



Small Whorled Pogonia Survey Report

Bad Creek Pumped Storage Project

FERC Project No. 2740

Oconee County, South Carolina

September 19, 2024



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Acronyms and Abbreviations

Bad Creek II	Bad Creek II Power Complex
Bad Creek or Project	Bad Creek Pumped Storage Project
Duke Energy	Duke Energy Carolinas, LLC
ILP	Integrated Licensing Process
SCDNR	South Carolina Department of Natural Resources
SWAP	South Carolina Wildlife Action Plan
USFWS	U.S. Fish and Wildlife Survey
USACE	U.S. Army Corps of Engineers

1 Introduction

Duke Energy Carolinas, LLC (Duke Energy) is the owner and operator of the 1,400-megawatt Bad Creek Pumped Storage Project (Project; Federal Energy Regulatory Commission [FERC] Project No. 2740) located in Oconee County, South Carolina. The existing (original) license for the Project was issued by the Commission for a 50-year term, with an effective date of August 1, 1977, and expires July 31, 2027, therefore, Duke Energy is pursuing a new license for the Project pursuant to the Commission's Integrated Licensing Process (ILP) (18 Code of Federal Regulations Part 5). An alternative relicensing proposal presently being evaluated by Duke Energy is the construction of a second 1,400-megawatt power complex (Bad Creek II Power Complex; Bad Creek II) adjacent to the existing Project to increase renewable pumping and generating capacity at the Project.

In response to a written request from the South Carolina Department of Natural Resources (SCDNR) in comments submitted to the Commission on the Initial Study Report (Duke Energy 2024) and to support Endangered Species Act Compliance for Clean Water Act Section 404, U.S. Army Corps of Engineers (USACE) permitting, Duke Energy contracted HDR to survey for the federally threatened small whorled pogonia (*Isotria medeoloides*) during the appropriate survey window (mid-May through early July)¹ as detailed in the Small Whorled Pogonia Study Plan, which was developed in collaboration with the SCDNR and filed with the fifth ILP Study Progress Report on June 28, 2024.

The SCDNR Natural Heritage Trust Program, which documents and tracks element of occurrence data for rare, threatened, and endangered species (both federal and state) indicates no record of the small whorled pogonia within a 2-mile of radius of the Project (SCNHP 2023), however, this species is listed by the U.S. Fish and Wildlife Survey (USFWS) (Information for Planning and Consultation [IPaC] species list; **Appendix A**) as having the potential to occur in the project vicinity, therefore surveys were conducted to determine the presence or absence of this protected species prior to land disturbance activities associated with the construction of Bad Creek II. This survey was also carried out to aid in the quality and comprehensiveness of the statewide dataset for rare, threatened, and endangered species and record incidental observations of priority plant species identified in the South Carolina Wildlife Action Plan (SWAP) during the survey.

This document provides an overview of the approach and results of the small whorled pogonia survey.

2 Study Area Overview

The Study Area included lands that will be potentially impacted by the construction of Bad Creek II and associated infrastructure including the proposed spoil area locations, Fisher Knob access road, and the Bad Creek 100kV Transmission Line access roads (Figure 1).

¹ A Natural Resources Survey was carried out by Duke Energy in 2021 and indicated that suitable habitat for the small whorled pogonia was present at the site, however, the study was performed outside of the survey window. The Natural Resources Survey was filed with the Pre-Application Document in February, 2023.

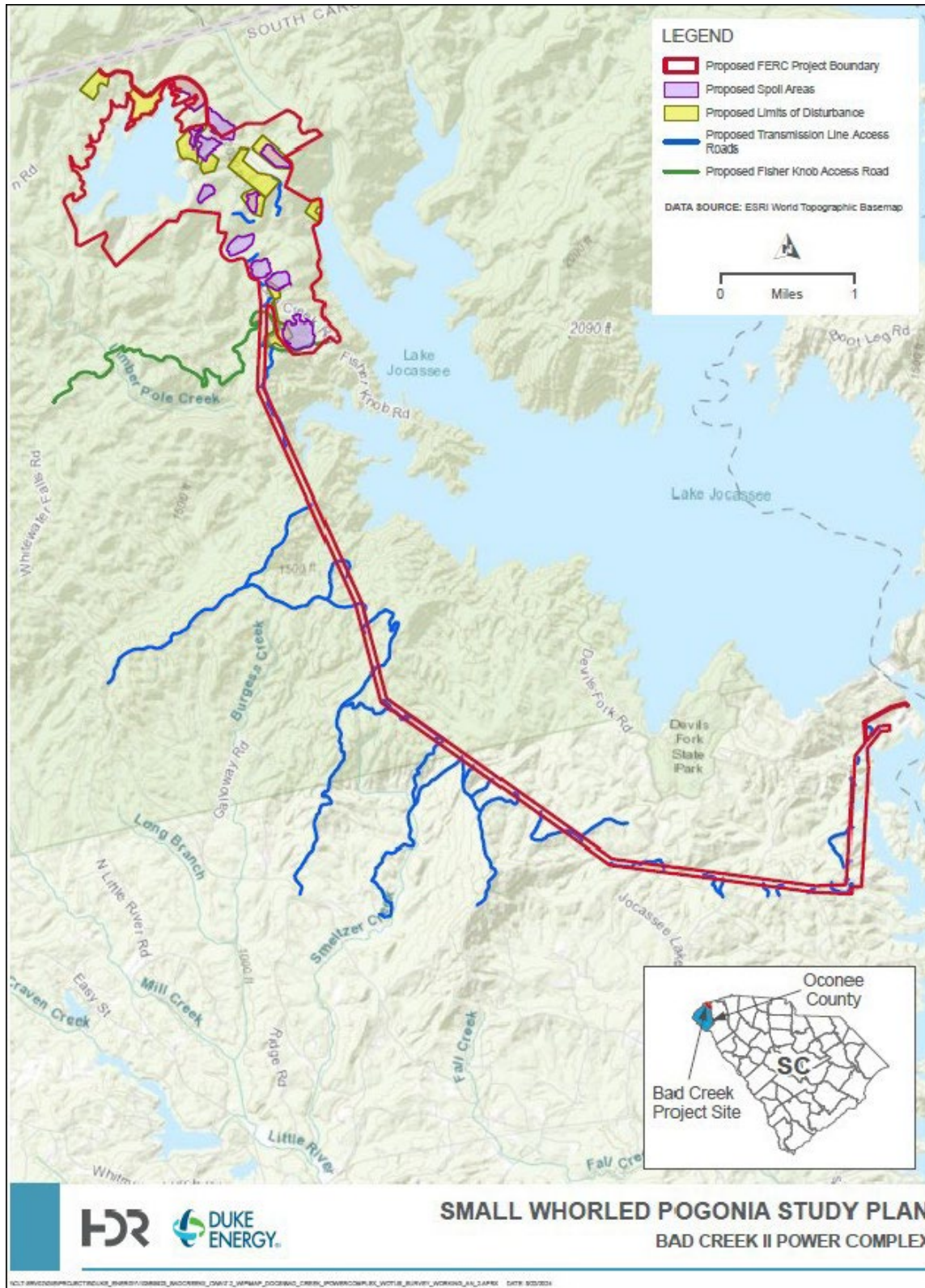


Figure 1. Bad Creek Site Vicinity with Proposed Locations of Spoil Areas and Transmission Line Access Roads

The Study Area is situated in the Southern Crystalline Ridges and Mountains ecoregion, which is the larger Level III Blue Ridge ecoregion of South Carolina. The Blue Ridge ecoregion is a narrow strip of mountainous ridges to hilly plateaus which transition to more massive mountainous areas with high peaks. The Southern Crystalline Ridges and Mountains region is a rough, dissected region with elevations between 1,200 – 4,500 feet above sea level (Griffith et al. 2002).

3 Small Whorled Pogonia Overview

3.1 Species Description

The small whorled pogonia is a perennial orchid that produces a smooth, hollow stem ranging from 2 to 14 inches tall and topped by five to six leaves in circular arrangement (false whorl). One or two flowers stand in the center of the whorl of leaves. The leaves are milky-green or grayish-green, and the flower is yellowish-green with a greenish-white lip (USFWS 2024). Flowers appear soon after the plants emerge in mid-May or June. This species is non-clonal, and plants may emerge each spring or they may remain vegetatively dormant and below the ground for one to several years. Each plant typically produces only one, rarely more than one, overwintering bud per year (USFWS 2022).

3.2 Habitat

The small whorled pogonia occurs in both young and mature mixed-deciduous or mixed-deciduous/coniferous forests. Sometimes it grows in stands of softwoods with a thick layer of dead leaves, often on slopes near small streams. The species may also be found on dry, rocky, wooded slopes; moist slopes; ravines lacking stream channels; or slope bases near braided channels of vernal streams. The orchid, often limited by shade, requires small light gaps or canopy breaks, and typically grows under canopies that are relatively open or near features like logging roads or streams that create long-persisting breaks in the forest canopy. It prefers acidic soils with a thick layer of dead leaved and sparse to moderate ground cover (USFWS 2024).

3.3 Natural Vegetative Community Types

The Study Area supports a wide diversity of flora and fauna due to highly varied topography and climatic conditions. Resources used to identify and categorize vegetative community types within the Study Area included the Ecological Zones in the Southern Blue Ridge Escarpment 4th Approximation (Simon 2015) and the Natural Communities of South Carolina Initial Classification and Description (Nelson 1986). The NatureServe community classification system (NatureServe 2013) was used to identify and categorize vegetative community types within the Study Area. Terminology in the Ecological Zones in the Southern Blue Ridge Escarpment was also used to describe the terrestrial habitats within the Study Area. Ecological groups and community types that were identified within the Study Area included Shortleaf Pine-Oak Forest and Woodland, Montane Oak-Hickory Forest, Cove Forest, and Floodplain Forest.

Shortleaf Pine-Oak Forest and Woodland

This habitat type is characterized by shortleaf pine (*Pinus echinate*) and oak dominated forested areas on exposed ridges and sideslopes (Simon 2015). Dominant tree canopy cover observed included white oak (*Quercus alba*), southern red oak (*Quercus falcata*), northern red oak (*Quercus rubra*), chestnut oak (*Quercus montana*), mockernut hickory (*Carya tomentosa*), tulip poplar

(*Liriodendron tulipifera*), white pine (*Pinus strobus*), sugar maple (*Acer saccharum*), eastern hemlock (*Tsuga canadensis*), loblolly pine (*Pinus taeda*), and sourwood (*Oxydendrum arboreum*). Sapling and shrubs consist of similar canopy species as well as American holly (*Ilex opaca*), buffalo-nut (*Pyrularia pubera*), lowbush blueberry (*Vaccinium angustifolium*), mountain laurel (*Kalmia latifolia*), rhododendron (*Rhododendron maximum*), Fraser magnolia (*Magnolia fraseri*), American witch-hazel (*Hamamelis virginiana*), black oak (*Quercus velutina*), and sassafras (*Sassafras albidum*). Herbaceous and vine species consisted of running cedar (*Lycopodium digitatum*), striped wintergreen (*Chimaphila maculata*), Christmas fern (*Polystichum acrostichoides*) and muscadine grape (*Vitis rotundifolia*).

Mixed Oak/Rhododendron Forest

This habitat type is characterized by rhododendron-dominated thickets found on mountains and upper piedmont with sparse herbaceous cover. Dominant species observed for this habitat type included northern red oak, shortleaf pine, mountain laurel, rhododendron, eastern hemlock, white pine, sourwood, red maple (*Acer rubrum*), and black gum (*Nyssa sylvatica*).

Montane Oak-Hickory Forest (Cove and Slope)

This habitat type is characterized by a mix of hardwood tree species on lower elevations within mountains and upland slopes between rivers and headwater tributaries. Dominant tree species observed for this habitat type included northern red oak, chestnut oak, pignut hickory (*Carya glabra*), white pine, red maple, tulip poplar, mountain laurel, sourwood, black gum, magnolia, and low bush blueberry.

Acidic Cove Forest

This habitat type is characterized by hemlock and mixed hardwood-conifer forests, typically dominated by an evergreen understory occurring in narrow coves (ravines) and extending to adjacent protected, north-facing slopes (Simon 2015). Dominant tree species observed for this habitat type consisted of red maple, sweetgum (*Liquidambar styraciflua*), black gum, eastern hemlock, rhododendron, tulip poplar, sourwood, chestnut oak, sweet birch (*Betula lenta*), and green ash (*Fraxinus pennsylvanica*). Shrubs consist of mountain doghobble (*Leucothoe fontanesiana*), buffalo-nut, witch hazel, elderberry (*Sambucus nigra*), Fraser magnolia, American snowbell (*Styrax americanus*), and pawpaw (*Asimina triloba*). The herbaceous and vine layer is dominated by Galax (*Galax urceolata*), wild hydrangea (*Hydrangea arborescens*), Jack-in-the-pulpit (*Arisaema triphyllum*), jewelweed (*Impatiens capensis*), Indian cucumber (*Medeola virginiana*), violets (*Viola* spp.), Christmas fern, sedges (*Carex* spp.), and Virginia creeper (*Parthenocissus quinquefolia*).

Floodplain Forest

This habitat type is found in regularly or seasonally flooded areas adjacent to river systems with a diverse herbaceous cover. Dominant trees consisted of white oak, sweetgum, red maple, eastern hemlock, sourwood, red oak, and American sycamore (*Platanus occidentalis*). The shrub and vine layer consists of pawpaw, alders (*Alnus* spp.), and muscadine. The herbaceous layer consists of New York fern (*Parathelypteris noveboracensis*), Indian cucumber, Hartweg's wild ginger (*Asarum hartwegii*), running cedar, partridge berry (*Mitchella repens*), sedge, Christmas fern, jewelweed (*Impatiens capensis*), and nettled chain fern (*Woodwardia areolata*).

Plants identified in the study area during the field investigation were classified into their appropriate category as tree, shrub, herb or vine and are provided in **Appendix B**.

4 Survey Methods

Before fieldwork began, a desktop review of existing site information was conducted to aid in identifying potential small whorled pogonia habitat in the Study Area. Information evaluated during the desktop review included existing vegetation patterns, topography, drainage, and potential or known SWAP priority plants (SCDNR 2015) in the vicinity of the study area.

Surveys were conducted during the USFWS recommended optimal survey window of mid-May – early July. Areas were surveyed along the 50-foot-wide buffer of the proposed temporary Fisher Knob access road and within the proposed limits of disturbance and spoil area alternatives, as well as along proposed transmission line access roads related to the Bad Creek II Power Complex proposed infrastructure (Figure 1).

Survey areas were visually delineated by local topography (ravines, slopes, benches) or by landmarks (boulders, downed or otherwise conspicuous trees, or old roads) (USFWS 2016). The survey methodology consisted of slowly traversing back and forth across transects; surveyors were spaced approximately 25-feet apart focusing the immediate area within a 10-to-15-foot radius depending on habitat type and visibility. Handheld Global Positioning System (GPS) units were used to navigate throughout the site to avoid survey gaps.

Vegetation cover type and specific habitats/substrates were noted by surveyors and photographed. A detailed photo log is included in **Appendix C**. Applicable reference materials were used during the field assessments including regional field guides and plant identification mobile apps to identify plants to genus and species level. Surveyors were aware that no small whorled pogonia voucher specimens were to be collected, and any plant locations were considered to be “Privileged Non-Public Information”. Additionally, field biologists recorded incidental observations of priority plant species identified on the South Carolina SWAP list that may occur in the Blue Ridge Ecoregion; this list is provided in **Appendix D**.

5 Survey Results and Conclusions

No small whorled pogonia was identified during the 2024 surveys², and no species on the SWAP list were observed. Several individuals of the *Trillium* genus were identified, including potential for the southern nodding trillium (*Trillium rugelii*, a SWAP species), but could not be classified to the species level since the survey was conducted outside of the survey window. Potential habitat for the small whorled pogonia was observed in all study areas.

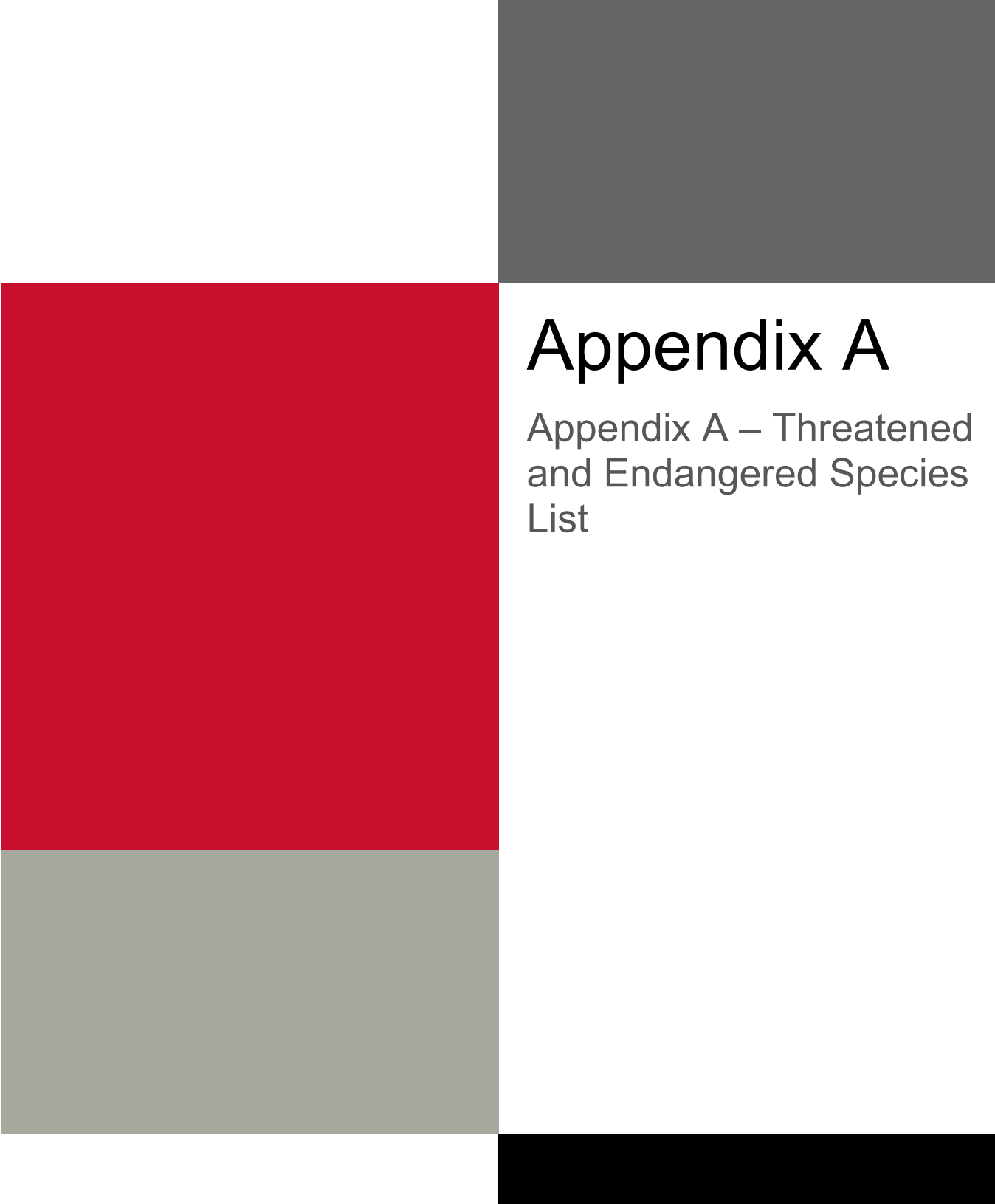
The species inventory is based on the best professional judgment of HDR’s team of biologists with experience in plant identification in the Blue Ridge ecoregion. Surveyor qualifications are provided in **Appendix E**. Further evaluation of rare, threatened, and endangered plants, and potential jurisdiction may be necessary if additional guidance, status changes, or further rulemaking are provided from the USACE, USFWS, and SCDNR. Documentation of consultation with resource agencies and other relicensing stakeholders is included in **Appendix F**. In association with the Draft License Application (scheduled for completion in February 2025), Duke Energy will consult with USFWS,

² Small whorled pogonia surveys were carried out in 2024 as follows: June 3-5 for the proposed Fisher Knob Access Road and transmission line access roads, and intermittently between late May and July 2024 for potential spoil areas and the general proposed limits of disturbance for Bad Creek II construction.

SCDNR, and the Wildlife and Botanical Resources Committee on the need to prepare a Species Protection Plan specific to small whorled pogonia or other special status plant species and communities. If required and as applicable, the Species Protection Plan may include, among other identified protection measures, provisions for future surveys.

6 References

- Duke Energy Carolinas, LLC (Duke Energy). 2024. Bad Creek Pump Storage Project (FERC Project No. 2740) Initial Study Report. Prepared by HDR Engineering, Inc. January, 2024. Accessed May 21, 2024. eLibrary;
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- Griffith, G.E., Omernik, J.M., Comstock, J.A., Schafale, M.P., McNab, W.H., Lenat, D.R., MacPherson, T.F., Glover, J.B., and Shelburne, V.B. 2002. Ecoregions of North and South Carolina (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).
- NatureServe. 2013. International Ecological Classifications Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA [URL]: <http://natureserve.org/products/terrestrial-ecological-systems-united-states> (Accessed October 2021).
- Nelson, J.B. 1986. The Natural Communities of South Carolina Initial Classification and Description. South Carolina Wildlife & Marine Resources Department. [URL]: <http://www.dnr.sc.gov/wildlife/publications/pdf/natcomm.pdf> (Accessed October 2021).
- Simon, Steven A. 2015. Ecological Zones in the Southern Blue Ridge Escarpment: 4th Approximation. [URL]: Biophysical Settings in the North Zone of the Cherokee National Forest Identified from Ecological Zones: First Approximation (conservationgateway.org) (Accessed August 2024)
- South Carolina Department of Natural Resources (SCDNR). 2015. SC State Wildlife Action Plan. <https://www.dnr.sc.gov/swap/index.html>. Accessed May 16, 2024.
- South Carolina Natural Heritage Program (SCNHP). 2023. Species of Concern Data Explorer Geographic Information System (GIS). SCDNR Columbia, SC. [URL]: [SC Natural Heritage Program](#). Accessed October 2023.
- U.S. Fish and Wildlife Service (USFWS). 2016. Small Whorled Pogonia (*Isotria medeoloides*) Survey Protocol for Maine. [Small Whorled Pogonia Survey Protocol for Maine | FWS.gov](#). Accessed May 16, 2024.
- _____. 2022. Small Whorled Pogonia (*Isotria medeoloides*) 5-Year Review: Summary and Evaluation. August, 2022. [Small whorled pogonia 5 year review \(ecosphere-documents-production-public.s3.amazonaws.com\)](#). Accessed May 15, 2024.
- _____. 2024. Small Whorled Pogonia Fact Sheet. [Small Whorled Pogonia Fact Sheet \(fws.gov\)](#). Accessed May 15, 2024.



Appendix A

Appendix A – Threatened
and Endangered Species
List

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

South Carolina Ecological Services
176 Croghan Spur Road, Suite 200
Charleston, SC 29407-7558
Phone: (843) 727-4707 Fax: (843) 727-4218



In Reply Refer To:

08/14/2024 14:47:17 UTC

Project Code: 2024-0130237

Project Name: Bad Creek Relicensing

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

To Whom It May Concern:

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

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

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

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

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

<https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

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

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

South Carolina Ecological Services
176 Croghan Spur Road, Suite 200
Charleston, SC 29407-7558
(843) 727-4707

PROJECT SUMMARY

Project Code: 2024-0130237
Project Name: Bad Creek Relicensing
Project Type: Power Gen - Hydropower - FERC
Project Description: hydro relicensing
Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@34.979103800000004,-82.99510223504396,14z>



Counties: Oconee County, South Carolina

ENDANGERED SPECIES ACT SPECIES

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
Small Whorled Pogonia <i>Isotria medeoloides</i> Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1890	Threatened
Smooth Coneflower <i>Echinacea laevigata</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3473	Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the ["Supplemental Information on Migratory Birds and Eagles"](#).

-
1. The [Bald and Golden Eagle Protection Act](#) of 1940.
 2. The [Migratory Birds Treaty Act](#) of 1918.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to [Bald Eagle Nesting and Sensitivity to Human Activity](#)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read ["Supplemental Information on Migratory Birds and Eagles"](#), specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

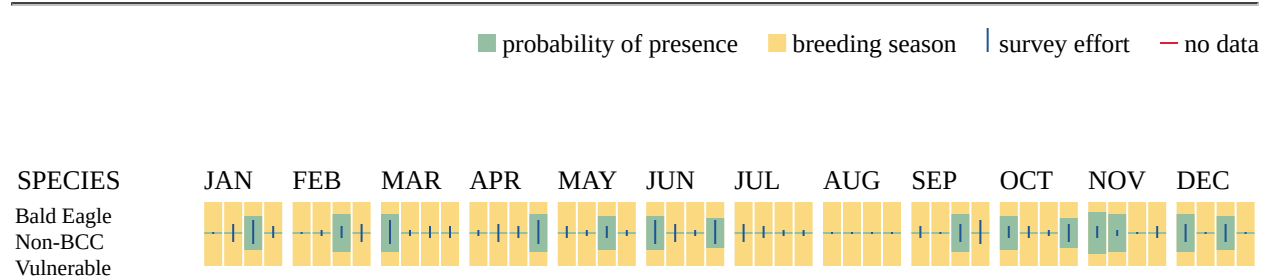
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats³ should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "[Supplemental Information on Migratory Birds and Eagles](#)".

-
1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Aug 31
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9454	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Cerulean Warbler <i>Setophaga cerulea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 27 to Jul 20
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Chuck-will's-widow <i>Antrostomus carolinensis</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9604	Breeds May 10 to Jul 10
Eastern Whip-poor-will <i>Antrostomus vociferus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10678	Breeds May 1 to Aug 20
Golden-winged Warbler <i>Vermivora chrysoptera</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Kentucky Warbler <i>Geothlypis formosa</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20

NAME	BREEDING SEASON
Prairie Warbler <i>Setophaga discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "[Supplemental Information on Migratory Birds and Eagles](#)", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.

■ probability of presence ■ breeding season | survey effort — no data



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>

- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

WETLANDS

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

WETLAND INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE VISIT [HTTPS://WWW.FWS.GOV/WETLANDS/DATA/MAPPER.HTML](https://www.fws.gov/wetlands/data/mapper.html) OR CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

IPAC USER CONTACT INFORMATION

Agency: HDR

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City: Charlotte

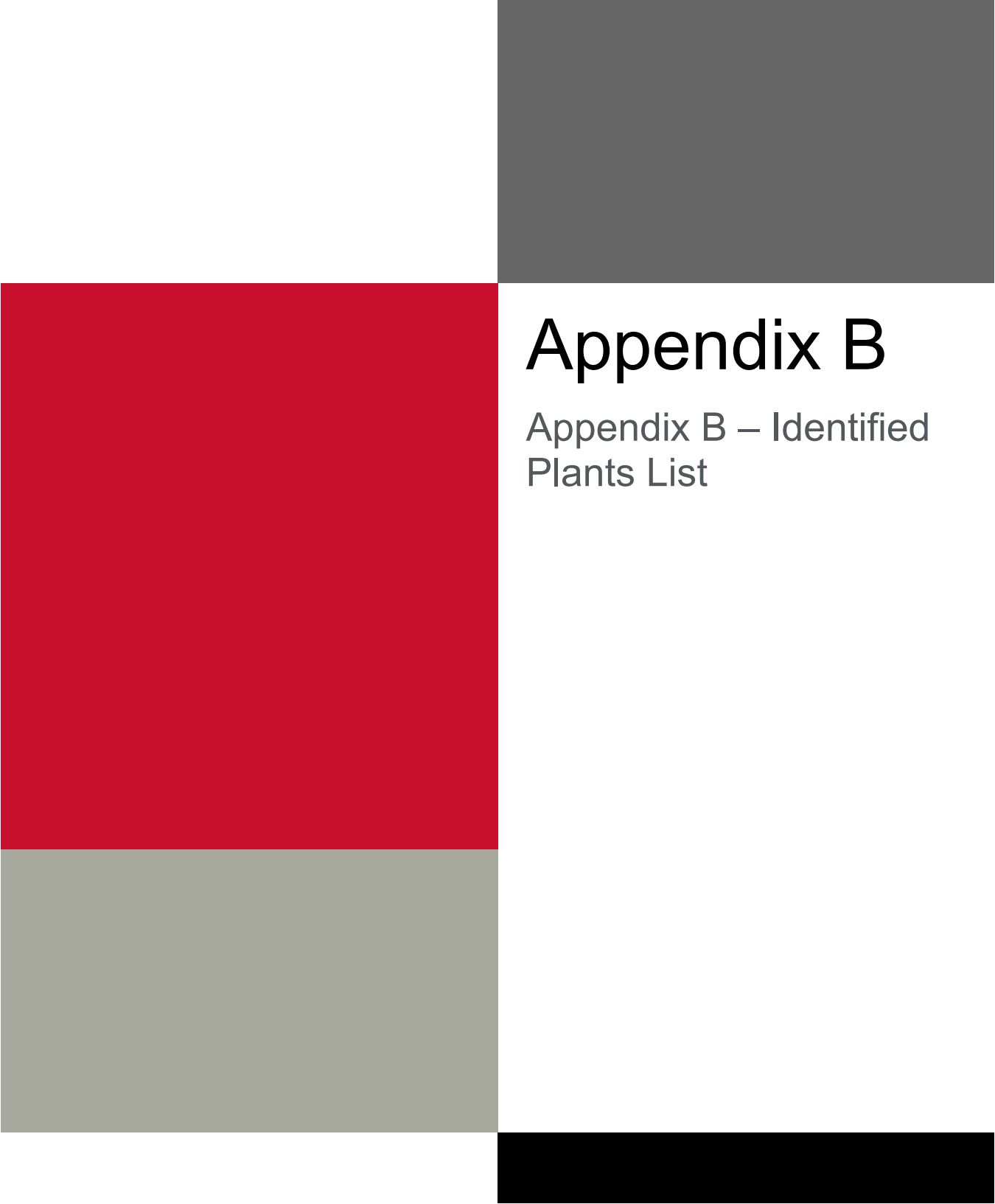
State: NC

Zip: 28202

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Phone: 7049736869

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Appendix B

Appendix B – Identified
Plants List

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Identified Plants List

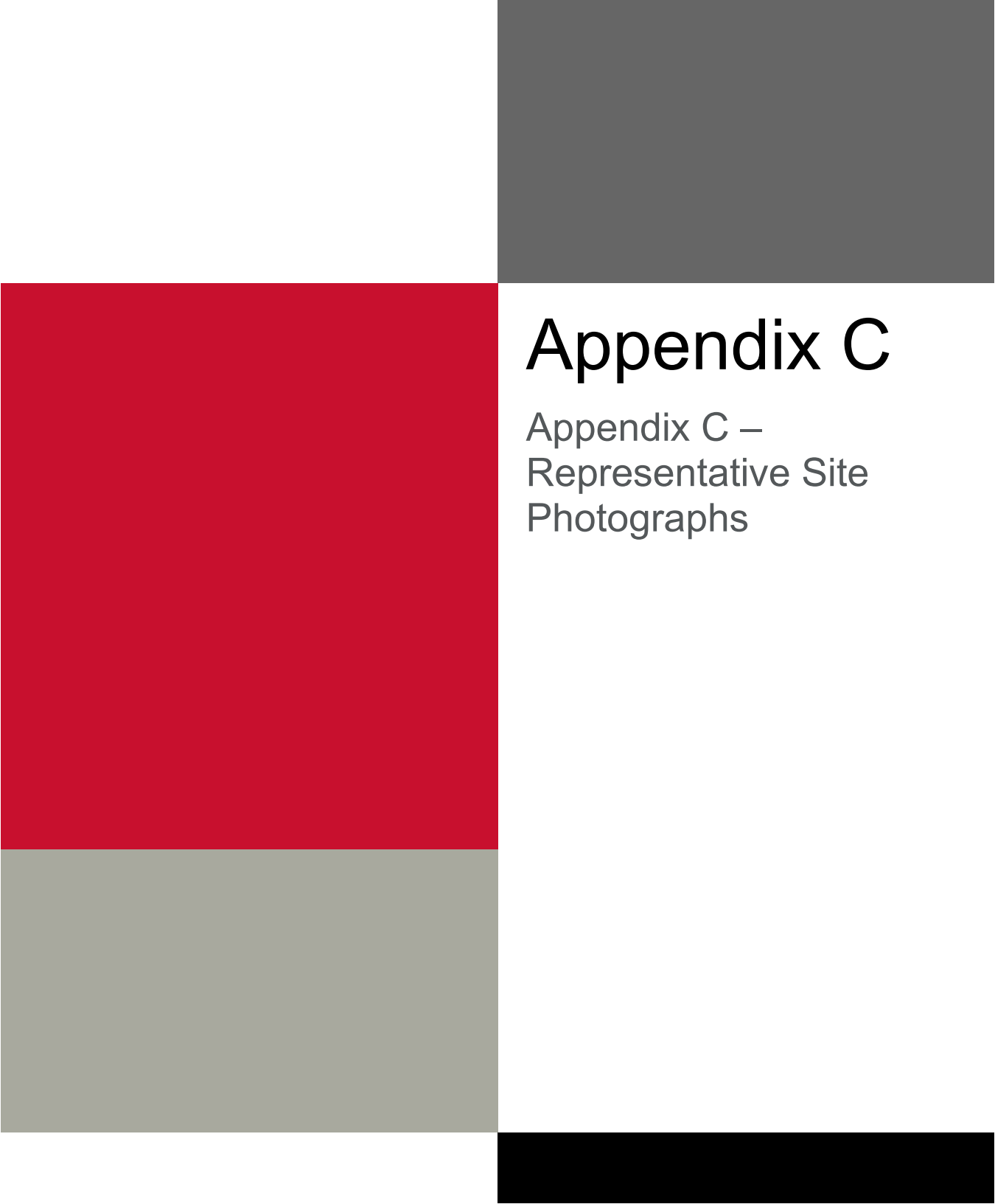
	Genus Species	Common Name
Trees	<i>Acer rubrum</i>	Red Maple
	<i>Albizia julibrissin</i>	Silktree
	<i>Asimina triloba</i>	Common Paw Paw
	<i>Betula lenta</i>	Sweet Birch
	<i>Carya glabra</i>	Pignut Hickory
	<i>Carya tomentosa</i>	Mockernut Hickory
	<i>Diospyros virginiana</i>	Persimmon
	<i>Fraxinus pennsylvanica</i>	Green Ash
	<i>Hamamelis virginiana</i>	American Witchhazel
	<i>Ilex opaca</i>	American Holly
	<i>Juniperus virginiana</i>	Eastern Red-Cedar
	<i>Kalmia latifolia</i>	Mountain Laurel
	<i>Liquidambar styraciflua</i>	Sweetgum
	<i>Liriodendron tulipifera</i>	Tulip Poplar
	<i>Magnolia frasier</i>	Fraser Magnolia
	<i>Nyssa sylvatica</i>	Black Tupelo
	<i>Oxydendron arboreum</i>	Sourwood
	<i>Pinus echinata</i>	Shortleaf Pine
	<i>Pinus strobus</i>	White Pine
	<i>Pinus taeda</i>	Loblolly Pine
	<i>Platanus occidentalis</i>	American Sycamore
	<i>Prunus serotina</i>	Black Cherry
	<i>Quercus alba</i>	White Oak
	<i>Quercus falcata</i>	Southern Red Oak
	<i>Quercus montana</i>	Chestnut Oak
	<i>Quercus rubra</i>	Northern Red Oak
	<i>Quercus velutina</i>	Black Oak
	<i>Rhododendron maximum</i>	Great Laurel
	<i>Robinia pseudoacacia</i>	Black Locust
	<i>Salix nigra</i>	Black Willow
	<i>Sassafras albidum</i>	Sassafras
	<i>Tsuga canadensis</i>	Eastern Hemlock
Shrubs	<i>Alnus serrulata</i>	Brookside Alder
	<i>Amelanchier arborea</i>	Common Serviceberry
	<i>Aralia spinosa</i>	Devil's Walking Stick
	<i>Elaeagnus umbellata</i>	Autumn olive
	<i>Epigaea repens</i>	Trailing Arbutus
	<i>Halesia tetraptera</i>	Mountain Silverbell
	<i>Leucothoe fontanesiana</i>	Dog Hobble
	<i>Pyrolaria pubera</i>	Buffalo-nut
	<i>Rhododendron maximum</i>	Great Laurel
	<i>Rosa multiflora</i>	Rambler Rose
	<i>Rubus</i> spp.	Blackberry
	<i>Styrax americanus</i>	American Snowbell
	<i>Vaccinium</i> spp.	Blueberry
	<i>Viburnum acerifolium</i>	Mapleleaf Viburnum
	<i>Xanthorhiza simplicissima</i>	Shrub Yellowroot

	Genus Species	Common Name
Herbs	<i>Actaea racemosa</i>	Black Snakeroot
	<i>Andropogon virginicus</i>	Broom-Sedge
	<i>Arisaema triphyllum</i>	Jack-in-the-Pulpit
	<i>Arundinaria appalachiana</i>	Hill Cane
	<i>Bidens aristosa</i>	Bearded Beggarticks
	<i>Boehmeria cylindrica</i>	Small-Spike False Nettle
	<i>Bromus arvensis</i>	Field Brome
	<i>Cardamine diphylla</i>	Two-leaved Toothwort
	<i>Carex frankii</i>	Frank's Sedge
	<i>Carex lurida</i>	Shallow Sedge
	<i>Carex spp.</i>	Sedge
	<i>Carex stipata</i>	Stalk-Grain Sedge
	<i>Chimaphila maculata</i>	Striped Wintergreen
	<i>Circaea spp.</i>	Nightshade
	<i>Cladonia rangiferina</i>	Reindeer lichen
	<i>Clematis virginiana</i>	Devil's-Darning-Needles
	<i>Cyperus strigosus</i>	Straw-Color Flat Sedge
	<i>Dichanthelium scoparium</i>	Broom Rosette Grass
	<i>Diodia teres</i>	Poorjoe
	<i>Elephantopus tomentosus</i>	Common Elephant's Foot
	<i>Eupatorium cappilifolium</i>	Dog Fennel
	<i>Eupatorium perfoliatum</i>	Common Boneset
	<i>Euphorbia spp.</i>	Spurge
	<i>Eurybia divaricata</i>	White Wood-aster
	<i>Galax urceolata</i>	Galax
	<i>Goodyera pubescens</i>	Downy Rattlesnake Plantain
	<i>Hexastylis spp.</i>	Wild Ginger
	<i>Houstonia purpurea</i>	Summer Bluet
	<i>Hydrangea arborescens</i>	Wild Hydrangea
	<i>Hylodesmum nudiflorum</i>	Naked-flowered Tick-Trefoil
	<i>Impatiens capensis</i>	Spotted Touch-Me-Not
	<i>Iris cristata</i>	Dwarf Crested Iris
	<i>Juncus effusus</i>	Lamp Rush
	<i>Juncus tenuis</i>	Lesser Poverty Rush
	<i>Juncus spp.</i>	Rushes
	<i>Laportea canadensis</i>	Wood Nettle
	<i>Lespedeza cuneata</i>	Chinese Bush-Clover
	<i>Lycopodium digitatum</i>	Running Cedar
	<i>Lycopus uniflorus</i>	Northern Bugleweed
	<i>Lysimachia quadrifolia</i>	Whorled Loosestrife
	<i>Maianthemum racemosum</i>	Solomon's Plume
	<i>Medeola virginiana</i>	Cucumber Root
	<i>Microstegium vininum</i>	Japanese Stiltgrass
	<i>Monarda clinopodia</i>	White Bergamot
	<i>Murdannia keisak</i>	Marsh Dewflower
	<i>Nabalus altissimus</i>	Tall Rattlesnake Root
	<i>Nabalus trifoliolatus</i>	Three-Leaved Rattlesnake Root
	<i>Onoclea sensibilis</i>	Sensitive Fern
	<i>Osmunda regalis</i>	Royal Fern
	<i>Osmundastrum cinnamomeum</i>	Cinnamon Fern
	<i>Oxalis corniculata</i>	Creeping Yellow Wood-Sorrel
	<i>Packera anonyma</i>	Small's Ragwort



	Genus Species	Common Name
	<i>Parathelypteris noveboracensis</i>	New York Fern
	<i>Passiflora lutea</i>	Yellow Passionflower
	<i>Perilla frutescens</i>	Beefsteakplant
	<i>Persicaria sagittata</i>	Arrow-Leaf Tearthumb
	<i>Phytolacca leptostachya</i>	American Lopseed
	<i>Polygala polygama</i>	Racemed Milkwort
	<i>Polystichum arostichoides</i>	Christmas Fern
	<i>Potentilla canadensis</i>	Dwarf Cinquefoil
	<i>Pteridium aquilinum</i>	Common Bracken Fern
	<i>Rubus allegheniensis</i>	Allegheny Blackberry
	<i>Sceptridium bitermatum</i>	Sparse-lobed Grapefern
	<i>Scirpus cyperinus</i>	Cottongrass Bulrush
	<i>Schizachyrium scoparium</i>	Little Bluestem
	<i>Smilax</i> spp.	Greenbriar
	<i>Solidago altissima</i>	Tall Goldenrod
	<i>Stellar pubera</i>	Star Chickweed
	<i>Trifolium repens</i>	White Clover
	<i>Trillium cuneatum</i>	Little Sweet Betsy
	<i>Trillium catesbaei</i>	Bashful Wakerobin
	<i>Trillium</i> spp.	Trillium species
	<i>Verbesina</i> spp.	Crownbeard
	<i>Vernonia noveboracensis</i>	New York Ironweed
	<i>Viola primulifolia</i>	Primrose-leaved Violet
	<i>Viola</i> spp.	Violet
	<i>Vulpia</i> spp.	Grass spp.
	<i>Woodwardia areolata</i>	Netted Chain Fern
Vines	<i>Bignonia capreolata</i>	Crossvine
	<i>Dioscorea villosa</i>	Wild Yam
	<i>Mitchella repens</i>	Partridge Berry
	<i>Parthenocissus quiquefolia</i>	Virginia Creeper
	<i>Toxicodendron radicans</i>	Poison Ivy
	<i>Vitis rotundifolia</i>	Muscadine

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Appendix C

Appendix C –
Representative Site
Photographs

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Photo 1. Potential SWP habitat; rocky slope with dappled sunlight (Fisher Knob Access Road)



Photo 2. Running cedar *Lycopodium digitatum* (Fisher Knob Access Road)



Photo 3. Potential SWP habitat; hardwood forest with dappled sunlight (Fisher Knob Access Road)



Photo 4. Potential SWP habitat; dry upland hardwood forest with dappled sunlight

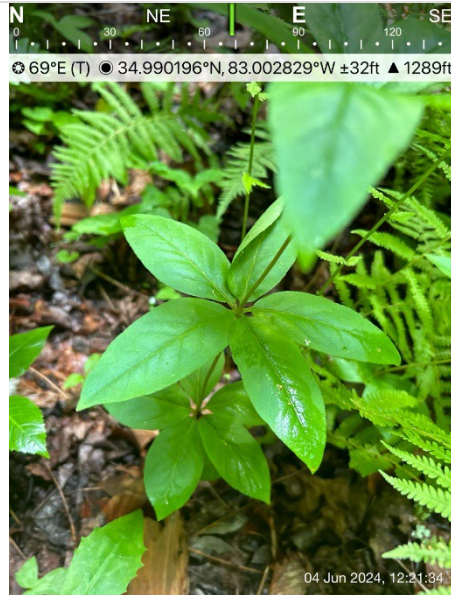


Photo 5. Whorled loosestrife *Lysimachia quadrifolia* (Fisher Knob Access Road)



Photo 6. Dense rhododendron sp.; not habitat for SWP (Fisher Knob Access Road)



Photo 7. *Trillium* sp. (Fisher Knob Access Road)



Photo 8. Cove forest adjacent to Howard Creek with dense vegetation; not habitat for SWP (Fisher Knob Access Road)



Photo 9. Hemlock, white pine with dense fern/herbaceous layer; not habitat for SWP (Fisher Knob Access Road)



Photo 10. Bottomland forest with dense herb and shrub layers; not habitat for SWP (Fisher Knob Access Road)



Photo 11. Bashful wakerobin *Trillium catesbaei* (Fisher Knob Access Road)



Photo 12. Mixed hardwood forest with herbaceous layer; not habitat for SWP (Fisher Knob Access Road)



Photo 13. Forested area with dense understory and herbaceous layers; not habitat for SWP (Fisher Knob Access Road)



Photo 14. Potential SWP habitat; upland hardwood forest with dappled sunlight (Fisher Knob Access Road)



Photo 15. Potential SWP habitat; hardwood slope (transmission line access roads)



Photo 16. Open space along access road; potential habitat for SWP on margins (transmission line access roads)



Photo 17. Slope with dense rhododendron sp.; not habitat for SWP (transmission line Access Roads)



Photo 18. Potential SWP habitat; mixed hardwood with dappled sunlight (transmission line access roads)



Photo 19. Mixed hardwood with dense understory; not habitat for SWP (transmission line access roads)



Photo 20. Access Road; potential habitat for SWP on margins (transmission line access roads)



Photo 21. Potential SWP habitat; dense mixed hardwood with dappled sunlight (transmission line access roads)

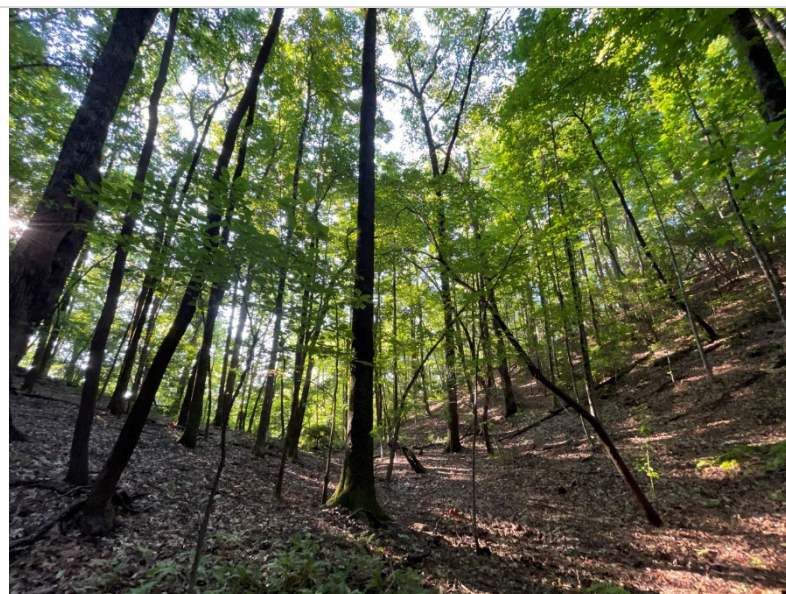


Photo 22. Potential SWP habitat; acidic cove forest (spoil location B)



Photo 23. Maintained open area; not habitat for SWP (spoil locations B, E, and F)



Photo 24. Potential SWP habitat; shortleaf pine and oak woodland (spoil locations B and C)



Photo 25. Dense vegetation in ROW; not SWP habitat (spoil locations C and M)



Photo 26. Potential SWP habitat; montane oak hickory cove forest (spoil location D)



Photo 27. Potential SWP habitat; dry mesic oak hickory forest (spoil locations C, D, G, I, and M)



Photo 28. Mixed hardwood with dense shrub layer; not habitat for SWP (spoil location J)



Photo 29. Potential SWP habitat; upland mixed wood with dappled sunlight (spoil location K)



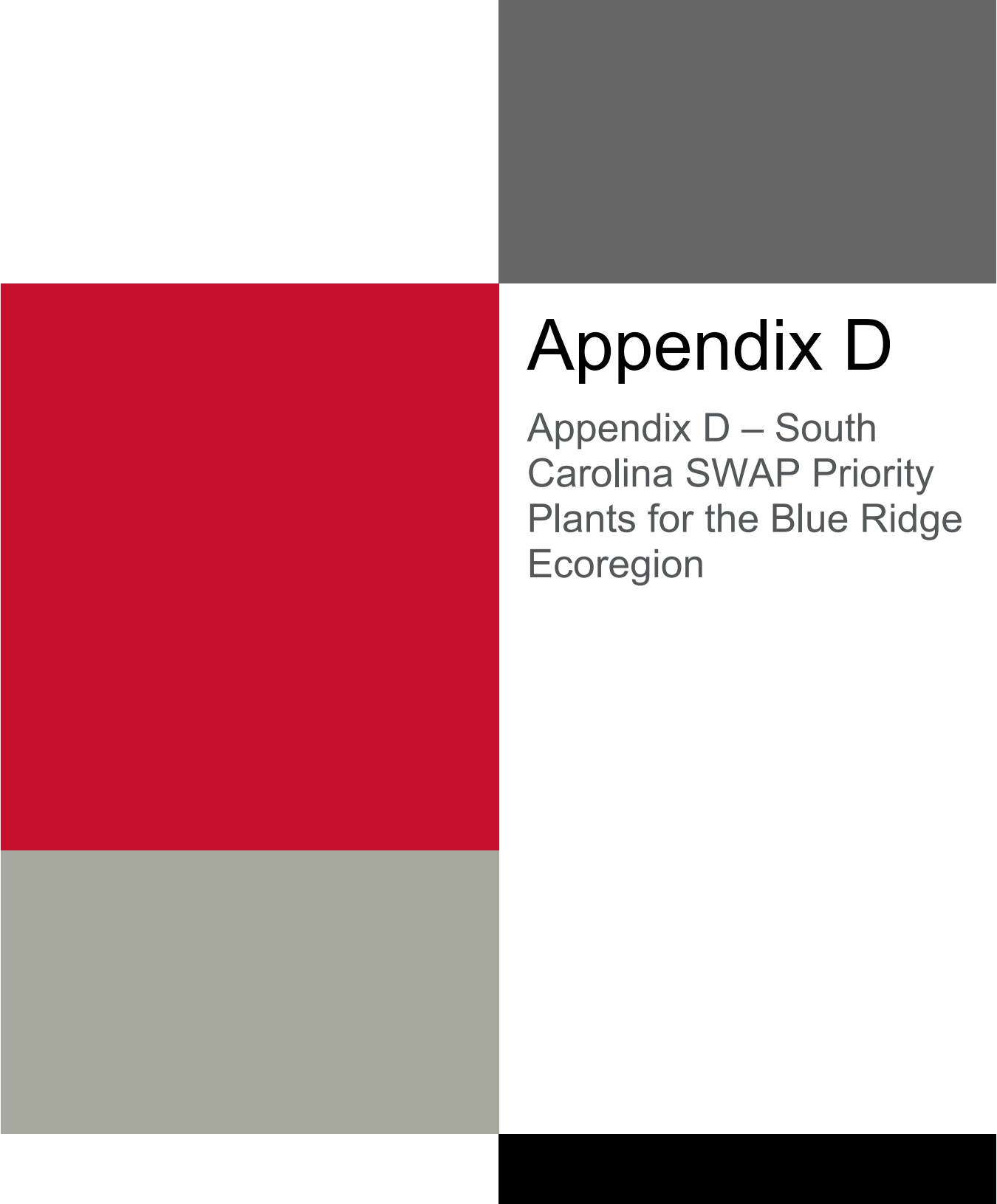
Photo 30. Potential SWP habitat; open herb layer with dappled sunlight (spoil location D)



Photo 31. Disturbed open habitat; not habitat for SWP (spoil location F)



Photo 32. Potential SWP habitat; upland mixed wood with dappled sunlight (spoil location K)

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Appendix D

Appendix D – South
Carolina SWAP Priority
Plants for the Blue Ridge
Ecoregion

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SWAP Priority Plants for the Blue Ridge Ecoregion

Scientific Name	Common Name	Legal Status	Priority	Habitat
<i>Agrimonia pubescens</i>	Soft Groovebur		Moderate	Low Elevation Basic and Acidic Mesic Forests
<i>Arnoglossum muehlenbergii</i>	Great Indian Plantain		Moderate	Low Elevation Basic and Acidic Mesic Forests; Bottomlands and Riparian Zones
<i>Asplenium monanthes</i>	Single-sorus Spleenwort		Moderate	Wet/Moist Unique Landforms
<i>Asplenium pinnatifidum</i>	Lobed Spleenwort		Moderate	Rock Outcrops
<i>Asplenium resiliens</i>	Black-stem Spleenwort		Moderate	Wet/Moist Unique Landforms
<i>Betula alleghaniensis</i>	Yellow Birch		Moderate	Bottomlands and Riparian Zones
<i>Bryocrumia vivicolor</i>	Bryocrumia Moss		High	Bottomlands and Riparian Zones
<i>Cardamine flagellifera</i>	Blue-Ridge Bittercress		High	Bottomlands and Riparian Zones
<i>Carex appalachica</i>	Appalachian Sedge		Moderate	Appalachian Oak Forest; High Elevation Forest; Rock Outcrops; Wet/Moist Unique Landforms
<i>Carex biltmoreana</i>	Biltmore Sedge		High	Rock Outcrops; Wet/Moist Unique Landforms
<i>Carex communis</i> var. <i>amplisquama</i>	Fort Mountain Sedge		High	Low Elevation Basic Mesic Forest
<i>Carex decomposita</i>	Cypress-knee Sedge		High	Depressions; Wet/Moist Unique Landforms
<i>Carex folliculata</i>	Long Sedge		Moderate	High Elevation Forest; Wet/Moist Unique Landforms
<i>Carex manhartii</i>	Manhart Sedge		Moderate	Bottomlands and Riparian Zones
<i>Carex pedunculata</i>	Longstalk Sedge		Moderate	Low Elevation Basic Mesic Forest
<i>Carex radfordii</i>	Radford's Sedge		High	Appalachian Oak Forest; Low Elevation Basic Mesic Forest
<i>Carex woodii</i>	Pretty Sedge		Moderate	Bottomlands and Riparian Zones
<i>Cheilolejeunea evansii</i>	Evan's Cheilolejeunea		High	Bottomlands and Riparian Zones; Wet/Moist Unique Landforms
<i>Chrysosplenium americanum</i>	American Golden-saxifrage		Moderate	Low Elevation Acidic Mesic Forest; Wet/Moist Unique Landforms
<i>Cladrastis kentukea</i>	Yellowwood		Moderate	Low Elevation Basic Mesic Forest
<i>Collinsonia verticillata</i>	Whorled Horse-balm		Moderate	Low Elevation Basic Mesic Forest; Low Elevation Acidic Mesic Forest
<i>Comptonia peregrina</i>	Sweet Fern		Moderate	Grasslands/Early-Successional
<i>Convallaria majuscula</i>	American Lily-of-the-valley		Moderate	High Elevation Forest
<i>Coreopsis latifolia</i>	Broad-leaved Tickseed		High	Low Elevation Basic Mesic Forest
<i>Cornus racemosa</i>	Stiff Dogwood		Moderate	Bottomlands and Riparian Zones
<i>Cystopteris bulbifera</i>	Bulblet Fern		Moderate	Rock Outcrops



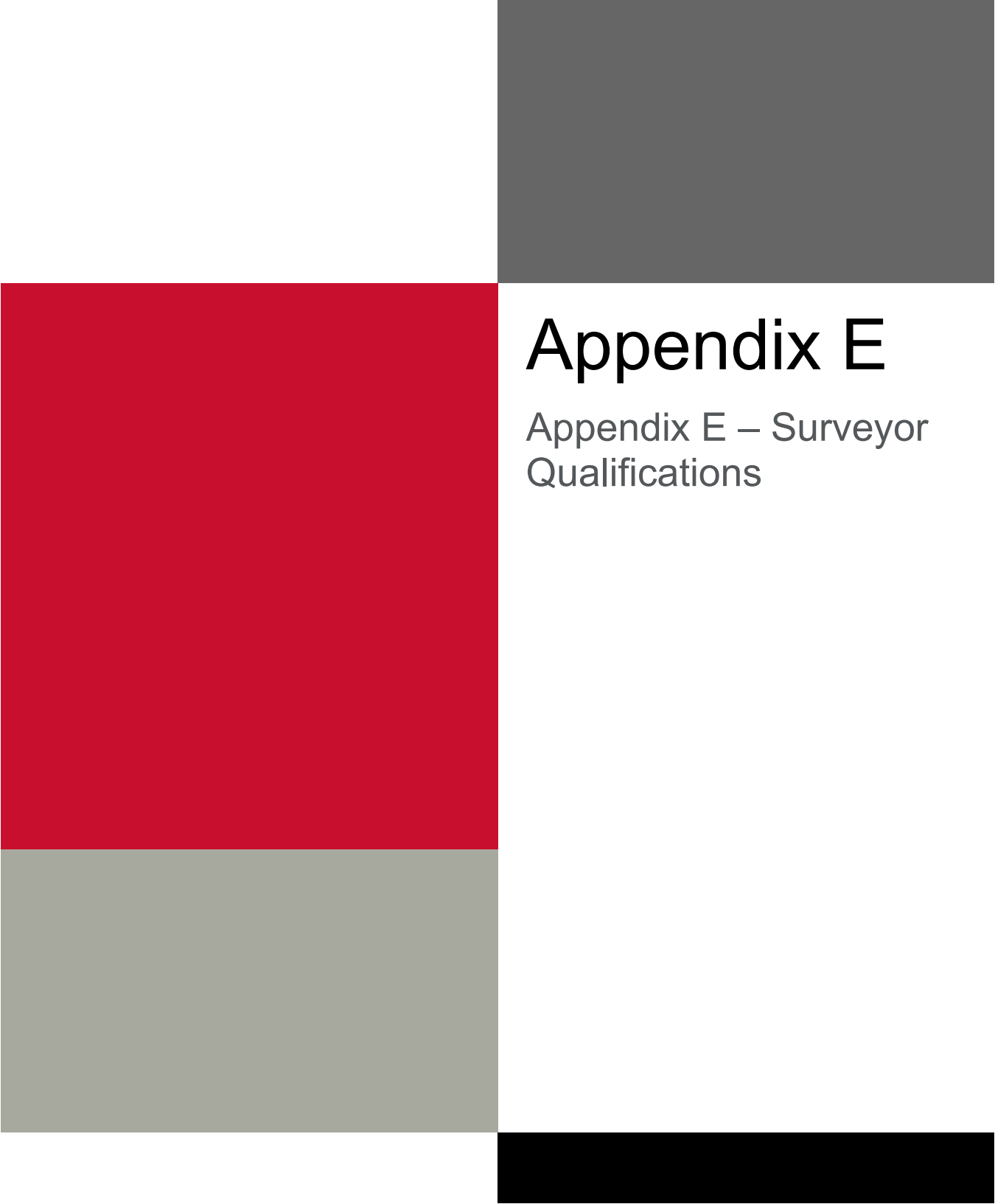
Scientific Name	Common Name	Legal Status	Priority	Habitat
<i>Danthonia epilis</i>	Bog Oat-grass		Moderate	Rock Outcrops; Wet/Moist Unique Landforms
<i>Deschampsia flexuosa</i>	Crinkled Hairgrass		Moderate	Rock Outcrops
<i>Dicentra eximia</i>	Wild Bleeding-heart		Moderate	Low Elevation Basic Mesic Forest
<i>Diplazium pycnocarpon</i>	Glade Fern		Moderate	Low Elevation Basic Mesic Forest
<i>Dryopteris goldiana</i>	Goldie's Woodfern		Moderate	Low Elevation Basic Mesic Forest; Rock Outcrops
<i>Echinacea laevigata</i>	Smooth Coneflower	LE: Endangered	Highest	Grasslands/Early-Successional
<i>Eurybia avita</i>	Alexander's Rock Aster		High	Rock Outcrops
<i>Fothergilla major</i>	Mountain Witch-alder		High	Low Elevation Basic Mesic Forest
<i>Gaylussacia baccata</i>	Black Huckleberry		Moderate	Appalachian Oak Forest; Low Elevation Acidic Mesic Forest
<i>Gymnoderma lineare</i>	Rocky Gnome Lichen	LE: Endangered	Highest	Rock Outcrops
<i>Helenium brevifolium</i>	Shortleaf Sneezeweed		Moderate	Bottomlands and Riparian Zones
<i>Helianthus glaucophyllus</i>	White-leaved Sunflower		Moderate	Low Elevation Basic Mesic Forest
<i>Helonias bullata</i>	Swamp-pink	LT: Threatened	Highest	Wet/Moist Unique Landforms
<i>Hydrangea cinerea</i>	Ashy-hydrangea		Moderate	Low Elevation Basic Mesic Forest
<i>Hydrocotyle americana</i>	American Water-pennywort		Moderate	Bottomlands and Riparian Zones; Depressions
<i>Hymenophyllum tayloriae</i>	Taylor's Fern		High	Wet/Moist Unique Landforms
<i>Hymenophyllum tunbrigense</i>	Tunbridge Fern		Moderate	Wet/Moist Unique Landforms
<i>Hypericum buckleii</i>	Blue Ridge St. John's-wort		High	Rock Outcrops
<i>Impatiens pallida</i>	Pale Jewel-weed		Moderate	Bottomlands and Riparian Zones; Depressions
<i>Isoetes caroliniana</i>	Engelmann's Quillwort		Moderate	Depressions
<i>Isotria medeoloides</i>	Small Whorled Pogonia	LT: Threatened	Highest	Wet/Moist Unique Landforms
<i>Juncus subcaudatus</i>	Woods-rush		Moderate	Depressions
<i>Juniperus communis</i> var. <i>depressa</i>	Dwarf Juniper		Moderate	High Elevation Forest
<i>Krigia montana</i>	False Dandelion		High	Rock Outcrops
<i>Lejeunea blomquistii</i>	"A Liverwort"		High	Rock Outcrops
<i>Leptohymenium sharpii</i>	Sharp's Leptohymenium Moss		High	Wet/Moist Unique Landforms



Scientific Name	Common Name	Legal Status	Priority	Habitat
<i>Liatris microcephala</i>	Small-head Gayfeather		Moderate	Rock Outcrops
<i>Liparis liliifolia</i>	Large Twayblade		Moderate	Low Elevation Basic Mesic and Acidic Forests
<i>Listera smallii</i>	Kidney-leaf Twayblade		Moderate	Low Elevation Acidic Mesic Forest
<i>Lophocolea appalachiana</i>	Appalachian Lophocolea		High	Wet/Moist Unique Landforms
<i>Lycopodium clavatum</i>	Running Pine		Moderate	Appalachian Oak Forest; High Elevation Forest
<i>Lycopodium porophyllum</i>	Rock Clubmoss		Moderate	Rock Outcrops
<i>Lycopodium tristachyum</i>	Deep-root Clubmoss		Moderate	High Elevation Forest
<i>Lysimachia fraseri</i>	Fraser Loosestrife		High	Bottomlands and Riparian Zones
<i>Lysimachia hybrida</i>	Lance-leaf Loosestrife		Moderate	Depressions
<i>Magnolia cordata</i>	Piedmont Cucumber Tree		Moderate	Low Elevation Basic Mesic Forest
<i>Mitella diphylla</i>	Two-leaf Bishop's-cap		Moderate	Low Elevation Basic Mesic Forest
<i>Monotropsis odorata</i>	Sweet Pinesap		High	Appalachian Oak Forest; High Elevation Forest
<i>Oenothera perennis</i>	Small Sundrops		Moderate	Depressions
<i>Panax quinquefolius</i>	American Ginseng		High	Low Elevation Basic Mesic Forest
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus		High	Wet/Moist Unique Landforms
<i>Pellaea atropurpurea</i>	Purple-stem Cliff-brake		Moderate	Rock Outcrops
<i>Pellaea wrightiana</i>	Cliff-brake Fern		Moderate	Rock Outcrops
<i>Pellia appalachiana</i>	Appalachian Pellia		Moderate	Bottomlands and Riparian Zones; Wet/Moist Unique Landforms
<i>Phacelia bipinnatifida</i>	Fernleaf Phacelia		Moderate	Low Elevation Basic Mesic Forest; Bottomlands and Riparian Zones
<i>Plagiochila caduciloba</i>	Gorge Leafy Liverwort		High	Wet/Moist Unique Landforms
<i>Plagiochila sharpii</i>	"A Liverwort"		High	Wet/Moist Unique Landforms
<i>Plagiochila sullivantii</i>	"A Liverwort"		High	Wet/Moist Unique Landforms
<i>Plagiomnium carolinianum</i>	Mountain Wavy-leaf Moss		High	Wet/Moist Unique Landforms
<i>Platanthera integrilabia</i>	White Fringeless Orchid	C: Candidate	Highest	Bottomlands and Riparian Zones; Depressions
<i>Platyhypnidium pringlei</i>	Pringle's Platyhypnidium Moss		High	Wet/Moist Unique Landforms
<i>Poa alsodes</i>	Blue-grass		Moderate	Low Elevation Basic Mesic Forest
<i>Porella japonica</i> ssp. <i>appalachiana</i>	"A Liverwort"		Moderate	Bottomlands and Riparian Zones



Scientific Name	Common Name	Legal Status	Priority	Habitat
<i>Pycnanthemum montanum</i>	Single-haired Mountain-mint		Moderate	Appalachian Oak Forest; High Elevation Forest; Low Elevation Basic Mesic Forest
<i>Rhododendron catawbiense</i>	Catawba Rhododendron		Moderate	High Elevation Forest
<i>Rudbeckia heliopsidis</i>	Sun-facing Coneflower		High	Low Elevation Acidic Mesic Forest
<i>Sarracenia rubra</i> ssp. <i>jonesii</i>	Mountain Sweet Pitcher-plant	LE: Endangered	Highest	Rock Outcrops; Wet/Moist Unique Landforms
<i>Saxifraga careyana</i>	Carey Saxifrage		High	High Elevation Forest; Low Elevation Basic Mesic Forest; Rock Outcrops
<i>Senecio millefolium</i>	Piedmont Ragwort		High	Rock Outcrops
<i>Shortia galacifolia</i>	Oconee bells		High	High Elevation Forest; Low Elevation Basic Mesic Forest; Rock Outcrops; Wet/Moist Unique Landforms
<i>Silene ovata</i>	Ovate Catchfly		High	Appalachian Oak Forest; High Elevation Forest; Low Elevation Basic Mesic Forest
<i>Solidago simulans</i>	Granite Dome Goldenrod		High	High Elevation Forest; Low Elevation Basic Mesic Forest; Rock Outcrops
<i>Stachys clingmanii</i>	Clingman's Hedge-nettle		High	Appalachian Oak Forest; High Elevation Forest
<i>Thermopsis mollis</i>	Soft-haired Thermopsis		Moderate	Low Elevation Acidic Mesic Forest
<i>Tradescantia virginiana</i>	Virginia Spiderwort		Moderate	High Elevation Forest; Low Elevation Basic Mesic Forest
<i>Trichomanes boschianum</i>	Bristle-fern		Moderate	Low Elevation Basic Mesic Forest; Rock Outcrops; Depressions
<i>Trichophorum cespitosum</i>	Deer-haired Bulrush		Moderate	High Elevation Forest
<i>Trillium grandiflorum</i>	Large-flower Trillium		Moderate	High Elevation Forest; Depressions
<i>Trillium rugelii</i>	Southern Nodding Trillium		High	Low Elevation Basic Mesic Forest; Depressions
<i>Trillium simile</i>	Sweet White Trillium		High	Low Elevation Basic Mesic Forest; Depressions
<i>Triphora trianthophora</i>	Nodding Pogonia		Moderate	Depressions
<i>Viola conspersa</i>	American Bog Violet		Moderate	Low Elevation Basic Mesic Forest
<i>Xyris torta</i>	Twisted Yellow-eyed-grass		Moderate	Wet/Moist Unique Landforms



Appendix E

Appendix E – Surveyor
Qualifications

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Surveyor Qualifications

Name	Eric Mularski, PWS, PMP
Education	B.S. Biology – Eastern Washington University – 2001
Experience:	Environmental Sciences and Planning Manager – HDR Engineering, Inc. (HDR) – October 2015 to present Environmental Scientist – HDR – November 2006 to October 2015 Environmental Scientist – Buck Engineering – October 2004 to November 2006 Fisheries Technician – Kalispel Tribe of Indians – June 2001 to September 2004
Qualifications:	18 years experience conducting botanical and presence and absence surveys for federally protected plant species in the Southern Blue Ridge Ecoregion of North Carolina, South Carolina, and Virginia.

Name	Paul Bright
Education	B.S. Geography: B.A. Earth Science – University of North Carolina at Charlotte - 2006
Experience:	Environmental Scientist II – HDR – January 2022 to present Environmental Scientist – SWCA Consultants – September 2021 to January 2022 Natural Resources Assistant – Mecklenburg County Park & Recreation Natural Resources – October 2020 to September 2021 Chief Operating Officer – EDIA Maps – November 2021 to September 2021 Environmental Scientist – Carolina Wetland Services – June 2006 to November 2009
Qualifications:	5 years experience conducting botanical and presence and absence surveys for federally protected plant species in the Southern Blue Ridge Ecoregion of North Carolina and South Carolina.

Name	Jake Irvin, PWS, CE
Education	M.S. Environmental Sciences – University of North Carolina at Wilmington – 2019 B.A. Environmental Sciences – Ferrum College - 2017
Experience:	Environmental Scientist II – HDR – July 2019 to present
Qualifications:	5 years experience conducting botanical and presence and absence surveys for federally protected plant species in the Southern Blue Ridge Ecoregion of North Carolina, South Carolina, and Virginia.

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A decorative graphic on the left side of the page consists of four overlapping rectangles: a dark grey rectangle at the top right, a red rectangle in the middle left, a light grey rectangle at the bottom left, and a black rectangle at the bottom right.

Appendix F

Appendix F – Consultation

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From: [Crutchfield Jr., John U](#)
To: [Olds, Melanie J](#); [Elizabeth Miller](#)
Cc: [Stuart, Alan Witten](#); [Fletcher, Scott T](#); [Kulpa, Sarah](#); [Mularski, Eric](#); [McCarney-Castle, Kerry](#)
Subject: Bad Creek Relicensing - Small Whorled Pogonia Draft Study Plan (REVIEW REQUESTED)
Date: Friday, May 24, 2024 12:20:08 PM
Attachments: [image001.png](#)
Importance: High

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Melanie and Elizabeth:

Duke Energy is pleased to distribute the draft Small Whorled Pogonia Study Plan for your review and comment.  [Bad Creek_Small Whorled Pogonia Study Plan_May 2024](#)

We kindly request comments back by June 7th; however, Duke Energy will have field crews at the project site the week of June 3rd, therefore, expedited comments received by the end of next week (May 31) would be greatly appreciated to facilitate the field effort.

Please let Alan or me know if you have any questions.

Regards,

John Crutchfield

Project Manager II

Water Strategy, Hydro Licensing & Lake Services

Regulated & Renewable Energy

Duke Energy

525 South Tryon Street, DEP-35B | Charlotte, NC 28202

Office 980-373-2288 | Cell 919-757-1095

From: [Olds, Melanie J](#)
To: [Crutchfield Jr., John U](#); [Elizabeth Miller](#)
Cc: [Stuart, Alan Witten](#); [Fletcher, Scott T](#); [Kulpa, Sarah](#); [Mularski, Eric](#); [McCarney-Castle, Kerry](#)
Subject: Re: [EXTERNAL] Bad Creek Relicensing - Small Whorled Pogonia Draft Study Plan (REVIEW REQUESTED)
Date: Wednesday, May 29, 2024 7:37:51 AM
Attachments: [image001.png](#)
[Outlook-aquwz1wf.png](#)
[Outlook-4amisz42.png](#)

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John,

The Service has reviewed the Small Whorled Pogonia Study Plan and does not have any comments. We look forward to seeing the results of the survey.

Melanie

Melanie Olds

Fish & Wildlife Biologist

Regulatory Team Lead/FERC Coordinator

U.S. Fish and Wildlife Service
South Carolina Ecological Services Field Office
176 Croghan Spur Road, Suite 200
Charleston, SC 29407
Phone: (843) 534-0403



NOTE: This email correspondence and any attachments to and from this sender is subject to the Freedom of Information Act (FOIA) and may be disclosed to third parties.

From: Crutchfield Jr., John U <John.Crutchfield@duke-energy.com>
Sent: Friday, May 24, 2024 12:19 PM
To: Olds, Melanie J <melanie_old@fws.gov>; Elizabeth Miller <MillerE@dnr.sc.gov>
Cc: Stuart, Alan Witten <Alan.Stuart@duke-energy.com>; scott.fletcher <scott.fletcher@duke-energy.com>; Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>
Subject: [EXTERNAL] Bad Creek Relicensing - Small Whorled Pogonia Draft Study Plan (REVIEW REQUESTED)

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links, opening attachments, or responding.

Dear Melanie and Elizabeth:

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Regards,

John Crutchfield

Project Manager II

Water Strategy, Hydro Licensing & Lake Services

Regulated & Renewable Energy

Duke Energy

525 South Tryon Street, DEP-35B | Charlotte, NC 28202

Office 980-373-2288 | Cell 919-757-1095

From: [Crutchfield Jr., John U](#)
To: [Elizabeth Miller](#)
Cc: [Stuart, Alan Witten](#); [Fletcher, Scott T](#); [Kulpa, Sarah](#); [Mularski, Eric](#); [McCarney-Castle, Kerry](#)
Subject: RE: Bad Creek Relicensing - Small Whorled Pogonia Draft Study Plan (REVIEW REQUESTED)
Date: Friday, May 31, 2024 2:13:55 PM
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Importance: High

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Elizabeth: Good afternoon!

I wanted to check in to see if SC DNR has any comments on the Small Whorled Pogonia Draft Study Plan. The survey crews are scheduled to be in the field **next week** and if Sc DNR has any comments on the study plan that might affect field surveys, please let us know.

Regards,
John

From: Crutchfield Jr., John U
Sent: Friday, May 24, 2024 12:20 PM
To: Melanie Olds <melanie_old@fws.gov>; Elizabeth Miller <MillerE@dnr.sc.gov>
Cc: Stuart, Alan Witten <Alan.Stuart@duke-energy.com>; Fletcher, Scott T <Scott.Fletcher@duke-energy.com>; Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>
Subject: Bad Creek Relicensing - Small Whorled Pogonia Draft Study Plan (REVIEW REQUESTED)
Importance: High

Dear Melanie and Elizabeth:

Duke Energy is pleased to distribute the draft Small Whorled Pogonia Study Plan for your review and comment.  [Bad Creek_Small Whorled Pogonia Study Plan_May 2024](#)

We kindly request comments back by June 7th; however, Duke Energy will have field crews at the project site the week of June 3rd, therefore, expedited comments received by the end of next week (May 31) would be greatly appreciated to facilitate the field effort.

Please let Alan or me know if you have any questions.

Regards,

John Crutchfield

Project Manager II

Water Strategy, Hydro Licensing & Lake Services

Regulated & Renewable Energy

Duke Energy

525 South Tryon Street, DEP-35B | Charlotte, NC 28202

Office 980-373-2288 | Cell 919-757-1095

From: [Elizabeth Miller](#)
To: [Crutchfield Jr., John U](#)
Cc: [Stuart, Alan Witten](#); [Fletcher, Scott T](#); [Kulpa, Sarah](#); [Mularski, Eric](#); [McCarney-Castle, Kerry](#)
Subject: RE: [EXTERNAL] RE: Bad Creek Relicensing - Small Whorled Pogonia Draft Study Plan (REVIEW REQUESTED)
Date: Monday, June 3, 2024 10:20:57 AM
Attachments: [image001.png](#)

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WARNING: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi John,

The SCDNR has reviewed the Small Whorled Pogonia draft Study Plan and has no comments to offer.

Thank you,

Elizabeth

Elizabeth C. Miller
SCDNR
Office: 843-953-3881
Cell: 843-729-4636

From: Crutchfield Jr., John U <John.Crutchfield@duke-energy.com>
Sent: Monday, June 3, 2024 9:09 AM
To: Elizabeth Miller <MillerE@dnr.sc.gov>
Cc: Stuart, Alan Witten <Alan.Stuart@duke-energy.com>; Fletcher, Scott T <Scott.Fletcher@duke-energy.com>; Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>
Subject: RE: [EXTERNAL] RE: Bad Creek Relicensing - Small Whorled Pogonia Draft Study Plan (REVIEW REQUESTED)

Thank you, Elizabeth.

From: Elizabeth Miller <MillerE@dnr.sc.gov>
Sent: Monday, June 3, 2024 9:07 AM
To: Crutchfield Jr., John U <John.Crutchfield@duke-energy.com>
Cc: Stuart, Alan Witten <Alan.Stuart@duke-energy.com>; Fletcher, Scott T <Scott.Fletcher@duke-energy.com>; Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>
Subject: [EXTERNAL] RE: Bad Creek Relicensing - Small Whorled Pogonia Draft Study Plan (REVIEW REQUESTED)

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Hi John,

Our upstate botanist was unable to review the draft plan last week but is planning to do so today. I'll get you our comments as soon as I can.

Thanks,

EM

Elizabeth C. Miller
SCDNR
Office: 843-953-3881
Cell: 843-729-4636

From: Crutchfield Jr., John U <John.Crutchfield@duke-energy.com>
Sent: Friday, May 31, 2024 2:14 PM
To: Elizabeth Miller <MillerE@dnr.sc.gov>
Cc: Stuart, Alan Witten <Alan.Stuart@duke-energy.com>; Fletcher, Scott T <Scott.Fletcher@duke-energy.com>; Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>
Subject: RE: Bad Creek Relicensing - Small Whorled Pogonia Draft Study Plan (REVIEW REQUESTED)
Importance: High

Elizabeth: Good afternoon!

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Regards,
John

From: Crutchfield Jr., John U
Sent: Friday, May 24, 2024 12:20 PM
To: Melanie Olds <melanie_old@fws.gov>; Elizabeth Miller <MillerE@dnr.sc.gov>
Cc: Stuart, Alan Witten <Alan.Stuart@duke-energy.com>; Fletcher, Scott T <Scott.Fletcher@duke-energy.com>; Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>
Subject: Bad Creek Relicensing - Small Whorled Pogonia Draft Study Plan (REVIEW REQUESTED)
Importance: High

Dear Melanie and Elizabeth:

Duke Energy is pleased to distribute the draft Small Whorled Pogonia Study Plan for your review and comment.  [Bad Creek_Small Whorled Pogonia Study Plan_May 2024](#)

We kindly request comments back by June 7th; however, Duke Energy will have field crews at the project site the week of June 3rd, therefore, expedited comments received by the end of next week (May 31) would be greatly appreciated to facilitate the field effort.

Please let Alan or me know if you have any questions.

Regards,

John Crutchfield

Project Manager II

Water Strategy, Hydro Licensing & Lake Services

Regulated & Renewable Energy

Duke Energy

525 South Tryon Street, DEP-35B | Charlotte, NC 28202

Office 980-373-2288 | Cell 919-757-1095

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From: [Crutchfield Jr., John U](#)
To: [Abney, Michael A](#); [Andrew Grosse](#); [Andy Douglas](#); [Austen Attaway](#); [Bill Ranson-Retired](#); [Chris Starker](#); [Dale Wilde](#); [Elizabeth Miller](#); [Mularski, Eric](#); [Fletcher, Scott T](#); [Huff, Jen](#); [Jennifer Kindel](#); [Keith A. Bradley](#); [Ken Forrester](#); [Olds, Melanie J](#); [Amedee, Morgan D.](#); [Pat Cloninger](#); [Samantha Tessel](#); [Stuart, Alan Witten](#); [suewilliams130@gmail.com](#); [Wes Cooler](#); [Willie Simmons](#)
Cc: [Sarah Salazar](#); [McCarney-Castle, Kerry](#); [Salazar, Maggie](#)
Subject: Bad Creek Relicensing - Small Whorled Pogonia Final Study Plan
Date: Wednesday, June 5, 2024 10:40:59 AM
Attachments: [image001.png](#)
Importance: High

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Wildlife & Botanical Resources Committee:

Please find attached the final Small Whorled Pogonia Study Plan which was developed in consultation and review by the US Fish & Wildlife Service and the South Carolina Department of Natural Resources. The study plan is being provide to the Resource Committee for information and reference.

The study plan can be accessed at the following link:  [20240605_Bad Creek_Small Whorled Pogonia_Study Plan.pdf](#)

The study plan was developed In response to a written request from the South Carolina Department of Natural Resources (SCDNR) in comments submitted to the Federal Energy Regulatory Commission on the Initial Study Report and to support Clean Water Act Section 404 U.S. Army Corps of Engineers permitting activities associated with the Bad Creek II Power Complex.

Duke Energy will survey the area around the proposed Fisher Knob Access Road for the federally threatened small whorled pogonia (*Isotria medeoloides*) during the appropriate survey window (mid-May through early July).

Please let Alan or me know if you have any questions.

Regards,

John Crutchfield

Project Manager II

Water Strategy, Hydro Licensing & Lake Services

Regulated & Renewable Energy

Duke Energy

525 South Tryon Street, DEP-35B | Charlotte, NC 28202

Office 980-373-2288 | Cell 919-757-1095

Memo

Date:	Wednesday, June 05, 2024
Project:	Bad Creek II Power Complex
To:	Alan Stuart, Duke Energy
From:	Eric Mularski, HDR
Subject:	Small Whorled Pogonia Study Plan

Project Understanding

Duke Energy Carolinas, LLC (Duke Energy) is the owner and operator of the 1,400-megawatt Bad Creek Pumped Storage Project (Project; Federal Energy Regulatory Commission [FERC] Project No. 2740) located in Oconee County, South Carolina. The existing (original) license for the Project was issued by the Commission for a 50-year term, with an effective date of August 1, 1977, and expires July 31, 2027, therefore, Duke Energy is pursuing a new license for the Project pursuant to the Commission's Integrated Licensing Process (ILP) (18 Code of Federal Regulations Part 5). An alternative relicensing proposal presently being evaluated by Duke Energy is the construction of a second 1,400-megawatt power complex (Bad Creek II Power Complex) adjacent to the existing Project to increase renewable pumping and generating capacity at the Project.

In response to a written request from the South Carolina Department of Natural Resources (SCDNR) in comments submitted to the Commission on the Initial Study Report (Duke Energy 2024) and to support Clean Water Act Section 404 U.S. Army Corps of Engineers permitting, Duke Energy proposed to survey the area around the proposed Fisher Knob Access Road for the federally threatened small whorled pogonia (*Isotria medeoloides*) during the appropriate survey window (mid-May through early July).¹

The SCDNR Natural Heritage Trust Program, which documents and tracks element of occurrence data for rare, threatened, and endangered species (both federal and state) indicates no record of the small whorled pogonia within a 2-mile of radius of the Project (SCNHP 2023), however, this species is listed on the U.S. Fish and Wildlife Survey (USFWS) Information for Planning and Consultation (IPaC) database as having the potential to occur in the project vicinity, therefore surveys are proposed to determine the presence or absence of this protected species prior to land disturbance activities associated with the access road and overall construction of the Bad Creek II Power Complex. This will aid in the quality and comprehensiveness of the statewide dataset for rare, threatened, and endangered species. Additionally, field biologists will record incidental observations of priority plant species identified in the SC Wildlife Action Plan (SWAP) during the survey.

¹ A Natural Resources Survey was carried out by Duke Energy in 2021 and indicated that suitable habitat for the small whorled pogonia was present at the site, however, the study was performed outside of the survey window. The Natural Resources Survey was filed with the Pre-Application Document in February, 2023.

This document provides an overview of the approach to the proposed small whorled pogonia surveys.

Small Whorled Pogonia

Species Description

The small whorled pogonia is a perennial orchid that produces a smooth, hollow stem from 2 to 14 inches tall and topped by five to six leaves in circular arrangement (false whorl). One or two flowers stand in the center of the whorl of leaves. The leaves are milky-green or grayish-green, and the flower is yellowish-green with a greenish-white lip (USFWS 2024). Flowers appear soon after the plants emerge in mid-May or June. This species is non-clonal, and plants may emerge each spring or they may remain vegetatively dormant and below the ground for one to several years. Each plant produces only one, rarely more than one, overwintering bud per year (USFWS 2022).

Habitat

The small whorled pogonia occurs in young as well as maturing (second to third successional growth) mixed-deciduous or mixed-deciduous/coniferous forests. Sometimes it grows in stands of softwoods with a thick layer of dead leaves, often on slopes near small streams. The species may also be found on dry, rocky, wooded slopes; moist slopes; ravines lacking stream channels; or slope bases near braided channels of vernal streams. The orchid, often limited by shade, requires small light gaps or canopy breaks, and typically grows under canopies that are relatively open or near features like logging roads or streams that create long-persisting breaks in the forest canopy. It prefers acidic soils with a thick layer of dead leaved and sparse to moderate ground cover (USFWS 2024).

Proposed Survey Methods

Surveys will be conducted during the USFWS recommended optimal survey window of mid-May – early July. Potential habitat will be surveyed along a 50-foot-wide buffer of the proposed Fisher Knob Access Road and within the proposed limits of disturbance and spoil area alternatives, as well as along proposed transmission line access roads related to the Bad Creek II Power Complex proposed infrastructure (Figure 1).

Survey areas can be visually delineated by local topography (ravines, slopes, benches) or by landmarks (boulders, downed or otherwise conspicuous trees, or old roads) (USFWS 2016). The survey methodology will consist of slowly traversing back and forth across transects; surveyors will be spaced approximately 25-feet apart focusing the immediate area within a 10-to-15-foot radius depending on habitat type and visibility. Handheld Global Positioning System (GPS) units will be used to navigate throughout the site to avoid survey gaps.

Small whorled pogonia plants favor certain micro-habitats such as:

- Vernal or ephemeral runoff courses (leaf piles)
- Terraces or benches and base-of-slope areas
- Small canopy openings, fern patches

If one or more small whorled pogonia plants are identified during the survey, the surveyor will do the following:

- Delineate a polygon of the location and demarcate the boundaries using brightly colored flagging. A GPS unit will be used to collect boundary coordinates.
- Photo-document the plants sufficiently to confirm the identification of the species.
- Describe the size of each population (e.g., in square feet).
- Record a detailed written description and photo-document of specific and surrounding habitat.
- Contact USFWS and SCDNR representatives within 48 hours of species sightings.

Vegetation cover type and specific habitats /substrates will be noted by surveyor. No voucher specimens will be collected, and any plant locations will be considered to be “Privileged Non-Public Information”. Additionally, field biologists will record incidental observations of priority plant species identified in the South Carolina SWAP; a list of priority plants included in the SWAP that may occur in Blue Ridge Ecoregion is provided in Table 1.

Results and Conclusions

Results and conclusions of the field surveys will be provided in a summary report during the third quarter of 2024.



Table 1. List of South Carolina State Wildlife Action Plan Priority Plant that May Occur in Blue Ridge Ecoregion

Scientific Name	Common Name	Legal Status	Priority	Habitat
<i>Agrimonia pubescens</i>	Soft Groovebur		Moderate	Low Elevation Basic and Acidic Mesic Forests
<i>Arnoglossum muehlenbergii</i>	Great Indian Plantain		Moderate	Low Elevation Basic and Acidic Mesic Forests; Bottomlands and Riparian Zones
<i>Asplenium monanthes</i>	Single-sorus Spleenwort		Moderate	Wet/Moist Unique Landforms
<i>Asplenium pinnatifidum</i>	Lobed Spleenwort		Moderate	Rock Outcrops
<i>Asplenium resiliens</i>	Black-stem Spleenwort		Moderate	Wet/Moist Unique Landforms
<i>Betula alleghaniensis</i>	Yellow Birch		Moderate	Bottomlands and Riparian Zones
<i>Bryocrumia vivicolor</i>	Bryocrumia Moss		High	Bottomlands and Riparian Zones
<i>Cardamine flagellifera</i>	Blue-Ridge Bittercress		High	Bottomlands and Riparian Zones
<i>Carex appalachica</i>	Appalachian Sedge		Moderate	Appalachian Oak Forest; High Elevation Forest; Rock Outcrops; Wet/Moist Unique Landforms
<i>Carex biltmoreana</i>	Biltmore Sedge		High	Rock Outcrops; Wet/Moist Unique Landforms
<i>Carex communis</i> var. <i>amplisquama</i>	Fort Mountain Sedge		High	Low Elevation Basic Mesic Forest
<i>Carex decomposita</i>	Cypress-knee Sedge		High	Depressions; Wet/Moist Unique Landforms
<i>Carex folliculata</i>	Long Sedge		Moderate	High Elevation Forest; Wet/Moist Unique Landforms
<i>Carex manhartii</i>	Manhart Sedge		Moderate	Bottomlands and Riparian Zones
<i>Carex pedunculata</i>	Longstalk Sedge		Moderate	Low Elevation Basic Mesic Forest
<i>Carex radfordii</i>	Radford's Sedge		High	Appalachian Oak Forest; Low Elevation Basic Mesic Forest
<i>Carex woodii</i>	Pretty Sedge		Moderate	Bottomlands and Riparian Zones
<i>Cheilolejeunea evansii</i>	Evan's Cheilolejeunea		High	Bottomlands and Riparian Zones; Wet/Moist Unique Landforms
<i>Chrysosplenium americanum</i>	American Golden-saxifrage		Moderate	Low Elevation Acidic Mesic Forest; Wet/Moist Unique Landforms
<i>Cladrastis kentukea</i>	Yellowwood		Moderate	Low Elevation Basic Mesic Forest
<i>Collinsonia verticillata</i>	Whorled Horse-balm		Moderate	Low Elevation Basic Mesic Forest; Low Elevation Acidic Mesic Forest
<i>Comptonia peregrina</i>	Sweet Fern		Moderate	Grasslands/Early-Successional

Scientific Name	Common Name	Legal Status	Priority	Habitat
<i>Convallaria majuscula</i>	American Lily-of-the-valley		Moderate	High Elevation Forest
<i>Coreopsis latifolia</i>	Broad-leaved Tickseed		High	Low Elevation Basic Mesic Forest
<i>Cornus racemosa</i>	Stiff Dogwood		Moderate	Bottomlands and Riparian Zones
<i>Cystopteris bulbifera</i>	Bulblet Fern		Moderate	Rock Outcrops
<i>Danthonia epilis</i>	Bog Oat-grass		Moderate	Rock Outcrops; Wet/Moist Unique Landforms
<i>Deschampsia flexuosa</i>	Crinkled Hairgrass		Moderate	Rock Outcrops
<i>Dicentra eximia</i>	Wild Bleeding-heart		Moderate	Low Elevation Basic Mesic Forest
<i>Diplazium pycnocarpon</i>	Glade Fern		Moderate	Low Elevation Basic Mesic Forest
<i>Dryopteris goldiana</i>	Goldie's Woodfern		Moderate	Low Elevation Basic Mesic Forest; Rock Outcrops
<i>Echinacea laevigata</i>	Smooth Coneflower	LE: Endangered	Highest	Grasslands/Early-Successional
<i>Eurybia avita</i>	Alexander's Rock Aster		High	Rock Outcrops
<i>Fothergilla major</i>	Mountain Witch-alder		High	Low Elevation Basic Mesic Forest
<i>Gaylussacia baccata</i>	Black Huckleberry		Moderate	Appalachian Oak Forest; Low Elevation Acidic Mesic Forest
<i>Gymnoderma lineare</i>	Rocky Gnome Lichen	LE: Endangered	Highest	Rock Outcrops
<i>Helenium brevifolium</i>	Shortleaf Sneezeweed		Moderate	Bottomlands and Riparian Zones
<i>Helianthus glaucophyllus</i>	White-leaved Sunflower		Moderate	Low Elevation Basic Mesic Forest
<i>Helonias bullata</i>	Swamp-pink	LT: Threatened	Highest	Wet/Moist Unique Landforms
<i>Hydrangea cinerea</i>	Ashy-hydrangea		Moderate	Low Elevation Basic Mesic Forest
<i>Hydrocotyle americana</i>	American Water-pennywort		Moderate	Bottomlands and Riparian Zones; Depressions
<i>Hymenophyllum tayloriae</i>	Taylor's Fern		High	Wet/Moist Unique Landforms
<i>Hymenophyllum tunbrigense</i>	Tunbridge Fern		Moderate	Wet/Moist Unique Landforms
<i>Hypericum buckleii</i>	Blue Ridge St. John's-wort		High	Rock Outcrops
<i>Impatiens pallida</i>	Pale Jewel-weed		Moderate	Bottomlands and Riparian Zones; Depressions
<i>Isoetes caroliniana</i>	Engelmann's Quillwort		Moderate	Depressions
<i>Isotria medeoloides</i>	Small Whorled Pogonia	LT: Threatened	Highest	Wet/Moist Unique Landforms
<i>Juncus subcaudatus</i>	Woods-rush		Moderate	Depressions

Scientific Name	Common Name	Legal Status	Priority	Habitat
<i>Juniperus communis</i> var. <i>depressa</i>	Dwarf Juniper		Moderate	High Elevation Forest
<i>Krigia montana</i>	False Dandelion		High	Rock Outcrops
<i>Lejeunea blomquistii</i>	"A Liverwort"		High	Rock Outcrops
<i>Leptohymenium sharpii</i>	Sharp's Leptohymenium Moss		High	Wet/Moist Unique Landforms
<i>Liatris microcephala</i>	Small-head Gayfeather		Moderate	Rock Outcrops
<i>Liparis liliifolia</i>	Large Twayblade		Moderate	Low Elevation Basic Mesic and Acidic Forests
<i>Listera smallii</i>	Kidney-leaf Twayblade		Moderate	Low Elevation Acidic Mesic Forest
<i>Lophocolea appalachiana</i>	Appalachian Lophocolea		High	Wet/Moist Unique Landforms
<i>Lycopodium clavatum</i>	Running Pine		Moderate	Appalachian Oak Forest; High Elevation Forest
<i>Lycopodium porophyllum</i>	Rock Clubmoss		Moderate	Rock Outcrops
<i>Lycopodium tristachyum</i>	Deep-root Clubmoss		Moderate	High Elevation Forest
<i>Lysimachia fraseri</i>	Fraser Loosestrife		High	Bottomlands and Riparian Zones
<i>Lysimachia hybrida</i>	Lance-leaf Loosestrife		Moderate	Depressions
<i>Magnolia cordata</i>	Piedmont Cucumber Tree		Moderate	Low Elevation Basic Mesic Forest
<i>Mitella diphylla</i>	Two-leaf Bishop's-cap		Moderate	Low Elevation Basic Mesic Forest
<i>Monotropsis odorata</i>	Sweet Pinesap		High	Appalachian Oak Forest; High Elevation Forest
<i>Oenothera perennis</i>	Small Sundrops		Moderate	Depressions
<i>Panax quinquefolius</i>	American Ginseng		High	Low Elevation Basic Mesic Forest
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-parnassus		High	Wet/Moist Unique Landforms
<i>Pellaea atropurpurea</i>	Purple-stem Cliff-brake		Moderate	Rock Outcrops
<i>Pellaea wrightiana</i>	Cliff-brake Fern		Moderate	Rock Outcrops
<i>Pellia appalachiana</i>	Appalachian Pellia		Moderate	Bottomlands and Riparian Zones; Wet/Moist Unique Landforms
<i>Phacelia bipinnatifida</i>	Fernleaf Phacelia		Moderate	Low Elevation Basic Mesic Forest; Bottomlands and Riparian Zones
<i>Plagiochila caduciloba</i>	Gorge Leafy Liverwort		High	Wet/Moist Unique Landforms
<i>Plagiochila sharpii</i>	"A Liverwort"		High	Wet/Moist Unique Landforms
<i>Plagiochila sullivantii</i>	"A Liverwort"		High	Wet/Moist Unique Landforms

Scientific Name	Common Name	Legal Status	Priority	Habitat
<i>Plagiomnium carolinianum</i>	Mountain Wavy-leaf Moss		High	Wet/Moist Unique Landforms
<i>Platanthera integrilabia</i>	White Fringeless Orchid	C: Candidate	Highest	Bottomlands and Riparian Zones; Depressions
<i>Platyhypnidium pringlei</i>	Pringle's Platyhypnidium Moss		High	Wet/Moist Unique Landforms
<i>Poa alsodes</i>	Blue-grass		Moderate	Low Elevation Basic Mesic Forest
<i>Porella japonica</i> ssp. <i>appalachiana</i>	"A Liverwort"		Moderate	Bottomlands and Riparian Zones
<i>Pycnanthemum montanum</i>	Single-haired Mountain-mint		Moderate	Appalachian Oak Forest; High Elevation Forest; Low Elevation Basic Mesic Forest
<i>Rhododendron catawbiense</i>	Catawba Rhododendron		Moderate	High Elevation Forest
<i>Rudbeckia heliopsisidis</i>	Sun-facing Coneflower		High	Low Elevation Acidic Mesic Forest
<i>Sarracenia rubra</i> ssp. <i>jonesii</i>	Mountain Sweet Pitcher-plant	LE: Endangered	Highest	Rock Outcrops; Wet/Moist Unique Landforms
<i>Saxifraga careyana</i>	Carey Saxifrage		High	High Elevation Forest; Low Elevation Basic Mesic Forest; Rock Outcrops
<i>Senecio millefolium</i>	Piedmont Ragwort		High	Rock Outcrops
<i>Shortia galacifolia</i>	Oconee bells		High	High Elevation Forest; Low Elevation Basic Mesic Forest; Rock Outcrops; Wet/Moist Unique Landforms
<i>Silene ovata</i>	Ovate Catchfly		High	Appalachian Oak Forest; High Elevation Forest; Low Elevation Basic Mesic Forest
<i>Solidago simulans</i>	Granite Dome Goldenrod		High	High Elevation Forest; Low Elevation Basic Mesic Forest; Rock Outcrops
<i>Stachys clingmanii</i>	Clingman's Hedge-nettle		High	Appalachian Oak Forest; High Elevation Forest
<i>Thermopsis mollis</i>	Soft-haired Thermopsis		Moderate	Low Elevation Acidic Mesic Forest
<i>Tradescantia virginiana</i>	Virginia Spiderwort		Moderate	High Elevation Forest; Low Elevation Basic Mesic Forest
<i>Trichomanes boschianum</i>	Bristle-fern		Moderate	Low Elevation Basic Mesic Forest; Rock Outcrops; Depressions
<i>Trichophorum cespitosum</i>	Deer-haired Bulrush		Moderate	High Elevation Forest
<i>Trillium grandiflorum</i>	Large-flower Trillium		Moderate	High Elevation Forest; Depressions

Scientific Name	Common Name	Legal Status	Priority	Habitat
<i>Trillium rugelii</i>	Southern Nodding Trillium		High	Low Elevation Basic Mesic Forest; Depressions
<i>Trillium simile</i>	Sweet White Trillium		High	Low Elevation Basic Mesic Forest; Depressions
<i>Triphora trianthophora</i>	Nodding Pogonia		Moderate	Depressions
<i>Viola conspersa</i>	American Bog Violet		Moderate	Low Elevation Basic Mesic Forest
<i>Xyris torta</i>	Twisted Yellow-eyed-grass		Moderate	Wet/Moist Unique Landforms

References

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- South Carolina Natural Heritage Program (SCNHP). 2023. Species of Concern Data Explorer Geographic Information System (GIS). SCDNR Columbia, SC. [URL]: [SC Natural Heritage Program](#). Accessed October 2023.
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- _____. 2022. Small Whorled Pogonia (*Isotria medeoloides*) 5-Year Review: Summary and Evaluation. August, 2022. [Small whorled pogonia 5 year review \(ecosphere-documents-production-public.s3.amazonaws.com\)](#). Accessed May 15, 2024.
- _____. 2024. Small Whorled Pogonia Fact Sheet. [Small Whorled Pogonia Fact Sheet \(fws.gov\)](#). Accessed May 15, 2024.

From: [Crutchfield Jr., John U](#)
To: [Abney, Michael A](#); [Andrew Grosse](#); [Andy Douglas](#); [Austen Attaway](#); [Bill Ranson-Retired](#); [Chris Starker](#); [Dale Wilde](#); [Elizabeth Miller](#); [Mularski, Eric](#); [Fletcher, Scott T](#); [Huff, Jen](#); [Jennifer Kindel](#); [Keith A. Bradley](#); [Ken Forrester](#); [Olds, Melanie J](#); [Amedee, Morgan D.](#); [Pat Cloninger](#); [Samantha Tessel](#); [Stuart, Alan Witten](#); [suewilliams130@gmail.com](#); [Wes Cooler](#); [Willie Simmons](#)
Cc: [Kulpa, Sarah](#); [McCarney-Castle, Kerry](#); [Salazar, Maggie](#)
Subject: Bad Creek Relicensing - Small Whorled Pogonia Survey Report
Date: Wednesday, August 28, 2024 6:37:10 AM
Attachments: [image001.png](#)
Importance: High

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Wildlife & Botanical Resources Committee:

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The final report can be accessed at the following link: [Small Whorled Pogonia Survey Report](#).

Please let Alan Stuart or me know if you have any questions.

Regards,

John Crutchfield

Project Manager II
Water Strategy, Hydro Licensing & Lake Services
Regulated & Renewable Energy
Duke Energy
525 South Tryon Street, DEP-35B | Charlotte, NC 28202
Office 980-373-2288 | Cell 919-757-1095

From: [Chris Starker](#)
To: [Crutchfield Jr., John U](#); [Abney, Michael A](#); [Andrew Grosse](#); [Andy Douglas](#); [Austen Attaway](#); [Bill Ranson-Retired](#); [Dale Wilde](#); [Elizabeth Miller](#); [Mularski, Eric](#); [Fletcher, Scott T](#); [Huff, Jen](#); [Jennifer Kindel](#); [Keith A. Bradley](#); [Ken Forrester](#); [Olds, Melanie J](#); [Amedee, Morgan D.](#); [Pat Cloninger](#); [Samantha Tessel](#); [Stuart, Alan Witten](#); [suewilliams130@gmail.com](#); [Wes Cooler](#); [Willie Simmons](#)
Cc: [Kulpa, Sarah](#); [McCarney-Castle, Kerry](#); [Salazar, Maggie](#)
Subject: Re: Bad Creek Relicensing - Small Whorled Pogonia Survey Report
Date: Wednesday, August 28, 2024 3:18:56 PM
Attachments: [image001.png](#)

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Thank you for sharing the report. Will there be additional surveys conducted? As the study plan and report state, "This species ... may remain vegetatively dormant and below the ground for one to several years." Neither the study plan nor the report includes a schedule/calendar for conducting surveys, but only provides an "optimal survey window of mid-May to early July." Seems like multiple calendar years would be ideal for determining its presence/absence considering orchids don't flower every year and may not even put out vegetative growth. Additionally, the survey results on page 5 state, "No small whorled pogonia was identified during the 2024 survey," which sounds as if there are plans to conduct additional surveys in following years, but this is not clear.

Similarly, the report should clearly state the year when the current observations/surveys were conducted. One assumes the survey results are from 2024 due to the statement in the study results section stated above, but based on the footnote on page 1, there could have been a survey in 2023, although hastily done given the lack of time for preparation. Regardless, redundancy in clarity never hurts and the reader shouldn't have to piece clues together to figure it out.

We also recommend including the qualifications of the biologists associated with the study and report, which is normal for a report of this type.

Lastly, northern starflower (see Photo 5 on page 2 of Appendix C) is not a rare species, although its presence in SC is perhaps unusual. It is in fact globally secure and not ranked in SC. Given the location of the surveys, though, its observation is perhaps on the edge of its typical range. That said, based on the image in the photo, it looks more like Indian cucumber (*Medeola virginiana*) to me.

Regardless of the presence/absence of SWP, I do want to point out that some of the plant community types that may be disturbed are ecologically significant, such as shortleaf pine forest and cove forest specifically.

Sincerely,
Chris

Chris Starker
Land Conservation Manager
864-203-1948

From: Crutchfield Jr., John U <John.Crutchfield@duke-energy.com>
Sent: Wednesday, August 28, 2024 6:36 AM
To: Abney, Michael A <Michael.Abney@duke-energy.com>; Andrew Grosse <grossea@dnr.sc.gov>; Andy Douglas <adoug41@att.net>; Austin Attaway <attawaya@dnr.sc.gov>; Bill Ranson <bill.ranson@retiree.furman.edu>; Chris Starker <cstarker@upstateforever.org>; dwilde@keoweefolks.org <dwilde@keoweefolks.org>; Elizabeth Miller <MillerE@dnr.sc.gov>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Fletcher, Scott T <Scott.Fletcher@duke-energy.com>; Jen Huff <jen.huff@hdrinc.com>; Jennifer Kindel <kindelj@dnr.sc.gov>; Keith Bradley <bradleyk@dnr.sc.gov>; Ken Forrester <forresterk@dnr.sc.gov>; Melanie Olds <melanie_olds@fws.gov>; Morgan Amedee <amedeemd@dhec.sc.gov>; Pat Cloninger <cloningerp@dnr.sc.gov>; Samantha Tessel <Tessels@dnr.sc.gov>; alan.stuart@duke-energy.com <alan.stuart@duke-energy.com>; Sue Williams <suewilliams130@gmail.com>; wes.cooler@mac.com <wes.cooler@mac.com>; Willie Simmons <simmonsw@dnr.sc.gov>
Cc: Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>; Maggie Salazar <maggie.salazar@hdrinc.com>
Subject: Bad Creek Relicensing - Small Whorled Pogonia Survey Report

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Please let Alan Stuart or me know if you have any questions.

Regards,

John Crutchfield

Project Manager II
Water Strategy, Hydro Licensing & Lake Services
Regulated & Renewable Energy
Duke Energy
525 South Tryon Street, DEP-35B | Charlotte, NC 28202
Office 980-373-2288 | Cell 919-757-1095

From: [Keith A. Bradley](#)
To: [Chris Starker](#); [Crutchfield Jr., John U](#); [Abney, Michael A](#); [Andrew Grosse](#); [Andy Douglas](#); [Austen Attaway](#); [Bill Ranson-Retired](#); [Dale Wilde](#); [Elizabeth Miller](#); [Mularski, Eric](#); [Fletcher, Scott T](#); [Huff, Jen](#); [Jennifer Kindel](#); [Ken Forrester](#); [Olds, Melanie J](#); [Amedee, Morgan D.](#); [Pat Cloninger](#); [Samantha Tessel](#); [Stuart, Alan Witten](#); [suewilliams130@gmail.com](#); [Wes Cooler](#); [Willie Simmons](#)
Cc: [Kulpa, Sarah](#); [McCarney-Castle, Kerry](#); [Salazar, Maggie](#)
Subject: RE: Bad Creek Relicensing - Small Whorled Pogonia Survey Report
Date: Thursday, August 29, 2024 10:24:37 AM
Attachments: [image001.png](#)

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All,

The northern starflower photo (*Trientalis borealis*, = *Lysimachia borealis*), is actually a picture of the fairly common *Lysimachia quadrifolia*.

Some other species that are certainly misidentifications include:

Asarum hartwegii

Carex pallescens

Juncus articulatus

Moehringia macrophylla

Scoparium spp. (perhaps *Schizachyrium scoparium* was intended)

Urtica dioica (likely *Laportea canadensis*)

Vaccinium angustifolium

Verbesina helianthoides

Also, *Circaea alpina* would represent *Circaea canadensis*. This is a state-tracked rare species and any data on the occurrence is appreciated.

[Keith A. Bradley, Botanist](#)

South Carolina Department of Natural Resources

Heritage Trust, Botany & Plant Conservation Program

1000 Assembly St., Columbia, SC 29201

BradleyK@dnr.sc.gov

From: Chris Starker <cstarker@upstateforever.org>

Sent: Wednesday, August 28, 2024 3:19 PM

To: Crutchfield Jr., John U <John.Crutchfield@duke-energy.com>; Abney, Michael A <Michael.Abney@duke-energy.com>; Andrew Grosse <GrosseA@dnr.sc.gov>; Andy Douglas

<adoug41@att.net>; Austen Attaway <AttawayA@dnr.sc.gov>; Bill Ranson <bill.ranson@retiree.furman.edu>; dwilde@keoweefolks.org; Elizabeth Miller <MillerE@dnr.sc.gov>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Fletcher, Scott T <Scott.Fletcher@duke-energy.com>; Jen Huff <jen.huff@hdrinc.com>; Jennifer Kindel <KindelJ@dnr.sc.gov>; Keith A. Bradley <BradleyK@dnr.sc.gov>; Ken Forrester <ForresterK@dnr.sc.gov>; Olds, Melanie J <melanie_old@fws.gov>; Morgan Amedee <amedeemd@dhec.sc.gov>; Pat Cloninger <CloningerP@dnr.sc.gov>; Samantha Tessel <Tessels@dnr.sc.gov>; alan.stuart@duke-energy.com; Sue Williams <suewilliams130@gmail.com>; wes.cooler@mac.com; Willie Simmons <SimmonsW@dnr.sc.gov>

Cc: Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>; Maggie Salazar <maggie.salazar@hdrinc.com>

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Land Conservation Manager
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Sent: Wednesday, August 28, 2024 6:36 AM
To: Abney, Michael A <Michael.Abney@duke-energy.com>; Andrew Grosse <grossea@dnr.sc.gov>; Andy Douglas <adoug41@att.net>; Austin Attaway <attawaya@dnr.sc.gov>; Bill Ranson <bill.ranson@retiree.furman.edu>; Chris Starker <cstarker@upstateforever.org>; dwilde@keoweefolks.org <dwilde@keoweefolks.org>; Elizabeth Miller <MillerE@dnr.sc.gov>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Fletcher, Scott T <Scott.Fletcher@duke-energy.com>; Jen Huff <jen.huff@hdrinc.com>; Jennifer Kindel <kindelj@dnr.sc.gov>; Keith Bradley <bradleyk@dnr.sc.gov>; Ken Forrester <forresterk@dnr.sc.gov>; Melanie Olds <melanie_olds@fws.gov>; Morgan Amedee <amedeemd@dhec.sc.gov>; Pat Cloninger <cloningerp@dnr.sc.gov>; Samantha Tessel <Tessels@dnr.sc.gov>; alan.stuart@duke-energy.com <alan.stuart@duke-energy.com>; Sue Williams <suewilliams130@gmail.com>; wes.cooler@mac.com <wes.cooler@mac.com>; Willie Simmons <simmonsw@dnr.sc.gov>
Cc: Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>; Maggie Salazar <maggie.salazar@hdrinc.com>
Subject: Bad Creek Relicensing - Small Whorled Pogonia Survey Report

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Regards,

John Crutchfield

Project Manager II
Water Strategy, Hydro Licensing & Lake Services

Regulated & Renewable Energy

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Office 980-373-2288 | Cell 919-757-1095

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To: [Keith A. Bradley](#); [Chris Starker](#); [Abney, Michael A](#); [Andrew Grosse](#); [Andy Douglas](#); [Austen Attaway](#); [Bill Ranson-Retired](#); [Dale Wilde](#); [Elizabeth Miller](#); [Mularski, Eric](#); [Fletcher, Scott T](#); [Huff, Jen](#); [Jennifer Kindel](#); [Ken Forrester](#); [Olds, Melanie J](#); [Amedee, Morgan D.](#); [Pat Cloninger](#); [Samantha Tessel](#); [Stuart, Alan Witten](#); [suewilliams130@gmail.com](#); [Wes Cooler](#); [Willie Simmons](#)
Cc: [Kulpa, Sarah](#); [McCarney-Castle, Kerry](#); [Salazar, Maggie](#)
Subject: RE: [EXTERNAL] RE: Bad Creek Relicensing - Small Whorled Pogonia Survey Report
Date: Wednesday, September 4, 2024 7:57:38 AM
Attachments: [image001.png](#)

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Chris and Keith: Thank you for your review and comments on the Small Whorled Pogonia Report. We appreciate your input and will address your comments and compile additional information into a revised report to be issued to the Resource Committee.

For other Resource Committee members, if you have any comments on the report, please let Alan and me know by end of next week.

Again, thank you for the input.

Regards,
John

From: Keith A. Bradley <BradleyK@dnr.sc.gov>
Sent: Thursday, August 29, 2024 10:24 AM
To: Chris Starker <chstarker@upstateforever.org>; Crutchfield Jr., John U <John.Crutchfield@duke-energy.com>; Abney, Michael A <Michael.Abney@duke-energy.com>; Andrew Grosse <GrosseA@dnr.sc.gov>; Andy Douglas <adoug41@att.net>; Austen Attaway <AttawayA@dnr.sc.gov>; Bill Ranson <bill.ranson@retiree.furman.edu>; dwilde@keoweefolks.org; Elizabeth Miller <MillerE@dnr.sc.gov>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Fletcher, Scott T <Scott.Fletcher@duke-energy.com>; Jen Huff <jen.huff@hdrinc.com>; Jennifer Kindel <KindelJ@dnr.sc.gov>; Ken Forrester <ForresterK@dnr.sc.gov>; Olds, Melanie J <melanie_old@fws.gov>; Morgan Amedee <amedeemd@dhec.sc.gov>; Pat Cloninger <CloningerP@dnr.sc.gov>; Samantha Tessel <Tessels@dnr.sc.gov>; Stuart, Alan Witten <Alan.Stuart@duke-energy.com>; Sue Williams <suewilliams130@gmail.com>; wes.cooler@mac.com; Willie Simmons <SimmonsW@dnr.sc.gov>
Cc: Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>; Maggie Salazar <maggie.salazar@hdrinc.com>
Subject: [EXTERNAL] RE: Bad Creek Relicensing - Small Whorled Pogonia Survey Report

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Juncus articulatus

Moehringia macrophylla

Scoparium spp. (perhaps *Schizachyrium scoparium* was intended)

Urtica dioica (likely *Laportea canadensis*)

Vaccinium angustifolium

Verbesina helianthoides

Also, *Circaea alpina* would represent *Circaea canadensis*. This is a state-tracked rare species and any data on the occurrence is appreciated.

Keith A. Bradley, Botanist

South Carolina Department of Natural Resources

Heritage Trust, Botany & Plant Conservation Program

1000 Assembly St., Columbia, SC 29201

BradleyK@dnr.sc.gov

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Sent: Wednesday, August 28, 2024 3:19 PM

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Cc: Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>; Maggie Salazar <maggie.salazar@hdrinc.com>

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Regardless of the presence/absence of SWP, I do want to point out that some of the plant community types that may be disturbed are ecologically significant, such as shortleaf pine forest and cove forest specifically.

Sincerely,
Chris

Chris Starker
Land Conservation Manager
864-203-1948

From: Crutchfield Jr., John U <John.Crutchfield@duke-energy.com>

Sent: Wednesday, August 28, 2024 6:36 AM

To: Abney, Michael A <Michael.Abney@duke-energy.com>; Andrew Grosse <grossea@dnr.sc.gov>; Andy Douglas <adoug41@att.net>; Austin Attaway <attawaya@dnr.sc.gov>; Bill Ranson <bill.ranson@retiree.furman.edu>; Chris Starker <cstarker@upstateforever.org>; dwilde@keoweefolks.org <dwilde@keoweefolks.org>; Elizabeth Miller <MillerE@dnr.sc.gov>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Fletcher, Scott T <Scott.Fletcher@duke-energy.com>; Jen Huff <jen.huff@hdrinc.com>; Jennifer Kindel <kindelj@dnr.sc.gov>; Keith Bradley <bradleyk@dnr.sc.gov>; Ken Forrester <forresterk@dnr.sc.gov>; Melanie Olds <melanie_olds@fws.gov>; Morgan Amedee <amedeemd@dhec.sc.gov>; Pat Cloninger <cloningerp@dnr.sc.gov>; Samantha Tessel <Tessels@dnr.sc.gov>; alan.stuart@duke-energy.com <alan.stuart@duke-energy.com>; Sue Williams <suewilliams130@gmail.com>; wes.cooler@mac.com <wes.cooler@mac.com>; Willie Simmons <simmonsw@dnr.sc.gov>
Cc: Kulpa, Sarah -hdrinc <Sarah.Kulpa@hdrinc.com>; Kerry McCarney-Castle <Kerry.McCarney-Castle@hdrinc.com>; Maggie Salazar <maggie.salazar@hdrinc.com>
Subject: Bad Creek Relicensing - Small Whorled Pogonia Survey Report

Dear Wildlife & Botanical Resources Committee:

Duke Energy is pleased to provide the final Small Whorled Pogonia Survey report, which was developed in response to a written request from the South Carolina Department of Natural Resources (SCDNR) in comments submitted to the Federal Energy Regulatory Commission on the Bad Creek relicensing Initial Study Report and to support Clean Water Act Section 404 U.S. Army Corps of Engineers permitting activities associated with the Bad Creek II Power Complex. The report was developed in consultation with the U.S. Fish & Wildlife Service and SCDNR and is being provided to the Resource Committee for information and reference.

The final report can be accessed at the following link: [Small Whorled Pogonia Survey Report](#).

Please let Alan Stuart or me know if you have any questions.

Regards,

John Crutchfield

Project Manager II

Water Strategy, Hydro Licensing & Lake Services

Regulated & Renewable Energy

Duke Energy

525 South Tryon Street, DEP-35B | Charlotte, NC 28202

Office 980-373-2288 | Cell 919-757-1095

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To: [Crutchfield Jr., John U](#); [Keith A. Bradley](#); [Chris Starker](#); [Abney, Michael A](#); [Andrew Grosse](#); [Andy Douglas](#); [Austen Attaway](#); [Bill Ranson-Retired](#); [Dale Wilde](#); [Elizabeth Miller](#); [Mularski, Eric](#); [Fletcher, Scott T](#); [Huff, Jen](#); [Jennifer Kindel](#); [Ken Forrester](#); [Amedee, Morgan D.](#); [Pat Cloninger](#); [Samantha Tessel](#); [Stuart, Alan Witten](#); [suewilliams130@gmail.com](#); [Wes Cooler](#); [Willie Simmons](#)
Cc: [Kulpa, Sarah](#); [McCarney-Castle, Kerry](#); [Salazar, Maggie](#)
Subject: Re: [EXTERNAL] RE: Bad Creek Relicensing - Small Whorled Pogonia Survey Report
Date: Thursday, September 5, 2024 4:05:58 PM
Attachments: [image001.png](#)
[Outlook-xphlhut5.png](#)
[Outlook-xlnh23b0.png](#)

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John,

The Service reviewed the report and does not have any comments.

Melanie

Melanie Olds

Fish & Wildlife Biologist

Regulatory Team Lead/FERC Coordinator

U.S. Fish and Wildlife Service
South Carolina Ecological Services Field Office
176 Croghan Spur Road, Suite 200
Charleston, SC 29407
Phone: (843) 534-0403



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From: Crutchfield Jr., John U <John.Crutchfield@duke-energy.com>

Sent: Wednesday, September 4, 2024 7:57 AM

To: Keith A. Bradley <BradleyK@dnr.sc.gov>; Chris Starker <cstarker@upstateforever.org>; Abney, Michael A <Michael.Abney@duke-energy.com>; Andrew Grosse <GrosseA@dnr.sc.gov>; Andy Douglas <adoug41@att.net>; Austen Attaway <AttawayA@dnr.sc.gov>; Bill Ranson <bill.ranson@retiree.furman.edu>; dwilde@keoweefolks.org <dwilde@keoweefolks.org>; Elizabeth Miller <MillerE@dnr.sc.gov>; Mularski, Eric -HDRInc <Eric.Mularski@HDRInc.com>; Fletcher, Scott T <Scott.Fletcher@duke-energy.com>; Jen Huff <jen.huff@hdrinc.com>; Jennifer Kindel <KindelJ@dnr.sc.gov>; Ken Forrester <ForresterK@dnr.sc.gov>; Olds, Melanie J <melanie_olds@fws.gov>; Morgan Amedee <amedeemd@dhec.sc.gov>; Pat Cloninger

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Subject: RE: [EXTERNAL] RE: Bad Creek Relicensing - Small Whorled Pogonia Survey Report

Chris and Keith: Thank you for your review and comments on the Small Whorled Pogonia Report. We appreciate your input and will address your comments and compile additional information into a revised report to be issued to the Resource Committee.

For other Resource Committee members, if you have any comments on the report, please let Alan and me know by end of next week.

Again, thank you for the input.

Regards,
John

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Please let Alan Stuart or me know if you have any questions.

Regards,

John Crutchfield

Project Manager II
Water Strategy, Hydro Licensing & Lake Services
Regulated & Renewable Energy
Duke Energy
525 South Tryon Street, DEP-35B | Charlotte, NC 28202
Office 980-373-2288 | Cell 919-757-1095

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Comment Response Table: Small Whorled Pogonia Survey Report

Organization	Comment/Question	Response
Upstate Forever	Are additional / future surveys planned for small whorled pogonia?	In association with the Draft License Application (scheduled for completion in February 2025), Duke Energy will consult with USFWS, SCDNR, and the Wildlife and Botanical Resources Committee on the need to prepare a Species Protection Plan specific to Small Whorled Pogonia or other special status plant species and communities. If required and as applicable, the Species Protection Plan may include, among other identified protection measures, provisions for future surveys.
	It is unclear when the surveys were conducted; please clarify.	Small whorled pogonia surveys were carried out in 2024 as follows: June 3-5 for the proposed Fisher Knob Access Road and transmission line access roads, and intermittently between late May and July 2024 for potential spoil areas and the general proposed limits of disturbance for Bad Creek II construction. As stated in the Small Whorled Pogonia Survey Report, a (more general) Natural Resources Survey was carried out by HDR in 2021 and indicated that suitable habitat for the small whorled pogonia was present at the site, however, that study was performed outside of the survey window for this species. The current study (2024) was performed during the recommended survey window.
	We recommend including the qualifications of the biologists associated with the study and report.	A summary of the surveyors' qualifications has been added to the revised study report (Appendix E). As previously noted in the study report, HDR's biologists who conducted the survey have previous experience in plant identification in the Blue Ridge ecoregion.
	Northern starflower (see Photo 5 on page 2 of Appendix C) is not a rare species, although its presence in SC is perhaps unusual.	Based on additional comments from SCDNR (below), the referenced photo caption has been revised from <i>Lysimachia borealis</i> to <i>Lysimachia quadrifolia</i> in the revised study report.
	Some of the plant community types that may be disturbed are ecologically significant, such as shortleaf pine forest and cove forest specifically.	Duke Energy acknowledges that, as documented in the Small Whorled Pogonia Survey Report (2024) and the previous Natural Resources Assessment (2021), there are other ecologically significant natural plant communities throughout the Project and will continue to consult with the Resource Committee regarding future construction impacts, as applicable.
SCDNR	The northern starflower photo (<i>Trientalis borealis</i> , = <i>Lysimachia borealis</i>), is actually a picture of the fairly common <u><i>Lysimachia quadrifolia</i></u> . Some other species that are certainly misidentifications	As noted above, the caption for the photo "northern starflower" has been revised from <i>Lysimachia borealis</i> to <i>Lysimachia quadrifolia</i> in the revised study report. Duke Energy appreciates SCDNR's review of the small whorled pogonia survey report. Duke Energy has further consulted with HDR, and HDR has in turn further reviewed available field survey documentation including

Organization	Comment/Question	Response
	include: • <i>Asarum hartwegii</i> • <i>Carex pallescens</i> • <i>Juncus articulatus</i> • <i>Moehringia macrophylla</i> • <i>Scoparium</i> spp. (perhaps <i>Schizachyrium scoparium</i> was intended) • <i>Urtica dioica</i> (likely <i>Laportea canadensis</i>) • <i>Vaccinium angustifolium</i> • <i>Verbesina helianthoides</i>	field notes and site photographs. We have incorporated these comments into the revised study report as follows: • Four species names in Appendix B have been corrected (<i>Asarum hartwegii</i>, <i>Carex pallescens</i>, <i>Juncus articulatus</i>, and <i>Moehringia macrophylla</i>). ○ <i>Asarum hartwegii</i> was misidentified and is likely a wild ginger (<i>Hexastylis</i> sp.). ○ <i>Carex pallascen</i> – changed to <i>Carex</i> sp. ○ <i>Juncus articulatus</i> – changed to <i>Juncus</i> sp. ○ <i>Moehringia macrophylla</i> – was likely star chickweed (<i>Stellar pubera</i>), which is a common species in South Carolina. • For <i>Scoparium</i> spp., <i>Schizachyrium scoparium</i> was in fact intended (Little Bluestem), which is a common species in South Carolina. • Based on available documentation, HDR is unable to confirm the last two species in SCDNR's list (left column), so the taxonomic classifications in Appendix B have been revised from species to genus level. HDR notes that these genera (wood nettle, blueberry, and crownbeards) are fairly common and were widely observed in the field.
	<i>Circaea alpina</i> would represent <i>Circaea canadensis</i>. This is a state-tracked rare species and any data on the occurrence is appreciated.	Duke Energy agrees with this species correction provided by SCDNR based on location. HDR's field team reviewed field notes and photographic inventory for this species. A photograph of a nightshade (<i>Circaea</i> spp.) plant species was retrieved, and the photograph metadata was used to acquire the location coordinates. The photograph and location map are illustrated on the following page.



Nightshade (*Circaea* spp.) near 34.990708°, -82.990566°