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RARE NATIVE TENNESSEE VASCULAR PLANTS IN THE FLORA OF GREAT SMOKY MOUNTAIN NATIONAL PARK

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ABSTRACT

This investigation characterized the importance of Great Smoky Mountains National Park in the conservation of rare Tennessee vascular plants. Based on current distributional data, 20 native vascular plants are entirely restricted in Tennessee to Great Smoky Mountains National Park. Three of these are narrowly endemic to the National Park itself (*Cacalia rugelii*, *Calamagrostis cainii*, and *Glyceria nubigena*), two are southern Appalachian endemics, 14 are northern species, and one is disjunct from the North Carolina coastal plain. Twenty-seven additional species are known from only one county or station beyond the National Park's three Tennessee counties. Within the park, Sevier County, which includes Mount LeConte, is a particularly important center of distribution for rare species. Mount LeConte itself includes five species that are entirely restricted in the state to the upper slopes of that mountain.

INTRODUCTION

The creation of Great Smoky Mountains National Park (authorized by Congress in 1926, established for official development in 1934, and dedicated in 1940) protected 212,000 hectares of rugged southern Appalachian landscape, about half of it in Tennessee. The species diversity of this area was known, at least in a general sense (Jennison 1939), at the time of park development, but foremost in the minds of park planners were other concerns: saving remnant oldgrowth stands (about 30 percent of the park had not been logged) and placing the mountain scenery in the public domain. Recent work in rare species conservation (e.g., Ayensu and DeFilippis 1978, Committee for Tennessee Rare Plants, 1978) has stimulated research on the conservation of rare species. Based on current study of rare plants in Great Smoky Mountains National Park (P. S. White, unpublished data), this article summarizes the importance of park in protecting rare Tennessee plants. Our primary aim was to list those species that are unknown

in Tennessee outside the National Park. We have also listed rare plants (defined as those plants known from five or fewer counties in the state) that have a large percent of their state populations in the park.

METHODS

Recent collecting and review of herbarium specimens have updated the vascular flora of Great Smoky Mountains National Park (hereafter, GRSM or, simply, the park) (White 1982a, 1982b). All species on the park vascular plant list were checked against rare plant records of the Committee for Tennessee Rare Plants (1978) and the Natural Heritage data bases of the Tennessee State Department of Conservation (Paul Somers, unpublished data) and of the Tennessee Valley Authority (Leo Collins and Thomas S. Patrick, unpublished data). Ed Schell furnished valuable information from his recent research on the flora of Northeast Tennessee. Tom Patrick also furnished valuable recent data on the state flora. Species were also checked against the County Atlas of Tennessee plants, being developed by B. E. Wofford and others at the University of Tennessee in Knoxville (county distribution maps have been published for some groups—Wofford and Evans 1979a, 1979b, Wofford 1980). Specimens were evaluated at several herbaria: Great Smoky Mountains National Park, University of Tennessee—Knoxville, Vanderbilt University, University of North Carolina—Chapel Hill, Duke University, North Carolina State University, Western Carolina University, Harvard University, and the Smithsonian Institution. Population data collected for a rare plant assessment for the park as a whole (P. S. White, unpublished data) are reported here for Tennessee rare species. The park includes parts of three Tennessee counties: Blount, Cocke, and Sevier.

Nomenclature follows White (1982a—see this reference for citation of binomial authors); that work was based on Radford et al. (1968), Cronquist (1980), and Kartesz and Kartesz (1980). Several groups are not discussed here

because of taxonomic problems: *Crataegus*, the blackberry section of *Rubus*, certain *Physalis* segregates, and taxa within the *Silphium astericus* complex (e.g., *S. dentatum*). Taxa that are judged to be imperfectly known (either in terms of taxonomy or distribution) are listed below.

Aster chlorolepis

Carex biltmoreana

Danthonia epilis

Philadelphus sharpianus

Platanthera grandiflora

Rhododendron viscosum var. *montanum*

Other rare taxa:

Philadelphus inodorus var. *strigosus*

Philadelphus hirsutus var. *nanus*

Robinia kelseyi

Silphium dentatum

RESULTS AND DISCUSSION

Twenty native vascular plants are entirely restricted in Tennessee to GRSM (Table 1). Six additional species may eventually be placed in this category, but their taxonomic status and total distributions are judged uncertain at this time (see methods).

As might be expected in these high mountains, 14 of the 20 restricted species are northern species at or near their southern range limits. Five are southern Appalachian endemics. Of these, three are narrow endemics of the Great Smoky Mountains: *Cacalia rugelia* (which occurs

throughout the spruce-fir zone and adjacent northern hardwood forest in the park), *Calamagrostis cainii* (which is known only from the upper slopes of Mount LeConte) and *Glyceria nubigena* (which has scattered populations from the vicinity of Silers Bald to Mount LeConte). One of the plants listed in Table 1 is unique on the list because it is a disjunct species from the Atlantic Coastal Plain (*Crotalaria purshii*, collected near the mouth of Abrams Creek, Blount County, Tennessee, by A. J. Sharp in 1934).

Sevier County, which includes a relatively large area of high elevation land and within which are Clingmans Dome, the highest elevation in the park, and Mount LeConte, is the most important rare plant county on the list presented in Table 1. Sixteen of the 20 species are found in that county, while five are found in Blount County and one is found in Cocke County (the smallest of the GRSM Tennessee counties, and the one which has had the least botanical attention). Mount LeConte is particularly important—five species are entirely restricted in Tennessee to the upper slopes of that mountain (*Calamagrostis cainii*, *Gentiana linearis*, *Juncus trifidus* var. *monanthos*, *Krigia montana*, and *Milium effusum*), and many other scarce Tennessee plants are found there as well (e.g., *Cardamine clematitidis*, *Carex ruthii*, *Drosera rotundifolia*, *Geum radiatum*, *Lycopodium selago*, *Scirpus cespitosus* var. *callosus*, and *Thelypteris phegopteris*). *Thelypteris phegopteris* was formerly thought to be

TABLE 1. Vascular plants of Great Smoky Mountains National Park that are unknown in Tennessee outside of the park (see also Appendix 1).

Species	Tennessee Counties	Listed Status in Tennessee	Last Collected (for older records only)	Geographic Affinity	Reference
<i>Betula cordifolia</i>	S	TN-T		Northern	Huber et al. 1977
<i>Botrychium oneidense</i>	S			Northern	Fosberg 1961
<i>Bromus ciliatus</i>	S	TN-SC	1939	Northern	
<i>Cacalia rugelia</i>	S, C	TN-T		GRSM-endemic	
<i>Calamagrostis cainii</i>	S	TN-T		GRSM-endemic	
<i>Carex trisperma</i>	B	TN-SC		Northern	
<i>Crotalaria purshii</i>	B	TN-PE-E	1934	Coastal plain	
<i>Gentiana linearis</i>	S	TN-T		Northern	
<i>Glyceria nubigena</i>	S	TN-E		GRSM-endemic	
<i>Juncus trifidus</i> var. <i>monanthos</i>	S	TN-PE-E	1959	So. App.-endemic	White 1982b
<i>Krigia montana</i>	S	TN-T		So. App.-endemic	
<i>Linnaea borealis</i>	S	TN-PE-E	1892	Northern	
<i>Lycopodium annotinum</i>	B	TN-PE-E	1981, 1899	Northern	
<i>Milium effusum</i>	S	TN-SC		Northern	White 1982b
<i>Rubus idaeus</i> var. <i>strigosus</i>	B, S			Northern	
<i>Sparganium androcladum</i>	B	TN-PE-	1948	Northern	
<i>Spiranthes ochroleuca</i>	S		1958	Northern	Catling 1982
<i>Thelypteris phegopteris</i>	S	TN-SC		Northern	White 1982b
<i>Thelypteris simulata</i>	S	TN-PE-SC	1931	Northern	Moran 1981
<i>Vaccinium angustifolium</i>	S			Northern	White 1982b

¹Tennessee counties: B = Blount, C = Cocke, and S = Sevier.

²Status in Tennessee: SC = special concern, T = threatened, E = endangered, and PE = possibly extirpated.

³Geographic affinity: GRSM = Great Smoky Mountains National Park, So. App. = southern Appalachian.

restricted in Tennessee to Mount LeConte, but has recently been found in the Clingmans Dome area (White 1982b).

Eight of the twenty plants listed in Table 1 have not been seen in Tennessee since their original collection dates. The most notable of these is *Linnaea borealis* (discussed in White 1981), which was collected by Albert Ruth in 1892 (specimen at the University of Tennessee herbarium). *Thelypteris simulata* is based on an H. S. Pepon specimen at the herbarium of the Illinois Natural History

TABLE 2. Native GRSM vascular plants that are known from five or fewer counties in Tennessee.

Species—Counties	
<i>Abies fraseri</i> —Cocke, Sevier, Carter	<i>Hypericum graveolens</i> —Sevier, Carter, Johnson
<i>Agrostis borealis</i> —Blount	<i>Hypericum mitchellianum</i> —Blount, Sevier, Unicoi, Carter
<i>Amelanchier sanguinea</i> —Blount, Sevier, Cumberland, Morgan	<i>Juncus gymnocarpus</i> —Blount, Sevier, Monroe
<i>Antennaria neglecta</i> —Blount, Sevier	<i>Listera smallii</i> —Sevier, Cocke, Johnson, Carter
<i>Apocynum androsaemifolium</i> —Blount, Cocke, Bledsoe	<i>Lonicera canadensis</i> —Sevier, Carter
<i>Aster phlogifolius</i> —Blount, Rhea, Grainger, Hawkins, Washington	<i>Lycopodium selago</i> —Sevier, Carter
<i>Botrychium matricariaefolium</i> —Sevier, Washington	<i>Lysimachia fraseri</i> —Sevier, Stewart, Hamilton, Polk
<i>Callitriche deflexa</i> —Blount, Tipton, Gibson, Madison, Coffee	<i>Lysimachia hybrida</i> —Blount, Coffee, Warren
<i>Campanula aparinoides</i> —Blount, Carter, Johnson, Fentress	<i>Melanthium hybridum</i> —Sevier, Unicoi
<i>Cardamine clematitis</i> —Sevier, Carter	<i>Menziesia pilosa</i> —Sevier, Carter, Johnson
<i>Cardamine flagellifera</i> —Blount, Sevier, Polk, Knox	<i>Monotropis odorata</i> —Blount, Cocke, Sevier, Grundy
<i>Carex bromoides</i> —Blount, Sevier, Monroe, Johnson	<i>Phacelia fimbriata</i> —Blount, Sevier, Unicoi, Carter
<i>Carex brunnescens</i> —Blount, Sevier, Cocke, Carter	<i>Picea rubens</i> —Sevier, Cocke, Unicoi, Johnson, Carter
<i>Carex crinita</i> var. <i>gynandra</i> —Sevier, Cocke, Washington	<i>Pieris floribunda</i> —Sevier, Cocke, Sullivan
<i>Carex leptoneura</i> —Blount, Sevier, Carter, Johnson	<i>Poa alsodes</i> —Blount, Sevier, Monroe, Knox, Morgan
<i>Carex misera</i> —Blount, Sevier, Carter	<i>Poa palustris</i> —Blount, Carter
<i>Carex pedunculata</i> —Blount, Johnson	<i>Poa trivialis</i> —Blount, Sevier, Jefferson, Knox, Johnson
<i>Carex ruthii</i> —Blount, Sevier, Cocke, Monroe, Carter	<i>Potamogeton amplifolius</i> —Blount, Loudon, Monroe, Unicoi
<i>Cimicifuga americana</i> —Sevier, Cocke, Union, Carter	<i>Polygala polygama</i> —Blount, Sevier, Polk, Greene
<i>Cinna latifolia</i> —Blount, Sevier, Cocke, Carter, Knox	<i>Polygonum cilinode</i> —Blount, Carter, Johnson
<i>Cirsium muticum</i> —Blount, Cocke, Sevier, Polk, Grundy	<i>Ranunculus laxicaulis</i> —Blount, Coffee, Henry
<i>Clintonia borealis</i> —Sevier, Cocke, Unicoi, Johnson	<i>Ribes glandulosum</i> —Sevier, Greene, Unicoi, Carter, Johnson
<i>Cuscuta rostrata</i> —Sevier, Cocke, Greene	<i>Rosa carolina</i> —Blount, Knox, Grainger
<i>Drosera rotundifolia</i> —Sevier, Cocke, Johnson, Fentress, Carter	<i>Sanicular marilandica</i> —Cocke, Morgan, Fentress, Johnson
<i>Elymus riparius</i> —Sevier, Monroe, Giles, Davidson, Henry	<i>Scirpus cespitosus</i> var. <i>callosus</i> —Sevier, Carter
<i>Epilobium ciliatum</i> —Blount, Carter, Johnson	<i>Scutellaria saxatilis</i> —Blount, Cumberland, Johnson, Carter
<i>Eupatorium maculatum</i> —Blount, Sevier, Carter	<i>Solidago glomerata</i> —Blount, Cocke, Sevier, Carter, Johnson
<i>Galim lanceolatum</i> —Sevier, Cocke, Grundy, Cumberland	<i>Spiraea virginiana</i> —Blount, VanBuren, Roane
<i>Gaylussacia ursina</i> —Blount, Sevier, Polk, Monroe	<i>Stachys clingmanii</i> —Blount, Sevier, Monroe, Polk
<i>Geum radiatum</i> —Blount, Sevier, Carter	<i>Stachys latidens</i> —Blount, Sevier, Knox, Unicoi, Carter
<i>Gnaphalium helleri</i> —Blount, Grundy, Polk, Roane	<i>Stellaria alsine</i> —Sevier, Cocke, Carter
<i>Helianthemum bicknellii</i> —Blount, Knox	<i>Stellaria longifolia</i> —Blount, Johnson
<i>Heracleum lanatum</i> —Blount, Cocke, Unicoi, Washington, Polk	<i>Streptopus amplexifolius</i> —Sevier, Carter
<i>Heuchera longiflora</i> —Cocke, Greene, Sullivan, Claiborne	<i>Streptopus roseus</i> —Sevier, Carter
<i>Hieracium scabrum</i> —Blount, Sevier, Johnson, Morgan, Carter	<i>Thalictrum coriaceum</i> —Blount, Sevier, Claiborne
<i>Hydrangea radiata</i> —Blount, Sevier, McMinn, Monroe	<i>Thermopsis villosa</i> —Blount, Sevier, Claiborne
<i>Hydrophyllum virginianum</i> —Sevier, Sullivan, Unicoi, Carter	<i>Trillium simile</i> —Blount, Cocke, Sevier, Monroe, Polk
	<i>Triosteum aurantiacum</i> —Sevier, Cocke, Johnson, Morgan
	<i>Viola fimbriatula</i> —Sevier, Monroe, Montgomery, Carter
	<i>Viola mackloskei</i> spp. <i>pallens</i> —Blount, Sevier, Carter, Johnson, Unicoi
	<i>Woodwardia virginica</i> —Blount, Coffee, Marion, VanBuren, Grundy

drocladum. H. M. Jennison, who explored the park under National Park Service contract from 1935 to 1939, collected the specimen on which *Bromus ciliatus* is based. All but one (*Sparganium androcladum*) of the plants based on such "lost" stations have been listed as "Possibly extirpated" on the Tennessee state rare plant list (Paul Somers, updated edition of the list in Committee for Tennessee Rare Plants 1978).

Five of the plants restricted in Tennessee to GRSM are listed as endangered in Tennessee, five are threatened, and six are special concern species (Table 1). Four of the plants have not been listed: *Botrychium oneidense* (because of taxonomic difficulties in this group), *Rubus idaeus* var. *strigosus*, *Spiranthes ochroleuca*, and *Vaccinium angustifolium*. *Spiranthes ochroleuca* has only recently been attributed to our area (Catling 1983).

Seventy-eight additional Tennessee rare plants (defined as those found in 5 or fewer of the state's 95 counties) are found in the GRSM flora (Table 2). One species is known from only one Tennessee county (*Agrostis borealis*—reported both within and outside the National Park boundaries). Thirteen of these are known from only two Tennessee counties—one of the park counties plus one additional county. Thirteen species are known from some combination of the three GRSM counties, plus one additional state county, thus making a total of 26 species which are known from only one county beyond the Cocke-Sevier-Blount County area.

In compiling these lists, it became apparent to us that other plants scarce in the state, some listed in Committee for Tennessee Rare Plants (1978), occurred in the GRSM flora but were known from six or more counties in the state. We offer here a selection of notable plants in this group. *Adlumia fungosa*, *Acer spicatum*, *Angelica triquinata*, *Arabis lyrata*, *Aralia nudicaulis*, *Aster acuminatus*, *Chelone lyoni*, *Chrysosplenium americanum*, *Circaea alpina*, *Cymophyllus fraseri*, *Dicentra canadensis*, *Dicentra eximia*, *Diervilla sessilifolia*, *Diphylleia cymosa*, *Draba ramosissima*, *Euonymus obovatus*, *Eupatorium capillifolium*, *Goodyera repens*, *Glyceria melicaria*, *Houstonia serpyllifolia*, *Lathyrus venosus*, *Leiophyllum buxifolium*, *Panax trifolius*, *Platanthera psycodes*, *Polymnia laevigata*, *Prenanthes roanensis*, *Prunus pensylvanica*, *Prunus virginiana*, *Pycnanthemum montanum*, *Ribes rotundifolium*, *Rubus canadensis*, *Rubus flagellaris*, *Sorbus americana*, *Synandra hispidula*, *Trichomanes petersii*, *Trillium rugelii*, *Trillium vaseyi*, *Vaccinium hirsutum*, *Veratrum viride*, *Viburnum alnifolium* and *Vittaria* sp.

Several other species that are absent from Tennessee or scarce in that state are found in the park's flora, but only from the North Carolina side of the park. These include: *Agastache scrophulariaefolia*, *Coeloglossum viride* var. *virescens* (unreported from Tennessee), *Corydalis semper-virens*, *Euphorbia purpurea* (unreported from Tennessee), *Helianthus glaucophyllus*, *Hydrocotyle americana*, *Lactuca biennis*, *Lilium gravi*, *Lilium philadelphicum*, *Liparis*

asphodeloides (Thomas and Chester 1967, Thomas 1976). Some of these plants may be of management concern along the developing Foothills Parkway; that roadway will be under management control of the National Park Service, as well.

CONCLUSIONS

Great Smoky Mountains National Park is a significant preserve for rare Tennessee vascular plants. Twenty species are restricted in the state to the park, and 78 additional rare species (defined as those occurring in five or fewer counties in the state) are present. Of the latter group, 26 species are found in only one other county beyond the three county area of the National Park itself.

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