References Cited

Aley, T., and C. Aley. 1987. Water quality protection studies, Logan Cave, Arkansas. Ozark Underground Laboratory. Report to Arkansas Game and Fish Commission. Pp. 1–2, 11–15.

Culver, D.C. 1982. Cave Life (Evolution and Ecology). Harvard Univ. Press. Pp 35, 51–54.

Figg, D.E., and K.B. Lister. 1990. Status survey of the troglobitic crayfish *Cambarus setosus* in Missouri. Missouri Department of Conservation. 7pp.

Hobbs, H.H., Jr., and A.V. Brown. 1987. A new troglobitic crayfish from Northwestern Arkansas (Decapoda: Cambaridae). Proc. Biol. Soc. Wash. 100(4), pp. 1041–1048.

Koppelman, J.B. 1990. A biochemical genetic analysis of troglobitic crayfish (Cambarus spp.) in Missouri, Oklahoma and Arkansas. Report to Missouri Department of Conservation, Oklahoma Natural Heritage Inventory, and Arkansas Game and Fish Commission. 12 pp.

Poulson, T.L. 1961. Cave adaptation in Amblyopsid fishes. Ph.D. dissertation, University of Michigan. Pp. 64–67.

Smith, K.L. 1984. The status of *Cambarus zophonastes* Hobbs and Bedinger, an endemic cave crayfish from Arkansas. Arkansas Natural Heritage Commission, Little Rock, Arkansas. 15 pp.

Author

The primary author of this rule is Paul D. Hartfield (see **ADDRESSES** section).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Regulation Promulgation

PART 17—[AMENDED]

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

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

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

2. Amend § 17.11(h) for animals by adding the following, in alphabetical order under "CRUSTACEANS", to the List of Endangered and Threatened Wildlife:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
CRUSTACEANS							
•	•	•	•	•	•		•
Crayfish (no common name).	*Cambarus aculabrum.*	U.S.A. (AR)	NA	E	499	NA	NA
•	•	•	•	•	•		•

Dated: February 26, 1993.

Richard N. Smith,

Deputy Director, Fish and Wildlife Service.

[FR Doc. 93–9747 Filed 4–26–93; 8:45 am]

BILLING CODE 4310–55–M

50 CFR Part 17

RIN 1018–AB83

Endangered and Threatened Wildlife and Plants; Endangered or Threatened Status for Seven Central Florida Plants

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The Service determines endangered status pursuant to the Endangered Species Act of 1973 as amended (Act) for the following five plants: *Cladonia perforata* (Florida perforate cladonia), *Crotalaria avonensis* (Avon Park harebells), *Nolina brittoniana* (Britton's beargrass), *Polygala lewtonii* (Lewton's polygala), and *Polygonella myriophylla* (sandlace). The Service determines threatened status for two plants: *Clitoria fragrans* (pigeon wings) and *Eriogonum longifolium* var. *gnaphalifolium* (scrub buckwheat). All seven plants are found in Highlands and Polk Counties in central Florida; four of the species range farther to the north or east, into Hernando, Lake, Osceola, Orange, and Marion Counties. One plant occurs on a barrier island in Okaloosa County, northwest Florida. Loss of habitat, mainly to citrus groves and residential development, is the primary threat to these species. This rule extends the Act's protection and recovery provisions to these seven species.

EFFECTIVE DATE: May 27, 1993.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours at the Jacksonville Field Office, U.S. Fish and Wildlife Service, 3100 University Boulevard South, suite 120, Jacksonville, Florida 32216.

FOR FURTHER INFORMATION CONTACT: Michael M. Bentzien, Assistant Field Supervisor, at the above address (telephone: 904–232–2580).

SUPPLEMENTARY INFORMATION:

Background

The seven plants determined to be endangered or threatened inhabit dry upland vegetation (including scrub, high pine, or intermediate "turkey oak barrens") in central peninsular Florida; one, the lichen *Cladonia perforata*, also occurs in coastal scrub in northwestern Florida.

Scrub is "a xeromorphic shrub community dominated by a layer of evergreen, or nearly evergreen oaks * * * or Florida rosemary (*Ceratiola ericoides*), or both, with or without a pine overstory, occupying well drained, infertile, sandy soils" (Myers 1990, pp. 154–155). The usual pine species in scrub is sand pine (*Pinus clausa*). Scrub is the habitat of the Florida scrub jay (*Aphelocoma coerulescens coerulescens*), a threatened species. Scrub occurs on dune ridges along Florida's Gulf and Atlantic coasts and on older inland sand ridges. Endemic plant species (species with limited geographic distributions) occur in scrub in various parts of Florida, with the largest concentration of endemics on the southernmost high interior ridge, the Lake Wales Ridge, northwest of Lake Okeechobee. Plants endemic to the Lake Wales Ridge are concentrated in scrub dominated by Florida rosemary on sites where the sand is apparently particularly devoid of nutrients; sites with slightly better nutrient status usually have dense stands of oaks, hickory, and sand pines (Myers 1990).

The scrub ecosystem is maintained by infrequent high intensity fires, with fires occurring as often as once a decade to less than once a century in sparsely-vegetated rosemary scrub (Myers 1990).

High pine (also called sandhills vegetation) is the other major type of natural vegetation on dry uplands in central Florida. It once was a very widespread forest type in the southeastern United States from Virginia to Texas (Myers 1990, citing several authors). High pine is longleaf pine forest with an open, grassy understory of wiregrass (*Aristida stricta*) and other grasses, numerous herbs, and deciduous turkey oaks (*Quercus laevis*) or bluejack oaks (*Q. incana*) that tolerate being burned to the ground. Frequent low-intensity fires maintained the grassy understory and prevented hardwoods from becoming canopy trees. In central Florida, high pine is intermingled with scrub; and "turkey oak barrens," intermediate between the two types of vegetation, exist in Polk and Highlands Counties (Christman 1988). Most of the "barrens" that are in evidence today may represent the results of logging of longleaf pine, followed by fire suppression, which allowed turkey oaks to reach tree size, and allowed evergreen oaks to invade, but Christman considers some of the barrens to be much older.

On central Florida's Lake Wales Ridge, the great majority of high pine was converted to citrus groves many years ago. Today, scrub is being converted to groves. Urban development is also destroying large areas of upland vegetation. Of approximately 546,800 acres of xeric upland vegetation originally in Highlands and Polk Counties, only approximately 15% remains intact (S. Freidman and J. Fitzpatrick 1992).

Because scrub and high pine in central Florida have many endemic plant taxa (species, subspecies, and varieties) Muller et al. 1989), the Service has responded by listing 13 plants from this region (50 FR 45616, Nov. 1, 1985; 52 FR 2227, Jan. 21, 1987; 52 FR 42068, Nov. 2, 1987). The Service has also listed scrub animals; two lizards (52 FR 42658, Nov. 6, 1987) and the Florida scrub jay (52 FR 20715, June 3, 1987). Other plant species are candidates for listing, including: *Schizachyrium niveum* (scrub bluestem), a species whose northern range limit is imperfectly known; it has been collected as far north as Aluchua County, Florida; *Calamintha ashei* (Ashe's savory, a mint) which has an unusual distribution, occurring in central Florida and southeast Georgia; and *Panicum abscissum* (cutthroat grass) which inhabits moist seeps near scrub and high pine.

Conservation measures that are underway to conserve the central Florida upland flora include:

(1) The State of Florida's Conservation and Recreation Lands program (CARL) is buying land in Highlands and Polk Counties. A completed acquisition, the Arbuckle State Forest and Park (13,700 acres), includes excellent examples of scrub vegetation. Acquisitions in progress in Polk County include Catfish Creek (1,100 acres acquired, 5,200 remaining) and Saddle Blanket Lakes (78 acres acquired, 800 remaining); and in Highlands County, Placid Lakes (negotiations underway). In these two counties, a massive Lake Wales Ecosystems proposal now under consideration incorporates most of the intact scrub and high pine in reasonably large tracts on the Lake Wales Ridge, totalling 32,000 acres (FL Dept. Natural Resources 1992).

(2) The Nature Conservancy has acquired preserves at Tiger Creek and Lake Apthorpe. This private organization has also purchased land at other locations, is assisting State and Federal land projects, and is working on fire management and other management issues for biological preserves.

(3) The Fish and Wildlife Service has proposed to create a Lake Wales Ridge National Wildlife Refuge, totalling about 10,000 acres, for endangered species that inhabit scrub vegetation. The 12 sites that might be acquired overlap with those in State projects. A large tract at Carter Creek (Sebring Highlands subdivision), Highlands County, is tentatively a high priority for acquisition, if funds become available.

Further information on conservation of these plants is provided below, under "Available Conservation Measures".

Discussion of the Seven Species

Cladonia perforata (Florida perforate cladonia) is a conspicuous lichen, "forming large dense clusters 20–60 mm [0.8–2.5 inches] tall" (Hilsenbeck and Muller 1991). *Cladonia* and similar lichens (family Cladoniaceae) are probably the most commonly collected lichens (Evans 1952). *Cladonia subtenuis* or *Cladonia evansii* are used as miniature shrubbery in architectural models and floral arrangements. The latter species is characteristic of scrub (T. Hendrickson, pers. comm., 1992).

The branches of *Cladonia* lichens differ from those of other branched (fruticose) lichens in that the *Cladonia* branches (podetia) are developmentally derived from spore-producing structures, rather than from the vegetative body (thallus) of the fungus that makes up the basic structure of a typical lichen. For *Cladonia perforata*, the vegetative body is not in evidence, and "the podetia, which grow in intricate tufts, are pale yellowish grey, and the surface appears more or less glossy. Individual podetia are mostly 40–60 mm. (1–1.5 inches) in height and their larger axes measure 3–6 mm. in diameter" (Evans 1952, p. 326). The podetia branch dichotomously (i.e., they fork), or they form whorls (splitting into three or more branches). "Wherever a branching takes place a circular opening is formed in the axil (just above the branch), and the larger of these openings measure 1–1.5 mm (0.06 inches) in diameter" (Evans 1952). Toward the top of the plant, where the branches are smaller, the openings are smaller, too. The surfaces of the podetia are uniform. The podetial wall's interior surface, facing the central canal, consists of loosely woven hyphae (fungal strands). "This species is also one of the few lichens that produces the *para*-depside squamatic acid. Although no medicinal or other useful properties for squamatic acid are currently known, this natural product has not been studied in this regard. (Other lichen products *do* have medicinal applications). Squamatic acid is found in nature only in lichens and there only in a few species * * *" (W.L. Culberson, Duke University, *in litt.*, Nov. 1992).

Cladonia uncialis, which is very similar to *Cladonia perforata*, has podetial surfaces with more or less distinct greenish areolae, rather than appearing uniform. *Cladonia uncialis* does not have a perforation in every axil, and its podetial walls have a solid layer of cartilaginous tissue on the interior (Evans 1952). Although Evans reported *C. uncialis* from southwestern Florida, Moore (1968) did not find it in Florida.

Cladonia leporina, which is common in Florida, is very similar to *Cladonia perforata* except that it has no holes in the podetia and the podetia have red tips consisting of spore-producing tissue (apothecia). *Cladonia perforata* has larger, more regularly branched podetia, with perforations. *Cladonia perforata* is illustrated in Hale (1983, p. 18) and in Buckley and Hendrickson (1988).

Cladonia perforata was first collected by George Llano in 1945 on Santa Rosa Island, and was named by Evans (1952). Llano and Evans both stated the site was in Escambia County, but Wilhelm and Burkhalter (1990) showed that the site was really in Okaloosa County, and had been paved over sometime between 1945 and the mid 1950's, when Llano revisited the area. The lichen was not collected again until Moore (1968)

found it in Highlands County, central Florida during her massive survey of Florida lichens in which she examined nearly 6,000 specimens, most of them collected by herself from 1964 through 1967. Buckley and Hendrickson (1988) relocated the remnants of Moore's population, and searched the surrounding area, including Archbold Biological Station, whose well-mapped vegetation contains 84 "rosemary balds", small hills of excessively drained sand (Archbold soil series) occupied by Florida rosemary, an array of smaller vascular plants (many of them endemic, including *Hypericum cumulicola* and *Eryngium cuneifolium*), and often a blanket of reindeer lichens. Buckley and Hendrickson (1988) found *Cladonia perforata* on six rosemary balds, and they report that ecologist Ann Johnson found the lichen on a seventh bald. They extended the search beyond Archbold Biological Station, but could find *Cladonia perforata* only in a six square mile area south and west of the station.

Wilhelm and Burkhalter (1990) relocated the lichen near its original locality on Santa Rosa Island (Eglin Air Force Base, Okaloosa County) but could not find it elsewhere on the barrier islands in an extensive search from Gulf Shores, Alabama, to Grayton Beach, Florida (Wilhelm and Burkhalter 1990).

By 1989, *Cladonia* and similar lichens had been collected throughout Florida; both Evans and Moore had conducted a great deal of field work. The Alexander W. Evans Herbarium is now at the Smithsonian Institution. It contains the type specimen of *Cladonia perforata* and more recent collections by Barbara Moore, Ann Buckley, Theodore Hendrickson, Gerould Wilhem and James Burkhalter, and a recent voucher specimen from Eglin Air Force Base made by Lt. Col. Douglas Ripley. The Smithsonian has no specimens from localities other than those reported above, and this indirect evidence suggested that "the range and occurrences of this lichen are truly limited" (Mason E. Hale, Jr. and Sherry K. Pittam, Botany, Smithsonian Institution, *in litt.*, Dec. 1989).

Hilsenbeck and Muller (1991) with several collaborators conducted a survey for *Cladonia perforata*, searching rosemary scrub at 111 sites throughout Florida. They enlisted James Allison and Thomas Patrick (Georgia Freshwater Wetlands and Heritage Inventory) to search similar areas in southeast Georgia (15 sites in 8 counties). Separately, as part of coastal inventories for the Florida Natural Areas Inventory, Ann Johnson and collaborators searched coastal scrubs along the lower east coast of Florida (Martin, Palm Beach, and St. Lucie Counties).

Hilsenbeck and Muller assembled the existing data to show that the lichen had been found at only 12 sites (including 6 on Archbold Biological Station). Earlier estimates of up to 15 sites were mistaken. In Okaloosa County, they confirmed the two known sites on Santa Rosa Island. They found that one site had recently been destroyed in Highlands County, but failed to find any new sites. They concluded that the lichen is indeed rare, with an estimated total of at least 26,000 individuals: 17,000 on one private site, 3,000 on another private site, 4,400 on Archbold Biological Station, and only 1,300 individuals on Santa Rosa Island. The largest site with *Cladonia perforata* is protected by its private owner; neither State nor Federal acquisition of the two private sites is presently contemplated.

In addition to the sites reported by Hilsenbeck and Muller, the Lake Apthorpe Preserve in Highlands County, owned by The Nature Conservancy, has *Cladonia perforata* (G. Babb, The Nature Conservancy, pers. comm., 1991; voucher specimen by Eric Menges at Archbold Biological Station). In January 1993, a biologist with the Archbold Biological Station discovered an additional population near the coast in southeast Florida in Martin County.

Both the central and panhandle Florida habitats of *Cladonia perforata* are rich in endemic vascular plant species that are associated with Florida rosemary. Several species or pairs of closely-related species have disjunct distributions between the two areas, much like *Cladonia perforata*. They include: *Lupinus aridorum* and *L. westianus, Paronychia chartacea*, and *Conradina brevifolia* and *C. canescens*.

Clitoria fragrans (pigeon wings) (Fanz 1979) is a member of the pea family (Fabaceae or Leguminosae). It is one of three species of the genus occurring in the southeastern states. The others are the butterfly pea, *Clitoria mariana*, and a species escaped from cultivation, *C. ternata*.

Clitoria fragrans is an erect perennial herb, 15–50 cm (6–20 inches) tall, with one or a few stems growing from a thick horizontal root that may be more than 2 m (6 feet) long. The stems are wiry (1–2 mm or 0.04–0.08 inch thick) and somewhat zigzag. The leaves have 3 rather leathery leaflets. Leaflets of the upper leaves are linear (lower leaves somewhat wider) and are obtuse (blunt) at the tip. The leaflets of *Clitoria mariana* are wider and are acute (pointed) at the tip.

Clitoria fragrans has two types of flowers: chasmogamous (showy insect pollinated) and cleistogamous (small, lacking petals, self-pollinating). Chasmogamous flowers are usually borne in pairs. The flowers are inverted so that the anthers and stigma touch the backs of visiting insects (the only other legume genus with inverted flowers is *Centrosema*, with two species in central Florida). The corolla has one large petal, the standard petal, 3.5–4.5 cm (1.5–2 inches) long (Fanz 1977) or 4.5–5 cm long (Isely 1990), colored lilac. The keel is small and white. The common name, pigeon wings, refers to the appearance of the flower. It was suggested by McFarlin on a herbarium specimen and adopted by Fanz (1979). Flowers with petals appear from May to June, with a few petalless (cleistogamous) flowers borne as late as September. Small thought the flowers were fragrant. Fanz (1977) detected only a very faint fragrance, but noted a heavy scent of flowering saw palmettos at the locality where Small collected the plant. The seed pod is borne on a stipe (stalk) that projects from the dried calyx (Isely 1990, p. 153; Fanz 1977, pp. 696–698; Mabberley 1987, p. 131).

Clitoria fragrans is easily distinguished from *C. mariana* by its purplish, glaucous stems, non-twining habit (it is an upright herb, not a vine), narrower leaflets, smaller flowers, and long-stipitate fruits (Fanz 1977, p. 702). The flowers of *Centrosema* differ from those of *Clitoria* by having shorter calyx tubes. *Centrosema arenicola* is restricted to much the same habitats as *Clitoria fragrans*, but has a somewhat larger range.

Clitoria fragrans was described by J.K. Small (1926) from specimens he collected near Sebring, Highlands County. McFarlin applied the name *Clitoria pinetorum* to specimens he collected, but he never published the name (Fanz 1977). Small (1933, p. 722) transferred the North American species of *Clitoria* to a new genus, *Martiusia*, but Fanz (1977) returned them to *Clitoria*.

Clitoria fragrans is distributed mainly on the Lake Wales Ridge in Highlands and Polk Counties (Fanz 1977, Wunderlin et al. 1980a, Christman 1988). On the Ridge, it is protected at Arbuckle State Forest and Park, Archbold Biological Station (private), Lake Apthorpe and Tiber Creek (The Nature Conservancy), and at Saddle Blanket Lakes (State acquisition project). It is also present at several sites that may be acquired by the State and/or Fish and Wildlife Service, including Carter Creek (Sebring Highlands) and a tract south of Lake Placid. It is reported to occur at the Avon Park Air Force Range (on the Bombing Range Ridge, a

separate landform from the Lake Wales Ridge) (Florida Natural Areas Inventory). It can be considered protected there. Fanz (1977) notes a collection made in Leesburg, Lake County in 1910, and a 1964 collection from Osceola County, 12 miles south of Holopaw via US 441. This site is on one of a series of low ridges with scrub vegetation in ranching country.

Clitoria fragrans occurs in scrub vegetation, turkey oak barrens, and at least at the edges of high pine (Christman and Judd 1990); it appears to have habitat preferences similar to *Eriogonum longifolium* var. *gnaphalifolium* and *Polygala lewtonii*, although its range does not extend as far north as these species. Fanz (1979) considers it a species of white sand soils, while the other two species tend to occur on yellow sand. Christman (pers. comm., 1992) considers it a species of yellow sand.

Crotalaria avonensis (Avon Park harebells) is also a member of the pea family. It was first collected by Ray Garrett of Avon Park in 1950; his specimen was assigned to *Crotalaria maritima* (=*C. rotundifolia*) by D.B. Ward in 1967. This specimen was not examined by Windler (1974) for his revision of the genus. Subsequently, K. DeLaney collected the plant in 1986 and, with R. Wunderlin, described it as a new species distinct from *Crotalaria rotundifolia*, a variable species that ranges from Virginia to Panama (DeLaney and Wunderlin 1989).

Crotalaria avonensis is a perennial herb. A vertical tap root produces flowering stems that originate as much as 10 cm (4 inches) below the surface, grow upright for only a few centimeters above the surface, and terminate in flowering racemes. The leaves are roughly 1–2 cm (0.5–1 inch) long, rounded, somewhat succulent, and coated with white or yellowish-white hairs. The racemes are both terminal and on short secondary branches opposite leaves. The flower, shaped like a typical pea flower, has a yellow corolla about 8–9 mm (0.3–0.4 inch) long. The keel petal (at the bottom of the corolla) is shorter than the wing petals (in *C. rotundifolia*, the wing petals are shorter). The seed pods are inflated, tan to gray to maroon, hairless or nearly so, 14–25 mm (.56–1.0 inch) long, and contain up to 18 seeds per pod. The pods can be nearly as long as the upright flower stalks that hold them in place. Flowering begins in mid-March and continues profusely until June. After flowering, the plants enter a vegetative phase, forming clusters of stems that give a clumped or rosette appearance. The plants are dormant from late fall or early winter until March. *Crotalaria rotundifolia* does not have a pronounced reproductive cycle, flowering most of the year (DeLaney and Wunderlin 1989).

Crotalaria avonensis is one of the most narrowly distributed of the Lake Wales Ridge endemics, currently known only from three sites, including the Saddle Blanket Lakes and Carter Creek tracts that might be protected through acquisition (K. DeLaney, *in litt.*, 1991). It typically grows in full sun on bare white sand or in association with clumps of reindeer lichens of the genus *Cladonia*, but many individuals occur in partial shade of other plants (DeLaney and Wunderlin 1989).

Scrub buckwheat is in the genus *Erigonum*, included in the Polygonaceae (jointweed family). This genus lacks the sheathing stipules (ocreae) that are typical of the family. *Eriogonum* includes about 150 species, mostly in western North America. Florida has only two species, both native to high pine: *Eriogonum tomentosum* is common throughout the northern part of the state, as far south as Highlands County. The second species, named *Eriogonum floridanum* by J.K. Small (1903), is restricted to central Florida (Small 1933, p. 445). Subsequent publications on Florida's flora have consistently adopted Small's treatment of *E. floridanum* as a full species (Kral 1983, p. 445; Ward 1979, p. 86; Wunderlin 1982, p. 169). This is a reasonable approach because *E. floridanum* is separated by hundreds of miles from the most similar taxa. However, James Reveal (1968), the expert on the genus, prefers an alternative approach. He treats the Florida plants as a variety of *Eriogonum longifolium*, a widespread, variable species that is represented east of the Mississippi by var. *harperi* (a candidate for Federal listing) in northern Alabama, Tennessee, and Kentucky (Kral 1983 and Kentucky heritage program data), and by *Eriogonum longifolium* var. *gnaphalifolium* Gandoger. Gandoger's (1906) name for the plant was based on a specimen collected near Eustis, Florida by "Hitchcock", evidently the eminent grass systematist A.S. Hitchcock. The Service accepts Reveal's taxonomic treatment in recognition of his expertise in this complex genus, while acknowledging that there are differences of opinion among botanists as to how to apply nomenclatural ranks to geographically isolated, morphologically distinguishable plant populations.

Scrub buckwheat is a perennial herb with a single stem that grows from a stout, woody root. Most of the leaves are at the base of the stem. They are 15–20 cm (6–8 inches) long, narrowly oblanceolate, entire, and green or bronze-green above, densely white-wooly beneath. Leaves on the stem are smaller and arranged alternately. The stem is erect, up to 1 m (3 feet) tall, and terminates in an open panicle. Each branch of the panicle ends in a cup-shaped involucre, with 5–8 teeth about 5 mm (0.2 inch) long. Within each involucre, 15–20 flowers form a cluster, with the stalk of each flower starting out erect, then reflexing so the flower hangs down below the involucre. Each flower is 6–8 mm (0.2–0.3 inch) long, with 6 linear sepals. The involucre and flowers are silvery, silky-pubescent. The only other species of *Eriogonum* in Florida, *E. tomentosum*, has leafy bracts in the racemes and the flowering stem has opposite leaves (Ward 1979, Wunderlin 1982). Both plants are illustrated in Rickett (1967). Because scrub buckwheat is a large, conspicuous plant that can not be mistaken for any other, its distribution is accurately known.

Scrub buckwheat "occurs in habitats intermediate between scrub and sandhills [high pine], and in turkey oak barrens from Marion County to Highlands County" (Christman 1988, p. 136). Other plants, including *Polygala lewtonii*, *Chionanthus pygmaeus*, and *Prunus geniculata*, occur in the same places. The northern range limit for scrub buckwheat is in Ocala National Forest and areas of mixed scrub and high pine south of Ocala in Marion County; suitable habitat and possibly the plant extend south into northern Sumter County. Scrub buckwheat historically occurred near Eustis in Lake County (there are no recent records), and it still occurs near Clermont in remnants of high pine with *Polygala lewtonii* and several endangered plant species. Scrub buckwheat occurs at other scattered localities, including Southwest Orange county, the northwest corner of Osceola County, and on the Lake Wales Ridge in Polk and Highlands Counties, as far south as Archbold Biological Station, south of Lake Placid. Most of the recent records for the species are from Polk and Highlands Counties, partly because intensive biological surveys of scrub vegetation have been conducted in those counties (Christman 1988; pers. comm. by K. DeLaney and E. Menges, 1991). Scrub buckwheat may once have occurred in the Tampa area, if a specimen cited by Gandoger as the type specimen of "*E. longifolium* var. *floridana*" should be assigned to this variety. An upland in southern Marion County where this species occurs

extends into Sumter County, and the plant's range may extend into Sumter, too.

Scrub buckwheat is protected in the Ocala National Forest, Lake Arbuckle State Forest and State Park, and Nature Conservancy preserves at Tiger Creek and Lake Apthorpe. Scrub buckwheat is likely to be protected at Catfish Creek and several other tracts if State or Federal land acquisition occurs as planned.

Nolina brittoniana (scrub beargrass) was collected and described by G.V. Nash (1895). H.H. Bartlett (1909) reviewed the genus in the Southeast and described the only other species of *Nolina* in Florida, *Nolina atopocarpa*, a candidate for Federal listing that occurs in the panhandle and in the peninsula from St. Augustine south to Charlotte County. The genus *Nolina* belongs to the Agavaceae (agave family), which includes century plants and yuccas. The genus is centered in southwestern North America (Mabberley 1987). The Agavaceae are often included in the Liliaceae (lily family), in the broad sense.

Nolina brittoniana is a perennial growing from a short, thick, fleshy, bulblike rootstock. The leaves are 1–2 meters long (3–6 feet) and 6–13 mm (0.2–0.5 inch) wide, forming a rosette with the youngest leaves upright and the oldest lying nearly flat on the ground. The flowering stem, usually solitary, grows at least 2 meters (6 feet) high from the rosette in April. The inflorescence is a panicle with about 6 branches; when in bloom, the branches are covered with small white six-parted flowers, making the plant very conspicuous (Kral 1983, Wunderlin et al. 1980b). Individual plants appear to usually have all male or all female flowers. The plants bear abundant seed, which is easily germinated, and the plant is not difficult to propagate (S. Wallace, Bok Tower Gardens, pers. comm., 1990). In nature, this species occurs as scattered specimens, and rarely if ever forms large colonies. *Nolina atopocarpa*, a species of dry flatwoods, may occur in the vicinity of *Nolina brittoniana;* this species has shorter leaves, greenish flowers, and asymmetric fruits (*N. brittoniana* has symmetrical fruits, triangular in cross section).

Nolina brittoniana occurs in scrub, high pine, and even occasionally in hammocks (Christman 1988). Its range is from the south end of the Lake Wales Ridge in Highlands County north to Orange County (Orlando) and northern Lake County. An apparently isolated locality was reported from Hernando County, north of Tampa.

On the Lake Wales Ridge, *Nolina brittoniana* occurs in both Highlands and Polk Counties, where it occurs in most of the tracts that are targeted for acquisition by the State or by the Fish and Wildlife Service. Northeast of Polk County, *Nolina brittoniana* occurred in the northwest corner of Osceola County and western Orange County (where it was collected in 1958). The plant probably still exists in Orange County, but remaining habitat is being destroyed very rapidly. In Lake County, *Nolina brittoniana* occurs in remnants of high pine on hills west of Lake Apopka, near Clermont. Also in Lake County, the type specimens of *Nolina brittoniana* were collected near Eustis in 1894, and the plant was collected near Tavares in 1941. Robert McCartney (pers. comm., 1990), a knowledgeable field worker, considers the northern range limit for *Nolina brittoniana* to be northern Lake County; however, to the north, a specimen was collected on "low ground" near Belleview, Marion County in 1928. Christman (1988) doubts this locality, but suitable habitat does exist in the vicinity. The plant was collected in a "much disturbed, old white sand scrub with hardwood intrusion" north of Tampa in Hernando County, in 1961. Larger scrubs in the same area have probably not been searched for rare plants.

Polygala lewtonii (Lewton's polygala) is a member of the Polygalaceae (milkwort family). It was first collected near Frostproof, Florida by F.L. Lewton in 1894, and was named by Small (1898). Further information on plants named by Small is provided in Austin 1987. The status of *Polygala lewtonii* as a distinct species was affirmed by Blake (1924) and James (1957). The genus has since been reviewed by Miller (1970) and Saulmon (1971).

Polygala lewtonii is a perennial with a taproot. Each plant produces one to several annual stems, which are spreading, upward-curving, or erect, and are often branched. The leaves are small, sessile, rather succulent, broader toward the tip, and are borne upright, tending to overlap along the stem, like shingles. The normally opening flowers are in erect, loosely flowered racemes up to 1.5 cm (0.6 inch) long. They are about 0.5 cm long and bright pink (Wunderlin et al. 1981) or "attractive purplish-red" (Ward and Godfrey 1979). Each flower is about 3.5 mm (0.14 inch) long. Two of the five sepals are enlarged and wing-like, between which the largest of the three petals forms a keel that ends in a tuft of finger-like projections (Ward and Godfrey 1979). This species is closely related to *Polygala polygama*, a widespread species that tends to form larger clumps and has a longer root, narrower leaves, and differently shaped wing sepals. *Polygala polygama* has short branches that hug the ground, bearing inconspicuous self-pollinating (cleistogamous) flowers. *Polygala lewtonii* is inferred to have similar cleistogamous flowers (James 1957 cited in Ward and Godfrey 1979), but Wunderlin et al. (1981) are not clear that they have been observed.

Polygala lewtonii occurs most frequently in habitats intermediate between high pine and scrub (turkey oak barrens), as well as in both habitats (Christman 1988, Wunderlin et al. 1981). It has been collected in Highlands, Polk Osceola, Lake, and Marion Counties. In Highlands County, it was collected at two sites near Sebring in 1945 and 1955, but was not seen again (Wunderlin et al. 1981) until recently, when it was found in turkey oak barrens northeast of Sebring (J. Fitzpatrick, Archbold Biological Station, pers. comm., 1992).

In Polk County, *Polygala lewtonii* is currently known to occur in Arbuckle State Forest and Park, the State's Catfish Creek land acquisition project (G. Babb, The Nature Conservancy, *in litt.*, 1991), The Nature Conservancy's Tiger Creek Preserve (Wunderlin et al. 1981), at a site near Davenport that was partly bulldozed in 1991, and in the Poinciana residential development (N. Bissett, *in litt.*, 1991). It also occurs at a site with the endangered Florida ziziphus (*Ziziphus celata*) (DeLaney et al. 1989).

In Osceola County, *Polygala lewtonii* was collected in 1974 at the northwest corner of the county, on a dry prairie above Lake Davenport. In Lake County, the plant has been collected in scrub four miles north of Astatula and from at least five sites in the hills between Lake Apopka and Clermont. These hills were once covered with high pine that had a significant number of scrub plant species, including the endangered *Prunus geniculata* (scrub plum), *Nolina brittoniana* (Wunderlin et al. 1981), and *Warea amplexifolia* (wide-leaf mustard) (Judd 1980). *Polygala lewtonii* was collected once near Eustis (James 1957, cited in Wunderlin et al. 1981). The plant was collected from Ocala National Forest (Marion County) in firebreaks near Juniper Springs, 1949, and apparently not again until 1991, when it was found in scrub (C. Greenberg, Univ. of FL, pers. comm., 1992).

Polygonella myriophylla, a member of the Polygonaceae (jointweed family), was first collected by J.K. Small and DeWinkler on a scrub ridge south of Frostproof, Polk County, Florida. Small (1924) described it as a new species,

Dentoceras myriophylla. Horton (1963) combined two of Small's genera with the genus *Polygonella*, making this species *Polygonella myriophylla*. The common name of sandlace comes from Christman (1988); other possibilities are Small's jointweed (Florida Natural Areas Inventory) or woody wireweed (Wunderlin 1982).

Polygonella myriophylla is a sprawling shrub that, as G.L. Webster noted on a herbarium specimen, has the habit of the popular landscaping plant creeping juniper, *Juniperus horizontalis* (cited in Wunderlin et al. 1980c). The shrub's many branches zigzag along the ground and root at the nodes, forming low mats. The lower parts of the creeping branches have reddish-brown bark that cracks and partly separates in long, flat, interlacing strips. The short lateral branches are upright, leafy, and end in flowering racemes. *Polygonella myriophylla* has the distinctive sheathing stipules (ocreae and ocreolae) typical of the jointweed family. The leaves are needle-like, fleshy, 3–10 mm (0.1–0.4 inch) long. The small flowers have white (or pink or yellow) petal-like sepals up to 3–4 mm (0.1 inch) long. Because this shrub's appearance is so unique, information on its distribution and abundance is particularly complete and accurate.

Polygonella myriophylla is, curiously, absent from the southern tip of the Lake Wales Ridge. Its range extends from Archbold Biological Station northward along the Lake Wales Ridge to the Davenport-Poinciana area in northern Polk County. Further northeast, it occurs at one site in Osceola County and three in western Orange County where it occurs with the endangered scrub lupine *Lupinus aridorum* (Wunderlin 1984). The Orange County sites are at Vineland, a rapidly developing portion of the Orlando metropolitan area. A report of *Polygonella myriophylla* from Lake County was based on a misidentification (Wunderlin et al. 1980c, Christman 1988). Kral's (1983) distribution map places this plant in DeSoto County, based on a specimen collected by J.K. Small and J.B. DeWinkler in 1919, before Highlands County was created in 1921 (specimen cited in Wunderlin et al. 1980c).

Polygonella myriophylla occurs within scrubs that cover about 25,000 acres (Christman 1988). It is currently protected at Archbold Biological Station (where it is rare), Saddle Blanket Lakes and Catfish Creek (State acquisition projects), and Lake Apthorpe (The Nature Conservancy). It is abundant in several tracts that are proposed for acquisition by the State or the Service.

Previous Federal Action

Federal government actions on four of the seven plants began as a result of section 12 of the Endangered Species Act of 1973, which directed the Secretary of the Smithsonian Institution to prepare a report on plants considered to be endangered, threatened, or extinct. This report, designated as House Document No. 94–51, was presented to the Congress on January 9, 1975. On July 1, 1975, the Service published a notice in the **Federal Register** (40 FR 27823) of its acceptance of the report as a petition in the context of section 4(c)(2) (now section 4(b)(3)) of the Act, as amended, and of its intention to review the status of the plant taxa contained within. *Nolina brittoniana, Polygala lewtonii, and Polygonella myriphylla* were included in these documents as endangered species, and *Clitoria frangrans* as a threatened species.

On June 16, 1976, the Service published a proposal in the **Federal Register** (42 FR 24523) to determine approximately 1,700 vascular plant species to be endangered species pursuant to section 4 of the Act. This proposal included *Nolina brittoniana, Polygala lewtonii*, and *Polygonella myriophylla*. General comments on the 1976 proposal were summarized in an April 26, 1978, **Federal Register** publication (43 FR 17909). The Endangered Species Act Amendments of 1978 required that all proposals over 2 years old be withdrawn. A 1-year grace period was given to those proposals already more than 2 years old. In the December 10, 1979, **Federal Register** (44 FR 70796), the Service published a notice of withdrawal of the June 16, 1976, proposal.

On December 15, 1980, the Service published a notice of review for plants (45 FR 82480). This notice included *Clitoria fragrans, Eriogonum longifolium* var. *gnaphalifolium* (under the name *Eriogonum floridanum*), and *Polygala lewtonii* as category 1 candidates, and *Nolina brittoniana* and *Polygonella myriophylla* as category 2 candidates. Category 1 candidates are those for which the Service currently has on file substantial information on biological vulnerability and threats to support preparation of listing proposals, while category 2 candidates are those for which data in the Service's possession indicate listing is possibly appropriate, but for which substantial data on biological vulnerability and threats are not currently known or on file to support proposed rules. On November 28, 1983, the Service published in the **Federal Register** a supplement to the notice of review (48 FR 53640); the notice changed *Eriogonum longifolium* var. *gnaphalifolium* to a category 2 species. Another updated notice of review published September 27, 1985 (50 FR 39526), changed *Polygonella myriophylla* to a category 3C species (no longer a candidate for Federal listing), based on a status survey that gave the impression that the plant was secure because it is locally abundant. Christman (*in litt.* 1987, 1988) pointed out that this was a mistake: *Polygonella myriophylla* is "much rarer, and more endangered, than several federally-listed scrub species, including *Paronychia chartacea, Chionanthus pygmaeus, Polygonella basiramia, Prunus geniculata*, for example."

On February 21, 1990 (55 FR 6184), the plant notice was again revised, assigning category 1 candidate status to all five plants that had previously been candidates, based on an abundance of new survey information. The 1990 notice assigned category 2 status to *Crotalaria avonensis* and to *Cladonia perforata*. Since then, a status survey on *Cladonia perforata* has been completed and further information on *Crotalaria avonensis* has been received from Mr. Kris Delaney, qualifying these species for category 1 status.

Based on the Service's system for ranking candidate species for listing, which has a range of 1 to 12, the listing priority number for each of the five endangered species in this rule was 2. *Clitoria fragrans* and *Eriogonum longifolium* var. *gnaphalifolium*, the two threatened species, were assigned a listing priority number of 8 and 9, respectively. A complete explanation of the Service's listing and recovery priority guidelines was published in the **Federal Register** of September 21, 1983 (48 FR 43098).

Petitions

The Service was petitioned to list the lichen *Cladonia perforata* by Ms. Ann Buckley in a letter received June 5, 1989. The Service found the action requested by the petition to be warranted, but precluded by work on other species having higher priority for listing (55 FR 31610, August 3, 1990). An administrative finding of "warranted but precluded" was repeated in October 1991, as discussed below, in connection with the Service's annual review of recycled petitions.

Section 4(b)(3)(B) of the Act, as amended in 1982, requires the Secretary to make findings on certain 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 *Clitoria fragrans, Nolina brittoniana, Polygala lewtonii,* and *Polygonella myriophylla* because the Service had accepted the 1975 Smithsonian report as a petition. In each October from 1983 through 1991, the Service found that the petitioned listing of these species was warranted but precluded by other listing actions of a higher priority, and that additional data on vulnerability and threats were still being gathered. Publication of a listing proposal on September 30, 1992 (57 FR 45020) constituted the final petition finding for these five species. The September 30, 1992, proposal also included *Eriogonum longifolium* var. *gnaphalifolium* and *Crotalaria avonensis,* for which no petition had been received.

Summary of Comments and Recommendations

In the September 30, 1992, 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 comment. A newspaper notice which invited general public comment was published on October 18, 1992, in the Sebring News-Sun newspaper (Highlands County) and on October 20, 1992, in the Hernando Times (Hernando County), Daily Commercial (Leesburg, Lake County), Ocala Star-Banner (Marion County), Daily News (Fort Walton Beach, Okaloosa County), The Orlando Sentinel (Orange County), and the Highlander (Lake Wales, Polk County). Comments were received from a member of the Polk County Board of County Commissioners and seven individuals. All commenters supported the proposal.

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that *Cladonia perforata, Crotalaria avonensis, Nolina brittoniana, Polygala lewtonii,* and *Polygonella myriophylla* should be classified as endangered species, and that *Clitoria fragrans* and *Eriogonum longifolium* var. *gnaphalifolium* should be classified as threatened 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 *Cladonia perforata* A.W. Evans (Florida perforate cladonia), *Clitoria fragrans* Small (pigeon wings), *Crotalaria avonensis* DeLaney & Wunderlin (Avon Park harebells), *Eriogonum longifolium* Nuttall var. *gnaphalifolium* Gandoger (=*Eriogonum floridanum* Small) (scrub buckwheat), *Nolina brittoniana* Nash (Britton's beargrass), *Polygala lewtonii* Small (Lewton's polygala), and *Polygonella myriophylla* (Small) Horton (sandlace) are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

All seven plants have already suffered serious loss of habitat to agriculture (citrus groves and pastures) and residential development, and all are threatened by future development. The Lake Wales Ridge in Polk and Highlands Counties originally had 250,000 acres of xeric upland vegetation (scrub and high pine), of which 27,500 acres remain. Because the plant species endemic to scrub or high pine in central Florida had much narrower local distributions within the Ridge (each species is likely to be found in only a fraction of seemingly suitable habitat), the loss of habitat for particular species has often been more severe than the overall figures indicate.

Citrus groves are being expanded rapidly on the southern Lake Wales Ridge because the area escaped the worst effects of severe freezes during the 1980's, especially December 1989. Development of a citrus grove recently caused the destruction of one population of *Cladonia perforata,* and other significant recent losses of scrub habitat have been documented from aerial photography by scientists at Archbold Biological Station. Property taxation in most Florida counties favors agricultural land use and penalizes leaving land "idle" in native vegetation. These policies may change; Polk County already has "preservation" zoning to protect natural vegetation.

The population of the Lake Wales Ridge is increasing as retirees and other immigrants to Florida, as well as retirees from within Florida, are attracted to areas with low costs of living and the perception of few urban problems. It is anticipated that immigration into central Florida will continue. This threatens the seven plants because most of them (*Cladonia perforata* and *Polygala lewtonii* appear to be exceptions) occur in subdivisions with unimproved lots without streets or utilities. The lack of streets discouraged building; the divided ownerships of these subdivisions and the high prices for which lots were originally sold discouraged the conversion of these subdivisions to citrus. As a result, these subdivisions have unintentionally protected the native vegetation, and several may be acquired as biological preserves, despite the difficulty of purchasing land on a lot-by-lot basis. There may be little time available to begin land acquisition at the largest subdivision under consideration for acquisition, Sebring Highlands (Carter Creek), where assessments collected from landowners have built up to a large enough sum to pave the main road through the subdivision. An electric line has already been built, so with the road paved, widespread construction of houses can be anticipated.

Funding for State or Federal land acquisition to conserve central Florida plants is not yet assured. Existing land acquisition plans by the Service focus on purchasing and managing scrub rather than high pine; this leaves *Eriogonum longifolium* var. *gnaphalifolium* and *Polygala lewtonii* unprotected. The State intends to purchase high pine, but funding for land management could be limited.

The largest populations of the lichen *Cladonia perforata* are on private land; the principal landowner intends to protect the lichen, but it is necessary to be cautious about the long-term conservation of this area.

In the counties north of Highlands and Polk, the pressures of residential development are generally severe, and historic populations of plants in the Orlando (Orange County area), as well as Eustis and Clermont (Lake County) areas, are known to have disappeared.

Clitoria fragrans occurs on Avon Park Air Force Range and has been collected on a low ridge with scrub in southern Osceola County, in a region of large ranches. The plant's habitat is appropriately managed on the Air Force Range, and conservations with range conservationists with the Soil Conservation Service indicate that scrub is quite likely to remain intact on ranches. Similarly, *Eriogonum longifolium* var. *gnaphalifolium* and *Polygala lewtonii* are probably secure in Ocala National Forest, although evaluation is needed of the distribution and management of these two species in the Forest. The relative security of these two species in parts of their range is the

primary reason for classifying them as threatened rather than endangered.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

There is little commercial trade in these seven plants, although *Nolina brittoniana* and *Polygonella myriophylla* are propagated and sold on a limited scale (Association of Florida Native Nurseries 1989). Commercial trade in these species should not adversely affect them, provided that nursery operators abide by State law and the Florida Native Plant Society's policy on transplanting native plants from the wild (Schwartz and Young 1992).

C. Disease or Predation

Not applicable.

D. The Inadequacy of Existing Regulatory Mechanisms

Nolina brittoniana and *Polygala lewtonii* are listed as endangered species, and *Clitoria fragrans* and *Eriogonum longifolium* var. *gnaphalifolium* are listed as threatened species under the Preservation of Native Flora of Florida law (section 581.185–187, Florida Statutes), which regulates taking, transport, and sale of plants but does not provide habitat protection. The Endangered Species Act will provide additional protection through the consultation requirements of section 7, recovery planning, and the prohibitions of section 9, which include the Act's additional penalties for taking of plants in violation of Florida law. The Florida law provides for automatic addition of federally listed plants to the State's list as endangered species.

Efforts by the Service to protect the threatened Florida scrub jay may benefit other plants and animals of the scrub. The scrub jay inhabits much of the scrub vegetation on the Lake Wales Ridge. The Endangered Species Act's prohibition against take of listed animals (section 9(a)(1)(B)) means that landowners seeking to destroy scrub habitat upon which scrub jays depend run the risk of a "taking" violation unless they obtain a section 10(a)(2) permit, which the Service can issue only if the landowner submits or participates in an acceptable conservation plan for the scrub jay.

As explained in the background section, 13 plant species from central Florida scrub and high pine habitat are already federally listed and recovery plans have been prepared (Fish and Wildlife Service 1987a, 1990). A final rule is in preparation to list a fourteenth species, the shortleaved rosemary *Conradina brevifolia*. Efforts already underway to conserve the 13 plants should benefit most of the species in this rule.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Fire occurs in scrub vegetation at irregular intervals. For all of the plants listed in this rule, other than the lichen *Cladonia perforata*, fire is probably beneficial. For the lichen, however, fire seems to be entirely destructive. The largest populations of the lichen are in the largest existing rosemary balds, which seem to have been affected by fires at extremely long intervals; the area "supports an uneven-aged stand of sand pines, with the oldest trees approaching 100 years" (Myers 1990). At the neighboring Archbold Biological Station, *Cladonia perforata* probably benefited from many years of fire suppression, which also left the Station grounds susceptible to wildfire. Today, the Station is implementing a prescribed fire program that probably offers the best long-term chance to maintain rosemary balds with *Cladonia* lichens, but there is a real possibility that lichen populations may be harmed by fires.

Human activities, including off road vehicle use, trash dumping, and inadvertent trampling during outdoor recreation activities, threaten most of these plants. The lichen *Cladonia perforata* appears to be vulnerable to public use on Eglin Air Force Base, Santa Rosa Island.

Hurricane storm surges may wash over the lichen populations on Santa Rosa Island.

The limited geographic distribution of each of the seven species, the fragmentation of remaining habitat into small segments isolated from each other, and the small sizes of populations of some species, especially *Cladonia perforata* and *Polygala lewtonii*, exacerbate the threats faced by these 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 *Crotalaria avonensis, Nolina brittoniana, Polygala lewtonii*, and *Polygonella myriophylla* as endangered species, and *Clitoria fragrans* and *Eriogonum longifolium* var. *gnaphalifolium* as threatened. Each of the species listed as endangered is likely to become extinct in a significant portion of its range within the foreseeable future, meeting the Act's requirements for listing as an endangered species. The two species listed as threatened are likely to become endangered species if effective conservation measures are not taken, meeting the Act's definition of threatened species.

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 a species is determined to be endangered or threatened. The Service finds that designation of critical habitat is not presently prudent for these species. Except for the relatively few protected sites with one or more of these species, the populations of these species are on unprotected private land where they would gain no added protection from designation of critical habitat, and where such a designation might motivate landowners to extirpate the plants. Designation of critical habitat might also attract persons wishing to collect plants for horticultural purposes, with or without the written permission of the landowner that is required by Florida law. For these reasons, it would not be prudent to determine critical habitat for the seven plant species. The State and The Nature Conservancy are working to acquire lands to conserve these plants. Many private owners of scrub habitat occupied by the threatened Florida scrub jay have been, or will be, contacted by the Service as part of its efforts to prevent take of the bird without permit (including destruction of nests or of occupied habitat). As a result, these landowners are aware of the importance of scrub habitat, if not of individual plant species. Protection of the plant species will be addressed through the recovery process and through the section 7 consultation process. For these reasons, the Service considers designation of critical habitat not to be prudent.

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. The protection required of Federal agencies and the prohibition 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 ensure 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.

Conservation of *Eriogonum longifolium* may require ensuring that use of herbicides in forestry or road right-of-way maintenance does not jeopardize this plant. It is not clear whether restrictions on herbicide use would be necessary to protect *Clitoria fragrans*, which occurs on grazing lands. The other species appear not to occur in situations where herbicide restrictions would be warranted. Implementation of any such restrictions would involve the Environmental Protection Agency (EPA).

Cladonia perforata occurs on a Gulf barrier island that is part of Eglin Air Force Base; *Clitoria fragrans* occurs on Avon Park Air Force Range, and *Eriogonum longifolium* var. *gnaphalifolium* occurs in the Ocala National Forest. The Service is currently aware of no ongoing or pending Federal actions (except for possible EPA involvement noted above) either on these lands or elsewhere that would affect these plants.

The Act and its implementing regulations found at 50 CFR 17.61, 17.62, and 17.63 for endangered species, and 17.71 and 17.72 for threatened species, set forth a series of general prohibitions and exceptions that apply to all listed plants. All trade prohibitions of section 9(a)(2) of the Act, implemented by 50 CFR 17.61 and 17.71, apply. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to import or export, transport in interstate or foreign commerce in the course of a commercial activity, sell or offer for sale these species in interstate or foreign commerce, or to remove and reduce to possession these species from areas under Federal jurisdiction. Seeds from cultivated specimens of threatened plant species are exempt from these prohibitions provided that a statement of "cultivated origin" appears on their containers. In addition, for endangered plants, the 1988 amendments (Pub. L. 100–478) to the Act prohibit the malicious damage or destruction on Federal lands and the removal, cutting, digging up, or damaging or destroying of endangered plants in knowing violation of any State law or regulation, including State criminal trespass law. Section 4(d) of the Act allows for the provision of such protection to threatened species through regulations. This protection may apply to threatened plants once revised regulations are promulgated. Certain exceptions apply to agents of the Service and State conservation agencies. The Act and 50 CFR 17.62, 17.63, and 17.72 also provide for the issuance of permits to carry out otherwise prohibited activities involving endangered and threatened species under certain circumstances.

It is anticipated that few trade permits will be sought or issued because the seven plant species are of limited horticultural interest, and only two (*Nolina brittoniana* and *Polygonella myriophylla*) may be in commerce across state lines. Requests for copies of the regulations on listed plants and inquiries regarding prohibitions and permits may be addressed to the Office of Management Authority, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, room 432, Arlington, Virginia 22203 (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).

References

A complete list of all references cited herein, as well as others, is available upon request from the Service's Jacksonville Field Office (see **ADDRESSES** section).

Author

The primary author of this rule is Mr. David Martin (see **ADDRESSES** section).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Regulations Promulgation

PART 17—[AMENDED]

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

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

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 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					
*	*	*	*	*	*	*
Agavaceae—Agave family:						
*	*	*	*	*	*	*
Nolina brittoniana	Britton's beargrass	U.S.A. (FL)	E	500	NA	NA
*	*	*	*	*	*	*
Cladoniaceae—Reindeer moss family:						
Cladonia perforata	Florida perforate cladonia	U.S.A. (FL)	E	500	NA	NA

Species		Historic range	Status	When listed	Critical habitat	Special rules
Scientific name	Common name					
• • •	•	•	•	•	•	•
Fabaceae—Pea family:						
• • •	•	•	•	•	•	•
Clitoria fragrans	Pigeon wings	U.S.A. (FL)	T	500	NA	NA
Crotalaria avonensis	Avon Park harebells	U.S.A. (FL)	E	500	NA	NA
• • •	•	•	•	•	•	•
Polygalaceae—Milkwort family:						
• • •	•	•	•	•	•	•
Polygala lewtonii	Lewton's polygala	U.S.A. (FL)	E	500	NA	NA
• • •	•	•	•	•	•	•
Polygonaceae—Buckwheat family:						
• • •	•	•	•	•	•	•
Eriogonum longifolium var. *gnaphalifolium* (=*Eriogonum floridanum*).	Scrub buckwheat	U.S.A. (FL)	T	500	NA	NA
• • •	•	•	•	•	•	•
Polygonella myriophylla	Sandlace	U.S.A. (FL)	E	500	NA	NA
• • •	•	•	•	•	•	•

Dated: April 8, 1993.

Richard N. Smith,

Acting Director, Fish and Wildlife Service.

[FR Doc. 93–9748 Filed 4–26–93; 8:45 am]

BILLING CODE 4310–55–M

50 CFR Part 17

RIN 1018–AB83

Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Three Puerto Rican Plants

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The Service determines *Aristida chaseae, Lyonia truncata* var. *proctorii* and *Vernonia proctorii* to be endangered species pursuant to the Endangered Species Act (Act) of 1973, as amended. These plants, including two shrubs and one grass species, are endemic to Puerto Rico, and all are restricted to the southwestern part of the island. With the exception of one site on the Cabo Rojo National Wildlife Refuge, the habitat of all three species is threatened with modification and loss due to various types of development. *Aristida chaseae* may also be affected by competition from introduced grass species. This final rule will implement the Federal protection and recovery provisions afforded by the Act for *Aristida chaseae, Lyonia truncata* var. *proctorii* and *Vernonia proctorii.*

EFFECTIVE DATE: May 27, 1993.

ADDRESSES: The complete file for this rule is available for inspection, by appointment, during normal business hours, at the Caribbean Field Office, U.S. Fish and Wildlife Service, P.O. Box 491, Boquerón, Puerto Rico 00622; and at the Service's Southeast Regional Office, suite 1282, 75 Spring Street, SW., Atlanta, Georgia 30303.

FOR FURTHER INFORMATION CONTACT: Ms. Susan Silander at the Caribbean Field Office address (809/851–7297) or Mr. Dave Flemming at the Atlanta Regional Office address (404/331–3580).

SUPPLEMENTARY INFORMATION:

Background

Aristida chaseae (no common name) was discovered by Agnes Chase near Boquerón in 1913. It was known only from the type collection for many years, until it was discovered by Paul McKenzie in 1987 on the Cabo Rojo National Wildlife Refuge. This new population, which contains from 150 to 175 plants, is approximately 8 km to the south of the type locality. The species apparently has been eliminated from the type location, possibly as a result of competition from vigorous, introduced grass species (McKenzie et al. 1989; Proctor 1991).

Later in 1987, McKenzie and Dr. George Proctor located a third population on the rocky, exposed upper slopes of Cerro Mariquita in the Sierra Bermeja, a range of hills also found within the municipality of Cabo Rojo. This range of hills is the oldest geologic formation in Puerto Rico and is known for its high plant endemism. Additional localities on ridges to the west within the Sierra Bermeja were found in 1988. In these hills, it occurs at elevations between 150 and 300 meters (McKenzie et al. 1989; Proctor 1991).

Aristida chaseae is a perennial grass with densely tufted, wide-spreading culms which may reach from 50 to 60 cm in length. The leaf blades are involute, 2 to 3 mm wide and 10 to 15 mm long. The panicles are narrow and may be from 10 to 15 cm in length. The glumes are equal, 10 to 13 mm long and acuminate or awn-tipped. The lemma is approximately 12 mm long, narrowed at the summit but scarcely beaked and scaberulous of the upper half. The callus is 1 mm long and densely pilose. The awns are equal, somewhat