

*Draft-December 2000*

**DRAFT ECONOMIC ANALYSIS  
OF CRITICAL HABITAT DESIGNATION  
FOR THE SPRUCE-FIR MOSS SPIDER**

December 2000

Prepared for:

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## 1. INTRODUCTION AND BACKGROUND

1. In October 2000, the U.S. Fish and Wildlife Service (the Service) proposed designation of critical habitat for the spruce-fir moss spider (*Microhexura montivaga*) on areas at or above 5,400 feet in elevations in western North Carolina and eastern Tennessee. The purpose of this report is to identify and analyze potential economic impacts that could result from the proposed critical habitat designation. This report was prepared by Industrial Economics, Incorporated (IEC), under contract to the U.S. Fish and Wildlife Service's Division of Economics.
2. Section 4(b)(2) of the Endangered Species Act (the Act) requires the Service to base final designation of critical habitat upon the best scientific and commercial data available, after taking into consideration the economic impact, and any other relevant impact, of specifying a particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided that the exclusion will not result in extinction of the species.
3. Under the listing of a species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, or carry out are not likely to jeopardize the continued existence of the species. The Act defines "jeopardize" as taking any action that would appreciably reduce the likelihood of both the survival and recovery of the species. For designated critical habitat, section 7(a)(2) also requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, or carry out do not result in destruction or adverse modification of critical habitat. Adverse modification of critical habitat is defined as any direct or indirect alteration that appreciably diminishes the value of critical habitat for the survival and recovery of the species.
4. This analysis must distinguish between economic impacts caused by the listing of the spruce-fir moss spider (hereafter "spider") as endangered and those additional effects that would be caused by the proposed critical habitat designation. The Service only considers the incremental economic impacts of the critical habitat designation above those of the listing and other laws because the Act specifically excludes the Service from considering the economic impacts of the listing. To evaluate the increment of economic impacts attributable to the critical habitat designation for the spider, above and beyond the listing, the analysis assumes a without-critical-habitat baseline and compares it to a with-critical-habitat scenario. The difference between the two is a measure of the net change in economic activity that may result from the designation of critical habitat for the spider. In the event that a land use or activity would be limited or prohibited by another existing statute, regulation, or policy, the economic impacts associated with those limitations or prohibitions would not be attributable to critical habitat designation.
5. The critical habitat designation for the spider encompasses land owned or managed by the National Park Service, the U.S. Forest Service, and the private owner of Grandfather Mountain. This analysis assesses how critical habitat designation for the spider may affect current and planned land

uses and activities on these lands. Private lands that are designated as critical habitat are subject to consultations under section 7 of the Act only when a Federal nexus, or connection, exists. A Federal nexus arises if the activity or land use of concern involves Federal permits, Federal funding, or another form of Federal involvement. Activities on private land that do not involve a Federal nexus are not affected by critical habitat designation.

6. To be considered in the economic analysis, activities must be "reasonably foreseeable," including, but not limited to, activities which are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Current and future activities that could potentially result in section 7 consultations or modifications are considered.

### 1.1 **Description of Species and Habitat**

7. The spruce-fir moss spider, measuring 0.1 to 0.15 inches in length, is the smallest member of the primitive spider suborder Mygalomorphae, commonly known as "tarantulas."<sup>1</sup> The species' coloration ranges from light brown to a darker reddish brown, with a yellowish carapace (hard covering over the front part of the body). The spider can be distinguished from other, similar species by its chelicerae (fangs) that project forward well beyond the front edge of the carapace, and a pair of very long rear spinnerets (organs for producing threads of silk).

8. Worldwide, the spruce-fir moss spider is found only on the highest mountain peaks (at or above 5,400 feet in elevation) in the Southern Appalachian Mountains of North Carolina and Tennessee. Based on field surveys and research, the Service has identified physical and biological habitat features, referred to as primary constituent elements, that are essential for the survival and recovery of the spider. These primary constituent elements for the spider include:

- Fraser fir or fir-dominated spruce-fir forests at and above 5,400 feet in elevation, and
- Moderately thick and humid, but not wet, moss (species in the genus *Dicranodontium*, and possibly *Polytrichum*) and/or liverwort mats on rock surfaces that are adequately sheltered from the sun and rain (by overhang and aspect) and include a thin layer of humid soil and/or humus between the moss and rock surface.

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<sup>1</sup> Information on the spider and its habitat is taken from the *Proposed Determination of Critical Habitat for the Spruce-fir Moss Spider*, October 6, 2000 (65 FR 59798).

## 1.2 Proposed Critical Habitat

9. The proposed critical habitat designation includes areas at or above 5,400 feet in elevation on and/or in the vicinity of Mount LeConte, Mount Collins, Clingmans Dome, Mount Buckley, Grandfather Mountain, and Roan Mountain. All of the areas designated as critical habitat are within what the Service believes to be the geographical area occupied by the spider. The spider occurs on relatively small rock outcroppings that support the primary constituent elements outlined above. Rather than attempting to identify each microhabitat site individually, the Service has elected to propose an inclusive area on each of the mountain peaks still providing habitat as critical habitat for the spider. The proposed critical habitat designation includes areas that do not support primary constituent elements for the spider. The Service maintains that the effects of Federal actions limited to these areas that do not contain the primary constituent elements would not require a section 7 consultation. However, any of these actions that have the potential to destroy or adversely affect adjacent or nearby habitat areas that support the spider primary constituent elements (e.g., pesticides traveling through the air or groundwater from one area to another) may require a section 7 consultation.
10. A more detailed description of each critical habitat unit is provided below:
- **Unit 1: Swain County, NC, and Sevier County, TN** - Critical habitat in this unit is entirely contained within the Great Smokey Mountains National Park (GSMNP). This unit stretches from The Narrows west along the North Carolina/Tennessee State line and includes Mount Buckley, Clingmans Dome, and Andrews Knob and Mount Collins. This unit is within the geographical area currently occupied by the spider and provides necessary high elevation spruce-fir habitat for two small populations of spiders. Land in this unit is used primarily for recreation.
  - **Unit 2: Sevier County, TN** - Similar to Unit 1, critical habitat in this unit is entirely contained within the GSMNP. This unit is bounded on the southwest side by the North Carolina/Tennessee State line and stretches northeast to contain Mount Kephart, Anakeesta Knob, and Mount LeConte. Mount LeConte contains the healthiest of the known surviving population of spruce-fir moss spider, harboring over 5,000 individuals. Land in this unit is used primarily for recreation.
  - **Unit 3: Avery and Mitchell Counties, NC, and Carter County, TN** - This critical habitat unit includes land entirely contained within the Pisgah National Forest in North Carolina and the Cherokee National Forest in Tennessee. This unit stretches west from the Elk Hollow Branch along the North Carolina/Tennessee State line and contains Carvers Gap, Roan Mountain, and Eagle Cliff. This unit was observed to support 12 small,

separate rock outcrop sites supporting very small spider populations at each site. Land in this unit is used primarily for recreation. There are no current or planned timber harvesting operations within this unit.

- **Unit 4: Avery, Caldwell, and Watauga Counties, NC** - Critical habitat in this unit includes all of the land above 5,400 feet of privately owned Grandfather Mountain. This includes Raven Rocks and Calloway Peak. The area that supports the spider is managed by the Nature Conservancy through an agreement with the landowner. Hiking is the primary land use in this unit.

## **2. FRAMEWORK, METHODOLOGY, AND IMPACTS**

### **2.1 Framework for Analysis**

11. As noted above, this economic analysis examines the impacts to land owners and managers of areas designated as critical habitat for the spider. An impact of critical habitat designation includes any effect of the designation above and beyond those impacts associated with the listing of the species. This report employs a framework that compares economic activity with critical habitat designation to economic activity without critical habitat designation. The without-critical-habitat baseline for analysis represents current and expected economic activity under all modifications prior to critical habitat designation, including protections already accorded to the spider under the listing as endangered. The difference between the two scenarios measures the net change in economic activity attributable to the designation of critical habitat for the spider.

### **2.2 Methodological Approach**

12. This report relies on a sequential methodology and focuses on distilling the salient and relevant aspects of potential economic impacts of designation. The methodology consists of:
  - Considering what specific activities take place on the Federal and private land affected by critical habitat designation;
  - Identifying whether activities taking place on the private land are likely to involve a Federal nexus;
  - Evaluating the likelihood that identified Federal activities and private activities with Federal nexuses will result in consultations and, in turn, that consultations will result in modifications to projects as a result of critical habitat designation;

- Evaluating the likelihood that consultations regarding the spider that have been completed will be reinitiated to address critical habitat issues.
- Attributing costs to any expected consultations, reinitiations and project modifications attributable to critical habitat designation;
- Determining the magnitude of any benefits associated with the current critical habitat designation;
- Assessing whether critical habitat designation will create economic impacts for small businesses as a result of modifications or delays to projects;

### **2.3 Information Sources**

13. The primary sources of information for this report were communications with personnel from the Service and affected Federal agencies, as well as the landowner of Grandfather Mountain. Publicly available data (e.g., maps available on the Internet) were also used to augment the analysis.

### **2.4 Impacts**

14. This section addresses specific economic impacts of critical habitat designation for the spider on landowners and managers within each unit of the proposed critical habitat area. On the whole, critical habitat designation for the spider is not likely to pose an incremental direct impact to the owners and managers of land within proposed critical habitat. The conclusion is based on the fact that the Service notified the appropriate Federal and State agencies of the spiders' general distribution during the development of the rule to list the spider as endangered. At that time, the Service asked the agencies to provide data on proposed or planned actions with a Federal nexus that might adversely affect the species.<sup>2</sup> Therefore, the affected Federal and State agencies were aware that they were required to notify and consult with the Service regarding any action with a Federal nexus that might adversely affect the species. They were also aware of the spiders' distribution and habitat requirements when the species was listed on March 8, 1995. The designation of critical habitat for the spider does not increase or change the existing regulatory burden posed by the listing on land owners and managers. Furthermore, the Service indicates that the outcome of consultations that have been completed are not likely to change because of reinitiation of consultation in order to address critical habitat issues. Therefore, the designation of critical habitat for the spider will likely have no incremental economic impacts beyond a few relatively insignificant economic costs and benefits identified below.

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<sup>2</sup>*Spruce-Fir Moss Spider Determined to be Endangered*, February 6, 1995 (60 FR 6968).

15. Activities that could affect the spider, past section 7 consultations in the proposed critical habitat area associated with the listing of the spider, and reasonably foreseeable future actions are identified below for each land owner or manager.

### **National Park Service**

16. Critical habitat units 1 and 2 are located within the Great Smoky Mountains National Park and are managed by the National Park Service (NPS). The primary activities within the proposed critical habitat designation include trail maintenance (e.g., minor reroutes, cutting trees that hang over the trail, erosion control, and brush cutting), park road and parking lot maintenance, and upkeep of the Mount LeConte Lodge.
17. These activities have triggered two informal consultations with the Service since the listing of the spider on February 6, 1995. The first informal consultation took place in 1999 in reference to a trail rehabilitation project. The Service identified areas where the spider was known to exist. The NPS planned a route that did not impact these areas and performed additional biological surveys to detect the presence of the spider. These surveys confirmed that the proposed trail route would not impact the spider primary constituent elements and the project was completed. In 2000, the spider was considered in an informal consultation along with 20 other endangered or threatened species regarding the proposal to reintroduce elk to the GSMNP. This consultation concluded that the proposal was not likely to adversely affect the spider, but it stipulated that a re-initiation of the consultation might be necessary if the elk were found to impact spider habitat.
18. The NPS identified several reasonably foreseeable activities that may trigger a section 7 consultation in the next five to ten years. These activities include, but are not limited to, improvements to and expansions of the LeConte Lodge facilities, additional trail maintenance, and the construction of a wetland treatment area for wastewater on Clingmans Dome and Mount LeConte.
19. The Service maintains that any potential section 7 consultation on these reasonably foreseeable activities would have been required without the designation of critical habitat and would be attributable to the listing. The Service maintains that consultations on these actions or other future actions are not likely to be different in the with-critical-habitat scenario when compared to the without-critical-habitat baseline. This analysis agrees with the Service's claim because the NPS was made aware of the spiders' distribution and of its need to consult with the Service on actions that affect the spider prior to the designation of critical habitat. Therefore, the designation of critical habitat is not likely to have any direct incremental economic impact on lands managed by the NPS.
20. However, some NPS staff are concerned that the designation of critical habitat will cause incremental economic impacts because it includes areas where the spider does not exist. The NPS

is concerned that it will have to conduct consultations for actions on these areas of unsuitable spider habitat that it would not have conducted under the listing. These incremental consultations could cause economic effects through additional paperwork and project delays.<sup>3</sup> The *Proposed Designation of Critical Habitat for the Spruce-fir Moss Spider* (65 FR 59798) states that Federal actions limited to areas that do not support the spider primary constituent elements would not require a section 7 consultation. Personal communications with the Service confirms this exception; therefore this analysis finds that the designation of critical habitat will not trigger any incremental section 7 consultations that would not have been required under the listing.

21. The Service recognizes that there will likely be some initial confusion about the implications of the designation of critical habitat since there are very few critical habitat designations in the area. Therefore, the proposed critical habitat designation for the spider may have relatively insignificant economic impacts arising from uncertainty about the implications of critical habitat. Some land managers may contact the Service to gain information and/or confirm the lack of additional regulatory burden imposed by the proposed designation. This analysis assumes the opportunity cost of the time spent in these informational conversations is equivalent to the hourly wage of the land manager and the Service staff. Based on this assumption, a conservative estimate of the opportunity cost of time is approximately \$50 per hour.<sup>4</sup> Informational conversations are likely to last one to two hours, thus the economic impact of each conversation is likely to range from \$100 to \$200. This analysis assumes that the designation of critical habitat may trigger three to five of these informational conversations, resulting in a total incremental economic impact ranging from \$300 to \$1,000.

## U.S. Forest Service

22. Unit 3 of the proposed critical habitat designation contains areas above 5,400 feet in the Pisgah National Forest and the Cherokee National Forest near Roan Mountain. The Roan Mountain Gardens and the Appalachian Trail draw many visitors (approximately 116,000 in 1999), making recreation the primary activity in this area. A limited amount of Fraser fir seedling collection and cone collection permitted by the U.S. Forest Service (USFS) is the only commercial activity within the area designated as critical habitat. The USFS estimates that issuing seedling collection permits generated approximately \$13,500 in revenue and issuing cone collection permits generated \$7,700

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<sup>3</sup>Personal communication with Inventory and Monitoring Coordinator, GSMNP on October 30, 2000.

<sup>4</sup>Hourly wage rate estimation based on U.S. Office of Personnel and Management 2000 General Schedule GS13 hourly base rate times 1.5 to adjust for benefits.

in 1999.<sup>5</sup> The USFS also conducts wildlife management activities, research, and park road maintenance in the Roan Mountain vicinity.

23. The activities mentioned above have triggered several informal consultations since the listing of the spider. In 1998, the USFS consulted with the Service regarding a proposed rerouting of the Appalachian trail. The Service agreed with the USFS that is new proposed route would not affect the spider. This consultation was re-initiated in 1999 to consider the discovery of spider populations on Roan Mountain. Considering this additional information, the Service found that the new trail route was not likely to affect the spider. Also in 1998, the USFS consulted informally with the Service regarding the maintenance of high elevation openings in the vegetation to facilitate wildlife passage. Since the microhabitat where the UFSF was maintaining these openings did not support the spider, the Service agreed with the USFS that maintaining the wildlife openings would not affect the spider. Finally, in 1999, the USFS consulted with the Service regarding pesticide application to combat gypsy moth infestations. The Service found that these applications were not likely to affect the spider since the USFS was not proposing any pesticide applications in the vicinity of the spider or other spruce-fir forest habitat.
24. Based on the activities and past consultations, the USFS predicts it will enter into consultation with the Service several times in the foreseeable future. These consultations will likely occur in reference to a planned expansion of the visitor center and parking lot on Roan Mountain and the toilet facilities near Carvers Gap. The USFS anticipates it will also perform minor trail alterations similar to the Appalachian trail re-route in 1998. The USFS does not anticipate consulting with the Service regarding the seedling and cone collection activities because the USFS only issues permits for specific areas that do not support the spider primary constituent habitat elements. The USFS and the Service agree that any potential future section 7 consultations on these and other activities would have happened without the designation of critical habitat and are attributable to the listing of the spider.<sup>6</sup> Therefore, the proposed critical habitat areas in Unit 3 are not likely to impose any incremental economic costs.

### **Grandfather Mountain**

25. The critical habitat designation within Unit 4 is entirely owned by Grandfather Mountain, Inc., and is managed as a private park and reserve. The park is open to the public and was

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<sup>5</sup>"Roan Mountain Information," facsimile received from Planner, Appalachian Ranger District, Burnsville Unit, National Forests in NC on November 9, 2000.

<sup>6</sup>Personal communication with Forest Ecologist, U.S. Forest Service, Asheville, NC on November 11, 2000.

designated an International Biosphere Reserve in 1992 by the United Nations.<sup>7</sup> All of the areas designated as critical habitat for the spider are currently managed through conservation easements donated to the Nature Conservancy. These easements prohibit all development, roads and structures. Therefore, the primary activities with the proposed critical habitat designation are hiking, sightseeing, and primitive camping.<sup>8</sup>

26. None of the current or reasonably foreseeable activities within Unit 4 have a Federal nexus. Thus, it is not likely that activities on Grandfather Mountain will require section 7 consultations, nor will the private landowner incur direct incremental economic impacts due to the designation of critical habitat for the spider. In addition, the owner of Grandfather Mountain has a longstanding working relationship with the Service and voluntarily takes steps to protect the spider and the eight other federally listed endangered and threatened species on the mountain. The owner won an Outstanding Conservationist Award in June 1997 for his conservation efforts.<sup>9</sup> This cooperation further reduces the need for any Federal involvement regarding the spider conservation in Unit 4.

## **2.5 Benefits**

27. As mentioned above, the designation of critical habitat for the spider is not likely to impose any incremental regulatory burden on Federal and private land owners and managers. Therefore, there is not likely to be any direct incremental benefits attributable to the critical habitat designation. However, critical habitat designation as a focal point for non-Federal conservation efforts has the potential to provide minor incremental economic benefits. For example, the North Carolina Chapter of the Nature Conservancy manages some of the land spider habitat on Grandfather Mountain through conservation easements. The North Carolina Chapter uses the general term "critical habitat" in its fund raising efforts to identify areas of land that are vital to the conservation of various species, even if these species do not have Federally designated critical habitat.<sup>10</sup> While the designation of critical habitat for the spider is not vital to the fund-raising campaign of the Nature Conservancy, it has the potential to enhance their efforts. The information of the Federal designation adds credence to the Conservancy's claim that Grandfather Mountain is "critical habitat." To date, the North Carolina chapter has raised millions of dollars for the conservation of Grandfather Mountain.

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<sup>7</sup>Grandfather Mountain, Inc., "Fast Facts," <http://www.grandfather.com/media/facts.htm>, November 2, 2000.

<sup>8</sup>Personal communication with Grandfather Mountain, Inc. owner, October 30, 2000.

<sup>9</sup>"Hugh Morton Honored by US Fish and Wildlife Service" *The Avery Journal*, June 18, 1997.

<sup>10</sup>Personal communication with the Director of Development, North Carolina Chapter of the Nature Conservancy on December 8, 2000.

Although the incremental impact may be minor and difficult to quantify, the designation of critical habitat for the spider is likely to enhance these conservation efforts.

28. This conservation benefit has been observed in reference to the designation of critical habitat for other endangered and threatened species. For example, the Barham Ranch is a 526-acre property in Orange County, California that hosts several endangered and threatened species, including the California gnatcatcher (*Polioptila californica californica*). Proponents of the conservation of the ranch believe that including the ranch within the boundaries of critical habitat for the California gnatcatcher would provide a public relations benefit for their conservation efforts.<sup>11</sup>

**2.6 Summary of Impacts**

29. Exhibit 1 summarizes the potential for new consultations and the expected benefits that will result from critical habitat designation for the spider.

<b>Exhibit 1</b>					
<b>SUMMARY OF ECONOMIC IMPACTS ASSOCIATED WITH CRITICAL HABITAT DESIGNATION FOR THE SPRUCE-FIR MOSS SPIDER</b>					
<b>Land Owner or Manager</b>	<b>Reasonably Foreseeable Activities and Land Uses within Proposed Critical Habitat</b>	<b>Federal Nexus</b>	<b>Likelihood of New Consultations</b>	<b>Potential for Incremental Costs</b>	<b>Potential for Incremental Benefits</b>
National Park Service	Recreational facilities management, trail maintenance, wastewater treatment	Federal land ownership	None	Minor- \$300-\$1,000	None
U.S. Forest Service	Recreational facilities management, trail maintenance	Federal land ownership	None	None	None
Grandfather Mountain, Inc.	Hiking trail maintenance, recreational use	None	None	None	Minor-potential fund raising benefits.

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<sup>11</sup>Letter from Co-chairs, Barham Ranch to Carlsbad Fish and Wildlife Office regarding critical habitat designation for the Coastal California Gnatcatcher, February 14, 2000.

## 2.7 **Potential Impacts to Small Businesses**

30. Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).<sup>12</sup> However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.
31. As mentioned above, the designation of critical habitat for the spider is not likely to directly or indirectly impact any small entities. Grandfather Mountain, Inc, and the small commercial firms collecting Fraser fir seedlings and cones on USFS land are likely to be considered small businesses under the size standards of the Small Business Administration.<sup>13</sup> The activities of these firms are not likely to be impacted by the designation of critical habitat in any way beyond the impacts associated with the listing of the spider.

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<sup>12</sup> 5 U.S.C. 601 et.seq.

<sup>13</sup>Small Business Administration, "Size Standards," <http://www.sba.gov/size/Main-faq.html>, November 13, 2000.

## REFERENCES

Grandfather Mountain, Inc., "Fast Facts," <http://www.grandfather.com/media/facts.htm>, November 2, 2000.

"Hugh Morton Honored by US Fish and Wildlife Service" The Avery Journal, June 18, 1997.

Letter from Co-chairs, Barham Ranch to Carlsbad Fish and Wildlife Office regarding critical habitat designation for the Coastal California Gnatcatcher, February 14, 2000.

Letter from State Supervisor, Asheville Field Office, U.S. Fish and Wildlife Service, to North Zone Wildlife Biologist, Cherokee National Forest, June 11, 1998.

Letter from State Supervisor, Asheville Field Office, U.S. Fish and Wildlife Service, to District Ranger, U.S. Forest Service, August 18, 1998.

Letter from State Supervisor, Asheville Field Office, U.S. Fish and Wildlife Service, to North Zone Wildlife Biologist, Cherokee National Forest, September 9, 1999.

Letter from State Supervisor, Asheville Field Office, U.S. Fish and Wildlife Service, to Acting Superintendent, National Park Service, October 3, 2000.

The Nature Conservancy, "Background/General Information", <http://www.tnc.org/frames/index.html?involved/match/faqs.html>, November 13, 2000.

*Proposed Determination of Critical Habitat for the Spruce-fir Moss Spider*, October 6, 2000 (65 FR 59798).

"Roan Mountain Information," facsimile received from Planner, Appalachian Ranger District, Burnsville Unit, National Forests in NC on November 9, 2000.

Small Business Administration, "Size Standards," <http://www.sba.gov/size/Main-faq.html>, November 13, 2000.

*Spruce-Fir Moss Spider Determined to be Endangered*, February 6, 1995 (60 FR 6968)

U.S. Fish and Wildlife Service, *Recovery Plan for the Spruce-fir Moss Spider*, Atlanta, GA, September 1998.