USDA United States Department of Agriculture | Forest Service | George Washington and Jefferson National Forests | 5162 Valleypointe Parkway Roanoke, VA 24019 540-265-5100

**File Code:** 1900; 2700
**Date:** August 24, 2016

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St., N.E., Room 1A
Washington, DC 20426

Dear Ms. Bose:

Subject: Forest Service Comments on the Biological Evaluation
OEP/DG2E/Gas
Mountain Valley Pipeline, LLC
Docket No. CP16-10-000

The Forest Service provides comments on the Biological Evaluation (BE) for the proposed Mountain Valley Pipeline Project (MVP Project), filed with the Federal Energy Regulatory Commission on June 23, 2016 by Mountain Valley Pipeline, LLC (MVP). The proposed MVP Project would affect 3.4 miles of National Forest System lands in the Jefferson National Forest.

Our specific comments are contained in the table provided in Attachment 1. Please also note the updated Occurrence Analysis Results table we provided in Appendix A. We appreciate MVP following the general outline recommended by the Forest Service as well as the additional observations and notes from field surveys.

Please file a final BE incorporating our comments and including any outstanding biological surveys. We understand that the final BE would be filed as privileged information to protect the specific locations included in the report, but because the BE contains the Forest Service's comments about species occurring on public lands, the final BE should also be a public document. Therefore, we recommend that MVP develop and file a public version of the document that does not contain specific locations, for review by stakeholders.

For questions, please contact Jennifer Adams, Special Project Coordinator, by phone at (540) 265-5114 or by email at jenniferpadams@fs.fed.us.

Sincerely,

JOBY P. TIMM
Forest Supervisor

cc: Mountain Valley Pipeline, LLC

## ATTACHMENT 1

### Comments on the Draft Biological Evaluation

| Page # | Section # | Comment |
|---|---|---|
| 4 | 2.3 | First paragraph. Applicant makes the statement *"Because 'Sensitive' is a USFS agency designation, the analysis of effects on these species is limited to activities on the JNF and includes downstream impacts where appropriate."* This is a fundamentally erroneous assumption and approach. The USFS is bound by NEPA to analyze connected actions (CEQ Sec. 1508.25 (a), (b), and (c)). The actions proposed in the watershed beyond the crossing of the JNF are part of the same decision and facilitated by the crossing of public lands; therefore, they are by definition **connected actions** [CEQ Sec. 1508.25 (a)1(iii)] and must be analyzed to determine any and all direct, indirect, and cumulative impacts of the proposed action. This means that actions taken on private property that may affect these species must be analyzed and considered in the same analysis by the same methods in order that the USFS can make an informed decision about the possibility that their actions or their consequences could cause a trend toward further listing of Sensitive species. |
| 4 | 2.2 | From the proposed project alignment on maps 1 and 2 of figure 3 in appendix A, the current proposed alignment of the pipeline shows it crossing an additional unnamed tributary to Craig Creek in Tract 006, and an additional unnamed tributary to Kimbalton Branch in Tract 001. These streams are not included in Table 2. |
| 4 | 2.3 | "Sedimentation Bounds for Effects" section does not utilize the information provided in the ***Hydrologic Analysis of Sedimentation Mountain Valley Pipeline – Jefferson National Forest*** (ESI report dated June 7, 2016) Table 4, to develop the cumulative effects analysis area and tie the predicted sediment increases to the downstream aquatic resources that would be useful in the discussion in sections 2.3.1, 2.3.2, and 2.3.3. |
| 5 | 2.3 | Applicant makes the statement *"Because no sediment routing is incorporated into RUSLE, the fate and deposition of displaced sediment remains unknown and is assumed to continue downstream to the next subwatershed."* This statement is only partially correct. RUSLE may not have sediment routing incorporated into it, but with a Digital Elevation Model (DEM) and using either Montgomery and Buffington (1998) or Rosgen (1998), one could make broad assumptions about the fate of the displaced sediments. Both publications discuss whether sediments in specific channel types are expected to be retained or transported to lower-gradient reaches. |
| 5 | 2.3 | Applicant analyzed a 125 foot construction corridor, which is a good assumption for the disturbance from the pipeline construction; however, it appears from the text that access roads and staging areas outside of this corridor were not considered. In a 7/5/2016 conference call, ESI said that access roads and staging areas were included in the sediment analysis. Better describe what the proposed action consisted of in the model, as it was unclear what specific land disturbing activities were included. A general description of those would be helpful (ie: 125-ft pipeline ROW, all access roads and staging areas). |
| 6 | 2.3 | Applicant states that *"this analysis focuses on sediment increases due to pipeline construction. Soil losses after the land has been revegetated are expected to be similar to those of a shrub/scrub landscape."* Better describe the long-term/cumulative impacts of the pipeline – such as the total load and yields above baseline for the pipeline as it transitions to various vegetative states over the life of the ROW including use and maintenance, not just construction. Eventually, the area will likely succeed into a shrub scrub landscape as the author describes, but unless the applicant is planting shrubs, it will likely be a grass/forb landscape for a |

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| | | substantial period of time. A proper analysis would include a sediment yield increase for the grass/forb transitional period and then the specific elevated soil loss from a shrub/scrub cover class. |
| 6 | 2.3 | Applicant makes the statement that *"the model represents a worst case scenario"* because it is modeled without erosion and sediment control practices. This is not an accurate statement if the estimate is based on normal rainfall. The model does not take extreme rainfall events, slope stability changes induced by the pipeline construction, and other factors that would have to be included in a worst case scenario. This characterization is incorrect. It would be more accurate to call it an unmitigated scenario. |
| 6 | 2.3 and throughout document | The report references BMPs to be up to 85% effective, but for this terrain that is an overestimate. No references to pipeline construction or any disturbance-specific BMPs for pipelines could be located in the referenced document and the author and the applicant conceded that the EPA publication was for "coastal areas." Please provide a justification for the relevance of this document to the proposal. It is unlikely that the EPA document is relevant in an analysis of large corridor disturbance perpendicular to the slope in steep, mountainous conditions. BMP effectiveness estimates from literature more specifically tied to what is proposed in the E&S plans would provide a more accurate picture of effects. |
| 7 | 2.3.3 | The discussion of Craig Creek should include the benefits accrued by changing the alignment of the pipeline to decrease the crossings of Craig Creek from 3 pipeline crossings to 1. Even if it is just a qualitative discussion, it would be valuable to point out. |
| 7 | 2.3.2 | The discussion on Clendennin Creek- Bluestone lake watershed would be more meaningful if there was a description or rationale provided as to WHY the sediment load in the watershed is predicted to increase by 95%. We can only assume that is it because that watershed includes the Pocahontas Rd to be used as an access road, and it crosses many of the channels mentioned in Table 2. |
| 18 | 4.1 | A list of the 65 species "analyzed based on habitat preferences" would be helpful here. Referring to the OAR list in the Appendix is confusing, due to the number of species on the table. |
| 18 | 4.1 | The last paragraph says "some species could not be eliminated....a field survey was needed to determine presence or absence." Please show a list in this section to identify which of the 32 species were surveyed. |
| 19 | 4.2 | This section states that plant surveys remain outstanding on tracts 005 and 006. Please update the text to reflect recently completed surveys. |
| 19 | 4.2 | This draft Biological Evaluation will not be complete without the additional survey information for proposed tracts 005 and 006. |
| 19 | 4.2 | The term "Portal searches" needs to be defined; it is unclear what the methodology is and what species is being surveyed for with this type of search. |
| 19 | 4.2 | Please clarify what surveys for reptiles, amphibians, and insects have been completed. |
| 20 | 5.0 | This paragraph says bat and plant surveys remain outstanding on Tracts 005 and 006. Please update the text to reflect recently completed surveys. |
| 21 | 5.1 | It says that four federally listed species were identified, but only 2 are on table 6. All four should be listed in table 6 for clarity, and the two eliminated from further consideration should be identified in table as such. |
| 20 | 5.0 | Observations and notes from field surveys are GREATLY appreciated for our information and review of the draft BE. For the final version that should be made available to the public, Appendix A and E should be removed to protect locations of sensitive resources. |
| 22 | 5.1.2 | It would be beneficial to discuss the benefits accrued by changing the alignment of the pipeline to decrease the crossings of Craig Creek from 3 pipeline crossings to 1. Table 4 in ***Hydrologic Analysis of Sedimentation Mountain Valley Pipeline – Jefferson*** |

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|---|---|---|
| | | ***National Forest*** (ESI report dated June 7, 2016) quantifies sediment load above baseline for specific river reaches. It would be meaningful to tie those reaches to the James spinymussel. |
| 23 | 5.2 | The 28 species identified with potential to occur in the proposed project area should be listed in a table in this section or as a separate table in the appendix, for clarification, along with their OAR codes. The list of species in the OAR table is long and confusing to try to identify the species you are referring to here. |
| 25 | 5.2.5 | Records for Diana fritillary also occur in Virginia, in the counties of the proposed pipeline route on the Jefferson NF. |
| 25-26 | 5.2.5 and 5.2.6 | For both Diana fritillary and regal fritillary, the ROW revegetation on FS lands will follow a two-step process recommended by the USFS in a revegetation plan. The first will be to stabilize soils right after tree removal and construction activities with appropriate seed mixes and techniques. The second and ongoing step will be to revegetate sections of the ROW corridor as appropriate with native seed mixes recommended by the Wildlife Habitat Council and in consultation with the USFS. |
| 27 | 5.2.8 | Table 4 in ***Hydrologic Analysis of Sedimentation Mountain Valley Pipeline – Jefferson National Forest*** (ESI report dated June 7, 2016) quantifies sediment load above baseline for specific river reaches. It would be meaningful to tie those reaches to the yellow lance. |
| 27 | 5.2.8 | 2nd paragraph, last sentence. "Implantation" should be implementation. |
| 27 | 5.2.9 | Table 4 in ***Hydrologic Analysis of Sedimentation Mountain Valley Pipeline – Jefferson National Forest*** (ESI report dated June 7, 2016) quantifies sediment load above baseline for specific river reaches. It would be meaningful to tie those reaches to the candy darter. |
| 28 | 5.2.10 | Table 4 in ***Hydrologic Analysis of Sedimentation Mountain Valley Pipeline – Jefferson National Forest*** (ESI report dated June 7, 2016) quantifies sediment load above baseline for specific river reaches. It would be meaningful to tie those reaches to the roughhead shiner. |
| 29 | 5.2.11 | Table 4 in ***Hydrologic Analysis of Sedimentation Mountain Valley Pipeline – Jefferson National Forest*** (ESI report dated June 7, 2016) quantifies sediment load above baseline for specific river reaches. It would be meaningful to tie those reaches to the orangefin madtom. |
| 30 | 5.2.12 | Table 4 in ***Hydrologic Analysis of Sedimentation Mountain Valley Pipeline – Jefferson National Forest*** (ESI report dated June 7, 2016) quantifies sediment load above baseline for specific river reaches. It would be meaningful to tie those reaches to the Kanawha minnow. |
| 30 | 5.2.13 | Table 4 in ***Hydrologic Analysis of Sedimentation Mountain Valley Pipeline – Jefferson National Forest*** (ESI report dated June 7, 2016) quantifies sediment load above baseline for specific river reaches. It would be meaningful to tie those reaches to the Atlantic pigtoe. |
| 30 | 5.2.13 | 2nd paragraph, last sentence. "Implantation" should be implementation. |
| 31 | 5.2.14 | Table 4 in ***Hydrologic Analysis of Sedimentation Mountain Valley Pipeline – Jefferson National Forest*** (ESI report dated June 7, 2016) quantifies sediment load above baseline for specific river reaches. It would be meaningful to tie those reaches to the green floater. |
| 34 | 7.0 | Add to Lit cited: ***Hydrologic Analysis of Sedimentation Mountain Valley Pipeline – Jefferson National Forest*** (ESI report dated June 7, 2016) |

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| iii | 5.1 | This is a Biological Evaluation that analyzes impacts to Forest Service Regional Forester designated sensitive species per policy found in section 2670 of Forest Service Manual. Federal listed species do not need to be included; their appropriate discussion is in the Biological Assessment required per Endangered Species and supplied to US Fish & Wildlife Service. |
| 252 | Appendix E | It would be helpful to have field survey observations for the remaining surveys to be completed in 2016. We look forward to receiving reports of outstanding surveys. |
| 21-22 | 5.1 | See comment above. Federal listed species should not be in BE but rather in BA. |
| 23 | 5.2 | Please start discussion with overview that all 192 Sensitive species known or likely to occur on the GWJNF were reviewed for occurrences and potential impacts, and that 164 (192-28=164) had potential to occur in the proposed project area. Reference reasons the 164 were eliminated per sensitive species list in Appendix B. |
| | Figure 4 | Maps 1, 2, 3, 4 (all) can be removed to eliminate specific location information thereby allowing document to be considered public and releasable. |
| | Figure 4 | Question on Map 4 of 4, please clarify to what species this refers. Also, clarify the reference to roosting potential (i.e., roosting potential of what). |
| | Appendix B | The OAR list used is dated Feb 24, 2014 and an update is now available per the comment below. An example of change is northern long-eared bat, in Appendix B, the listed federal status is "PE" when it has changed to "T." |
| | Appendix A | Please use the updated OAR list for the BE as provided below. |

# APPENDIX A

## Documentation of Threatened, Endangered or Sensitive Species Occurrences for Proposed Mountain Valley Pipeline
## Coding for Occurrence Analysis Results (OAR) for 193 species

**Forest updated July 28, 2016 (based on Region 8 sensitive species list effective January 1, 2002)**

| OAR | GW | J | Species Name | Common Name | Range on or near GWJNFs | Habitat - Detail | TES | GRank | VA SRank | WV SRank |
|---|---|---|---|---|---|---|---|---|---|---|
| **VERTEBRATE** | | | | | | | | | | |
| **Fish** | | | | | | | | | | |
| 1 | - | X | *Ammocrypta clara* | Western sand darter | Clinch R, Powell R | Aquatic-rivers | S | G3 | S1 | - |
| 1 | - | X | *Cottus baileyi* | Black sculpin | Little R, Upper Clinch R, S Fk Holston R | Aquatic-streams | S | G4Q | S2 | - |
| 1 | - | X | *Chrosomus cumberlandensis* | Blackside dace | Upper Cumberland R, Upper Powell R, Poor Fk Cumberland R | Aquatic-streams | T | G2 | S1 | S3 (KY) |
| 1 | - | X | *Chrosomus tennesseensis* | Tennessee dace | Lick Ck, N Fk Holston R, Beaverdam Ck, M Fk Holston R | Aquatic-streams | S | G3 | S1 | - |
| 1 | - | X | *Erimonax monachus* | Spotfin chub | Lower N Fk Holston R | Aquatic-streams | T | G2 | S1 | - |
| 1 | - | X | *Erimystax cahni* | Slender chub | Two sites - Powell R, Lee Co | Aquatic-rivers | T | G1 | S1 | - |
| 1 | - | X | *Etheostoma acuticeps* | Sharphead darter | S and Middle Fk Holston R | Aquatic-rivers | S | G3 | S1 | - |
| 8 | - | X | *Etheostoma osburni* | Candy darter | Big Stony Ck, Laurel Fork in New R watershed | Aquatic-streams | S | G3 | S1 | S2 |
| 1 | - | X | *Etheostoma percnurum* | Duskytail darter | Copper Ck, Clinch R | Aquatic-rivers | E | G1 | S1 | - |
| 1 | - | X | *Etheostoma tippecanoe* | Tippecanoe darter | Four sites Clinch R, lower Copper Ck | Aquatic-rivers | S | G2 | S1 | S2 |
| 1 | - | X | *Ichthyomyzon greeleyi* | Mountain brook lamprey | M, N Fk Holston R, Copper Ck, Indian Ck, Clinch R, Powell R | Aquatic-rivers | S | G3G4 | S2 | S1 |
| 1 | - | X | *Notropis ariommus* | Popeye shiner | N Fk Holston R, Clinch R, Powell R | Aquatic-rivers | S | G3 | S2S3 | S2 |
| 8 | X | X | *Notropis semperasper* | Roughhead shiner | Upper James R watershed above Buchanan | Aquatic-rivers | S | G2G3 | S2S3 | - |
| 1 | - | X | *Noturus flavipinnis* | Yellowfin madtom | Lower & Mid reaches of Copper Ck, Powell R | Aquatic-streams | T | G1 | S1 | - |
| 8 | X | X | *Noturus gilberti* | Orangefin madtom | S Fk Roanoke R watershed, Roanoke R above Salem, Craig Ck, Johns Ck, Cowpasture R | Aquatic-streams | S | G2 | S2 | - |
| 1 | - | X | *Percina burtoni* | Blotchside logperch | N Fk Holston R, Clinch R, Copper Ck, Little R | Aquatic-rivers | S | G2G3 | S1 | - |
| 7/9 | - | X | Percina rex | Roanoke logperch | Upper Roanoke R watershed | Aquatic-rivers | E | G1G2 | S1S2 | - |
| 1 | - | X | *Percina williamsi* | Sickle darter | N Fk Holston R above Saltville, lower Copper Ck | Aquatic-rivers | S | G2 | S1S2 | S2 |
| 1 | - | X | *Phenacobius crassilabrum* | Fatlips minnow | Unimpounded lower S Fk Holston R, Whitetop Laurel Ck | Aquatic-rivers | S | G3G4 | S2 | - |
| 8 | - | X | *Phenacobius teretulus* | Kanawha minnow | Upper New R watershed | Aquatic-streams | S | G3G4 | S2S3 | S1 |
| **Amphibian** | | | | | | | | | | |
| 1 | - | X | *Plethodon hubrichti* | Peaks of Otter salamander | Peaks of Otter, Apple Orchard Mtn | Mixed oak, late successional with loose rocks and logs, >1800' | S | G2 | S2 | - |
| 1 | X | - | *Plethodon punctatus* | Cow Knob salamander | Shenandoah Mtn, VA & WV | Mixed oak, late successional with loose rocks and logs, >2500' | S | G3 | S2 | S1 |
| 1 | - | - | *Plethodon shenandoah* | Shenandoah salamander | Three isolated populations in SNP: Hawksbill Mtn, The Pinnacles, Stony Man Mtn GW occurrence questionable | Talus slopes. Erroneous records from Three Ridges, The Priest, Pompeii on the Pedlar | E | G1 | S1 | - |
| 1 | - | X | *Plethodon welleri* | Weller's salamander | Mt Rogers & Whitetop Mtn | Spruce-fir forests and adjacent northern hardwoods | S | G3 | S2 | - |
| **Bird** | | | | | | | | | | |
| 2 | X | X | *Falco peregrinus* | Peregrine Falcon | Hack sites late 80s and early 90s – Mt Rogers, Grayson; Cole Mtn, Amherst; Big Schloss, Shenandoah; Elliot Knob, Augusta; High Knob, Rockingham Cos. No nests, current migrant | Nests on ledges or cliffs, buildings, bridges, quarry walls. Non-breeding sites, farmland, open country, lakeshores, broad river valleys, airports, cities. Prefers pigeons, ducks | S | G4 | S1B/S2N | S1B/S2N |
| 2 | X | - | *Haliaeetus leucocephalus* | Bald Eagle | Potomac R, James R, New R, Upper Tennessee watersheds | Feeds and nests on or near large lakes and rivers | S | G5 | S3S4B/S3S4N | S2B/S3N |
| 2 | X | - | *Lanius ludovicianus migrans* | Migrant Loggerhead Shrike | Ridge & Valley (Shenandoah Valley) | Open grasslands with trees and shrubs, fencerows | S | G4 | S2B/S3N | S1B/S2N |
| 2 | X | X | *Thryomanes bewickii altus* | Appalachian Bewick's Wren | Historical records in Botetourt, Giles, Highland Washington Cos | Thickets, old fields, fencerows, old home sites | S | G5T2Q | SHB/S1N | S1B/S1N |

| OAR | GW | J | Species Name | Common Name | Range on or near GWJNFs | Habitat - Detail | TES | GRank | VA SRank | WV SRank |
|---|---|---|---|---|---|---|---|---|---|---|
| **Mammal** | | | | | | | | | | |
| 2 | X | X | *Corynorhinus townsendii virginianus* | Virginia big-eared bat | Summer: VA - Tazewell Co (3 caves), Highland Co (1 cave); WV - Pendleton Co (4 caves); Winter: Highland, Rockingham, Bland, and Tazewell Cos (6 caves); Pendleton Co (6 caves). Largest VA population in Tazewell Co and largest WV population in Pendleton Co. Small numbers of bats (usually <10) in a few other widely scattered caves during summer months. Bath & Pulaski Co records are historic. No occupied caves currently known on Forest. | Resides in caves winter and summer. Short distance migrant (<40 miles) between winter and summer caves. Forages primarily on moths and foraging habitat is common (fields, forests, meadows, etc.). Forages within 6 miles of summer caves. USFWS Critical Habitat is 5 caves in WV (4 Pendleton Co and 1 Tucker Co). Closest Critical Habitat cave to GWJNF is ~3 miles in Pendleton Co, WV. OAR code of "2" used when project further than 6 miles from summer or winter occupied cave. | E | G3G4T2 | S1 | S2 |
| 1 | - | X | *Glaucomys sabrinus coloratus* | Carolina northern flying squirrel | Mt Rogers & Whitetop area | Spruce-fir forests and adjacent northern hardwoods | E | G5T2 | S1 | - |
| 1 | X | - | *Glaucomys sabrinus fuscus* | Virginia northern flying squirrel | Laurel Fork area, Highland Co | Spruce forests and adjacent northern hardwoods | S | G5T2 | S1 | S2 |
| 1 | X | - | *Microtus chrotorrhinus carolinensis* | Southern rock vole | Alleghany Mtn, Bath Co | Cool, moist, mossy talus under oaks/northern hardwoods | S | G4T3 | S1 | S2 |
| 1 | - | X | *Myotis grisescens* | Gray bat | Ridge & Valley, Clinch R watershed | Caves winter and summer, forages widely. | E | G3 | S1 | - |
| 4 | X | X | *Myotis leibii* | Eastern small-footed bat | Ridge & Valley | Hibernates in caves during winter, roosts in crevices of large rock outcrops, cliffs, and under large rocks in talus & boulder-fields during summer, plus similar man-made structures like rip-rap and bridges, forages widely in all forested and open habitat types over both ridges and valleys. | S | G1G3 | S2 | S1 |
| 3 | X | X | Myotis septentrionalis | Northern long-eared bat | Blue Ridge, Ridge & Valley, Cumberland Mtns | Hibernates in crevices and cracks of cave walls during winter (sometimes mines & tunnels), difficult to find and rarely seen. During summer, forages widely and roosts singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Also may roost in structures like barns, sheds, & houses. | T | G1G2 | S3 | S3 |
| 3 | X | X | *Myotis sodalis* | Indiana bat | Blue Ridge, Ridge & Valley, Cumberland Mtns | Caves winter, upland hardwoods summer, forages widely along riparian areas and open woodlands. | E | G2 | S1 | S1 |
| 1 | X | - | *Sorex palustris punctulatus* | Southern water shrew | Alleghany Mtn, Bath Co; Laurel Fork, Highland Co | Riparian areas w/in spruce-fir forests and northern hardwoods. | S | G5T3 | S1S2 | S1 |
| **INVERTEBRATE** | | | | | | | | | | |
| **Snail (Mollusk, Class Gastropoda)** | | | | | | | | | | |
| 2 | X | X | *Glyphyalinia raderi* | Maryland glyph | Alleghany, Montgomery Cos | Calciphile, edge of seeps within leaf litter. May burrow. | S | G2 | S1S2 | S2 |
| 1 | X | - | *Helicodiscus diadema* | Shaggy coil | Alleghany Co | Calciphile; semi-open, calcium-rich environments, especially limestone rubble/talus and thinly wooded limestone hills. | S | G1 | S1 | - |
| 1 | X | - | *Helicodiscus lirellus* | Rubble coil | Rockbridge Co | Calciphile; limestone rubble and rich fossiliferous shale talus. Found among leaf litter and limestone stones or talus, or rich shale scree, upon steep, forested slopes which are associated with certain rivers in the upper James River watershed, including Maury R & Kerr's Ck. | S | G1 | S1 | - |
| 1 | X | X | *Helicodiscus triodus* | Talus coil | Alleghany, Botetourt, Rockbridge Cos | Calciphile, limestone rubble on wooded hillsides and near cave entrances. | S | G2 | S1S2 | SH |
| 1 | - | X | *Io fluvialis* | Spiny riversnail | Clinch R, N Fk Holston R | Aquatic-rivers. | S | G2 | S2 | - |
| 2 | - | X | *Paravitrea reesei* | Round supercoil | Monroe, WV; Grayson, Montgomery, Pulaski, Smyth Cos., VA | Calcareous woodlands and glades. Prefers moist environments. Prefers moist environments. | S | G3 | S2 | S1 |
| **Mussel (Mollusk, Class Bivalvia)** | | | | | | | | | | |
| 1 | X | - | *Alasmidonta varicosa* | Brook floater | Potomac drainage | Aquatic-rivers. | S | G3 | S1 | S1 |
| 1 | - | X | *Cumberlandia monodonta* | Spectaclecase | 2 sites Clinch R | Aquatic-rivers. | E | G3 | S1 | - |
| 1 | - | X | *Cyprogenia stegaria* | Fanshell | Lower Clinch R, Scott Co | Aquatic-rivers. | E | G1Q | S1 | S1 |
| 1 | - | X | *Dromus dromas* | Dromedary pearlymussel | Clinch R, Powell R, N Fk Holston R | Aquatic-rivers. | E | G1 | S1 | - |
| 7 | X | X | *Elliptio lanceolata* | Yellow lance | Roanoke R, James R | Aquatic-rivers. | S | G2G3 | S2S3 | - |

| OAR | GW | J | Species Name | Common Name | Range on or near GWJNFs | Habitat - Detail | TES | GRank | VA SRank | WV SRank |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | X | *Epioblasma brevidens* | Cumberlandian combshell | Clinch R, Powell R, N Fk Holston R | Aquatic-rivers | E | G1 | S1 | - |
| 1 | - | X | *Epioblasma capsaeformis* | Oyster mussel | Clinch R, Powell R, N Fk Holston R | Aquatic-rivers | E | G1 | S1 | - |
| 1 | - | - | *Epioblasma florentina aureola* | Golden riffleshell | Restricted to lower 1.0 mile of Indian Ck to Clinch R. All other historical populations in M & Upper Tennessee R system now extirpated. | Aquatic-rivers | E | G1T1 | S1 | - |
| 1 | - | X | *Epioblasma torulosa gubernaculum* | Green-blossom pearlymussel | Clinch R, N Fk Holston R | Aquatic-rivers | E | G2TX | SX | - |
| 1 | - | X | *Epioblasma triquetra* | Snuffbox | Clinch R, Powell R, N Fk Holston R | Aquatic-rivers | E | G3 | S1 | S2 |
| 1 | - | X | *Fusconaia cor* | Shiny pigtoe | Clinch R, Powell R, N Fk Holston R, Copper Ck | Aquatic-rivers | E | G1 | S1 | - |
| 1 | - | X | *Fusconaia cuneolus* | Fine-rayed pigtoe | Clinch R, Powell R, Copper Ck, Little R | Aquatic-rivers | E | G1 | S1 | - |
| 8 | - | X | *Fusconaia masoni* | Atlantic pigtoe | Roanoke R, Craig Ck drainage | Aquatic-rivers | S | G2 | S2 | - |
| 1 | - | X | *Hemistena lata* | Cracking pearlymussel | Clinch R, Powell R | Aquatic-rivers | E | G1 | S1 | - |
| 1 | - | X | *Lampsilis abrupta* | Pink mucket | Clinch R | Aquatic-rivers | E | G2 | SX | S1 |
| 1 | - | X | *Lasmigona holstonia* | Tennessee heelsplitter | Upper Clinch, N and M Fk Holston R drainages; Wolf Ck, Bland Co below Burkes Garden | Aquatic-streams | S | G3 | S1 | - |
| 8 | X | - | *Lasmigona subviridis* | Green floater | Widely distributed in N & S Fk Shenandoah R, Pedlar R, James R | Aquatic-rivers | S | G3 | S2 | S2 |
| 1 | - | X | *Lemiox rimosus* | Birdwing pearlymussel | Clinch R, Powell R, Copper Ck, Little R | Aquatic-rivers | E | G1 | S1 | - |
| 1 | - | X | *Pegias fabula* | Little-winged pearlymussel | Clinch R, N Fk Holston R, S Fk Holston R, Little R | Aquatic-streams | E | G1 | S1 | - |
| 1 | - | X | *Plethobasus cyphyus* | Sheepnose | Clinch R, Powell R | Aquatic-rivers | E | G3 | S1 | S1 |
| 8/9 | X | X | *Pleurobema collina* | James spinymussel | Potts Ck, Craig Ck, Johns Ck, Patterson Run, Pedlar R, Cowpasture R, Mill Ck (Deerfield) | Aquatic-rivers | E | G1 | S1 | S1 |
| 1 | - | X | *Pleurobema cordatum* | Ohio pigtoe | Clinch R | Aquatic-rivers | S | G4 | S1 | S2 |
| 1 | - | X | *Pleurobema oviforme* | Tennessee clubshell | Clinch R, Powell R, N. Middle, S Fk Holston R | Aquatic-streams | S | G2G3 | S2S3 | - |
| 1 | - | X | *Pleurobema plenum* | Rough pigtoe | Clinch R | Aquatic-rivers | E | G1 | SH | SH |
| 1 | - | X | *Pleurobema rubrum* | Pyramid pigtoe | Upper Clinch R | Aquatic-rivers | S | G2G3 | SH | - |
| 1 | - | X | *Pleuronaia barnesiana* | Tennessee pigtoe | Clinch R, Powell R, N Middle, S Fk Holston R | Aquatic-rivers | S | G2G3 | S2 | - |
| 1 | - | X | *Pleuronaia dolabelloides* | Slabside pearlymussel | Clinch R, M Fk Holston, N Fk Holston R | Aquatic-rivers | E | G2 | S2 | - |
| 1 | - | X | *Ptychobranchus subtentum* | Fluted kidneyshell | Holston R., Powell R., Indian R., Clinch R., Little R., Copper Ck., Big Moccasin Ck. Critical Habitat: Indian Ck, VA: M Fk Holston R. VA: Big Moccasin Ck., VA: Copper Ck., VA; Clinch R. TN, VA: Powell R., TN, VA | Aquatic-rivers | E | G2 | S2 | - |
| 1 | - | X | *Quadrula cylindrica strigillata* | Rough rabbits foot | Clinch R, Powell R, N Fk Holston R, Copper Ck | Aquatic-streams | E | G3G4T2 | S2 | - |
| 1 | - | X | *Quadrula intermedia* | Cumberland monkeyface | Powell R | Aquatic-rivers | E | G1 | S1 | - |
| 1 | - | X | *Quadrula sparsa* | Appalachian monkeyface | Clinch R, Powell R | Aquatic-rivers | E | G1 | S1 | - |
| 1 | - | X | *Toxolasma lividum* | Purple lilliput | N Fk Holston R, Clinch R | Aquatic-rivers | S | G3Q | SH | - |
| 1 | - | X | *Villosa perpurpurea* | Purple bean | Clinch R, Copper Ck | Aquatic-rivers | E | G1 | S1 | - |
| 1 | - | X | *Villosa trabalis* | Cumberland bean | Clinch R | Aquatic-rivers | E | G1 | SX | - |
| **Spider (Arachnid)** | | | | | | | | | | |
| 1 | - | X | *Microhexura montivaga* | Spruce-fir moss spider | Whitetop Mtn | Damp, well-drained moss and liverwort mats on boulders in mature spruce-fir forests | E | G1 | S1 | - |
| **Pseudoscorpion (Arachnid, Order Pseudoscorpionida)** | | | | | | | | | | |
| 1 | - | X | *Kleptochthonius orpheus* | Orpheus cave pseudoscorpion | Patton Cave, Monroe Co, WV | Caves | S | G1 | - | S1 |
| **Amphipod (Crustacean, Order Amphipoda)** | | | | | | | | | | |
| 1 | - | X | *Stygobromus abditus* | James Cave amphipod | James, Sam Bells caves, Pulaski Co; Watsons cave, Wythe Co; and other New River caves | Aquatic-caves, water well | S | G3 | S3 | - |
| 1 | - | X | *Stygobromus cumberlandus* | Cumberland cave amphipod | Lee, Scott, Wise Cos | Aquatic-caves | S | G3G4 | S1S2 | - |
| 2 | - | X | *Stygobromus estesi* | Craig County cave amphipod | Caves in Upper Sinking Ck Valley and Potts Ck, Poverty Hollow seeps, Captain seeps | Aquatic-caves, seeps | S | G4 | S3 | - |

| OAR | GW | J | Species Name | Common Name | Range on or near GWJNFs | Habitat - Detail | TES | GRank | VA SRank | WV SRank |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | - | X | *Stygobromus fergusoni* | Montgomery County cave amphipod | Botetourt, Montgomery Cos | Aquatic-caves. | S | G2G3 | S1 | - |
| 1 | X | - | *Stygobromus gracilipes* | Shenandoah Valley cave amphipod | Frederick, Rockingham, Shenandoah, Warren Cos | Aquatic-caves | S | G3G4 | S3 | S1 |
| 1 | X | - | *Stygobromus hoffmani* | Alleghany County cave amphipod | Low Moor cave, Alleghany Co | Aquatic-caves, groundwater habitats including springs and seeps. | S | G2 | S2 | - |
| 1 | X | - | *Stygobromus mundus* | Bath County cave amphipod | Alleghany, Bath Cos | Aquatic-caves | S | G2G3 | S1S2 | - |
| **Isopod (Crustacean, Order Isopoda)** | | | | | | | | | | |
| 1 | - | - | Antrolana lira | Madison Cave Isopod | Documented population centers in Waynesboro-Grottoes area, Augusta Co; Harrisonburg area Rockingham Co; valley of main stem of Shenandoah R, Warren, Clarke cos,VA Jefferson Co, WV. Not known from the GWNF | Aquatic-subterranean obligate in caves and karst groundwater. | T | G2G4 | S2 | S1 |
| 1 | - | X | *Caecidotea incurva* | Incurved cave isopod | McCullin Cave, Smyth Co; Groseclose Cave No 1, Wythe Co | Aquatic-caves | S | G2G4 | S2 | - |
| 1 | X | X | *Miktoniscus racovitzai* | Racovitza's terrestrial cave isopod | Alleghany, Botetourt, Page, Rockbridge, Shenandoah Cos | Aquatic-caves | S | G3G4 | S2 | - |
| **Crayfish (Crustacean, Order Decapoda)** | | | | | | | | | | |
| 1 | - | X | *Cambarus callainus* | Big Sandy crayfish | In VA, Upper Russell Fk drainage Big Sandy R | Aquatic-streams. Fast flowing streams of moderate width. | T | G2 | S1S2 | S1 |
| **Millipede (Class Diplopoda)** | | | | | | | | | | |
| 1 | - | X | *Brachoria dentata* | A millipede | Known only from Pennington Gap and Cave Spring Recreation Area, Lee Co | Leaf litter, deciduous forests | S | G1 | S1 | - |
| 1 | - | X | *Brachoria eutypa ethotela* | Hungry Mother millipede | Pine Mtn above Troutdale | Leaf litter, deciduous forests | S | GNRTNR | S3 | - |
| 1 | - | X | *Buotus carolinus* | A millipede | Brush Mtn, Whitetop Mtn, Apple Orchard Mtn, Tazewell Beartown | Beech leaf litter, deciduous forests. | S | G3 | S3 | - |
| 1 | - | X | *Cleidogona hoffmani* | Hoffman's cleidogonid millipede | Mt Rogers, Whitetop Mtn, Elk Garden; Hamilton cave (private) Bland Co | Mountaintop species, leaf litter, deciduous forests. | S | G3 | S2S3 | - |
| 1 | - | X | *Cleidogona lachesis* | A millipede | Mt Rogers & Whitetop Mtn | Beech leaf litter, deciduous forests. | S | G2 | S1 | - |
| 1 | - | X | *Dixioria fowleri* | Fowler's millipede | Walker Mtn; Comers Rock on Iron Mtn; Laurel Ck, Damascas; 1/2 mile west of NRA office; Tazewell Beartown | Leaf litter, deciduous forests | S | G2 | S2 | - |
| 1 | - | X | *Dixioria pela coronata* | A millipede | Endemic to Mt Rogers. | Leaf litter, northern hardwood and spruce-fir forests. Altitudinally restricted, >5000' | S | G2T2 | S2 | - |
| 1 | X | - | *Nannaria shenandoah* | Shenandoah Mountain xystodesmid millipede | One site: along Long Run Road, Rockingham Co | Leaf litter, mixed oak forest | S | G1 | S1 | - |
| 1 | X | - | *Pseudotremia alecto* | A millipede | Griffith Knob, Alleghany Co; near Mountain Grove Saltpetre Cave, Bath Co | Leaf litter, deciduous forests | S | GNR | SNR | - |
| 1 | X | X | *Semionellus placidus* | A millipede | Hawksbill Mtn, Apple Orchard Mtn, Tomahawk Mtn | Leaf litter, deciduous forests. | S | G3 | S3 (old rank S2) | - |
| **Centipede (Insect, Order Chilopoda)** | | | | | | | | | | |
| 1 | X | X | *Escaryus cryptorobius* | Montane centipede | The Priest, Nelson Co; Whitetop Mtn, near junction of Grayson, Washington, Smyth Co | Upper soil horizon, spruce - birch forests. | S | G2 | S2 | - |
| 1 | - | X | *Escaryus orestes* | Whitetop Mountain centipede | Whitetop Mtn, near junction of Grayson, Washington, Smyth Co | Dark moist soil and litter, spruce - birch forests. | S | G1G2 | S1S2 | - |
| 1 | X | - | *Nampabius turbator* | A cave centipede | One known site: Low Moor cave, Alleghany Co | Caves. | S | G1G2 | S1 | - |
| **Springtail (Insect, Order Collembola)** | | | | | | | | | | |
| 1 | X | X | *Pygmarrhopalites carolynae* | A cave springtail | Augusta, Bath, Highland, Lee, Wise Cos | Caves | S | G4 | S3 | - |
| 2 | - | X | *Pygmarrhopalites commorus* | A cave springtail | Giles, Lee, Wise Cos | Caves | S | G2G3 | S2S3 | - |
| 1 | X | - | *Pygmarrhopalites sacer* | A cave springtail | Bath Co | Caves. | S | G2 | S2 | - |
| **Mayfly (Insect, Order Ephemeroptera)** | | | | | | | | | | |
| 1 | - | X | *Leptophlebia johnsoni* | Johnson's pronggill mayfly | One location: Lewis Fk north slope Mt Rogers. | Aquatic-streams. | S | G4 | S1 | - |
| **Dragonfly (Insect, Order Odonata)** | | | | | | | | | | |

| OAR | GW | J | Species Name | Common Name | Range on or near GWJNFs | Habitat - Detail | TES | GRank | VA SRank | WV SRank |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | X | X | *Gomphus viridifrons* | Green-faced clubtail | New R, Craig Ck, Pound R, Locust Spring | Aquatic-rivers | S | G3G4 | S2 | S2 |
| 8 | - | X | *Ophiogomphus incurvatus alleghaniensis* | Allegheny snaketail | Rich Ck, Giles Co | Aquatic-streams | S | G3T2T3 | S1 | S1 |
| **Stonefly (Insect, Order Plecoptera)** | | | | | | | | | | |
| 1 | - | X | *Acroneuria kosztarabi* | Virginia stonefly | Station Spring Ck, Tazewell Co | Aquatic-streams | S | G1G2 | S1S2 | - |
| 1 | - | X | *Isoperla major* | Big stripetail stonefly | Burkes Garden, Tazewell Co | Aquatic-streams | S | G1 | S1 | - |
| 1 | - | X | *Megaleuctra williamsae* | Smokies needlefly | Mt Rogers & Whitetop Mtn | Aquatic-streams | S | G2 | S1S2 | - |
| 1 | - | X | *Taeniopteryx nelsoni* | Cryptic willowfly | Lewis Fk & Grindstone Branch N of Mt Rogers | Aquatic-streams | S | G1 | S1 | - |
| **Beetle (Insect, Order Coleoptera)** | | | | | | | | | | |
| 1 | X | X | *Cicindela ancocisconensis* | Appalachian tiger beetle | Alleghany, Bath, Highland, Lee, Rockbridge, Washington, Wise Cos | Riparian - sandy/silty edges of streams and rivers | S | G3 | S2 | S3 |
| 2 | X | X | *Cicindela patruela* | Northern barrens tiger beetle | Blue Ridge, Ridge & Valley | Eroded slopes of exposed sandstone and conglomerate | S | G3 | S2 | S2S3 |
| 1 | - | X | *Cyclotrachelus incisus* | A ground beetle | Breaks Interstate Park, Dickenson Co | Dry, well drained site, red maple, magnolia, mountain laurel | S | G4 | S1 | - |
| 4 | X | X | *Hydraena maureenae* | Maureen's hydraenan minute moss beetle | Alleghany, Bath, Botetourt, Bland, Craig, Cos | Interstitial water in riparian-shale substrate along stream edge | S | G2? | S2? | - |
| **Scorpionfly (Insect, Order Mecoptera)** | | | | | | | | | | |
| 2 | - | X | *Brachypanorpa jeffersoni* | Jefferson's short-nosed scorpionfly | Sugar Run Mountain, Giles Co; Whitetop Mtn, Smyth Co | Moist soil around seeps. Only known from high elevation. Larvae use short burrows in loose soil and moss. | S | G2 | S1S2 | - |
| **Butterfly, Skipper, Moth (Insect, Order Lepidoptera)** | | | | | | | | | | |
| 2 | X | X | *Callophrys irus* | Frosted elfin | Frederick, Montgomery, Page, Roanoke Cos | Dry, open woods, clearings, and road/powerline ROWs with abundant wild indigo, *Baptisia tinctoria* | S | G3 | S2? | S1 |
| 6 | X | X | *Speyeria diana* | Diana fritillary | Blue Ridge, Ridge & Valley | Grasslands-shrublands, near streams with thistles and milkweeds. Larval host plant, violets, *Viola* spp | S | G3G4 | S3 | S2S3 |
| 6 | X | X | *Speyeria idalia* | Regal fritillary | Blue Ridge, Ridge & Valley | Riparian, grasslands-shrublands. Larval host plant, violets, *Viola* spp | S | G3 | S1 | S1 |
| 2 | X | X | *Erynnis persius persius* | Persius duskywing | Blue Ridge, Ridge & Valley | Bogs, wet meadows, open seepages in boreal forests. Larval host plant, lupine, *Lupinus perennis*, wild indigo, *Baptisia tinctoria* | S | G5T1T3 | S1 | - |
| 2 | X | - | *Pyrgus centaureae wyandot* | Appalachian grizzled skipper | Ridge & Valley | Shale barrens, open shaley oak woodlands. Larval host plant, cinquefoil, *Potentilla* spp, strawberry, *Fragaria virginina.* | S | G5T1T2 | S1 | S1 |
| 2 | X | X | *Catocala herodias gerhardi* | Herodias underwing | Bald Knob, Bath Co; Poverty Hollow, Montgomery Co; Sand Mtn, Wythe Co (non FS property) | Pitch pine/bear oak scrub woodlands, >3000'. Larval host plant oak, *Quercus* spp | S | G3T3 | S2S3 | SU |
| 1 | X | - | *Euchlaena milnei* | Milne's euchlaena moth | Warm Springs Mtn, Catawba Creek Slopes, Sweet Spring Hollow, Salt Pond Mtn. (Doe Creek) | Moist, forested slopes of mixed pine hardwoods. Acidic oak woods | S | G2G4 | S2 | S2 |
| 1 | X | - | *Psectrotarsia hebardi* | Hebard's noctuid moth | Bath Co | Rich, mesic hardwood forest. Larvae host plant, Canada horse-balm, *Collinsonia canadensis* | S | GU | SH | - |
| **NON-VASCULAR PLANT** | | | | | | | | | | |
| **Lichen** | | | | | | | | | | |
| 1 | - | X | *Gymnoderma lineare* | Rock gnome lichen | Whitetop Mtn | Spruce-fir forests | E | G2 | S1 | - |
| 2 | - | X | *Hypotrachyna virginica* | Virginia hypotrachyna lichen | Mt Rogers & Whitetop Mtn | Spruce-fir forests. Found on *Abies, Picea, Rhododendron* in spruce-fir and fire-cherry, *Prunus pensylvanica* communities in southern Appalachian Mountains. Typically at higher elevations, has been found at lower elevations | S | G1G2 | S1 | SNR |
| 1 | X | X | *Peltigera hydrothyria* | Hydrothyria lichen | Augusta, Amherst, Alleghany, Bedford, Botetourt, Giles, Highland, Madison, Nelson, Rockbridge, Shenandoah, Smyth, Wythe Cos VA; Pendleton Co WV | Aquatic - in streams/springs/cascades. Grows at or below water level in cool, clear, partially-shaded streams | S | G4 | S1 | - |
| **Liverwort** | | | | | | | | | | |
| 1 | - | X | *Bazzania nudicaulis* | A liverwort | Mt Rogers & Whitetop Mtn | Bark and rock outcrops in spruce-fir forests | S | G2G3 | S? | - |
| 1 | - | X | *Frullania oakesiana* | A liverwort | Mt Rogers & Whitetop Mtn | Bark in spruce-fir forests | S | G3? | S? | - |

| OAR | GW | J | Species Name | Common Name | Range on or near GWJNFs | Habitat - Detail | TES | GRank | VA SRank | WV SRank |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | X | *Mertzgeria fruticulosa* | A liverwort | Whitetop Mtn | Bark in spruce-fir forests, >5000' | S | G2Q | S? | - |
| 2 | - | X | *Nardia lescurii* | A liverwort | Blue Ridge, Ridge & Valley | Riparian - on peaty soil over rocks, usually in shade and associated w/ water, <3000' | S | G3? | S1 | - |
| 1 | - | X | *Plagiochila austinii* | A liverwort | Little Stony Ck – Cascades; Red Ck on Beartown Mtn | Rich, moist, densely forested ravines; shaded outcrops | S | G3 | S? | - |
| 3 | - | X | *Plagiochila sullivantii var. sullivantii* | A liverwort | Whitetop Mtn, Salt Pond Mtn | Moist shaded rock outcrops, under cliff ledges, in crevices | S | G2T2 | SNR | - |
| 1 | - | X | *Sphenolobopsis pearsonii* | A liverwort | Mt Rogers & Whitetop Mtn | Bark of Fraser fir, mountain ash, occasionally red spruce, >5000' | S | G2 | S? | - |
| **Moss** | | | | | | | | | | |
| 1 | - | X | *Sphagnum flavicomans* | Northeastern peatmoss | Whitetop Mtn | Bogs, seeps | S | G3 | SU | - |
| **VASCULAR PLANT** | | | | | | | | | | |
| 3 | X | X | *Aconitum reclinatum* | Trailing white monkshood | Blue Ridge, Ridge & Valley | Rich cove sites, streambanks, seepages; all with high pH | S | G3 | S3 | S3 |
| 1 | - | X | *Actaea rubifolia* | Appalachian black cohosh | Lower Clinch R watershed, Scott, Wise Cos | Moist, rich wooded bluffs over limestone | S | G3 | S1 | - |
| 2 | X | X | *Allium oxyphilum* | Nodding onion | Monroe, Summers, Mercer, Greenbrier Cos, WV | Shale barrens, sandstone glades | S | G2 | S1 | S2 |
| 1 | X | - | *Arabis patens* | Spreading rockcress | Frederick, Lee, Page, Shenandoah, Warren Cos, VA; Hampshire, Hardy, Pendleton Cos, WV | Shaded, calcareous cliffs, bluffs, and talus slopes | S | G3 | S1 | S2 |
| 4 | X | X | *Berberis canadensis* | American barberry | Blue Ridge, Ridge & Valley | Calcareous open woods, bluffs, cliffs, and along fencerows | S | G3 | S3S4 | S1 |
| 1 | - | X | *Betula uber* | Virginia round-leaf birch | One location: Cressy Ck, Smyth Co | Riparian, mixed open forest, usually disturbed sites | T | G1Q | S1 | - |
| 2 | X | - | *Boechera serotina* | Shale barren rockcress | Ridge & Valley N of James R watershed | Shale barrens and adjacent open oak woods | E | G2 | S2 | S2 |
| 3 | X | X | *Buckleya distichophylla* | Piratebush | Blue Ridge S of Roanoke R, Ridge & Valley S of James R | Open oak and hemlock woods | S | G3 | S2 | - |
| 1 | - | X | *Cardamine clematitis* | Mountain bittercress | Blue Ridge, Ridge & Valley, S of New R watershed | Riparian, spring seeps, rocky streamsides | S | G3 | S1 | - |
| 1 | - | X | *Cardamine flagellifera* | Blue Ridge bittercress | Blue Ridge, Ridge & Valley, S of New R watershed | Riparian, spring seeps, rocky streamsides | S | G3 | SH | S2 |
| 1 | X | X | *Carex polymorpha* | Variable sedge | Blue Ridge, Ridge & Valley, N of James R | Open acid soil, oak-heath woodlands, responds positively to fire | S | G3 | S2 | S1 |
| 2 | X | X | *Carex schweinitzii* | Schweinitz's sedge | Augusta, Bath, Highland, Montgomery, Pulaski, Washington Cos | Bogs, limestone fens, marl marshes | S | G3G4 | S1 | - |
| 1 | - | X | *Chelone cuthbertii* | Cuthbert turtlehead | Blue Ridge Plateau, Grayson, Carroll Cos | Bogs, wet meadows, boggy woods and thickets | S | G3 | S2 | - |
| 3 | - | X | *Cleistesiopsis bifaria* | Small spreading pogonia | Craig, Dickenson, Scott, Wise Cos | Well drained, rather open, scrubby hillsides, oak-pine-heath woodlands, acidic soils | S | G4? | S2 | S1 |
| 2 | - | X | *Clematis addisonii* | Addison's leatherflower | Montgomery, Roanoke, Botetourt, Rockbridge Cos | Open glades & rich woods over limestone and dolostone | S | G1? | S2 | - |
| 2 | X | X | *Clematis coactilis* | Virginia white-haired leatherflower | Ridge & Valley, Rockbridge Co, S to Wythe Co | Shale barrens, rocky calcareous woodlands | S | G3 | S3 | - |
| 3 | X | X | *Corallorhiza bentleyi* | Bentley's coralroot | Alleghany, Bath, Giles Cos VA; Monroe, Pocahontas Cos WV | Dry, acid woods, along roadsides, well-shaded trails | S | G2 | S2 | S1 |
| 3 | X | X | *Delphinium exaltatum* | Tall larkspur | Blue Ridge, Ridge & Valley | Dry calcareous soil in open grassy glades or thin woodlands | S | G3 | S3 | S2 |
| 1 | X | - | *Echinodorus tenellus* | Dwarf burhead | Pines Chapel Pond, Augusta Co | Pond margins, wet depressions in sandy soil | S | G5? | S1 | - |
| 2 | X | X | *Echinacea laevigata* | Smooth coneflower | Alleghany, Montgomery Cos | Open woodlands and glades over limestone or dolomite | E | G2G3 | S2 | - |
| 2 | X | X | *Euphorbia purpurea* | Glade spurge | Blue Ridge, Ridge & Valley | Rich, swampy woods, seeps and thickets | S | G3 | S2 | S2 |
| 1 | - | X | *Gentiana austromontana* | Appalachian gentian | Mt Rogers, Whitetop Mtn, High Knob | High elevation forests and grassy balds Southern Appalachian endemic | S | G3 | S3 | S1 |
| 2 | - | X | *Hasteola suaveolens* | Sweet-scented Indian-plantain | Giles, Montgomery, Pulaski Cos | Riverbanks, wet meadows | S | G4 | S2 | S3 |
| 1 | X | - | *Helenium virginicum* | Virginia sneezeweed | Endemic to Augusta, Rockingham Cos | Seasonally dry meadows and sinkhole depressions | T | G3 | S2 | - |
| 1 | X | - | *Helonias bullata* | Swamp-pink | Augusta, Nelson Cos | Sphagnum bogs, seeps, and streamsides | T | G3 | S2S3 | - |
| 1 | X | - | *Heuchera alba* | White alumroot | Shenandoah Mtn | High elevation rocky woods and bluffs | S | G2Q | S1 | S2 |

| OAR | GW | J | Species Name | Common Name | Range on or near GWJNFs | Habitat - Detail | TES | GRank | VA SRank | WV SRank |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | X | X | *Hypericum mitchellianum* | Blue Ridge St. John's-wort | Blue Ridge, Ridge & Valley | Grassy balds, forest seepages, moderate to high elevations | S | G3 | S3 | S1 |
| 2 | X | X | *Ilex collina* | Long-stalked holly | Blue Ridge, Ridge & Valley | Bogs, seep, shrubby streamheads, >3100' | S | G3 | S1 | S2 |
| 1 | - | X | *Iliamna corei* | Peter's Mountain-mallow | One location: Narrows, Peters Mountain, Giles Co. | Rich, open woods along sandstone outcrops, soil pockets, fire maintained. | E | G1 | S1 | - |
| 1 | X | X | *Iliamna remota* | Kankakee globe-mallow | Alleghany, Botetourt, Rockbridge, Bedford Cos | Open, disturbed riverbanks and roadsides | S | G1Q | S1 | - |
| 1 | X | - | *Isoetes virginica* | Virginia quillwort | Augusta Co | Summer-dry sinkhole ponds, seasonally wet upland depressions, and small, wet-weather drains, especially in moss hummocks. | S | G1 | S1 | - |
| 3 | X | X | *Isotria medeoloides* | Small whorled pogonia | In mountains of VA known only from Bedford, Craig, and Lee Cos; other VA occurrences in Piedmont & Coastal Plain. | Open, mixed hardwood forests on level to gently sloping terrain with north to east aspect | T | G2? | S2 | S1 |
| 3 | X | X | *Juglans cinerea* | Butternut | Blue Ridge, Ridge & Valley | Well-drained bottomland and floodplain, rich mesophytic forests mostly along toeslopes. | S | G4 | S3? | S3 |
| 2 | X | X | *Liatris helleri* | Turgid gayfeather | Blue Ridge, Ridge & Valley | Shale barrens, mountain hillside openings. | S | GNR | S3 | S2 |
| 1 | - | X | *Lilium grayi* | Gray's lily | Blue Ridge, Mt Rogers & Whitetop Mtn (occurrences north of Floyd Co questionable). | Bogs, open seeps, wet meadows, grassy balds | S | G3 | S2 | - |
| 1 | X | - | *Lycopodiella margueritae* | Marguerite's clubmoss | Bath Co | Seasonally moist soils, wet acidic ditches, borrow pits. | S | G2 | NA | - |
| 1 | - | X | *Micranthes caroliniana* | Carolina saxifrage | Blue Ridge, Ridge & Valley, S of New R | Moist, shaded rocks and cliffs. | S | G3 | S3 | S1 |
| 6 | X | X | *Monotropsis odorata* | Sweet pinesap | Blue Ridge, Ridge & Valley | Dry oak-pine-heath woodlands, soil usually sandy. | S | G3 | S3 | S1 |
| 1 | - | X | *Packera millefolium* | Piedmont ragwort | Lee, Scott Cos | Open limestone outcrops and cedar barrens. | S | G2 | S2 | - |
| 2 | X | - | *Paxistima canbyi* | Canby's mountain lover | Ridge & Valley, Sarver Barrens SBA, Craig Co | Calcareous cliffs and bluffs, usually undercut by stream. | S | G2 | S2 | S2 |
| 3 | X | X | *Phlox buckleyi* | Sword-leaf phlox | Blue Ridge, Ridge & Valley | Open, often dry oak woodlands and rocky slopes, usually over shale in humus rich soils, often along roadsides. | S | G2 | S2 | S2 |
| 3 | X | X | *Poa paludigena* | Bog bluegrass | Blue Ridge, Ridge & Valley | Shrub swamps and seeps, usually under shade | S | G3 | S2 | S1 |
| 1 | X | - | *Potamogeton hillii* | Hill's pondweed | Bath Co | Clear, cold calcareous ponds. | S | G3 | S1 | - |
| 2 | X | - | *Potamogeton tennesseensis* | Tennessee pondweed | Ridge & Valley | Ponds, back water of streams and rivers | S | G2G3 | S1 | S2 |
| 1 | - | X | *Prenanthes roanensis* | Roan Mountain rattlesnake-root | Mt Rogers & Whitetop Mtn | Grassy balds, open high elevation forests and outcrops | S | G3 | S3 | - |
| 3 | X | X | *Pycnanthemum torrei* | Torrey's mountain-mint | Bland, Bath, Giles, Rockbridge, Wythe Cos | Open, dry rocky woods, roadsides, and thickets near streams, heavy clay soil over calcareous rock | S | G2 | S2 | S1 |
| 2 | - | X | *Rudbeckia triloba var. pinnatiloba* | Pinnate-lobed coneflower | Giles, Montgomery, Smyth, Wise Cos | Dry calcareous soil of open woods and roadsides. | S | G5T3 | S1 | - |
| 1 | - | X | *Sceptridium jenmanii* | Alabama grapefern | Scott, Russell, Wise Cos | Open woods, old fields, pastures. | S | G3G4 | SH | - |
| 1 | X | X | *Scirpus ancistrochaetus* | Northeastern bulrush | Ridge & Valley | Mountain ponds, sinkhole ponds in Shenandoah Valley. | E | G3 | S2 | S1 |
| 4 | X | X | *Scutellaria saxatilis* | Rock skullcap | Blue Ridge, Ridge & Valley | Rich, dry to mesic ridgetop woods, 32 counties in VA, likely G4/S4 | S | G3 | S3 | S2 |
| 1 | X | X | *Sida hermaphrodita* | Virginia mallow | Ridge & Valley, James R watersheds | Riverbank glades with loose rock or sandy soil. | S | G3 | S1 | S3 |
| 1 | - | X | *Silene ovata* | Mountain catchfly | Dickenson, Lee, Wise Cos | Rich woodlands and forests over limestone. | S | G3 | S1 | - |
| 1 | - | X | *Spiraea virginiana* | Virginia spiraea | Blue Ridge, Ridge & Valley, S of New R | Scoured banks of streams, riverside or island shrub thickets. | T | G2 | S1 | S1 |
| 1 | X | - | *Trillium pusillum var. moniticulum* | Virginia least trillium | Great North Mtn & Shenandoah Mtn, VA and WV | Open oak woodlands in well-drained soil and margins of thickets. | S | G3T2 | S2 | S1 |
| 3 | - | X | *Tsuga caroliniana* | Carolina hemlock | Blue Ridge north to James R. | Rocky ridges and slopes, usually dry and well drained. | S | G3 | S3 | - |
| 2 | X | X | *Vitis rupestris* | Sand grape | Ridge & Valley | Scoured banks of rivers and streams over calcareous bedrock | S | G3 | S1 | S2 |

## LEGEND FOR TES SPECIES LIST IN OCCURRENCE ANALYSIS RESULTS:

**OAR CODES:**

1 = Project located out of known species range.

2 = Lack of suitable habitat for species in project area.
3 = Habitat present, species was searched for during field survey, but not found.
4 = Species occurs in project area, but outside of activity area.
5 = Field survey located species in activity area.
6 = Species not seen during field survey, but possibly occurs in activity area based on habitat observed. or Field survey not conducted when species is recognizable (time of year or time of day). Therefore assume presence and no additional surveys needed.
7 = Aquatic species or habitat known or suspected downstream of project/activity area, but outside identified geographic bounds of water resource cumulative effects analysis area (defined as point below which sediment amounts are immeasurable and insignificant).
8 = Aquatic species or habitat known or suspected downstream of project/activity area, but inside identified geographic bounds of water resource cumulative effects analysis area.
9 = Project occurs in a 6th level watershed included in the USFWS/FS T&E Mussel and Fish Conservation Plan (August 8, 2007 U.S. Fish & Wildlife Service concurrence on updated watersheds). Conservation measures from the USFWS/FS T&E Mussel and Fish Conservation Plan applied.

**SPECIES:** The term "species" includes any subspecies of fish, wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife, which interbreeds when mature (Endangered Species Act of 1973, as amended through the 100th Congress).

**RANGE:** The geographical distribution of a species. For use here "range" is expressed as where a species is known or expected to occur on or near the George Washington and Jefferson National Forests in terms of landform (feature name, physiographic province), political boundary (county name), or watershed (river, or stream name).

**HABITAT:** A place where the physical and biological elements of ecosystems provide a suitable environment and the food, cover and space resources needed for plant and animal livelihood (FSM 2605-91-8, pg. 10 of 13).

**TES CODES:**

T = Federally listed as Threatened
E = Federally listed as Endangered
P = Federally Proposed as T or E
S = Southern Region (R8) Sensitive species

**GLOBAL RANK:** Global ranks are assigned by a consensus of the network of natural heritage programs, scientific experts, NatureServe and The Nature Conservancy to designate a rarity rank based on the range-wide status of a species or variety. This system was developed by The Nature Conservancy and is widely used by other agencies and organizations as the best available scientific and objective assessment of taxon rarity and level of threat to its existence. The ranks are assigned after considering a suite of factors including number of occurrences, numbers of individuals, and severity of threats.

G1 = Extremely rare and critically imperiled with 5 or fewer occurrences or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.
G2 = Very rare and imperiled with 6 to 20 occurrences or few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.
G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range; or vulnerable to extinction because of other factors. Usually fewer than 100 occurrences are documented.
G4 = Common and apparently secure globally, although it may be rare in parts of its range, especially at the periphery.
G5 = Very common and demonstrably secure globally, although it may be rare in parts of its range, especially at the periphery.
GH = Formally part of the world's biota with the exception that may be rediscovered.
GX = Believed extinct throughout its range with virtually no likelihood of rediscovery.
GU = Possibly rare, but status uncertain and more data needed.
G? = Unranked, or, if following a ranking, ranking uncertain (ex. G3?).
G_Q = Taxon has a questionable taxonomic assignment, such as G3Q.

G_T = Signifies the rank of a subspecies or variety. For example, a G5T1 would apply to a subspecies of a species that is demonstrably secure globally (G5) but the subspecies warrants a rank of T1, critically imperiled.

**STATE RANK**: The following ranks are used by the Virginia Department of Conservation and Recreation to set protection priorities for natural heritage resources. Natural Heritage Resources (NHRs) are rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The criterion for ranking NHRs is the number of populations or occurrences, i.e. the number of known distinct localities; the number of individuals in existence at each locality or, if a highly mobile organism (e.g., sea turtles, many birds, and butterflies), the total number of individuals; the quality of the occurrences, the number of protected occurrences; and threats.

- **S1** - Extremely rare; usually 5 or fewer populations or occurrences in the state; or may be a few remaining individuals; often especially vulnerable to extirpation.
- **S2** - Very rare; usually between 6 and 20 populations or occurrences; or with many individuals in fewer occurrences; often susceptible to becoming extirpated.
- **S3** - Rare to uncommon; usually between 21 and 100 populations or occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.
- **S4** - Common; usually >100 populations or occurrences, but may be fewer with many large populations; may be restricted to only a portion of the state; usually not susceptible to immediate threats.
- **S5** - Very common; demonstrably secure under present conditions.
- **SA** - Accidental in the state.
- **S#B** - Breeding status of an organism within the state.
- **SH** - Historically known from the state, but not verified for an extended period, usually > 15 years; this rank is used primarily when inventory has been attempted recently.
- **S#N** - Non-breeding status within the state. Usually applied to winter resident species.
- **SR** – Reported for Virginia, but without persuasive documentation that would provide a basis for either accepting or rejecting the report.
- **SU** - Status uncertain, often because of low search effort or cryptic nature of the element.
- **SX** - Apparently extirpated from the state.
- **SZ** - Long distance migrant, whose occurrences during migration are too irregular, transitory and/or dispersed to be reliably identified, mapped and protected.
- **NA** – Not Applicable- A conservation status rank in not applicable because the species is not a suitable target for conservation activities.

**These ranks should not be interpreted as legal designations.**