernscula		all life stages, all seasons	VN	₽	NA.	VM	Effects from tree clearing beyond 0.25 mile of a hibermocula have been previously addressed in the Service is programmatic hoopsel optimize may maniplementing the first 40 cm definitionally, notice exested from this activity is underpoted to be insignificant and would not result in the finding of their from adjacent roots trees. AMMs prevent discharge of a significant amount of water mot her recluing area of known hibermocular placed medicionally, we do not attaching the hibermocular place and the Addriconally, we do not attaching the hibermocular place. Addrictionally, we do not attaching majore to hibermocula PS-WV3-Y-1 fased on the AMM engeting ps-Wy4-Y-1 (M. Shills, EQT, camel to P Friedman, FERC, and J. Sumhope, Service, November 17, 2017). We do not anticipate impacts to Canno and Tavney's Cave based on hydrologic and geologic analysis (FERC, 2017).
New Disturbance - Construction	Trenching (digging, blasting, dewatering, open trench, sedimentation)	human activity,ground disturbance; instream & riparian disturbance, temporary dewatering	decreased aquatic invortebrates, daytime arousal	instream sedimentation & water flow disruption; human presence & noise	all life stages; all seasons	NA	NA	NA	MA	These effects have been previously addressed in the Service's programmatic helogical opinion implementing the final 4(4) rule dated January 5, 2016. Additionally, if Shating is necessary value 10 S miles of a known or positivity in bleezing is necessary value 10 S miles of a known or positivity in bleezing a large species of the service of the servi
New Disturbance - Construction	Pipe Stringing - bending, welding, coating, padding and backfilling	human activity	daytime arousal	human presence & noise	all life stages; spring-fall	NA	NA	NA	MA	Transe effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated January 5, 2016.

	itic	eviously the final acula; d not te ed in the ation in the ation in the ula PS- mail to P. not	eviously the final ated to be ost trees. ag a 7:00 maximize	reviously; the final cula; d not te ed in the ed in the astion in the	the	ula, by the d d d d d d d d d d d d d d d d d d d	lic	the	tic	tic
omments	Those effects have been proviously addressed in the Service's programmatic	interesting optimization that the state of a historical manage is a processing of the state of t	Effects from use clearing beyond 12.5 miles of a historiscula have been proviously addressed in the Service's programmatic biological opinion implementing the final 4(4) rule dated Jimany 5, 2016. Noise created from this activity is anticipated to be insignificant and would not result in the finalizing of has from adjuent roots (trees. Additionally, adverse effects from lighting will be minimized by instituting a 7/30 as in 0.700, pa. m. work day and ultiting will to the other lighting fixtures to maximize adjuing fixtures to maximize adjuing fixtures to maximize adjuing fixtures to maximize adjuditing to revent unintentional lighting of surrounding areas.	Effects from two clearing beyond 0.25 mile of a hibermedia have been previously addressed in the Service a programmatic hological optimism implementing the final definition in the Service at programmatic objection definition implementing the final definition in the Service and Service	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated January 5, 2016.	Effects from this activity will occur within (2.2 mile of?) known inheamsodia, Came Cane, Thomys 2 (Cent., and F.WVF.) 4.24, and this is not example by the final 4(j), tild. Approximately 16.8 sears of forest clearing will occur within 0.25 mile of the behammenia between white 0.25 mile of the behammenia will remove the conformation of the control of the control of control of the control of control of the co	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated January 5, 2016.	These effects have been previously addressed in the Service's grognammatic biological opinion implementing the final 4(d) rule dated January 5, 2016.	These effects have been greviously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated January 5, 2016.	These effects have been previously addressed in the Service's programmatic
NE. NLAA, MA, or LAA	MA	WW	WA	MA	MA	4	MA	MA	MA	MA
Demographic Consequences	NA	Ą	NA	NA NA	NA	reproduction	NA	NA	NA	NA
Conservation Need Affected	NA	NA	NA	NA	NA	through the production of the	NA	NA	NA	NA
Range of Response	NA 1	NA I	NA NA	NA	NA 1	kins kins kins kins kins kins kins kins	NA	NA P	NA	NA 1
Exposure	100	all reasons all seasons	all life stages; spring-fall	all life stages;	all life stages	all life stages, spring-fall	all life stages	all life stages	The second	all life stages
Stressor Pathway (optional)	water alterations; human	uman	human presence	moval of forested habitat, tered surface water flow into twes; human presence	egetation removal human resence	reserve	vegetation removal, instream sedimentation & water flow disruption, human presence & noise	egelation removal, instream edimentation & water flow isruption, human presence & otse	egetation removal. instream edimentation & water flow issruption, human presence & oise	instream sedimentation &
Sireaur	nytime	toss or altention of inbernation of the conditions, daytine arousal	daytime arousal	altered water flow & hamidity in relative to the control of the co	alteration of summer roosting habitat, & staging/swarming habitat, increased davime arousal	abtention of summer rooting habitat, & vy spring stagnifuli svammig habitat, daytime arrossal	alteration of summer roosting habitat, & v spring staging/fall swarming habitat, si increased daytine arousal, decreased of adattic	alteration of summer roosting habitat, & v spring staging/fall svarming habitat, a increased daytine arousal, decreased of aquatic invertebrates	alteration of summer roosting habitat, & verying staging/fall swarming habitat, increased dayline arousal, decreased dayline arousal, decreased aquatic	7
Eav frontiental Impact or Unicat	withdrawal/discharge of water into	human activity & disturbunce, obstructed cave entrances or voxes	noise disturbance	teration of surface water flow, egelation removal; human activity	ee removal, loss or alteration of arested habitat, human disturbance	isering of forested labitat, Eleman zivriy and disturbance	Tree removal, Loss or alteration of forested habitat, Human disturbance, Instream and riparian disturbance	Tree removal, Loss or alteration of forested habitat, Human disturbance, Instream and riparian disturbance	Tree removal, Loss or alteration of forested habitat, Human disturbance, Instream and riparian disturbance	Human activity, Instream and riparian
Subactivity		Regarding and Subilization - restoration of corridor	Facilities - noise, lights	Access Roads - upgrading existing roads, new roads temp and permanent - grading, graveling	Access Roads - upgrading existing tr roads, new roads temp and permanent for - culvert installation	Access Roads - upgraching existing programming and permanent - tree framming and recremoval	Stream Crossings, flume	Stream Crossings, dam & pump		Stream Equipment Crossing
Pipeline Activity				New Disturbance -	New Disturbance - Construction	New Datachance -	New Disturbance - Construction	New Disturbance - Construction	New Disturbance - Construction	New Disturbance -

	Cainmonts	Effects from this activity to locace within 10, 2 mile of 3 known thermouls, follow Cave, Taware's 'Cave, and PS-WU'3-P!-1, and take is not examply by the final 4(4) that Approximately 16 is series of freest eleming with occur within 0.25 mile of the bibermouls. Mortains Visiley will implement and locace within 0.25 mile of the bibermouls. Mortains Visiley will implement a 100°PR counted documented between 100°PR counting. Clearing treest around inhermouls will permanently alterior was do not anticipate dreest impeat to basic manning. Clearing treest around inhermouls will permanently decrease fronging and rossing painted requiring busin operation in seasoning period (April Industrial to the seriest in loss surround plementation with less interesting behavior of the conting in observations, which could result in decreased survival or breaking ancessed of small percentage of NL 138. The spring emergence period (April Industry May) is also a sensitive time period for the basic and may here before different series of the effects of the disease and may here reduced for reserves and many else well-well may be effects of the disease and may be to well-well of the disease and may here reduced for reserves and amage to write matching to the order of the disease and may be to well or the second and may be the disease of the disease and may be to well-well of the industry of the disease of the single of the second of the reserved of the second of the second of the reserved of the second of the reserved of the second of the reserved by the second of the final of the single second of the reserved by a second of the second of the reserved by a second of the second of the reserved by the final 4(4) that impacts from lighting will be full cate-off directed down. The Publicy and Second of the second of the public of the public of the second of the pu	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(4) rule dated January 5, 2016.	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated January 5, 2016.	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated January 5, 2016.	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(4) rule dated January 5, 2016.	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated January 5, 2016.	Effects from tha activity will cocur within O.5 ratile of 3 known bibermeads. Cance Cree, Teneny's Care, and FS-WH'3-Y-2P1, and take in not exempt by the final 4(4) rule. Approximately 16 8 acres of Greest electring will occur within 0.15 min of the the theoremist. Moreomatical solutions will supplement a CPICR accound concurrented hierarcainal, therefore we do not anticipate direct impacts to buls charge great significant and therefore we do not anticipate direct impacts to buls charge great significant in the manning to potential effects, separation alternations to travel corridors and foneign plantiat should be small. Mountain Valley will into will be maximum time direct required to be extent woodly encoccionant and therefore we do not anticipate new frees will receive a size that will provide habital techne long greatment. Allow, this intensity as foreign effect, after from tighting will be minimized by instituting a farm-7 mn work day and permanent outdoor lighting will be "full cut- off utered down.	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated Jamary 5, 2016.	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(3) rule dated January 5, 2016.	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(4) rule dated January 5, 2016.	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated Jamary 5, 2016.	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated January 5, 2016.	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(4) rule dated January 5, 2016.
	NE, NLAA, MA, or LAA	M	MA	MA	MA	MA	MA	NLAA	MA	MA	MA	MA	MA	MA
	Demographic Consequences	numbers,	numbers, reproduction	NA	NA	NA	NA	numbers, reproduction	NA	NA	NA	NA	NA	NA
	Conservation Need Affected	shellering,	breeding, sheltering	NA	NA	NA	NA	breeding, sheltering	NA	NA	NA	NA	NA	NA
			kill, harm. harass	NA	NA	NA	NA	Kill, harm, harass	NA	NA	NA	NA	NA	NA
	Exposure (Resource Affected)	all life stages, spring -fail	unlikely	all life stages; all seasons	all life stages;	all life stages, (not hibernation)	all life stages, (not hibernation)	all life stages, (not hibernation)	unlikely	all life stages, spring-fall	all life stages, all seasons	unlikely	unlikely	unlikely
	Stressor Pathway (eptional)	resence	isturbance	wedand vegetation, of several of wedand vegetation of sales of air flow in/out of aves, human presence & soise	& noise	human presence	Log		contamination of water & vegetation, loss of herbaccous vegetation	alteration of water or air flow in/out of hibernacula, human presence	hibernacula or habitat	sgetation removal, human sturbance	getation removal, human sturbance	getation removal, human sturbance
	Stressor	spring stagmidgill swarming labitat, & spring stagmidgill swarming labitat, daytime arousal arousal spring labitat spring labi	alteration of summer roosting/foraging v habital, & spring stagetizell swarming of habitat increased arousal, daytine distributes, roost abandonment, increased predation due to daytime activity.	flooding hibernacula; decreased aquatic invertebrates, alteration of staging/swarming habitat, daytine arousal	daytime arousal	increased daytime arousal	· .		E STATE OF THE STA	loss or alteration of hibernation conditions, hibernacula no longer suitable davime arousal		alteration of summer roosting habitat, & spring staging/fall swarming habitat, increased daytime arousal	alteration of summer roosting habitat, & vv spring staging/fall swarming habitat, di increased davtime arousal	alteration of summer roosting habitat, & spring staging/fall swarming habitat, increased daytime arousal
thern long-eared bat.	Envitoumental Impact or Threat			alteration of surface water flow, vegetation removal; human activity; welland disturbance	human activity	Increased human activity and disturbance	Loss or alteration of forested habitat, Increased human activity and disturbance	Loss or alteration of forested habitat	Chemical contamination, Vegetation los	Human activity and disturbance, Obstructed hibernacula entrances or vents	Human activity and disturbance, Smoke disturbance		Tree removal, Loss or alteration of forested habitat, Human disturbance	Tree removal, Loss or alteration of forested habitat, Human disturbance
Table 5. Analysis of effects on Northern long-eared bat.	Subactivity			Crossings, wetlands and other water bodies (non-riparian) - grading, trenching, regrading	Crossings, wetlands and other water bodies (non-riparian) - pipe stringing			Vegetuton Management - chainsaw, Iree clearing, Iree side trimming	20	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	g			ROW repair, regrading, revegetation - instream stabilization and/or fill
Table 5. Anal	Pipeline Activity	New Distriction	New Disturbance - Construction	New Disturbance - Construction	New Disturbance - Construction	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance	Operation & Maintenance

	Service's programmatic lated January 5, 2016. sison Control, Revegetation, val will not be done more	Service's programmatic lated January 5, 2016.	or of 3 known thermacula, and take is not exempt by the 4 will occur within 0.25 mile of 17 OFR around documented Poets to bast during spring feets, vegetation illerations to Montain Valley will mow at well provide but that the top to the standard direction will provide but the part of the provided provided the provided provided to the first of the provided provided provided the provided p	Service's programmatic ated January 5, 2016.	Service's programmatic
Соитрепъ	These effects have been previously addrased in the Service's programmatic belongisted opinion implementing the firm 4(4) rule dated January 5, 2016. Additionally, in accordance with FERC's Upland Foreign Control, Recognision and Administrative Plan, registation manimismos Plan, registation manimismos branch segetation manimismos branch segetation manimismos branch were 3 years (FERC'S 2013a).	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated January 5, 2016.	Effects from that searchy will coccus within O.52 mile of 3 known behermouls, Canso Cowe, Tawany's Cawe, and PS-WYO-3-Y-31, and take is not exempt by the (6) nile Approximately 16.8 acres of facest clearing will occur within 0.25 mile of the behermotials. Mornialn's High will imprise ment at 10°YS around documented hierarcoini, therefore we do not anticipine direct imposts to best during spring sharing fall survaning. AMMs immirate potential effects, regulation alterations to travel corridors and foregaing habitat should be small. Mountain Valley will mow at the maximum time interval required to prevent woody encroachemer and therefore we do not antiquate new trees will reach a size that will provide habitat before being removed. Noise cented from this activity is covered by the final 4(d) rule. Timpost from thighing will be minimized by traitisting at Jan work day and permisent outdoor tighting will be "fill one-off" directed down.	These effects have been previously addressed in the Service's programmatic biological opinion implementing the final 4(d) rule dated January 5, 2016.	These effects have been previously addressed in the Service's programmatic
NE, NEAA. Ma, of LAA	MA	MA	NLAA	MA	MA
Demographic NE, NEAA, Consequences MA, or LAA	numbers, reproduction	NA	numbers, reproduction	NA	NA
Conservation Need Affected	breeding, sheltering	NA	sheltering	NA	NA
Range of Response	harm, harass breeding,	NA	kill, harm, harass	NA	NA
Exposure (Resource Affected)	unlikely	all life stages	all life stages	all life stages	all life stages
Stressor Pathway (optional)	vegetation removal, human disturbance			human presence	human presence
Stressor	alteration of summer roosting babitat, & 'vegenticior removal, human spring stagning/hall swaming habitat, disturbance increased daytine arousal	alteration of summer roosting habitat, & vogetation removal. human spring staging/fall swarming habitat, dishurbance increased daytime arousal	alteration of summer roosing hablas, & vegetation removal, human staging swarming habitat increased daytime arrosasl daytime arrosasl	increased daytime arousal h	davtime arousal
Environmental Impact or Threat	Tree removal, Loss or alteration of forested habitat, Human disturbance	Tree removal, Loss or alteration of forested habitat, Human disturbance	tree removal, loss or alteration of forested habitat, human disturbance	Hunan disturbance	Human activity and Disturbance
Lable 5. Analysis of effects on Northern fong-cared Dat. Pipeline Activity Subactivity	Access Road Maintenance - grading, Tree removal, Loss or alteration of graveling forested habitat, Human disturbance	Access Road Maintenance - culvert Tree removal, Loss or alteration of replacement forested habitat, Human disturbance	General Appartenance and Calbodie: tree removal, loss or alteration of Protection Construction - Off ROW forested labitals, human disturbant Clearing	General Appurtenance and Cathodic Protection Construction - trenching, anode, bell hole	Inspection Activities - ground and
Pipeline Activity	Operation & Maintenance	Operation & Maintenance	Operation & Multiterance	Operation & Maintenance	Operation &

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