

**Biological Evaluation/Biological Assessment  
for  
Threatened, Endangered, and Sensitive (TES) Species**

**2013 Gypsy Moth Slow the Spread (STS) Project**

**Eastern Divide Ranger District and Mount Rogers National Recreation Area**

**George Washington and Jefferson National Forests**

**Bland, Grayson, Smyth, and Tazewell Counties, Virginia**

**Introduction**

Forest Service Manual (FSM) Section 2672.41 requires a biological evaluation (BE) and/or biological assessment (BA) for all Forest Service planned, funded, executed, or permitted programs and activities. The objectives of this BE/BA are to: 1) ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native species or contribute to trends toward federal listing, 2) comply with the requirements of the Endangered Species Act (ESA) so that federal agencies do not jeopardize or adversely modify critical habitat (as defined in ESA) of federally listed species, and 3) provide a process and standard to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision-making process using the best available science.

The Eastern Divide Ranger District (EDRD) and Mount Rogers National Recreation Area (NRA) support known occurrences and suitable habitat for several TES species, all of which were considered in this analysis. This BE/BA documents the analysis of potential effects of the proposed project to TES species and associated habitat. It also serves as biological input into the environmental analysis for project-level decision making to ensure compliance with the ESA, National Environmental Policy Act (NEPA), and National Forest Management Act (NFMA).

The USDA - Forest Service (USDA-FS) in cooperation with the Virginia Department of Agriculture and Consumer Services (VDACS) proposes to treat approximately 34,481 acres in two separate treatment blocks for control of the gypsy moth. All 34,481 acres would receive a mating disruption treatment. The application would occur in mid to late June 2013 depending on growth and development of gypsy moth caterpillars. These acres include 25,120 acres of private land and 9,361 acres of National Forest lands.

**Project Area and Cumulative Effects Analysis Area**

The areas to be treated are named for the Quadrangle Map (USGS 7.5' quad map) on which the majority of the treatment area falls. The names do not imply that the geographic features for which the quadrangle maps are named falls within the treatment area. (i.e. the Broadford treatment area is on the Broadford quad map, but does not contain the community of Broadford.)

The following describes the locations of the two blocks (also see the location maps in Appendix A and table 1):

**Garden Mountain** - Approximately 24,621 acres of private land and 8,835 acres of National Forest System (NFS) land (total 33,456 acres) in Bland and Tazewell Counties on the Eastern Divide Ranger District would be treated with mating disruption. Approximately 3,048 acres are proposed within the Garden Mountain Wilderness and 3,168 acres are proposed within the Hunting Camp Creek Wilderness. Open roads within the block include State Roads (SR) 42 and 623.

**Middle Fox Creek** - Approximately 499 acres of private land and 526 acres of NFS land (total 1,025 acres) in Grayson and Smyth Counties on the Mount Rogers National Recreation Area (NRA) would be treated with mating disruption. Open roads within the block include SR's 675 and 772.

TABLE –1

Treatment Area Name	Treatment	Maximum Proposed Dose (ai/ac.)	Area Size (acres)	Acres by Ownership		
				Private	National Forest Wilderness	Other National Forest
Garden Mountain	Mating Disruption	15g	33,456	24,621	6,216	2,619
Middle Fox Creek	Mating Disruption	6g	1,025	499	0	526
Total			34,481	25,120	6,216	3,145

The geographic scope of this biological analysis for terrestrial plants and animals is the total acreage of each project area. The geographic scope of the analysis for the Indiana bat is the entire George Washington and Jefferson National Forests (GWJNF). The geographic scope of the analysis for aquatic species is the watersheds of streams located within the project areas as described above. This aquatic geographic scope was selected because, based upon professional judgment and in consultation with the Forest fisheries biologist, each immediate project area is the only area of concern.

The scope of this analysis is therefore limited to the proposal for treatment of two blocks totaling 34,481 acres of intermingled national forest and private lands located in southwest Virginia as part of the STS program. It does not relate to other STS, suppression, or eradication treatment activities outside the scope of this project EA conducted by the FS and/or VDACS on other public and/or private lands in Virginia. Those activities are covered by other EAs, ESA consultations with the U.S. Fish and Wildlife Service, and decisions.

The proposed treatment area includes 6,216 acres managed as Wilderness in the Garden Mountain area by the EDRD. Vegetation in the National Forest portion of both project areas is comprised primarily of forested stands of upland oaks with scattered stands of southern yellow pine and white pine along with more mesic associated hardwoods. Private lands are also

predominately forested but may contain some agricultural land consisting of open pastureland and old fields. This mixture of vegetation is typical of acidic soils developed over sandstone and shale bedrock in the Appalachians, specifically Ridge and Valley, and more neutral soils developed over carbonate (limestone and dolostone) rocks in the valley portions. Valley soils are less acidic and vegetation is typical of lands that have seen greater influence of human habitation and agriculture.

Past events have played a significant role in creating the vegetative condition existing today. Most of the area, prior to National Forest acquisition, was extensively harvested for lumber and pulpwood during the latter part of the 19th century and the early 1900's. The chestnut blight during the 1920's and 30's removed all of the American chestnut from the overstory and created openings that enabled previously overtopped trees, primarily oak species, to grow and replace the American chestnut in the overstory. This area has also been subjected to recurrent wildfires in the past as evidenced from the charred stumps and basal fire scars found throughout the project area. Over the past 80 years wildfires have mostly been excluded from the project area due to an aggressive fire suppression program. This has allowed shade tolerant and fire intolerant tree species such as red maple and white pine to become more common in the understory. These species are likely to become more dominant than oaks in future stand composition since most oaks found on the Forest are classified as intermediate in shade tolerance and not able to compete with vegetation that has a high shade tolerance.

### **Proposed Management Action**

Results of the 2012 gypsy moth trapping program, following defoliation in parts of western Virginia, revealed a wide spread and potentially growing gypsy moth population that has ability to rapidly increase its spread even further to the south and west. To help slow this spread there is a proposal for aerial treatments of selected areas now supporting growing gypsy moth population numbers with mating disruption.

**Treatment areas:** To help slow this spread the proposal is for one aerial application of gypsy moth mating disruptant to two areas as outlined above in Table 1.

**Mating Disruption:** The following information on mating disruption was provided by the USDA Forest Service, Forest Health Protection office, in Asheville, NC, last modified in 2009. Pheromones are chemicals produced by insects to communicate with one another. In the case of the gypsy moth, the female releases a sex pheromone when she is ready to mate. The pheromone attracts the male moths that follow the scent to its source – the female. A synthetic pheromone much like the real gypsy moth pheromone has been produced in the laboratory. This synthetic pheromone is formulated into controlled release dispensers that are scattered over the forest canopy using aircraft. The dispensers slowly release the pheromone into the environment over a 2-3 month period when gypsy moths would be mating. The males become disoriented because the air is filled with pheromone and they cannot distinguish the real female pheromone from the pheromone released by the dispensers. This process is called mating disruption and is effective at controlling low-density populations of the gypsy moth. The applications would occur in mid to late June 2013 prior to the emergence of the gypsy moth breeding adults.

- Disparlure (chemical name: cis-7, 8-epoxy-2-methyloctadecane) is the name of the sex pheromone produced by the female gypsy moth to attract the male for mating.

Disparlure is also synthesized and used in the cooperative USDA Forest Service STS project to control low-density gypsy moth populations.

- Disrupt II® (Hercon Environmental, Emigsville, PA) is the name of a plastic laminate flake formulation that contains disparlure as the active ingredient. It is 17.9% active ingredient (pheromone) by weight and is registered with the Environmental Protection Agency to control low density populations of gypsy moth (EPA Reg. No. 8730-55 Prior to application the flakes are mixed with a sticker (Gelva Multipolymer Resin Emulsion 2333) to ensure they will stick at all levels in the forest canopy or on foliage where gypsy moths are found.
- SPLAT-GM (ISCA Technologies, Riverside, CA) is the name of a polymer matrix formulation that contains disparlure as the active ingredient. It is 13% active ingredient (pheromone) by weight and is registered with the Environmental protection Agency for use on low-density gypsy moth populations (EPA Reg. No. 80286-4)
- The products would be applied at a dose of either 15 grams or 6 grams of active ingredient per acre. The 15 gram dose is equivalent to an application rate of about ½ cup of Disrupt II flakes or 1 cup SPLAT-GM droplets distributed per acre. Proportionally, the 6 gram rate is less than ¼ cup of flakes per acre or 1/3 cup of SPLAT-GM droplets distributed per acre.

Field studies and operational use of this tactic (mating disruption) over many years show that it does effectively suppresses mating in low-density gypsy moth populations, and therefore controls populations. Its use has been integral in the well established STS project. The mating disruption is species specific to gypsy moth with no known effects on other lepidoptera (moth or butterfly) species or any other non-target species. Both Disrupt II and SPLAT-GM have been studied extensively and do not pose any risk to humans or the environment.

The public will be notified of the proposed treatment dates and times through local newspapers. Signs about the treatment will also be placed along roads and trails at major entry points to the treatment areas. These signs will inform people of the type of treatment and the time span in which application may occur. Coordination will occur with the Appalachian Trail Conservancy (ATC), who has agreed to disseminate information through their website and other sources for the trail and hiking community.

## **Future Actions**

Activities on private land within these watersheds are expected to remain about the same as current for the next 10 years. There are no foreseeable future projects planned on National Forest System (NFS) land within the project areas that may have a cumulative effect on terrestrial or aquatic plants and animals with regards to this project. Because of the overall benign nature of this project on the environment there will be no affect on any future projects that may be planned on National Forest land. However, a rapidly growing and spreading gypsy moth population without any treatment will likely lead to increased tree mortality (especially oaks) depending on defoliation levels and weather (amount and seasonality of precipitation) following defoliation. This will shift the composition of forest vegetation towards trees that are

not favored by gypsy moths (such as yellow poplar) and away from oaks that are important ecosystem components and hard-mast producers for wildlife that favor acorns.

## **Species Reviewed**

Federally listed threatened and endangered species, species proposed for federal listing, and Southern Region sensitive species (TES) that may potentially be affected by this project were examined using the following existing available information:

1. Reviewing the list of TES plant and animal species known, or likely to occur, on the George Washington and Jefferson National Forests, and their habitat preferences. This review included the current list of federal endangered, threatened, and proposed species for the Forest concurred with by the U.S. Fish & Wildlife Service on January 4, 2007, and the January 1, 2002 Southern Region Sensitive Species list, revised for known or possible Forest occurrences on March 4, 2004, with Forest-specific updates current as of April 1, 2011 (attached as Appendix A).
2. Consulting element occurrence records (EOR's) for TES species as maintained by the Virginia Division of Natural Heritage (VDNH), and supplied to the Forest.
3. Consulting species information, including county occurrence records, as maintained in the online database (<http://vafwis.org/fwis/>) titled Virginia Fish and Wildlife Information Service (VAFWIS) of the Virginia Department of Game and Inland Fisheries (VDGIF).
4. Consulting with individuals in the private and public sector who are knowledgeable about the area and its flora and/or fauna.
5. Reviewing sources listed in the reference portion of this report.
6. Reviewing the results of past field surveys that may have been conducted in the area.

Most TES species known to occur on the Forest have unique habitat requirements, such as shale barrens, rock outcrops, bogs, caves, and natural ponds. Information gathered, analyzed, and presented in the Southern Appalachian Assessment dated July 1996 states that approximately 84% of threatened and endangered species and 74% of sensitive species are associated with rare or unique habitats, often referred to as rare communities.

Appendix A of this document lists all 190 TES species currently known or expected to occur on or near the George Washington and Jefferson National Forests. All species on the list were considered during the analysis for this project.

A “step down” process was followed to eliminate species from further analysis and focus on those species that may be affected by proposed project activities. Species not eliminated are then analyzed in greater detail. Results of this “step down” analysis process are displayed in the Occurrence Analysis Results (OAR) column of the table in Appendix A. First, the range of a species was considered. Species’ ranges on the Forest are based on county records contained in such documents as the Atlas of the Virginia Flora, but are refined further when additional information is available, such as more recent occurrences documented in scientific literature or in Natural Heritage databases. Many times range information clearly indicates a species will not occur in the project area due to the restricted geographic distribution of most TES species. When the project area is outside a known species range, that species is eliminated from further consideration by being coded as OAR code “1” in the Appendix A table. For this project, 129

species were eliminated from further consideration because the project area is not within the species known range.

For the remaining species, after this first step, knowledge of habitat types and conditions within the project area were used to determine if suitable habitat or the species were likely to be present in the project area.

### **Data Base Review and Results**

Since some species could not be eliminated from further consideration based on known range, they were considered to be absent or present depending upon the presence of appropriate habitat existing within the project area on National Forest lands. Potential TES species occurrences and project implementation effects were reviewed and analyzed by Steve Croy, Forest Ecologist; Mike Donahue, Biological Technician; Fred Huber, Forest Botanist; and Dawn Kirk, Forest Fisheries/Aquatic Biologist.

From the review of the Forest TES list, additional species were eliminated because of a lack of suitable habitat in the project area (OAR code "2"). For this project 24 species were eliminated from further consideration because National Forest lands lacked suitable habitat to support the species. The results of this review are documented in the Appendix A table.

### **Species Identified as Being In the Action Area or Potentially Affected by the Action**

From the review, those species which were analyzed further are those that: a) are known to be located in the activity area (OAR code "5") = 2 species; b) possibly occur in the activity area based on habitat observed during past surveys and knowledge of the area (OAR code "6") = 15 species; c) those aquatic species known or suspected downstream of project area but are outside identified geographic bounds of the water resource analysis area (OAR code "7") = 9 species; and d) those aquatic species known or are suspected downstream within the geographic bounds of the water resource analysis area (OAR code "8") = 11 species.

As a result of this process, 37 species are therefore known to occur, or have potential to be located within the project areas.

### **Effects of Proposed Management Action on Species**

The analysis of possible effects to species identified as known or expected to occur in the vicinity of the proposed project, or likely to be affected by the action includes the following existing information:

1. Data on species/habitat relationships.
2. Species range distribution.
3. Occurrences obtained from past field surveys or field observations.
4. The amount, condition, and distribution of suitable habitat.

A letter was received from the Virginia Department of Conservation and Recreation – Division of Natural Heritage on January 24, 2013 which states that natural heritage resources (plants, animals, natural communities) occur, or are likely to occur, in the project areas; but due to the

scope of the activity and distance to the resources they do not anticipate that the project will adversely impact those natural heritage resources. A letter was received on November 30, 2012 from the Virginia Department of Game & Inland Fisheries regarding state and federal listed species. They stated the endangered Virginia big-eared bat was known from the Burkes Garden area but based on the scope of the project and pesticides proposed the project would have no adverse impacts on the bats. For birds they stated there was a known bald eagle nest in Burkes Garden and recommended a 1000' buffer from aircraft around the nest from December 15 to July 15. They also stated that one state endangered freshwater mussel and two fish, one state endangered and one state threatened, were known to occur in streams adjacent to or within the Garden Mountain treatment block and recommended a 500' buffer either side of streams known to support these species. After further discussions with VDGIF recommended mitigations were modified and finalized to be 100 foot buffers on 2 creeks (Wolf Creek and Station Spring Creek), eliminating North Fork of Holston River from the spray block, and a 500' vertical buffer over eagles nest in Burkes Garden. All of these final recommendations are incorporated into the project design for implementation.

#### **Mating Disruption (Pheromone) Treatment:**

The toxicity of insect pheromones to mammals is extremely low, and the U.S.-Environmental Protection Agency (EPA) requires less rigorous testing of these products than it requires of insecticides that use a toxic pesticidal mode of action. Disparlure, Disrupt II, and SPLAT-GM are formulations of the chemical sex-attractant and delivery system that modifies the male moth behavior and ultimately results in mating disruption between the male and female gypsy moths. Toxicity data indicates that this pheromone is not toxic to mammals, birds, reptiles, amphibians, or fish. The pheromone flakes and capsules are gypsy moth-specific and due to the non-toxic pesticidal mode of action of disparlure it is not toxic to any other invertebrates. Disparlure is not known to directly or indirectly affect forest health, water quality, soil productivity, or soil fertility. There is no evidence to indicate that the sticker (Gelva RA2333) used to apply the flakes has any impacts on non-target species or the environment.

While this treatment will disrupt mating activities for gypsy moths, other moths will be unaffected. Therefore those moth populations will continue to be available as food sources for bats. Since female gypsy moths do not fly and males fly little at night they are typically not a food source for bats.

Given the nature of the proposed action and the fact that this treatment is species specific to the gypsy moth, there will be no impacts on any other animal or plant species that may inhabit or traverse the project areas. Therefore there will be no cumulative effects from pheromone application.

#### **Determination of Effect**

Across all treatment blocks proposed for pheromone flake applications, given the species-specific nature of pheromone application that disrupts mating activities only on gypsy moths, the project is not likely to adversely affect any federally listed plant or animal species. For Forest Service sensitive species there will be no impact.

**Persons Consulted:**

Fred Huber – Forest Botanist, GWJNFs

Mike Donahue – Biological Technician, GWJNFs

Dawn Kirk – Forest Fisheries/Aquatic Biologist, GWJNFs

S. Reñe Hypes – Virginia Division of Natural Heritage Project Review Coordinator

Shane Hanlon – Southwest Virginia Field Office, USFWS

**Prepared by:**

/s/ Steven Q. Croy

February 14, 2013

Steve Croy

Date

Forest Ecologist / Fire Planner, GWJNFs

Attachments: References

Appendix A – Forest TES List

Maps

Letters – VDCR-DNH & VDGIF



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## APPENDIX A

### Documentation of Threatened, Endangered or Sensitive Species Occurrences for 2013 Gypsy Moth Slow the Spread (STS) Project

#### Coding for Occurrence Analysis Results (OAR)

Forest update April 1, 2011 (based on Region 8 sensitive species list effective Jan. 1, 2002).

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
<b>VERTEBRATES</b>										
<b>Fish</b>										
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 Fork Holston R	Aquatic-streams	S	G4Q	S2	-
1		X	Cyprinella monacha	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	-
7		X	Etheostoma acuticeps	Sharphead darter	S and Middle Fk Holston R	Aquatic-rivers	S	G3	S1	-
1		X	Etheostoma susanae	Cumberland Johnny darter	Endemic to Upper Cumberland R watershed near VA	Aquatic-streams	S	G2	S1 (KY)	-
1		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
1	X	X	Notropis semperasper	Roughhead shiner	Upper James R watershed above Buchanan	Aquatic-rivers	S	G2G3	S2S3	-
1		X	Noturus flavipinnis	Yellowfin madtom	Lower & Middle reaches Copper Ck, Powell R.	Aquatic-streams	T	G1	S1	-
1	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	G2	S1	-
8		X	Percina macrocephala	Longhead darter	N Fk Holston R above Saltville, lower Copper Ck	Aquatic-rivers	S	G3	S1S2	S2
1		X	Percina rex	Roanoke logperch	Upper Roanoke R watershed	Aquatic-rivers	E	G1G2	S1S2	-
1		X	Phenacobius crassilabrum	Fatlips minnow	Unimpounded lower S Fk Holston R, Whitetop Laurel Ck	Aquatic-rivers	S	G3G4	S2	-
1		X	Phenacobius teretulus	Kanawha minnow	Upper New R watershed	Aquatic-streams	S	G3G4	S2S3	S1
1		X	Phoxinus cumberlandensis	Blackside dace	Poor Fk. Cumberland R, Upper Powell R.	Aquatic-streams	T	G2	S1	S3 (KY)
8		X	Phoxinus tennesseensis	Tennessee dace	Lick Ck, N Fk Holston R, Beaverdam Ck, M Fk Holston R	Aquatic-streams	S	G3	S1	-
<b>Amphibian</b>										
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	X		Plethodon shenandoah	Shenandoah salamander	Three isolated populations in SNP: Hawksbill Mtn, The Pinnacles, Stony Man Mtn. GW occurrence questionable.	Talus slopes	E	G1	S1	-
1		X	Plethodon welleri	Weller's salamander	Mt Rogers & Whitetop Mtn	Spruce-fir forests and adjacent northern hardwoods	S	G3	S2	-
<b>Birds</b>										
2	X	X	Falco peregrinus	Peregrine Falcon	Hack sites late 80s & 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. Prefers pigeons, ducks.	S	G4	S1B/S2N	S1B/S2N
5	X		Haliaeetus leucocephalus	Bald Eagle	Potomac R, James R watershed	Feeds and nests on or near large lakes and rivers	S	G5	S2S3B/S3N	S2B/S3N
1	X		Lanius ludovicianus migrans	Migrant Loggerhead Shrike	Ridge & Valley (Shenandoah Valley)	Open grasslands with trees and shrubs, fencerows	S	G4	S2B/S3N	S1B/S2N
1	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	S1B/S2N	S1B/S1N
<b>Mammals</b>										
5	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, & Tazewell Cos. (6 caves), Pendleton Co. (6 caves), largest VA population in Tazewell Co. & largest WV population in Pendleton Co. Small #'s of bats (usually <10) in a few other widely scattered caves during summer months. Bath & Pulaski County records are historic, no occupied caves currently known.	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. & 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	G4T2	S1	S2
2		X	Glaucomys sabrinus coloratus	Carolina northern flying squirrel	Mt Rogers & Whitetop area	Spruce-fir forests and adjacent northern hardwoods	E	G5T1	S1	-
1	X		Glaucomys sabrinus fuscus	Virginia northern flying squirrel	Laurel Fork area, Highland Co	Spruce-fir forests and adjacent northern hardwoods	E	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
6		X	Myotis grisescens	Gray bat	Ridge & Valley, Clinch R watershed	Caves winter and summer, forages widely	E	G3	S1S2	-

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
6	X	X	Myotis leibii	Eastern small-footed bat	Ridge & Valley	Hibernates in caves during winter, roosts in crevices of large rock outcrops, cliffs, & under large rocks in talus & boulder-fields during summer, forages widely in all forested and open habitat types over both ridges and valleys.	S	G3	S1	S1
6	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
<b>INVERTEBRATES</b>										
<b>Snail (Mollusk, Class Gastropoda)</b>										
1	X	X	Glyphyalinia raderi	Maryland glyph	Alleghany, Montgomery Cos	Calciophile, edge of seeps within leaf litter	S	G2	S1S2	S2
1	X		Helicodiscus diadema	Shaggy coil	Alleghany Co	Calciophile, limestone rubble and talus	S	G1	S1	-
1	X		Helicodiscus lirellus	Rubble coil	Rockbridge Co	Calciophile, limestone rubble and talus	S	G1	S1	-
1	X	X	Helicodiscus triodus	Talus coil	Alleghany, Botetourt, Rockbridge Cos	Calciophile, limestone rubble on wooded hillsides and caves	S	G2	S1S2	SH
7		X	Io fluviatilis	Spiny riversnail	Clinch R, N Fk Holston R	Aquatic-rivers	S	G2	S2	-
1		X	Paravitrea reesi	Round supercoil	Monroe, Summers Cos, WV	Calcareous woodlands and glades	S	G3	S2	S1
<b>Clam and Mussel (Mollusk, Class Bivalvia)</b>										
1	X		Alasmidonta varicosa	Brook floater	Potomac drainage	Aquatic-rivers	S	G3	S1	S1
1		X	Cumberlandia monodonta	Spectacle case	2 sites Clinch R	Aquatic-rivers	S	G2G3	S1	-
1		X	Cyprogenia stegaria	Fanshell	Lower Clinch R, Scott Co	Aquatic-rivers	E	G1	S1	S1
9		X	Dromus dromas	Dromedary pearlymussel	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers	E	G1	S1	-
1	X	X	Elliptio lanceolata	Yellow lance	Roanoke R, James R	Aquatic-rivers	S	G2G3	S2S3	-
9		X	Epioblasma brevidens	Cumberlandian combshell	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers	E	G1	S1	-
9		X	Epioblasma capsaeformis	Oyster mussel	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers	E	G1	S1	-
9		X	Epioblasma florentina walkeri	Tan ruffleshell	Clinch R, M Fk Holston R, N Fk Holston R	Aquatic-rivers	E	G1T1	S1	-
9		X	Epioblasma torulosa gubernaculum	Green-blossom pearlymussel	Clinch R, N Fk Holston R	Aquatic-rivers	E	G2TX	SX	-
7		X	Epioblasma triquetra	Snuffbox	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers	S	G3	S1	S2
7		X	Fusconaia barnesiana	Tennessee pigtoe	Clinch R, Powell R, N, Middle, S Fk Holston R	Aquatic-rivers	S	G2G3	S2	-
9		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	-
1		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
8		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	-
1	X		Lasmigona subviridis	Green floater	Widely distributed in N & S Fk Shenandoah R, Pedlar R, James R	Aquatic-rivers	S	G3	S2	S2
9		X	Lemiox rimosus	Birdwing pearlymussel	Clinch R, Powell R, Copper Ck, Little R	Aquatic-rivers	E	G1	S1	-
7		X	Lexingtonia dolabelloides	Slabside pearlymussel	Clinch R, M Fk Holston, N Fk Holston R	Aquatic-rivers	S	G2	S2	-
9		X	Pegias fabula	Little-winged pearlymussel	Clinch R, N Fk Holston R, Little R	Aquatic-streams	E	G1	S1	-
1		X	Plethobasus cyphus	Sheepnose	Clinch R, Powell R	Aquatic-rivers	S	G3	S1	S1
1	X	X	Pleurobema collina	James spiny mussel	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	G3	S1	S2
7		X	Pleurobema oviforme	Tennessee clubshell	Clinch R, Powell R, N, Middle, S Fk Holston R	Aquatic-streams	S	G3	S2S3	-
1		X	Pleurobema plenum	Rough pigtoe	Clinch R	Aquatic-rivers	E	G1	SH	-
1		X	Pleurobema rubrum	Pyramid pigtoe	Upper Clinch R	Aquatic-rivers	S	G2	S1	-
7		X	Quadrula cylindrica strigillata	Rough rabbitsfoot	Clinch R, Powell R, N Fk Holston R, Copper Ck	Aquatic-streams	E	G3T2	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	-
7		X	Toxolasma lividus	Purple lilliput	N Fk Holston R, Clinch R	Aquatic-rivers	S	G2	S1	-
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	-
<b>Spider (Arachnid)</b>										
1		X	Microhexura montivaga	Spruce-fir moss spider	Mt Rogers	Damp, well-drained moss and liverwort mats on boulders in mature spruce-fir forests	E	G1	S1	-
<b>Pseudoscorpion (Arachnid, Order Pseudoscorpiones)</b>										
1		X	Kleptochthonius orpheus	Orpheus cave pseudoscorpion	Patton cave, Monroe Co, WV	Caves	S	G1	-	S1
<b>Amphipod (Crustacean, Order Amphipoda)</b>										
1		X	Stygobromus abditus	James cave amphipod	James & Sam Bells caves, Pulaski Co; Watsons cave, Wythe Co; & other New River caves	Caves	S	G2G3	S2	-
1		X	Stygobromus cumberlandus	Cumberland cave amphipod	Lee, Scott, Wise Cos	Caves	S	G3G4	S1S2	-
1		X	Stygobromus estesi	Craig County cave amphipod	Caves in Upper Sinking Ck Valley and Potts Ck, Poverty Hollow seeps, Captain seeps	Caves, seeps	S	G4	S3	-
1		X	Stygobromus fergusonii	Montgomery County cave amphipod	Botetourt, Montgomery Cos	Caves	S	G2G3	S1	-
1	X		Stygobromus gracilipes	Shenandoah Valley cave amphipod	Frederick, Rockingham, Shenandoah, Warren Cos	Caves	S	G3G4	S2S3	S1
1	X		Stygobromus hoffmani	Alleghany County cave amphipod	Lowmoore cave, Alleghany Co	Caves	S	G1	S1	-

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	X		Stygobromus mundus	Bath County cave amphipod	Alleghany, Bath Cos	Caves	S	G2G3	S1S2	-
<b>Isopod (Crustacean, Order Isopoda)</b>										
2		X	Caecidotea incurva	Incurved cave isopod	Smyth, Wythe Cos	Caves	S	G2G4	S2	-
1	X	X	Miktoniscus racovitzai	Racovitza's terrestrial cave isopod	Alleghany, Botetourt, Page, Rockbridge, Shenandoah Cos	Caves	S	G3G4	S2	-
<b>Millipede (Class Diplopoda)</b>										
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	G2	S2	-
2		X	Buotus carolinus	a millipede	Brush Mtn, Whitetop Mtn, Apple Orchard Mtn, Tazewell Beartown	Beech leaf litter, deciduous forests	S	G1	S1	-
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	G2	S2	-
1		X	Cleidogona lachesis	a millipede	Whitetop Mtn & Mt Rogers	Beech leaf litter, deciduous forests	S	G2	S1	-
1		X	Dixioria fowleri	Fowler's millipede	Walker Mtn; Comers Rock on Iron Mtn; Laurel Ck, Damascus; 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	G1	S1	-
1	X	X	Semionellus placidus	a millipede	Hawksbill Mtn, Apple Orchard Mtn, Tomahawk Mtn	Leaf litter, deciduous forests	S	G3	S2	-
<b>Centipede (Insect, Order Chilopoda)</b>										
1	X	X	Escaryus cryptorobius	Montane centipede	The Priest, Nelson Co; Whitetop Mtn, Washington Co	Upper soil horizon, spruce - birch forests	S	G2	S2	-
1		X	Escaryus orestes	Whitetop Mountain centipede	Whitetop Mtn, Washington Co	Dark moist soil and litter, spruce - birch forests	S	G1G2	S1S2	-
1	X		Nampabius turbator	a cave centipede	One known site: Lowmoore cave, Alleghany Co	Caves	S	G1G2	S1	-
<b>Springtail (Insect, Order Collembola)</b>										
1	X	X	Arrhopalites carolynae	A cave springtail	Augusta, Highland, Bath, Lee, Wise Cos	Caves	S	G2G4	S1	-
1		X	Arrhopalites commorus	A cave springtail	Giles, Lee, Wise Cos	Caves	S	G2G4	S1	-
1	X		Arrhopalites sacer	A cave springtail	Bath Co	Caves	S	G1G2	S1	-
<b>Mayfly (Insect, Order Ephemeroptera)</b>										
1		X	Leptophlebia johnsoni	Johnson's prong-gill mayfly	One location: Lewis Fk north slope Mt Rogers	Aquatic-streams	S	G4	S1	-
<b>Dragonfly and Damselfly (Insect, Order Odonata)</b>										
1	X	X	Gomphus viridifrons	Green-faced clubtail	New R, Craig Ck, Pound R, Locust Spring	Aquatic-rivers	S	G3	S2	S2
1		X	Ophiogomphus incurvatus alleghaniensis	Allegheny snaketail	Rich Ck, Giles Co	Aquatic-streams	S	G3T3	S1	S1
<b>Stonefly (Insect, Order Plecoptera)</b>										
1		X	Acronetia koszarabi	Virginia stonefly	Station Spring Ck, Tazewell Co	Aquatic-streams	S	G1	S1	-
1		X	Isoperla major	Big striptail stonefly	Burkes Garden, Tazewell Co	Aquatic-streams	S	G1	S1	-
1		X	Megaleuctra williamsae	Smokies needelfly	Mt Rogers & Whitetop Mtn	Aquatic-streams	S	G2	S1	-
1		X	Taeniopteryx nelsoni	Cryptic willowfly	Lewis Fk & Grindstone Branch N of Mt Rogers	Aquatic-streams	S	G1	S1	-
<b>Beetle (Insect, Order Coleoptera)</b>										
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	-
1	X	X	Hydraena maureanae	Maureen's shale stream beetle	Alleghany, Bath, Botetourt, Bland, Craig, Cos	Interstitial water in riparian-shale substrate along stream edge	S	G1G3	S1S3	-
<b>Scorpionfly (Insect, Order Mecoptera)</b>										
1		X	Brachyanorpa 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	-
<b>Butterfly and Moth (Insect, Order Lepidoptera)</b>										
1	X	X	Callophrys irus	Frosted elfin	Frederick, Montgomery, Page, Roanoke Cos	Dry, open woods, clearings, and road/powerline ROWs w/ abundant wild indigo ( <i>Baptisia tinctoria</i> )	S	G3	S2?	S1
2	X	X	Erynnis persius persius	Persius duskywing	Blue Ridge, Ridge & Valley	Bogs, wet meadows, open seepages in boreal forests	S	G5T1T3	S1	-
2	X		Pyrgus centaureae wyandot	Appalachian grizzled skipper	Ridge & Valley	Shale barrens, open shaley oak woodlands	S	G5T1T2	S1S2	S1
6	X	X	Speyeria diana	Diana fritillary	Blue Ridge, Ridge & Valley	Grasslands-shrublands, near streams with thistles and milkweeds, larval host plant, violets	S	G3G4	S3	S2S3
6	X	X	Speyeria idalia idalia	Regal fritillary	Blue Ridge, Ridge & Valley	Riparian, grasslands-shrublands	S	G3T1Q	S1	S1
2	X	X	Catocala herodias gerhardi	Herodias underwing	Bald Knob, Bath; Poverty Hollow, Montgomery Co; Sand Mtn, Wythe Co (non FS property)	Pitch pine/bear oak scrub woodlands, >3000'	S	G3T3	S2S3	SU
1	X		Erythrocia hebardei	Hebard's noctuid moth	Bath Co	Rich, mesic hardwood forest. Larvae host plant is Canada horse-balm ( <i>Collinsonia canadensis</i> ).	S	GU	SH	-
1	X		Euchlaena milnei	Milne's euchlaena moth	Edinburg Gap, Shenandoah Co	Moist, forested slopes of mixed pine hardwoods. Acidic oak woods.	S	G2G4	S2	S2
<b>NON-VASCULAR PLANTS</b>										
<b>Lichen</b>										
1			Gymnoderma lineare	Rock gnome lichen	Whitetop Mtn		E	G2	S1	-



OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	X	X	Peltigera hydrothyria	Waterfan	Amherst, Alleghany, Bedford, Botetourt, Giles, Madison, Nelson, Rockbridge, Shenandoah Cos	Aquatic – in streams/springs/cascades	S	G3	S1	-
1		X	Hypotrachyna virginica	a foliose lichen	Mt Rogers & Whitetop Mtn	Spruce-fir forests	S	G1G2	S1	-
<b>Liverwort</b>										
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?	-
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?	SU	-
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?	-
1		X	Plagiochila sullivantii var sullivantii	a liverwort	Whitetop Mtn, Salt Pond Mtn	Moist shaded rock outcrops, under cliff ledges, in crevices	S	G2T2	S?	-
1		X	Sphenolobopsis pearsonii	a liverwort	Mt Rogers & Whitetop Mtn	Bark of Fraser fir, mountain ash, occasionally red spruce, >5000'	S	G2	S?	-
<b>Moss</b>										
1		X	Sphagnum flavicomans	a peatmoss	Whitetop Mtn	Bogs, seeps	S	G3	SU	-
<b>VASCULAR PLANTS</b>										
6	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	X	Allium oxophilum	Nodding onion	Monroe, Summers, Mercer, Greenbrier Cos, WV	Shale barrens, sandstone glades	S	G2Q	-	S2
1	X	X	Arabis patens	Spreading rockcress	Frederick, Lee, Page, Shenandoah, Warren Cos	Shaded, calcareous cliffs, bluffs, and talus slopes	S	G3	S3	S2
1	X		Arabis serotina	Shale barren rockcress	Ridge & Valley N of New R watershed	Shale barrens and adjacent open oak woods	E	G2	S2	S2
6	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	-
1		X	Botrychium jennmanii	Dixie grapefern	Scott, Wise Cos	Open woods, old fields, pastures	S	G3G4	SH	-
6	X	X	Buckleya distichophylla	Piratebush	Blue Ridge S of Roanoke R, Ridge & Valley S of James R	Open oak and hemlock woods	S	G2	S2	-
2	X	X	Cardamine clematidis	Mountain bittercress	Blue Ridge, Ridge & Valley, S of New R watershed	Riparian, spring seeps, rocky streambanks	S	G2G3	S1S2	-
2	X	X	Cardamine flagellifera	Bittercress	Blue Ridge, Ridge & Valley, S of New R watershed	Riparian, spring seeps, rocky streambanks	S	G3	S1	S2
1	X	X	Carex polymorpha	Variable sedge	Blue Ridge, Ridge & Valley, N of James R	Open acid soil, oak-heath woodlands, responds to fire	S	G3	S2	S1
2	X	X	Carex schweinitzii	Schweinitz's sedge	Bath, Montgomery, Pulaski, Washington Cos	Bogs, limestone fens, marl marshes	S	G3	S1	-
2		X	Chelone cutbertii	Cuthbert turtlehead	Blue Ridge Plateau, Grayson, Carroll Cos	Bogs, wet meadows, boggy woods and thickets	S	G3	S2	-
1		X	Cimicifuga rubifolia	Appalachian bugbane	Lower Clinch R watershed	Moist, rich wooded bluffs over limestone	S	G3	S2	-
1		X	Cleistes bifaria	Small spreading pogonia	Craig, Dickenson, Scott, Wise Cos	Well drained, rather open, scrubby hillsides, oak-pine-heath woodlands, acidic soils	S	G3G4	S1	S1
1		X	Clematis addisonii	Addison's leatherflower	Montgomery, Roanoke, Botetourt, Rockbridge Cos	Open glades & rich woods over limestone & dolostone	S	G2	S2	-
1	X	X	Clematis coactilis	Virginia white-haired leatherflower	Ridge & Valley, Rockbridge Co, S to Wythe Co	Shale barrens, rocky calcareous woodlands	S	G3G3	S3	-
1	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	G1?	S1	S1
2	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 parvulus	Dwarf burhead	Pines Chapel Pond, Augusta Co	Pond margins, wet depressions in sandy soil	S	G3	SR	-
1	X	X	Echinacea laevigata	Smooth coneflower	Alleghany, Montgomery Cos	Open woodlands and glades over limestone or dolomite	E	G2	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 austroriparian	Appalachian gentian	Mt Rogers, Whitetop Mtn, High Knob	High elevation forests and grassy balds. Southern Appalachian endemic.	S	G3	S3?	S1
1		X	Hasteola suaveolens	Sweet-scented Indian-plantain	Giles, Montgomery, Pulaski Cos	Riverbanks, wet meadows	S	G3	S2	S3
1	X		Heuchera alba	White alumroot	Shenandoah Mtn	High elevation rocky woods and bluffs	S	G2Q	S2?	S2
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
1	X		Helenium virginicum	Virginia sneezeweed	Endemic to Augusta, Rockingham Cos	Seasonally dry meadows and sinkhole depressions	T	G2	S2	-
1	X		Helonias bullata	Swamp-pink	Augusta, Nelson Cos	Sphagnum bogs, seeps, and streambanks	T	G3	S2S3	-
2	X	X	Ilex collina	Long-stalked holly	Blue Ridge, Ridge & Valley	Bogs, seep, shrubby streamheads, >3100'	S	G3	S2	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	G1Q	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	Seasonally dry sinkhole depressions	S	G1Q	S1?	-
1	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
6	X	X	Juglans cinerea	Butternut	Blue Ridge, Ridge & Valley	Well-drained bottomland and floodplain, rich mesophytic forests mostly along toeslopes	S	G3	S3?	S3
2	X	X	Liatis turgida	Turgid Gayfeather	Blue Ridge, Ridge & Valley	Shale barrens, mountain hillside openings	S	G3	S3S4	S2
2		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	S1	-
6	X	X	Monotropsis odorata	Sweet pinesap	Blue Ridge, Ridge & Valley	Dry oak-pine-heath woodlands, soil usually sandy	S	G3	S3	S1
2	X		Paxistima canbyi	Canby's mountain lover	Ridge & Valley	Calcareous cliffs and bluffs, usually undercut by stream	S	G2	S2	S2
2	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

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
2	X	X	<i>Poa paludigena</i>	Bog bluegrass	Blue Ridge, Ridge & Valley	Shrub swamps and seeps, usually under shade	S	G3	S2	S1
1	X		<i>Potamogeton hillii</i>	Hill's pondweed	Bath Co	Clear, cold calcareous ponds	S	G3	S1	-
2	X		<i>Potamogeton tennesseensis</i>	Tennessee pondweed	Ridge & Valley	Ponds, back water of streams and rivers	S	G2	S1	S2
1		X	<i>Prenanthes roanensis</i>	Roan Mountain rattlesnake-root	Mt Rogers & Whitetop Mtn	Grassy balds, open high elevation forests and outcrops	S	G3	S3	-
6	X	X	<i>Pycnanthemum torrei</i>	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
1		X	<i>Rudbeckia triloba</i> var. <i>pinnatifida</i>	Pinnate-lobed coneflower	Wise Co	Dry calcareous soil of open woods and roadsides	S	G5T3	S1	-
2	X	X	<i>Saxifraga caroliniana</i>	Carolina saxifrage	Blue Ridge, Ridge & Valley, S of New R	Moist, shaded rocks and cliffs	S	G2	S2?	S1
1	X	X	<i>Scirpus ancistrochaetus</i>	Northeastern bulrush	Ridge & Valley	Mountain ponds, sinkhole ponds in Shenandoah Valley.	E	G3	S2	S1
6	X	X	<i>Scutellaria saxatilis</i>	Rock skullcap	Blue Ridge, Ridge & Valley	Rich, dry to mesic ridgetop woods, 32 counties in VA, likely G4/S4	S	G3	S3S4	S2
1		X	<i>Senecio millefolium</i>	Piedmont ragwort	Lee, Scott Cos	Open limestone outcrops and cedar barrens	S	G2	S2	-
1	X	X	<i>Sida hermaphrodita</i>	Virginia mallow	Ridge & Valley, James R watersheds	Riverbank glades with loose rock or sandy soil	S	G3	S1	S3
1		X	<i>Silene ovata</i>	Mountain catchfly	Lee, Wise Cos	Rich woodlands and forests over limestone	S	G2G3	S1	-
6		X	<i>Spiraea virginiana</i>	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		<i>Trillium pusillum</i> var. <i>monticulum</i>	Mountain least trillium	Great North Mtn & Shenandoah Mtn, VA & WV	Open oak woodlands in well drained soil and margins of thickets	S	G3T2	S2	S1
6		X	<i>Tsuga caroliniana</i>	Carolina hemlock	Blue Ridge north to James R.	Rocky ridges and slopes, usually dry and well drained	S	G3	S3	-
6	X	X	<i>Vitis rupestris</i>	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 = Federally listed mussel and/or fish species known in 6<sup>th</sup> level watershed of project area. Conservation measures from USFWS/FS Conservation Plan (August 8, 2007) applied. (When #9 used, #7 or #8 will be added to indicate bounds of aquatic analysis area.)

**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 100<sup>th</sup> 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

**GLOBAL RANK:** Global ranks are assigned by a consensus of the network of natural heritage programs, scientific experts, 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 critical 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, though it may be rare in parts of its range, especially at the periphery.
- G5 = Very common and demonstrably secure globally, though 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 = The 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.

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