50 CFR Part 17

RIN 1018-AB31

Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Geum radiatum and Hedyotis purpurea var. montana

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The Service lists two plants, *Geum radiatum.* (spreading avens) and *Hedyotis purpurea* var. *montana* (Roan Mountain bluet), as endangered species under authority of the Endangered Species Act of 1973, as amended (Act). These perennial herbs, limited to 11 *Geum* populations and 6 *Hedyotis* populations in North Carolina and Tennessee, are endangered by residential and recreational development, habitat disturbance due to heavy use by hikers and climbers, collection, and natural succession. This action implements Federal protection provided by the Act for *Geum radiatum* and *Hedyotis purpurea* var. *montana*

EFFECTIVE DATE: May 7, 1990.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, 100 Otis Street, Room 224, Asheville, North Carolina 28801.

FOR FURTHER INFORMATION CONTACT: Nora Murdock at the above address (704/259-0321 or FTS 672-0321).

SUPPLEMENTARY INFORMATION:

Background

Geum radiatum, described by André Michaux (1803) from material collected in North Carolina, is a perennial herb with basal rosettes of leaves arising from horizontal rhizomes. The stems grow 2 to 5 decimeters tall and are topped with an indefinite cyme of bright yellow actinomorphic flowers. Flowering occurs from June through September, with fruiting from August through October. The fruit is a hemispheric aggregate of hirsute achenes, 7 to 9 millimeters in diameter (Kral 1983, Radford *et al.* 1968, Massey *et al.* 1980). This species can be easily distinguished from other Southeastern *Geums* by its large yellow flowers and by its leaves (mostly basal), which have large terminal lobes and small laterals (Massey *et al.* 1980). *Geum radiatum* has been placed in other genera by various workers; Robert Brown (1823) placed it in the genus *Sieversia;* Bolle (1933) placed it in the genus *Acomastylis*; and Hara (1935) placed it in *Parageum*. Currently accepted taxonomic treatment places this species in the genus of Michaux's original description (Raynor 1952, Robertson 1974).

Hedyotis purpurea (L.) T. & G. var. *montana* (Small) Fosberg was first described as *Houstonia montana* in 1903 by J. K. Small from specimens collected by J. W. Chickering, Jr., in 1877 from the summit of Roan Mountain in North Carolina and Tennessee. Another synonym is *Houstonia purpurea L.* var. *montana* (Small) (Terrell 1959, Terrell 1978). This species is a shallow-rooted perennial that forms low-growing, loose tufts 1 to 1.5 decimeters tall. The inflorescence is a subsessile few-flowered cyme. The bright purple flowers appear in July and early August, followed by the many-seeded capsule (Kral 1983, Radford *et al.* 1968). *H. purpurea* var. *montana* is distinguished from *H. p.* var. *purpurea* by its larger corolla size, different corolla color (deep purple as opposed to purplish to white in *H. p.* var. *purpurea*), and its larger seed size (Kral 1983, Terrell 1978).

These two species are endemic to a few scattered mountaintops in western North Carolina and eastern Tennessee where they grow, exposed to full sunlight, in the shallow acidic soils of high elevation cliffs, outcrops, steep slopes, and gravelly talus associated with cliffs. Substrate types are variable for the species but include various igneous, metamorphic, and metasedimentary rocks such as quartz diorite, garnet-rich biotite, muscovite and quartz schist, quartz phyllite, metagraywacke, metaconglomerate, and metarkoses containing feldspar and chlorite, amphibole, hornblende, and feldspar gneiss (Massey *et al.* 1980). Common associates of these two species include *Leiophyllum buxifolium, Menziesia pilosa, Rhododendron catawbiense, Aster* spp., *Carex* spp., *Solidago* spp., *Heuchera villosa, Saxifraga michauxii,* and various grass species. Some of the sites are also occupied by *Liatris helleri* and/or *Solidago spithamaea,* species that are already federally listed as threatened. The high elevation coniferous forests adjacent to the rock outcrops and cliffs occupied by these two species are dominated by red spruce (*Picea rubens*) and another Federal candidate species, Fraser fir (*Abies fraseri*) (Massey *et al.* 1980, Morgan 1980, Kral 1983).

Sixteen populations of *Geum radiatum* have been reported historically; 11 remain in existence. Three of these populations are in Ashe County, North Carolina, with one population each remaining in Avery, Transylvania, Watauga, Buncombe, and Yancey Counties, North Carolina, and Sevier County, Tennessee; the other two populations are located on the Mitchell County, North Carolina/Carter County, Tennessee line and the Avery/Watauga County line in North Carolina. Six of the remaining populations are located on privately owned lands; four are located on public land administered by the U.S. Forest Service and the National Park Service, and one is located on State park land administered by the North Carolina Department of Environment, Health, and Natural Resources. Five additional populations were historically known for this species. The reasons for the disappearance of *Geum radiatum* at these sites are undocumented. However, most of the sites have been subjected to heavy recreational use by hikers, climbers, and sightseers.

Hedyotis purpurea var. *montana* was known historically from seven populations; six remain. Two of these are located on the line between Avery and Watauga Counties, North Carolina; one is at the juncture of the boundaries of Mitchell and Avery Counties, North Carolina, and Carter County, Tennessee; two are in Ashe County, North Carolina;

and one population remains in Watauga County, North Carolina. The seventh population was reported from Yancey County, North Carolina, but has not been found there during recent searches (Paul Somers, personal communication, Tennessee Department of Conservation, 1988; Alan Weakley, personal communication, North Carolina Natural Heritage Program). That site, like those from which *Geum radiatum* has vanished, has also been subjected to relatively heavy recreational use.

The continued existence of both species is threatened by trampling and associated soil erosion and compaction, other forms of habitat disturbance due to heavy use of the habitat by recreationists such as hikers, as well as by development for commercial recreational facilities and residential purposes. Since both species are early successional pioneers, some of the populations are also threatened by natural succession (Massey *et al.* 1980, Kral 1983). Construction of new trails, other recreational improvements, significant increases in intensity of recreational use, or intensive development without regard to the welfare of these species at any of the sites could further jeopardize their continued existence. Most of the populations occupy a very small total area. Seven of the remaining *Geum radiatum* populations have fewer than 50 plants remaining in each, with 3 of these having fewer than 10 plants each. Over the past decade, at least four of the currently extant *Geum radiatum* populations have undergone significant population declines (ranging from 67 percent to 96 percent); four others have suffered declines of lesser magnitude. Only three are known to have maintained relative stability during the same period. One of the privately owned sites for these two species has been developed as a commercial recreation facility; development of a second site as a ski resort is currently underway. The third privately owned site is owned in part by The Nature Conservancy and is therefore partially protected. The remaining three sites in private ownership are unprotected, with residential development currently underway at two of the sites. The five sites in public ownership are located in scenic areas that attract large numbers of visitors annually.

Federal government actions on *Geum radiatum* began with section 12 of the Endangered Species Act of 1973, which directed the Secretary of the Smithsonian Institution to prepare a report on those plants considered to be endangered, threatened, or extinct. This report, designated as House Document No. 94–51, was presented to Congress on January 9, 1975. The Service published a notice in the July 1, 1975, **Federal Register** (40 FR 27832) of its acceptance of the report of the Smithsonian Institution as a petition within the context of section 4(c)(2) (now section 4(b)(3)) of the Act and of its intention thereby to review the status of the plant taxa named within. *Geum radiatum* was included in the July 1, 1975, notice of review. On December 15, 1980, the Service published a revised notice of review for native plants in the **Federal Register** (45 FR 82480); *Geum radiatum* was included in that notice as a category 1 species; *Hedyotis purpurea* var. *montana* was included as a category 2 species. Category 1 species are those species for which the Service currently has on file substantial information on biological vulnerability and threats to support proposing to list them as endangered or threatened species. Category 2 species are those for which listing as endangered or threatened may be warranted but for which substantial data on biological vulnerability and threats is not currently known or on file to support proposed rules.

On November 28, 1983, the Service published a supplement to the notice of review for native plants in the **Federal Register** (48 FR 53640); the plant notice was again revised September 27, 1985, (50 FR 39536). *Geum radiatum* was included as a category 2 species in both the 1983 supplement and the 1985 revised notice. *Hedyotis purpurea* var. *montana* was included in the 1985 notice as a category 2 species. Subsequent to the 1985 notice, the Service received additional information from the North Carolina Natural Heritage Program (A. Weakley, personal communication, 1988); this information and additional field data gathered by the Heritage Program, the Fish and Wildlife Service, and the National Park Service (Keith Langdon, personal communication, Great Smoky Mountains National Park, 1988; Bambi Teague, personal communication, Blue Ridge Parkway, 1988) indicate that the addition of *Geum radiatum* and *Hedyotis purpurea* var. *montana* to the Federal List of Endangered and Threatened Plants is warranted.

Section 4(b)(3)(B) of the Endangered Species Act, as amended in 1982, requires the Secretary to make certain findings on pending petitions within 12 months of their receipt. Section 2(b)(1) of the 1982 amendments further requires that all petitions pending on October 13, 1982, be treated as having been newly submitted on that date. This was the case for *Geum radiatum* because of the acceptance of the 1975 Smithsonian Report as a petition. In October of 1983, 1984, 1985, 1986, 1987, and 1988, the Service found that the petitioned listing of *Geum radiatum* was warranted but precluded by listing actions of a higher priority and that additional data on vulnerability and threats were still being gathered. On July 21, 1989, the Service published a proposal to list the species as endangered. Publication of that rule constituted the final finding that is required.

Summary of Comments and Recommendations

In the July 21, 1989, proposed rule and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to the development of a final rule. Appropriate State agencies, county governments, Federal agencies, scientific organizations, and other interested parties were contacted and requested to comments. Newspaper notices inviting public comment were published in the *Asheville Citizen-Times* (Asheville, North Carolina) on August 27, 1989; *Watauga Democrat* (Boone, North Carolina) on August 25, 1989; *Transylvania Times* (Brevard, North Carolina) on August 28, 1989; *Yancey Journal* (Burnsville, North Carolina) on August 30, 1989; *Avery Journal* (Newland, North Carolina) on August 31, 1989; *Mountain Press* (Sevierville, Tennessee) on August 26, 1989; *Elizabethton Star* (Elizabethton, Tennessee) on August 27, 1989; and *Jefferson Post* (West Jefferson, North Carolina) on August 28, 1989.

Eleven comments were received. Of these, nine respondents expressed support for the proposal, including the U.S. Forest Service, the National Park Service, the Tennessee Department of Conservation, the Land-of-Sky Regional Council, the North Carolina Department of Agriculture's Plant Conservation Program, the Tennessee Valley Authority, and the mayor of Mars Hill, North Carolina. One comment was received that stated no position on the proposal. The North Carolina Farm Bureau Federation expressed concern that the listing of these two species without designation of critical habitat would result in undue restrictions on the use of agricultural pesticides in the State. The Service believes that the recent consultation with the Environmental Protection Agency has resulted in an effective program for protecting endangered species from pesticides without unduly restricting the

commercial use of such chemicals. In addition, neither of the two species in question occurs in areas immediately adjacent to farmland or commercially managed forests. Critical habitat was not designated for these species (see "Critical Habitat" section of this rule) because both are exceedingly rare and attractive to collectors; publication of site-specific maps could result in the further endangerment of these plants, especially at sites where only a few individuals remain.

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that *Geum radiatum* and *Hedyotis purpurea* var. *montana* should be classified as endangered species. Procedures found at section 4(a)(1) of the Endangered Species Act (16 U.S.C. 1531 *et seq.*) and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act were followed. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to *Geum radiatum* Michaux (spreading avens) and *Hedyotis purpurea* var. *montana* (Chickering) Fosberg (Roan Mountain bluet) are as follows:

A. *The present or threatened destruction, modification, or curtailment of its habitat or range. Geum radiatum* and *Hedyotis purpurea* var. *montana* are restricted to a few mountaintops and cliff faces in the southern Appalachians of western North Carolina and eastern Tennessee (see "Background" section for specific distributions). Although populations are declining and vanishing for reasons that are, in many cases, not clearly understood, destruction and adverse modification of their habitat pose a major threat to the remaining populations of both species. Thirty-one percent of the historically known *Geum radiatum* populations have been extirpated, along with 17 percent of the *Hedyotis purpurea* var. *montana* populations. Only 11 populations of the *Geum* and 6 of the *Hedyotis* remain.

The 6 remaining *Hedyotis* populations are small and vulnerable, with two occupying a total of less than 10 square meters. Two of these populations occupy sites that have been or are being developed for commercial recreation. A third site, located on land administered by the U.S. Forest Service, contains 41 percent of the remaining individuals of this species and is subjected to heavy and increasingly intense recreational use. The other three populations, located on private land, are protected only so long as concerned and willing landowners are able to extend necessary safeguards to the species.

As detailed in the "Background" section, significant declines have been documented in many of the extant *Geum* populations during the past decade. Five of the remaining 11 *Geum* populations are located on public lands where they are subjected to heavy recreational use. One of these sites, owned by the U.S. Forest Service, currently supports 73 percent of the remaining individuals of this species; recreational pressure on this already heavily used site is steadily increasing. Of the six privately owned sites, one has been developed as a commercial recreation facility that attracts several hundred thousand visitors annually. A second site is currently being developed as a ski resort; the other four privately owned sites are currently unprotected and located in an area that is rapidly developing as a center for resorts and tourism.

The greatest damage to *Geum radiatum* and *Hedyotis purpurea* var. *montana* in the past has probably come from the commercial development of the open mountain summits where they occur. The construction of trails, parking lots, roads, buildings, observation platforms, suspension bridges, and other recreational, residential, and commercial facilities has taken its toll on the species either through the actual construction process or by trampling due to hikers and sightseers (Kral 1983). Currently, heavy trampling occurs at six of the locations where these two species are known to survive; however, all of the small habitats occupied by these species are threatened by increases in intensity of use, particularly if additional development occurs (Massey *et al.* 1980).

With anticipated increased usage by sightseers, rock climbers, and hikers at 8 of the remaining 11 localities where *Geum radiatum* occurs, and at 4 of the 6 remaining *Hedyotis purpurea* var. *montana* localities, significant impacts on these species in the form of increased soil erosion, soil compaction, and trampling could occur if protection is not provided. Likewise, additional development at any of the locales (such as expansion of trails or sidewalks, construction of additional visitor facilities, or residential development) could further threaten the species if proper planning does not occur.

B. *Overutilization for commercial, recreational, scientific, or educational purposes.* Neither *Geum radiatum* nor *Hedyotis purpurea* var. *montana* is currently a significant component of the commercial trade in native plants; however, both have attractive growth habits and showy flowers and have potential for horticultural use. Some collecting from wild populations of *Geum* is already occurring. Publicity could generate an increased demand and intensify collecting pressure on wild populations of both species.

C. *Disease or predation.* These taxa are not known to be threatened by disease or predation.

D. *The inadequacy of existing regulatory mechanisms. Geum radiatum* and *Hedyotis purpurea* var. *montana* are afforded legal protection in North Carolina by North Carolina General Statute, Chapter 106, Article 19–B, 202.12–202.19, which prohibits intrastate trade and taking of State-listed plants without a State permit and written permission of the landowner. *Geum radiatum* is listed in North Carolina as threatened—special concern (currently proposed as endangered—special concern); *Hedyotis purpurea* var. *montana* is currently being added to the State's list as endangered. In Tennessee, State-listed plants are afforded legal protection by the Rare Plant Protection and Conservation Act of 1985, Tennessee Code Ann., Chapter 242, section 11–26–201 to 11–26–214, Public Acts of 1985. This statute prohibits taking of listed species without permission of the landowner or manager and regulates commercial sale and export. *Geum radiatum* is listed as endangered in Tennessee. State prohibitions against taking are difficult to enforce and do not cover adverse alterations of habitat or unintentional damage from recreational use. The Endangered Species Act will provide additional protection and encouragement of active management for *Geum radiatum* and *Hedyotis purpurea* var. *montana*, particularly on Federal lands.

E. *Other natural or manmade factors affecting its continued existence.* These taxa are rare and vulnerable due to their specialized habitat requirements and the limited amount of potential habitat. As mentioned in the previous sections of this rule, most of the remaining populations are small in numbers of individuals and in terms of area covered by the plants. Therefore, little genetic variability exists in these species, making it more important to maintain as much habitat and as many of the remaining colonies as possible. *Geum radiatum* and *Hedyotis purpurea* var. *montana* are early pioneer species growing on rock ledges in full sun. Depending upon the elevation and

suitability of the site for supporting woody vegetation, invasion by shrubs and trees can occur, eliminating these species by overcrowding and shading. Since this type of succession is a slow process, this is not considered an immediate threat to survival of the species. However, proper management planning for *Geum radiatum* and *Hedyotis purpurea* var. *montana* is needed to address this aspect of the species' biology. Natural rock slides, severe storms or droughts, or other natural events may also eliminate populations of these plants.

In recent years the spruce fir forests adjacent to the cliffs and rock outcrops occupied by these species have suffered dramatic declines due, at least in part, to airborne pollution and the impacts of an exotic insect, the balsam wooly aphid. The impacts of this forest decline on these two rare herbaceous species cannot be accurately assessed at this time. Even though both species are pioneers and require exposure to full sunlight, the drastic decline in the high elevation forests may result in excessive desiccation of the moist sites occupied by *Geum* and *Hedyotis*. This theory would seem to be supported by the fact that populations of *Geum*, particularly those located on drier sites, usually abort the fruiting stems before seed can be set. The rhizomes of these perennials are believed to be capable of surviving for decades (Prince and Morse 1985), but continued failure in seed production poses a definite threat to long-term survival and recovery of the species.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by these species in determining to make this rule final. Based on this evaluation, the preferred action is to list *Geum radiatum* and *Hedyotis purpurea* var. *montana* as endangered. With 31 percent of the *Geum* and 17 percent of the *Hedyotis* populations having already been extirpated, and only 11 populations of *Geum* and 6 of *Hedyotis* remaining (all of which are subject to some form of threat), these species warrant protection under the Act. With the small number of remaining populations and the small number of individuals and area covered by these populations, and with significant declines having been documented in many of the surviving populations, these two plants are in danger of extinction throughout all or significant portions of their ranges and therefore qualify as endangered species under the Act. Critical habitat is not being designated for the reasons discussed below.

Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time the species is determined to be endangered or threatened. The Service finds that designation of critical habitat is not prudent for *Geum radiatum* or *Hedyotis purpurea* var. *montana* at this time. Publication of critical habitat descriptions and maps would increase public interest and possibly lead to additional threats for these species from collecting and vandalism (see threat factor "B" above). Both species have showy flowers and have some potential for horticultural use. Increased publicity and a provision of specific location information associated with critical habitat designation could result in increased collecting from wild populations since neither species is readily available from cultivated sources. Although taking of endangered plants from lands under Federal jurisdiction (and from privately owned lands under certain circumstances (see "Available Conservation Measures" section)) and reduction to possession is prohibited by the Endangered Species Act, taking provisions are difficult to enforce. Publication of critical habitat descriptions would make *Geum radiatum* and *Hedyotis purpurea* var. *montana* more vulnerable and would increase enforcement problems for the U.S. Forest Service and the National Park Service. Also, the populations on private lands would be more vulnerable to taking. Increased visits to population locations stimulated by critical habitat designation, even without collection of plants, could adversely affect the species due to the associated increase in trampling of the fragile habitat occupied by these plants. The Federal and State agencies and landowners involved in managing the habitat of these species have been informed of the plants' locations and of the importance of protection; therefore, it would not be prudent and no additional benefit would result from a determination of critical habitat.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. Such actions are initiated by the Service following listing. The protection required of Federal agencies and the prohibitions against certain activities involving listed plants are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) requires Federal agencies to insure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

The U.S. Forest Service and the National Park Service have jurisdiction over portions of the species' habitat. Federal activities that could impact *Geum radiatum* and *Hedyotis purpurea* var. *montana* and their habitat in the future include, but are not limited to, the following: construction of recreational facilities (including trails, buildings, or maintenance of these facilities), use of aerially applied retardants in fire-fighting efforts, road construction, permits for mineral exploration, and any other activities that do not include planning for the species' continued existence. The Service will work with the involved agencies to secure protection and proper management of *Geum radiatum* and *Hedyotis purpurea* var. *montana* while accommodating agency activities to the extent possible.

The Act and its implementing regulations found at 50 CFR 17.61, 17.62, and 17.63 set forth a series of general trade prohibitions and exceptions that apply to all endangered plants. All trade prohibitions at section 9(a)(2) of the Act, implemented by 50 CFR 17.61 apply. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to import or export any endangered plant, transport it in interstate or foreign commerce in the course of commercial activity, sell or offer it for sale in interstate or foreign commerce, or remove it from areas under Federal jurisdiction and reduce it to possession.

In addition, the 1988 amendments (Pub. L. 100–478) to the Act protect endangered plants from malicious damage or destruction on Federal lands and their removal, cutting, digging up, or damaging or destroying in knowing violation of any State law or regulation, including State criminal trespass law. The 1988 amendments do not reflect this protection for threatened plants. Certain exceptions can apply to agents of the Service and State conservation agencies. The Act and 50 CFR 17.62 and 17.63 also provide for the issuance of permits to carry out otherwise prohibited activities involving endangered species under certain circumstances. It is anticipated that few trade permits would ever be sought or issued since *Geum radiatum* and *Hedyotis purpurea* var. *montana* are not common in cultivation or in the wild. Requests for copies of the regulations on plants and inquiries regarding them may be addressed to the Office of Management Authority, U.S. Fish and Wildlife Service, P.O. Box 3507, Arlington, Virginia 22203–3507 (703/358–2104).

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

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Author

The primary author of this final rule is Nora Murdock, Asheville Field Office, U.S. Fish and Wildlife Service, 100 Otis Street, Room 224, Asheville, North Carolina 28801 (704/259–0321 or FTS 672–0321).

List of Subjects in 50 CFR Part 17.

Endangered and threatened species, Fish, Marine mammals, Plants (agriculture).

Regulations Promulgation

Accordingly, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, is amended as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1543; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

2. Amend § 17.12(h) by adding the following, in alphabetical order, to the List of Endangered and Threatened Plants:

§ 17.12 Endangered and threatened plants.

* * * * *

(h) * * *

Species		Historic range	Status	When listed	Critical habitat	Special rules
Scientific name	Common name					
Rosaceae—Rose family:						
• • •	• •	•	•	•		
Geum radiatum	Spreading avens	U.S.A. (NC, TN)	E	381	NA	NA
• • •	• •	•	•	•		
Rubiaceae—Coffee family:						
• • •	• •	•	•	•		
Hedyotis purpurea var. *montana.*	Roan Mountain bluet	U.S.A. (NC, TN)	E	381	NA	NA
• • •	• •	•	•	•		

Dated: March 15, 1990.

Richard N. Smith,

Acting Director, Fish and Wildlife Service.

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