

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018-AB75

Endangered and Threatened Wildlife and Plants; Endangered or Threatened Status for Five Florida Plants

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The Service determines four Florida plant species to be endangered species, and one to be a threatened species, pursuant to the Endangered Species Act of 1973 (Act), as amended. The four species determined to be endangered are: *Conradina glabra* (Apalachicola rosemary) of Liberty County, threatened by habitat modification; *Conradina brevifolia* (short-leaved rosemary) of Highlands and Polk Counties, threatened by habitat destruction for agricultural or residential purposes; *Conradina etonia* (Etonia rosemary) of Putnam County, threatened by residential development; and *Cucurbita okeechobeensis* ssp. *okeechobeensis* (Okeechobee gourd) of the southern shore of Lake Okeechobee in Palm Beach County, threatened by vegetation management measures and the consequences of water level management. The Service determines threatened status for *Pinguicula ionantha* (Godfrey's butterwort), native to four counties in the Florida panhandle. It is threatened by habitat degradation due to lack of prescribed fire and shading by planted pines. This rule implements the protection and recovery provisions afforded by the Act for the five species.

EFFECTIVE DATE: August 11, 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

Discussion of the Three *Conradina* Species

Conradina (minty rosemary) is a genus of minty-aromatic shrubs belonging to the mint family (Lamiaceae) that resemble the herb

rosemary (*Rosmarinus officinalis*), native to the Mediterranean region. *Conradina* is characterized by dense hairs appressed or matted on the under surfaces of the leaves, and by the flower's corolla tube, which is sharply bent above the middle, rather than straight or gently curved (Shinners 1962).

The genus *Conradina* consists of six allopatric species, i.e., the ranges of the species do not overlap (Kral and McCartney 1991). The most widespread and variable species is *Conradina canescens* of the Florida panhandle, southern Alabama, and southern Mississippi. This species occurs on dry sand soils on coastal dunes, in sand scrub vegetation, and in dry longleaf pinelands. The other five species have more restricted geographic distributions and are considerably less variable (Gray 1965).

Conradina verticillata (Cumberland rosemary) is native to north-central Tennessee. It was federally listed as a threatened species in the Federal Register of November 29, 1991 (56 FR 60937).

Conradina grandiflora (large-flowered rosemary) is native to scrub vegetation near Florida's Atlantic coast from Daytona Beach south to Miami, as well as inland near Orlando and in Okeechobee County. Despite measures to protect the federally threatened Florida scrub jay that occurs in the same scrub vegetation, habitat of *Conradina grandiflora* is being lost to development, and Federal listing of *Conradina grandiflora* is probably warranted, but was not proposed with the other species of *Conradina* because other listing actions were of higher priority.

The three other species of *Conradina*—*Conradina glabra* (Apalachicola rosemary), *Conradina brevifolia* (short-leaved rosemary), and *Conradina etonia* (Etonia rosemary)—are subjects of this rule.

Conradina glabra is restricted to Liberty County, Florida, west of Tallahassee near the Apalachicola River (Gray 1965; Schultz 1987, citing personal communication from Wilson Baker; and S. Gatewood, The Nature Conservancy, Tallahassee, pers. comm. 1991). Plants collected from Santa Rosa County near Milton, northeast of Pensacola (by S.C. Hood in 1949) were assigned to this species by Shinners (1962). Gray (1965) searched the Milton area for *Conradina glabra* without finding it. Later, Godfrey (1988) found plants assignable to *C. glabra* north of Milton, in Blackwater State Forest. The Blackwater Forest plants are within the geographic range of the widespread, variable *Conradina canescens* and,

except for being glabrous, the Santa Rosa County plants resemble *Conradina canescens* more than *C. glabra*. In 1989, Elaine Luna was studying the taxonomy and distribution of *Conradina glabra*, but results are not yet available (D. White, Florida Natural Areas Inventory, memo, October 1989; R. Hilsenbeck, Florida Natural Areas Inventory, *in litt.*, 1991). Kral and McCartney (1991) implicitly assign the Blackwater plants to *C. canescens*. Godfrey (1988) corrects an erroneous report by Godfrey and Ward (1979) that "most collections (of *C. glabra*) have been made in or near the Apalachicola National Forest" in Franklin County, Florida. The plant does not occur in the National Forest or Franklin County.

Conradina glabra occurs in an area of several square miles near State Road 12 and County Road 271, northeast of Bristol, Liberty County. The area is a gently undulating upland, originally with longleaf pine-wiregrass vegetation, dissected by ravines of the Sweetwater Creek system, which drain westward to the Apalachicola River. Parts of the Apalachicola ravines are incorporated in public and private nature preserves that protect rich hardwood forests with the narrowly endemic Florida torreya (*Torreya taxifolia*) and Florida yew (*Taxus floridana*). Heads of ravines, called steepheads, have slopes that are undermined by groundwater seeping into the ravine bottom, causing the slopes to gradually slump, carrying the vegetation with it. At least one steephead shrub, Florida yew, appears to be adapted to slowly moving down the slopes (Redmond 1984, cited in Platt and Schwarz 1990), and *Conradina glabra* may sometimes be carried into ravines. "Many older *Conradina* shrubs occur at the edge of the ravine and even extend a short distance down into open areas of the ravine; younger *Conradina* plants have become established in the barren, exposed soil adjacent to the pines and often extend into the pine stand. This suggests that *C. glabra* is able to compete effectively in open, newly exposed areas but is unable to compete in closed stands of mixed hardwoods or pines. This species probably features significantly in secondary plant succession in the area, much of which is frequently subjected to burning." (Gray 1965). Wilson Baker (pers. comm. cited in Schultz 1987) suggested that *Conradina* spread from the ravine edges into newly planted pine plantations on the uplands during the 1950's. Kral (1983) considered *Conradina glabra* to have inhabited the grassy understory of the upland longleaf pine-wiregrass vegetation before pine

plantations were developed, as well as steephead edges. Kral thought that *Conradina glabra* was increasing in slash pine plantations, along with another woody mint, *Calamintha dentata*. However, Kral thought it "premature to state that this will be a stable system" because the planted slash pine had not thrived, the plantations were probably more open than had been intended, and that if the slash pines matured, they might provide "more shade and more competition than is good for the *Conradina*". Most of the slash pine was cut in 1987 and replanted to sand pine (S. Gatewood, The Nature Conservancy, *in litt.*, 1987). *Conradina glabra* currently "is found on road edges, in planted pine plantations and along their cleared edges, and along the edges of the ravines" (Baker, pers. comm., in Schultz 1987).

At the present time, there are four distinct natural colonies of *Conradina glabra* on land owned by a forest products company and on public road rights-of-way. A fifth, artificial colony is being created a short distance from the plant's native range, on similar ravine edges, in the Apalachicola Bluffs and Ravines Preserve, owned by The Nature Conservancy (S. Gatewood, The Nature Conservancy, pers. comm., 1991).

Conradina glabra was named as a distinct species by Shinnars (1962), a treatment that was upheld by Gray (1965). The plant had first been collected in 1931, and Small (1933, p. 1167) mentioned the specimen without assigning a name. *Conradina glabra* is a much-branched shrub up to 2 meters tall. Kral (1983) noted that it is "often clonal" and Wilson Baker (pers. comm. cited in Schultz 1987) thinks the species may spread by rhizomes; however, Dr. Ann Johnson (Florida Natural Areas Inventory) has noted that woody mints, including *Conradina brevifolia* and *Calamintha ashei*, are killed by fire and come back from seed. Regrowth from rhizomes has never been observed. She suggests that some excavation of roots of *Conradina glabra* should be performed to confirm that it is rhizomatous, rather than simply tending to occur in a clumped distribution pattern.

The branches of *Conradina glabra* are spreading or upright. The leaves are evergreen, opposite, with additional leaves in short shoots in the axils giving the appearance of fascicles. The leaves are needle-like, "very similar to the needles of fir" (Kral 1983, p. 949). The leaves are hairless on the upper surface—the only species of *Conradina* for which this is the case. The flowers are usually in groups of 2 or 3. The calyx and corolla are two-lipped. The corolla is 1.5–2.0 centimeters (cm) long,

from its base to the tip of its longest lobe, with a slender corolla tube that is straight for about 5 millimeters (mm) long, then bends sharply downward to form a funnel-shaped throat 5 mm long, then widens out into upper and lower lips. The outside of the tube and throat are white, with the lobes and lips lavender blue at the tips. The lower lip of the corolla is three-lobed, with a band of purple dots extending along its inner side. The four stamens are paired. Many flowers are male sterile. In extreme cases, the stamens are "grossly malformed, being petaloid in shape, texture, and color. A less bizarre manifestation of male sterility is that in which only aborted pollen grains are contained in anthers that appear completely normal" (Gray 1965). Male sterility may be the result of inbreeding and homozygosity (Gray 1965). The plant is illustrated in Godfrey (1988).

Conradina brevifolia (short-leaved rosemary) inhabits sand pine scrub vegetation on the Lake Wales Ridge in Polk and Highlands Counties, Florida. Scrub vegetation on the ridge is typically dominated by evergreen scrub oaks and other shrubs, with sand pine and open areas with herbs and small shrubs. This vegetation has many endemic species, including 13 plants federally listed as endangered or threatened, the federally threatened Florida scrub jay (*Aphelocoma coerulescens coerulescens*), and two threatened lizards (blue-tailed mole skink and sand skink). *Conradina brevifolia* has a very restricted geographic distribution within the Lake Wales Ridge, occurring only in about 30 scrubs whose combined areas total less than 6,000 acres (Christman 1988). As such, it is one of the most narrowly distributed of the Lake Wales Ridge endemic plants. The plant is protected on Lake Arbuckle State Forest and on land currently owned by The Nature Conservancy at Saddle Blanket Lakes. This 568-acre tract is the nucleus of a planned 878-acre State acquisition. Further State, Federal, and private land purchases are contemplated in the area, including the proposed Lake Wales Ridge National Wildlife Refuge.

Conradina brevifolia was described as a new species by Shinnars (1962). It is similar to *C. canescens* but has shorter leaves: the larger leaves on well-developed flowering branches are 6.0–8.2 mm long, mostly shorter than the internodes, versus 7.0–20 mm long, mostly longer than the internodes for *C. canescens*. *Conradina brevifolia* also tends to have more flowers per axil than *C. canescens*: 1 to 6 per axil versus 1 to 3. Gray (1965) made it clear that *C. brevifolia*, like *C. glabra*, is

morphologically not strongly differentiated from, and is less variable than, *C. canescens*. Gray (1965), Wunderlin et al. (1980), Kral (1983), and Kral and McCartney (1991) have upheld *C. brevifolia* as a distinct species. Wunderlin (1982) includes *C. brevifolia* in *Conradina canescens*, without noting *C. brevifolia* as a synonym, and DeLaney and Wunderlin (1989) follow this practice.

Conradina etonia (Etonia rosemary) is known from only two sites near Etonia Creek, northeast of Florahome, Putnam County, northeastern Florida. It occurs in Florida scrub vegetation with sand pine and shrubby evergreen oaks. Scrub in this area is the northeastern range limit for several plant species of Florida scrub, including silk bay (*Persea humilis*), sand holly (*Ilex cumulicola*), *Garberia heterophylla*, and the scrub palmetto (*Sabal etonia*), which is named for this area but does not occur in the immediate vicinity of *Conradina etonia* (Kral and McCartney 1991; S. Christman, Florida Dept. of Natural Resources, pers. comm., 1991). The threatened Florida scrub jay occurs in the same habitat as *Conradina etonia*. The sites where this plant is known to occur are privately owned and are subdivided for residential development, or have been approved for such development.

Conradina etonia was discovered in 1990 and promptly described as a new species (Kral and McCartney 1991). It is similar to *Conradina grandiflora* in general habit of growth, and the flowers of both species are large and quite similar in appearance. However, the leaves of *Conradina etonia* are distinctly broader than those of *C. grandiflora* and have lateral veins that are clearly visible on the under surface, a feature that is seen in no other species of *Conradina*. The pubescence of the leaves and much of the rest of the plant is also quite different between the two species. Kral and McCartney (1991) are convinced "that *Conradina etonia* could well be the best marked species in a genus whose species differ mostly in very fine characters." They express hope that further searches of scrub vegetation in northeastern Florida may turn up more localities for *Conradina etonia* and that some intermediates between it and *C. grandiflora* might be found; they mention a specimen of *C. grandiflora* from south of Daytona Beach whose new shoots have a downiness similar to that of *C. etonia*. However, the extent of sand pine scrub suitable for *Conradina etonia* is limited and it is botanically reasonably well explored, primarily by Robert McCartney, with other visits by

Steven Christman, Robert Godfrey, and Robert Kral.

Discussion of Cucurbita Okeechobeensis ssp. Okeechobeensis

Cucurbita okeechobeensis ssp. *okeechobeensis* (Okeechobee gourd) is an annual, fibrous-rooted, high-climbing vine with tendrils, belonging to the gourd family (Cucurbitaceae). Its leaf blades are heart-to-kidney shaped, with 5–7 shallow, angular lobes and irregularly serrated margins (*C. o. martinezii* has more regularly serrated margins) (Walters and Decker-Walters 1993). Young leaves are covered with soft hairs. The cream colored flowers are bell-shaped, with the corolla 6–7 cm (2–3 in) long; they can be distinguished from flowers of *C. o. martinezii* (Martinez gourd) by the presence of dense pubescence (hairs) on the hypanthium (the tube formed by the fused bases of the petals and sepals) of the male flower and on the ovary of the female flower. The gourd is globular or slightly oblong, light green with 10 indistinct stripes, and hard shelled with bitter flesh. The seeds are gray-green and flat (Small 1930, Tatje 1980, Walters and Decker-Walters 1991).

Merrill (1944) and Harper (1958) speculated that William Bartram saw the Okeechobee gourd on the St. Johns River in northern Florida, but archeological study of seed remains indicates that another wild cucurbit (*Cucurbita pepo* ssp. *ovifera* var. *texana*) was present in the watershed until the 18th century, so Bartram did not necessarily see the Okeechobee gourd (Decker and Newsom 1988). Harshberger (1914) mentioned lianas in the pond apple (*Annona glabra*) hammocks along the south shore of Lake Okeechobee, including "a kind of gourd". Small saw and/or collected the Okeechobee gourd in 1913 and 1917, and he found it to be locally common in the Okeechobee pond apple forests, but at least 95 percent of this habitat had already been destroyed by 1930 when he named the gourd *Pepo okeechobeensis* (Small 1922, 1930).

Bailey (1930) transferred the Okeechobee gourd to the genus *Cucurbita*, which includes pumpkins, squashes, and gourds. In a subsequent publication, Bailey (1943) described two new gourd species, *Cucurbita martinezii* and *Cucurbita lundelliana* (Martinez and Lundell gourds, respectively). These two gourds were proven to be closely related to *C. okeechobeensis* (Rhodes et al. 1968, Bemis et al. 1970). The Okeechobee, Martinez, and Lundell gourds are the only members of the genus *Cucurbita* with small gray-green seeds, but the former two are the only

species of *Cucurbita* with cream-colored corollas (all others are bright yellow). The Martinez gourd occurs in Mexico near the Gulf coast in the states of Veracruz, Tamaulipas, eastern San Luis Potosí, and Puebla, as well as in northern Oaxaca and Chiapas. The high-climbing vines grow at forest edges, along streams, and as a weed in coffee and citrus plantations. *Cucurbita lundelliana* is restricted to the limestone plains of Yucatan in Mexico, Belize, and Guatemala, as well as Honduras (Walters and Decker-Walters 1991).

Robinson and Puchalski (1980) re-examined the herbarium specimens Bailey had used or made from cultivated material, as well as more recent specimens, available cultivated material, and information on morphology, crossability, disease resistance, and isozymes (including their own work). They showed that the morphological distinctions Bailey had made between *C. okeechobeensis* and *C. martinezii* were incorrect, that the two taxa seemed indistinguishable, and that they should be assigned to the same species.

Previously, Filov (1966) had recognized the similarity between the Okeechobee and Martinez gourds, referring to them as varieties, with the Martinez gourd called *Cucurbita okeechobeensis* var. *martinezii*. However, this new combination of names by Filov failed to meet the requirements of the International Code of Botanical Nomenclature because neither Small's original name for the plant nor Small's nor Bailey's publications were cited.

Andres and Nabhan (1988) recognized the Okeechobee gourd and the Martinez gourd as geographical subspecies, based on a survey of 10 enzyme systems; the two taxa appeared distinct for one of the 10 systems. They also found that the Martinez and the Lundell gourd were identical for that one system. R.W. Robinson (*in litt.* 1988) rejected the idea of establishing a subspecies on the basis of a single allelic difference. The Service, agreeing with Robinson's assessment, took the position that until further systematic study showed otherwise, the Okeechobee gourd in Florida could not reasonably be considered distinct from the widespread Martinez gourd, and was consequently ineligible for Federal listing.

In 1990, the Service helped fund a field and systematic survey of the gourd sponsored by the Center for Plant Conservation and conducted by Terrence W. Walters and Deena Decker-Walters, experts on the systematics of *Cucurbita*. The new study coincided with a severe drought that lowered the

level of Lake Okeechobee, exposing bare ground that provided optimal germination and growing conditions for the Okeechobee gourd. As a result, searches for the gourd by Walters and Decker-Walters were highly successful.

The systematic study by Walters and Decker-Walters analyzed morphological, phenological (time of flowering and fruiting) characters and isozyme characters. They found that *Cucurbita lundelliana* is morphologically distinct from the other two taxa (as other taxonomists had found). There is a general lack of morphological discontinuities between the Okeechobee and Martinez gourds, except that the two can be reliably distinguished by the presence of pubescence on the male hypanthium and female ovary in the case of the former. The isozyme analysis by Walters and Decker-Walters surveyed 10 enzyme systems, revealing 40 alleles at 20 loci. The analysis showed substantial genetic diversity within *C. lundelliana*—more than exists within the Okeechobee and Martinez gourds, if they are considered a single species. Walters and Decker-Walters confirmed the report of Andres and Nabhan (1988) that plants of *Cucurbita okeechobeensis* from all the known sites for the species are fixed for a unique allele at one locus, while the other two taxa are fixed for another allele.

Walters and Decker-Walters conclude that *C. lundelliana* is an older, genetically more diverse species than the other two, and that the Lundell gourd exhibits a closer relationship to the Martinez gourd than to the Okeechobee gourd. For the most part, the alleles present in the Okeechobee gourd are a subset of those present in the Martinez gourd, although the two taxa can readily be distinguished. Using the methods of Nei (1981) and Sarich (1977), Walters and Decker-Walters calculated an estimated time since divergence between the Okeechobee and Martinez gourds around 450,000 years ago. While these calculations must be interpreted cautiously, they suggest that the former is more likely a remnant population from a time when its ancestors had a continuous distribution around the periphery of the Gulf of Mexico, rather than a recent immigrant to Florida that floated across the Gulf of Mexico or was deliberately introduced by Native Americans.

Overall, Walters and Decker-Walters found that *C. lundelliana* was distinct, to an extent typical of full species, from the other two taxa, and that the Okeechobee and Martinez gourds should be considered distinct at the subspecies level. Following the rules of botanical nomenclature, Walters and

Decker-Walters will apply the name *Cucurbita okeechobeensis* to both the Okeechobee and Martinez gourds, with the Okeechobee gourd becoming subspecies *okeechobeensis* (Walters and Decker-Walters 1993), following the suggestion of Andres and Nabhan (1988).

Okeechobee gourd persisted around Indian villages with the Seminole pumpkin, *Cucurbita moschata* (Small 1930). The Seminole pumpkin, with edible flesh, had been an important food crop, while the extremely bitter flesh of the Okeechobee gourd precludes its use for food, although the seeds are edible and nutritious, and the flesh has detergent properties (Robinson and Puchalski 1980). Okeechobee gourd may have been used as "the fruit of [the Martinez gourd] was, at least until the recent past, as a ball or rattle, a utensil such as a small ceremonial cup, or for its detergent quality" (Andres and Nabhan 1988). The Seminole pumpkin is still cultivated in Florida, and may have been confused with the Okeechobee gourd by Avery and Loope (1980). Morton's (1975) suggestion that the Seminole pumpkin may be a derivative of the Okeechobee gourd is not supported by systematists (Bailey 1930, Andres and Nabhan 1988).

Cucurbita okeechobeensis ssp. *martinezii* is currently used as a source of disease resistance for summer squash, pumpkins, and gourds (*C. pepo*) (T. Andres, Cornell Univ., pers. comm., 1987). It and *C. o.* ssp. *okeechobeensis* are resistant to cucumber mosaic virus, powdery mildew, bean yellow mosaic virus, tobacco ringspot virus, tomato ringspot virus, and squash mosaic virus (Robinson 1980). Both of these wild gourds represent germplasm that can be used in breeding economically valuable cultivated members of the Cucurbitaceae family (Esquinas-Alcazar and Gulick 1983), and both of these wild gourds are maintained in cultivation for this purpose. Additionally, the Okeechobee gourd has in its leaves, roots, and fruits, the richest content of cucurbitacins in the genus. These bitter chemicals render the fruits inedible, if not poisonous, to humans, but are attractive to southern corn rootworm and striped cucumber beetle, so cucurbitacin-rich plants could be used to lure these pests away from crops (G. Nabhan, Desert Botanical Garden, *in litt.*, 1988).

The Okeechobee gourd was collected or observed infrequently after 1930; in 1941, it was found on Observation Island in Lake Okeechobee, Glades County. This mile-long island, covered with Australian pine, is accessible only by helicopter or airboat and lies within

the critical habitat of the federally-endangered snail kite (*Rostrhamus sociabilis plumbeus*). R.W. Robinson (*in litt.* 1987) failed to relocate the gourd on Observation Island in 1984 or 1987. W.M. Buswell, in a 1943 letter to Bailey, reported the gourd from the east side of the lake, about five miles north of the St. Lucie Canal. Hanna and Hanna (1946) mentioned the gourd, which "grows profusely in heavy tangled woods." A search of 22 sites on or near the southern shores of Lake Okeechobee (Tatje 1980) failed to find the gourd, but a 1981 search turned up the gourd in some of the same areas: lake, levee, and canal banks at Creamer and Torry Islands in Lake Okeechobee near Belle Glade (Florida Natural Areas Inventory data). In 1965, it was seen north of Homestead in an agricultural area of Dade County (Florida Natural Areas Inventory data). A population on a disturbed roadside north of Andytown, Broward County, was discovered in 1978 and destroyed by road construction the next year (Tatje 1980). The plant was not observed until recently by personnel of the South Florida Water Management District, which manages much of the potential habitat in and near Lake Okeechobee (W. Dineen, South Florida Water Mgt. Distr., pers. comm., 1986). U.S. Army Corps of Engineers personnel (M. Mingea, USACOE, *in litt.*, 1992) are familiar with the gourd, and Florida Game and Fresh Water Fish Commission personnel report (pers. comm. 1992) a site for the gourd in Glades County near Fisheating Bay on spoil ridges and willows.

Gary Paul Nabhan (*in litt.* 1987; 1988) and Jono Miller searched for Okeechobee gourd in March 1987. They found three gourds in a small remnant stand of small pond apples, many of them apparently in decline, with dead branches. The stand was inundated in 1.5–2 feet of water with the lake at 15.2–15.3 feet above mean sea level (lake level provided by Mr. Walt Dineen, South Florida Water Management District). Nabhan noted that the gourd seemed to need the natural trellises of pond apple branches, although the pond apple persists at some sites where gourds have not been seen, including Ritta Island on the south side of the lake. Nabhan suggested that remnant pond apple stands could be managed to encourage both pond apples and gourds, possibly by erecting low levees to provide exposed bare ground where gourd seeds can germinate during winter low water. Gourd vines had last been seen in 1981, when a drought caused the lake to drop to its lowest

recorded level of 9.75 feet (Florida Natural Areas Inventory).

In winter and early spring of 1990–91, during a drought when Lake Okeechobee's level was about 12 feet, Walters and Decker-Walters (1991) found 50 gourds at Nabhan's site, and 10 other population sites. Gourd plants were found climbing on pond apple trees, and, more abundantly, on elderberries and other woody plants, including papaya. Gourds also sprawled across herbaceous plants—something Nabhan had looked for but not seen. Walters and Decker-Walters and Nabhan suggested that Okeechobee gourds disperse by floating in canals; they provided evidence that marsh rabbits are the main terrestrial dispersal agent. They saw a rabbit gnawing on a green gourd and saw gnawed and broken gourds in animal nests, presumably made by marsh rabbits.

Okeechobee gourd seeds germinate readily on alligator nests, where water-dispersed gourds wash up on shores with warm soil, full sun, and no competition from other plants. The seeds germinate in early spring during the dry season, when the lake level is low. Seedlings do not tolerate water-soaked soils for extended periods of time. By the rainy season, the vines have climbed shrubs, avoiding complete inundation as the lake rises. Walters and Decker-Walters conclude that "for the gourd to maintain viable healthy populations, fluctuations in lake level are necessary. High lake levels facilitate gourd dispersal and inundate and destroy aggressive weeds in local habitats. As lake levels decrease, the cleared open habitats allow the quickly germinating Okeechobee gourd seeds to sprout and begin climbing before they have to compete with other pioneer species."

Discussion of Pinguicula Ionantha

Pinguicula ionantha (Godfrey's butterwort or violet-flowered butterwort) is a member of the bladderwort family (Lentibulariaceae), a small family of carnivorous plants closely related to the snapdragon family (Scrophulariaceae). *Pinguicula ionantha* has a rosette of fleshy, oblong, bright green leaves that are rounded at their tips, with only the edges rolled upward. The rosette is about 15 cm (6 in) across. The upper surfaces of the leaves are covered with short glandular hairs that capture insects. The flowers are on leafless stalks (scapes) about 10–15 cm (4–6 in) tall. When a flower is fully open, its corolla is about 2 cm (almost 1 in) across. The five corolla lobes are pale violet to white. The throat of the corolla and the corolla tube are deeper

violet with dark violet veins. The corolla has a spur 4–5 mm (0.2 in) long that is yellow to olive.

Pinguicula ionantha is one of three *Pinguicula* species in the southeastern United States whose leaves are usually submerged and are relatively flat, rather than rolled up around the edges. The other two species are *Pinguicula primuliflora*, whose flowers have a differently shaped and colored corolla, and *Pinguicula planifolia*, which has red to reddish leaves and much narrower corolla lobes. All three species are endemic to northwestern Florida (Kral 1983). *Pinguicula ionantha* was not described as a distinct species until 1961, partly because the complex flowers and fleshy leaves of butterworts make poor herbarium specimens, partly because the species is rare (Godfrey and Stripling 1961, Godfrey and Wooten 1981, Wood and Godfrey 1957).

The geographic range of *Pinguicula ionantha* is in the Florida panhandle near the Gulf coast between Tallahassee and Panama City (Godfrey and Wooten 1981, Florida Natural Areas Inventory (FNAI) 1989). The FNAI database has 20 element occurrences (a technical term in Heritage program methodology) for this plant, representing herbarium specimens collected since 1956 and reliable sightings. Eight occurrences that date from before 1970 have not been seen since. Twelve occurrences are from 1980–1990. Four occurrences are in the Apalachicola National Forest in Liberty County (within the National Forest, the FNAI follows a practice of defining "occurrences" along compartment boundaries, which often results in more occurrences being recorded than would be the case on private land). A summary by Thomas Gibson of data available from herbaria (assembled in the late 1970's) showed the following number of sites by county: Bay 3, Franklin 4, Gulf 1, Liberty 2, for a total of 10 sites. Gibson defined sites as separated by at least 3 miles.

An extensive field survey for potentially threatened and endangered plants in the range of *Pinguicula ionantha* (FNAI 1989) located only one new site for this plant. Reports by Donald Schnell (*in litt.* 1990) and comments in Kral (1983), Thomas Gibson (*in litt.*, ca. 1978), and Loran Anderson (*in FNAI* 1989), show that *Pinguicula ionantha* is locally abundant in Apalachicola National Forest and is (or was until recently) locally abundant elsewhere. A survey for this butterwort during its flowering season could provide more detailed information on its status, but the available data are sufficient to proceed with listing.

Pinguicula ionantha inhabits seepage bogs on gentle slopes, deep quagmire bogs, ditches, and depressions in grassy pine flatwoods and grassy savannahs. It often occurs in shallow standing water. The most similar species, *Pinguicula primulifolia*, occurs in the same geographic area, but it often occupies a somewhat different habitat, occurring in flowing water and shaded areas. The habitat difference provided a clue to Godfrey and Stripling (1961) that the two species were distinct. Another endemic butterwort species, *Pinguicula planifolia*, occurs with *Pinguicula ionantha* at one site. In Franklin County, *Pinguicula ionantha* occurs at a savannah with a particularly rich flora, including *Macbridea alba* (white birds-in-a-nest) and *Scutellaria floridana* (Florida skullcap), both federally listed as threatened species.

Savannahs (i.e., grass-sedge bogs or wet prairies) (Frost et al. 1986) are nearly treeless and shrubless and have rich floras of grasses, sedges, and herbs. Savannah vegetation, grassy seepage bogs, and the grassy understory of flatwoods (largely wiregrass, *Aristida stricta*) are maintained by frequent, low-intensity fires. Lightning fires tend to occur during the growing season, and the region's history of fire-setting (and suppression) by humans is long and complex. The frequency and season of fire is important to the plant species that make up the vegetation, but fire effects can be subtle and more research is needed if fire management is to be applied scientifically to conserving the native flora (Robbins and Myers in preparation, Clewell 1986). Savannahs resembling those of the Apalachicola area occur in the Cape Fear region of North Carolina (Walker and Peet 1985) and in coastal Alabama and Mississippi (Norquist 1984).

Savannahs and related vegetation are commercially valueless unless they are planted to pine trees or converted to pasture or farmland. To prepare savannahs for planting pines, bedding and other mechanical methods are employed, which may be destructive to native herbs (Kral 1983). After site preparation, and for the first few years after a new crop of pines is planted, surviving native herbs often prosper (FNAI 1989 includes examples). One occurrence for *Pinguicula ionantha* in the FNAI database is from "bedded slash pine/pond cypress scrubby woods. Troughs between beds holding water. Intact *Aristida* groundcover." As the young pines grow large enough to cast shade, many understory grasses and herbs, including *Pinguicula ionantha*, are adversely affected (Kral 1983). Clewell (1986, p. 402) considered it

"unlikely that many (pine) plantations will continue to support significant remnants of the original ground cover", and that because most ground cover plants reproduce slowly, there is little reason to expect them to be able to recolonize pine plantations from which they are extirpated; as a result, Clewell called the conversion of native pinelands to commercial pine plantations "an irreversible and irretrievable loss of habitat".

Savannah herbs, including *Pinguicula ionantha*, often persist under powerlines and on road rights-of-way. The permanence of such semi-artificial habitats is uncertain.

Lack of prescribed fire or prescribed fire during the dormant season is detrimental to much of the pineland and savannah flora (Robbins and Myers in prep.; Platt et al. 1988). In recent years, liability problems strongly discouraged private landowners in Florida from applying prescribed fire; the Florida legislature passed a prescribed burning bill in 1990 intended to encourage the responsible use of fire. Increasing interest in growing season burning by researchers and public land managers may influence some private landowners.

In the absence of frequent fire, titi (*Cyrilla racemiflora* and *Cliftonia monophylla*) invades savannahs and seepage bogs, creating thickets that exclude grasses and herbs, including *Pinguicula ionantha*. Titi encroachment into these habitats is so extensive that the Forest Service plans to reclaim 35,000 acres of titi for pine timber production (National Forests in Florida 1985).

Populations of *Pinguicula ionantha* fluctuate in size. A site at Carrabelle where Dr. Godfrey saw *Pinguicula ionantha* in abundance in 1990 seemingly had none in 1991. Such changes mean that long-term changes in abundance of this plant are probably difficult to assess.

Previous Federal Action

Section 12 of the Endangered Species Act of 1973 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. In these documents, *Conradina glabra*, *Conradina brevifolia*, and *Pinguicula*

ionantha were included as endangered species and *Cucurbita okeechobeensis* as a threatened species. On June 16, 1976, the Service published a proposed rule (41 FR 24524) to determine some 1,700 U.S. vascular plant species recommended by the Smithsonian report (including *Conradina glabra*, *Conradina brevifolia*, and *Pinguicula ionantha*) to be endangered species pursuant to Section 4 of the Act. This proposal was withdrawn in 1979 (44 FR 12382).

On December 15, 1980, the Service published a notice of review for plants (45 FR 82480), which included *Conradina glabra*, *Conradina brevifolia*, and *Pinguicula ionantha* as category 1 candidates (taxa for which the Service currently has on file substantial data on biological vulnerability and threats to support proposing to list them as endangered or threatened species). *Cucurbita okeechobeensis* was included as a category 2 candidate (a taxon for which data in the Service's possession indicates listing is possibly appropriate).

A supplement to the notice of review published on November 28, 1983 (48 FR 53640) changed *Conradina glabra*, *Conradina brevifolia*, and *Pinguicula ionantha* to category 2 candidates. A notice of review published September 27, 1985 (50 FR 39526) retained all four species as category 2 candidates.

A notice of review published February 21, 1990 (55 FR 6184) made several changes. *Conradina glabra* was returned to category 1, based on new information developed by the Florida Natural Areas Inventory. *Pinguicula ionantha* was returned to category 1, based on field work conducted by Loran Anderson, Wilson Baker, and Angus Gholson in the Apalachicola National Forest in 1987 (D. White, FNAI, *in litt.*, 1990) and outside the National Forest in 1988 (FNAI 1989). *Cucurbita okeechobeensis* was changed to Category 3B (a category for plants with names that, on the basis of current taxonomic understanding, does not represent a distinct taxon meeting the Act's definition of "species"). The change came after the Service concurred with comments by Richard W. Robinson (New York State Agricultural Experiment Station, *in litt.*, 1988), a specialist in the genus, who did not support the recognition of a taxonomic distinction between the Florida and Mexican plants of *Cucurbita okeechobeensis*. Gary Paul Nabhan (Desert Botanical Garden, Phoenix, *in litt.*, 1988 and pers. comm.) and other specialists in *Cucurbita* had urged proceeding with listing. The taxonomic questions that prevented listing have

been answered by Walters and Decker-Walters (1993).

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 *Conradina glabra*, *Conradina brevifolia*, *Cucurbita okeechobeensis* (*C. o. ssp. okeechobeensis*, since Walters and Decker-Walters 1993), and *Pinguicula ionantha* because the Service had accepted the 1975 Smithsonian report as a petition. In each October from 1983 through 1989, 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 proposals to list these species, published on May 20, 1992, constituted the final petition findings for *Conradina glabra*, *Conradina brevifolia*, *Cucurbita okeechobeensis* (*C. o. ssp. okeechobeensis*, since Walters and Decker-Walters 1993), and *Pinguicula ionantha*.

Because *Conradina etonia* was described as a new species in 1991, it has not been covered by a notice of review or by the petition process, although Dr. Steven Christman (Florida Dept. Natural Resources, pers. comm., 1991) suggested emergency listing of the newly-described plant.

Summary of Comments and Recommendations

In the May 20 proposed rules (57 FR 21369, 21377, and 21381) and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to the development of final rules. Appropriate state agencies, county governments, Federal agencies, scientific organizations, and other interested parties were contacted and requested to comment. Newspaper notices were published in the Palatka Daily News, Putnam County (June 5, 1992), the Highlander, Lake Wales, Polk County (June 6), The Star, Port St. Joe (June 4); the Apalachicola Times (June 4); the Calhoun County Record, Blountstown (June 4); the News-Herald, Panama City (June 8), and in the Palm Beach Post (June 7). A public hearing was held on September 16, 1992 (advertised in the Orlando Sentinel on August 23, 1992). The comment period closed September 28, 1992.

The public hearing was attended by eight persons, of whom six made

statements. Two speakers opposed immediate listing of the Okeechobee gourd, preferring further study of its distribution and abundance, one opposed listing, and three supported immediate listing. Approximately 31 letters or phone calls commented on the proposals or provided information (several letters were sent twice, and several commenters sent more than one letter).

Support for all five proposed listings came from the Florida Natural Areas Inventory; the Florida Native Plant Society; and the Center for Plant Conservation. The State of Florida's Clearinghouse in the Governor's office stated that the proposals are consistent with State plans, programs, procedures, and objectives. The Florida Department of Agriculture and Consumer Services, Division of Plant Industry supported the proposed listings and pointed out that the proposals' wording failed to reflect a recent change in Florida Regulated Plant Index; the change is incorporated in the final rule.

Three commenters supported the listing of all three *Conradina* mints. In a fourth letter, an ecologist commented on the idea that *Conradina glabra* may be rhizomatous; that comment is incorporated in the text.

Two botanists and a medical doctor who are experts on carnivorous plants commented in support of the proposal to list *Pinguicula ionantha* (Godfrey's butterwort). One provided site-specific confirmation of threats to the plant. Another pointed out a useful reference, and a third provided information on trade that is incorporated in the final rule.

The U.S. Forest Service concurred in listing of *Pinguicula ionantha*, noting that bedding and planting for slash pine is a serious threat to this plant, and that no present or planned activities in the Apalachicola National Forest threaten this plant. For good measure, the Forest Service concurred with the proposal to list *Conradina glabra*, on grounds that this plant might occur in the Forest.

Eight letters supported the proposal to list the Okeechobee gourd as an endangered species. Two letters urged designation of critical habitat. Six of the letters were from botanists, economic botanists, botanical garden curators, and a plant breeder specializing in squashes. The plant breeder suggested a correction to the proposal's description of leaf lobing and serration in the Okeechobee and Martinez gourds. This has been done with the assistance of Dr. Terrence Walters. A botanist emphasized the threat to this plant from the proliferation of exotic plant species at the edges of Lake Okeechobee. A

botanical garden curator who has cultivated and collected Okeechobee gourd provided additional documentation of searches for the gourd at Lake Okeechobee and information on his experiences in cultivating the gourd in a semi-natural setting. An economic botanist who is familiar with the gourd in its native habitat pointed out that the listing proposal should not have applied the term "population" for each collection site; the sites probably represent only a single population. One commenter doubted the report that Okeechobee gourd plants survived although inundated in 1.5-2 feet of water (Nabhan 1988); another commenter noted that cultivated Okeechobee gourd plants in a semi-natural environment succumb to flooding. The U.S. Army Corps of Engineers commented that they are familiar with the localities where the gourd occurs and will take every step necessary to insure its survival.

The Florida Sugar Cane League opposed immediate listing of the Okeechobee gourd, arguing that detailed, multi-year surveys of its distribution and abundance are needed to properly appraise its status. An agricultural scientist who has been familiar with the Okeechobee gourd for over 35 years concurred with the Sugar Cane League, raised a number of additional questions about the proposal, and opposed its listing.

Specific issues raised by the comments are listed below with the Service's response to each:

Issue 1: Because the Service's proposal is based on incomplete information, the identification and evaluation of the natural or manmade factors that may affect the gourd's continued existence may not be complete nor accurate. One commenter added that the proposal and the literature cited contained misleading statements and incorporate what may be anecdotal information. There is no evidence that the Okeechobee gourd was restricted to pond apple forests or even that there is sufficient sunlight for its seeds to germinate in such forests. Searches for the gourd were inadequate: Tatje (1980) searched only unpromising areas, while Nabhan (1988) cannot be considered scientific literature because it is polemical and fails to cite references. None of the surveyors sought information that could be provided by knowledgeable local residents. Walters and Decker-Walters (1991) conducted their searches at the wrong times of year (March was early for this spring-germinating species, and January and February could have been late to find live gourd plants). Surveys for vines and

fruit in early to midsummer would be more appropriate.

Service Response: The proposal noted that Okeechobee gourd probably met the current standards for Federal listing as an endangered or threatened species by the early 1930's due to destruction of its habitat. As noted in the proposal, early observers of the lake saw the gourd in pond apple forests. Its population biology in such forests is unknown because the forests no longer exist. Walters and Decker-Walters (1991) noted that alligator nests and other bare, sunny areas appear to be important germination sites.

Tatje's (1980) survey was a part of a comprehensive survey of endangered plants of southern Florida conducted by Dr. Daniel Austin of Florida Atlantic University. His examination of the rim of Lake Okeechobee was reasonable, based on the existence of herbarium specimens from the lake margin. R.W. Robinson searched for the gourd in 1984 and 1987, obtaining guidance from local residents and visiting Observation Island by airboat (R.W. Robinson, *in litt.*, 1987). Nabhan (1988) and Miller spent a great deal of time searching for the Okeechobee gourd, aided by a visit to the South Florida Water Management District and by boaters' reports of gourd sightings. They even placed "wanted" posters for the gourd at boat launching sites (Nabhan, *in litt.*, 1987). Walters and his collaborators conducted their survey with the written permission of the Water Management District. The Florida Game and Fresh Water Fish Commission provided airboat transportation. Richard Moyroud (*in litt.*, 1992, commenting on the proposal) has also spent considerable time searching for the Okeechobee gourd, partly with Walters and Decker-Walters. The survey by Walters and Decker-Walters was intended primarily to obtain germ plasm for a taxonomic assessment, not to exhaustively search the potential range of the gourd. Electrophoretic examination of cultivated material of Okeechobee gourd had shown little genetic variability (Andres and Nabhan 1988), and the study by Walters and Decker-Walters has not revealed more.

Issue 2: Two commenters noted that more thorough, systematic, probably multi-year surveys of the Okeechobee gourd will be needed to ensure its survival. The gourd has persisted along the lake's margins without Federal protection, so why not delay listing until after the surveys are done?

Service Response: The Service finds that the best available information indicates that the Okeechobee gourd is in danger of extinction throughout all or

a significant portion of its range, thereby meeting the Act's definition of an endangered species (see following section).

Issue 3: Listing the Okeechobee gourd as an endangered or threatened species may not offer any protection to the species in addition to that already provided by Florida law because the protection against "take" that the Endangered Species Act provides for animals does not extend to plants (section 9(a)(2)). In addition, the proposal's failure to determine critical habitat for the Okeechobee gourd leaves the species unprotected from Federal government actions because only critical habitat is protected under the Act's section 7 consultation requirements for Federal agency actions: undesignated habitat is unprotected.

Service Response: Under section 9 of the Act, plants located on lands under Federal jurisdiction are protected from taking. Additionally, endangered plants are protected from malicious damage or destruction on Federal lands, as well as the removal, cutting, digging up, damaging, or destroying of endangered plants in knowing violation of any State law or regulation, including State criminal trespass law. The consultation requirements of section 7 of the Act, which provide protection with respect to Federal government activities, apply to endangered and threatened plants with or without critical habitat. In absence of critical habitat, Federal agencies must still insure, under section 7(a)(2), that their actions are not likely to jeopardize the continued existence of endangered or threatened species. In addition to the protection of section 7(a)(2) and section 9, section 7(a)(1) provides that Federal agencies "shall * * * utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act."

Issue 4: There is no support for the proposal's allegation that the Okeechobee gourd was abundant in the 1920's; the failure of local historian Lawrence Will (1964) to mention the gourd indicates that it was not important.

Service Response: The Okeechobee gourd's status today (and its future prospects) are more important than its past. The final rule provides some additional historical information on Okeechobee gourd.

Issue 5: Statements about lake levels in the proposal are inaccurate. The Service should have relied on primary records available from the Corps of

Engineers or the South Florida Water Management District.

Service Response: This issue was raised by an individual, not by the affected agencies. It would appear difficult to improve on Johnson's (1974) account of the history of attempts to manage the level of Lake Okeechobee, which is cited by a Water Management District survey of the lake's history (Pesnall and Brown 1977).

Issue 6: The proposal's statement that the gourd wasn't collected often after 1930 and similar statements in Walter and Decker-Walters (1991) are baseless. The plant has been frequently seen, just not noted by botanists.

Service Response: Because the Okeechobee gourd is a member of an economically important genus, there has been considerable interest over the years in collecting this species, and specimens have been obtained by J.H. Davis, Erdman West, John Beckner, and Donovan Correll, who were hard-working, persistent collectors. Given this level of interest, it is significant that a very rare species like *Spigelia gentianoides* is better represented than the gourd in Florida herbaria. The Okeechobee gourd is obviously persisting without human assistance, but it is by no means an abundant plant, and genetic test results suggest little genetic variation.

Issue 7: How did Walters and Decker-Walters (1991) analyze phenological characters? Why did they examine fewer specimens for some characters than from others and fail to utilize all the plant material they collected?

Service Response: Phenological and other characters were measured from plants grown from seed at Fairchild Tropical Garden. The gourd trellis at Fairchild was a large facility, but it could accommodate only a limited number of these large plants. As a result, characters that require adult plants were measured from fewer plants than characters taken from seeds or seedlings.

Issue 8: Andres and Nabhan (1988) provided no valid statement on the rarity of Okeechobee gourd.

Service Response: The paper is cited with respect to the gourd's systematics, not its rarity.

Issue 9: Why was Small (1918) cited? This paper didn't mention the Okeechobee gourd.

Service Response: This paper was cited in Walters and Decker-Walters (1991) but not in the proposal. John Kunkel Small observed and collected the species on trips he reported in the 1918 paper.

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that *Conradina glabra*, *Conradina brevifolia*, *Conradina etonia*, and *Cucurbita okeechobeensis* ssp. *okeechobeensis* (Okeechobee gourd) should be classified as endangered species, and *Pinguicula ionantha* should be classified as a 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 endangered or threatened due to one or more of the five factors described in Section 4(a)(1). These factors and their application to *Conradina glabra* Shinnery (Apalachicola rosemary), *Conradina brevifolia* Shinnery (short-leaved rosemary), *Conradina etonia* Kral & McCartney (Etonia rosemary), *Cucurbita okeechobeensis* ssp. *okeechobeensis* (= *Pepo okeechobeensis* Small) (Okeechobee gourd), and *Pinguicula ionantha* Godfrey (Godfrey's butterwort), are as follows:

A. The present or threatened destruction, modification, or curtailment of its habitat or range

Conradina Species

Conradina glabra is a narrowly distributed species that was originally restricted to a specialized habitat, the edges of steephead ravines and possibly also to upland longleaf pine-wiregrass vegetation. The plant appears to require full sunlight or light shade. Planted pine trees are likely, by the time they mature, to produce dense shade that could kill this species. Another possible problem in planted pine stands is that sand pine (which is currently grown in the area) does not tolerate prescribed fire, which may help keep habitat open for *Conradina glabra*. Other *Conradina* species grow in habitats with varying natural fire frequencies. Forestry practices may kill *Conradina glabra* directly: S. Gatewood (The Nature Conservancy, memorandum, 1987, provided by FNAI) reported that when most of the range of this plant was cut and site-prepared in 1987, he observed some *Conradina glabra* plants surviving on areas where chopping had not occurred, none where it had. The long-term consequences of the 1987 activity is not yet known; planting of slash pines in the area may have allowed *Conradina glabra* to spread through the plantations

and onto road rights-of-way, but the site preparation methods used then were probably different from those in use today, and the slash pines never thrived well, casting less shade than can be expected of sand pines. The herbicide hexazinone (Velpar) is sometimes used in timber regeneration areas (S. Gatewood, memorandum, May 1987), and its use could affect *Conradina glabra*. The very limited distribution of *Conradina glabra*, and management of most of that range by a single landowner exacerbates the threat to this plant from forestry practices, simply because the same management practices are likely to be applied rangewide, at the same time. Some land with *Conradina glabra* has been converted to improved pasture, destroying the plant (Kral 1983) and rendering the land uninhabitable for it.

Except for two protected sites, *Conradina brevifolia* is threatened by destruction of its central Florida scrub habitat for agricultural purposes (citrus groves and pastures) and for residential development. As explained in the background section, 13 plant species from this habitat are federally listed (Fish and Wildlife Service 1990), and *Conradina brevifolia* is more narrowly distributed than most of the listed species. Its listing was delayed only because of uncertainty over its taxonomic status due to its treatment in Wunderlin (1982). *Conradina brevifolia* will benefit from the recovery plans that have already been prepared for these plants, from actions that are being taken to protect the threatened Florida scrub jay from take as defined by the Endangered Species Act, from planning that is underway to create a Lake Wales Ridge National Wildlife Refuge for endangered and threatened plants and animals, and from State and private land acquisition projects.

Conradina etonia is threatened by residential development of its two sites, one in a subdivision where houses are being built, and the other in an area where the landowner has obtained all necessary permits to create a residential development.

Okeechobee Gourd

Until the 1920's, Okeechobee gourd was abundant in swampy pond apple forests along the shore of Lake Okeechobee. John K. Small (1930) estimated that 95 percent of the former range of Okeechobee gourd had already been destroyed by agricultural development. It would appear that by 1930 Okeechobee gourd met the present-day standards for listing as an endangered species.

Since 1930, natural vegetation that remained along the lake shores was

further affected by lowering of the lake level from a maximum of about 20 feet above sea level (with an extreme range of stage of 7 or 8 feet). During the 1920's attempts were made to keep the lake within 13.5 to 16.5 feet (with the lake staying below minimum for most of three years). The current preferred range is 15.5 to 17.5 feet (Johnson 1974, Blake 1980, Fernald and Patton 1984). The lake level has fallen below the preferred range during dry periods in recent years, providing bare muck where the Okeechobee gourd's seeds can germinate. Any change in lake level management that would reduce the likelihood of low water would threaten this species, and changes in management that would result in more frequent low-water episodes might be beneficial.

Construction of the Hoover Dike and other water management facilities, planting of exotic melaleuca trees, the spread of Australian pine (*Casuarina*), and the use of Torrey and Creamer Islands for pasture also affected the habitat of this plant (these islands are now owned by the State and withdrawn from agricultural use). Herbicide use for vegetation management purposes may have affected the gourd. The Okeechobee gourd persists, in small numbers, in highly modified vegetation, and is highly vulnerable to further modifications of that vegetation.

Godfrey's Butterwort

Pinguicula ionantha has a limited geographic distribution. Within its range, it has been collected or observed at only 20 localities. Because it was only recognized as a distinct species in 1961, there has not been a long record of observations of this plant. Donald Schnell (*in litt.*, 1990) considers the plant to be visible mostly in Apalachicola National Forest, where it is locally abundant. On a roadside where *Pinguicula ionantha* has been known to occur since 1960 (FNAL), Schnell commented: "The areas * * * north of Carrabelle have fallen off tremendously in the past ten years due to roadside work, lumbering and development—This area is outside the Forest".

The effects of forest management on *Pinguicula ionantha* are as follows: logging of cypress or pine and site preparation that removes other plants without lowering the water table is likely to favor this plant at least temporarily. Because *Pinguicula ionantha* does not tolerate shade, canopy closure in pine plantations results in loss or diminishment of the species, at least until the next logging (Kral 1983). At the present time, it is not

known whether *Pinguicula ionantha* will persist indefinitely under a regime of commercial pulpwood production, but the prospects are unfavorable. If Clewell (1986) is correct in his belief that pinelands and savannahs, once converted to pulpwood production, cannot be restored, then the effects of pulpwood management on *Pinguicula ionantha* are irreversible once they occur.

The Forest Service's practice of conducting prescribed burns during the growing season to reduce the incidence of brown-spot infection of longleaf pine seedlings (Robbins and Myers *in preparation*) appears to favor many herbs, including *Pinguicula ionantha*. Most private land is planted with slash pine rather than longleaf, reducing the silvicultural need for prescribed fire.

Both commercial forest management and management of the Apalachicola National Forest have had the effect of allowing titi to encroach into grassy bog and savannah vegetation. This encroachment appears to pose the most serious threat to *Pinguicula ionantha* (J. Palis, Florida Natural Areas Inventory, pers. comm., 1991). Roadside maintenance, fireline cutting, and drainage ditch construction also threaten *Pinguicula ionantha* habitat.

Forest Service management practices are intended to benefit sensitive plant species, especially in the 469-acre Apalachicola Savannah Research Natural Area, which was established in 1978 (National Forests in Florida 1985). Unfortunately, management of this area to date has been based on casual observation of plant species rather than scientific monitoring to determine whether management practices benefit sensitive plants in the natural area (J. Walker, D. White, pers. comm., 1990). Folkerts (1977) had already noted the importance of conserving this plant in the National Forest.

In the Tates Hell area of Franklin County, the new owner of a 182,000 acre tract is selling small parcels to individuals; such sales may affect *Pinguicula ionantha* because an increase in the number of landowners and construction of dispersed houses will result in fire suppression. Fire suppression will reduce the habitat available to this species.

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

There is commercial trade in the genus *Conradina*, whose species have considerable horticultural potential. Robert McCartney (Woodlanders, Inc., Aiken, SC) reports that all the species of *Conradina* are easily propagated and are

in cultivation (cited in U.S. Fish and Wildlife Service 1991). The Woodlanders catalog shows that the widespread, variable *Conradina canescens* is a rich source of horticultural selections, and it appears to be the species of greatest horticultural interest. Commercial trade in the rarer species of *Conradina* should not adversely affect those species, provided that it is dependent upon plants propagated from plants in cultivation. Inappropriate collecting from plants in the wild is a threat to the three *Conradina* species listed as endangered in this rule.

Due to the limited distribution and small population sizes of Okeechobee gourd, indiscriminate collecting of any nature could seriously affect this species. Hobbyist interest in gourds raises the possibility of such collecting.

During the 1970's, *Pinguicula ionantha* was one of the native carnivorous plants "most sought after and actually collected by hobbyists for personal use" (D. Schnell, *in litt.*, 1978), but the fashion for exotic green plants has died down since then. Collection of *Pinguicula ionantha* by carnivorous plant enthusiasts probably still occurs, and the species is at least periodically offered for sale in the United States by at least three nurseries (P.A. Thomas, *in litt.*, 1992). The international market is taken up by commercially propagated Mexican species (D. Schnell, R. Hanrahan, T.L. Mellichamp, *in litt.*, 1990).

C. Disease or Predation

Not applicable.

D. The Inadequacy of Existing Regulatory Mechanisms

Conradina glabra is listed as a threatened species, and *Cucurbita okeechobeensis* ssp. *okeechobeensis* and *Pinguicula ionantha* are listed as endangered species on the Florida Regulated Plant Index (Florida Department of Agriculture and Consumer Services Rule Chapter 5B-40). The list was formerly part of the Preservation of Native Flora of Florida law (section 581.185-187, Florida Statutes). The Regulated Plant Index regulates taking, transport, and sale of plants but does not provide habitat protection. The Endangered Species Act will provide additional protection through sections 7 and 9, and recovery planning. The Florida law provides for automatic addition of federally listed plants to the State's list as endangered species.

E. Other Natural or Manmade Factors Affecting its Continued Existence

The threats listed above are exacerbated by a number of factors, including: The limited geographic distributions of each of the five species, the fragmentation of remaining habitat for *Conradina brevifolia* into small segments isolated from each other, the small sizes of the two known *Conradina etonia* populations and the very small number of *Cucurbita okeechobeensis* ssp. *okeechobeensis* plants in the wild add to the threats faced by these species. The lack of morphological variation in *Conradina glabra* and *Conradina brevifolia* compared to *Conradina canescens*, and the high incidence of male sterility in *Conradina glabra* suggest that these species are inbred, and gene pools may be limited. Limited gene pools may depress reproductive vigor, or single human-caused or natural environmental disturbances could destroy a significant percentage of the individuals of these species, especially *Conradina glabra* and *C. etonia*.

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 *Conradina glabra*, *C. brevifolia*, *C. etonia*, and *Cucurbita okeechobeensis* ssp. *okeechobeensis* as endangered species. Each of these species 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. As discussed under Factor E for *Cucurbita okeechobeensis* ssp. *okeechobeensis*, the great majority of this species' habitat was destroyed 50 years ago, and the species has barely persisted in heavily modified areas that are subject to erratic flooding.

The preferred action for *Pinguicula ionantha* is to list it as a threatened species, in part because the uniformity of land use practices in most of its range exacerbates the risks posed by Factors A, B and D; therefore, unless conservation measures are taken, this species is likely, in the foreseeable future, to be in danger of extinction throughout a significant portion of its range, fitting the Act's definition of a threatened species.

Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that, to the maximum extent prudent and determinable, the Secretary propose critical habitat at the time the species is proposed to be

endangered or threatened. The Service finds that designation of critical habitat is not prudent for these five species.

All of the occurrences of the *Conradina* species, except for two protected sites with *Conradina brevifolia*, and many of the *Pinguicula ionantha* sites, are on unprotected private land. The sites on private land are unlikely to be affected by any Federal action in which there would be added protection from designation of critical habitat, and such a designation might motivate landowners to protect their property values and/or property rights from potential State regulation by extirpating the plants. Because *Pinguicula ionantha* occurs on commercial forest land, landowners might be inclined to attempt its extirpation to avoid limitations on the use of herbicides. 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. In particular, *Pinguicula ionantha* is vulnerable to carnivorous plant enthusiasts. Carnivorous plants in general are in great demand by commercial interests, although this species appears not to be in demand at the present time. For these reasons, it would not be prudent to determine critical habitat for these four species. The State and The Nature Conservancy are aware of the need to conserve *Conradina brevifolia* on lands they own. Owners of privately owned sites for the other two species have been, or will be contacted by the Service or other conservation agencies. Protection of these four species will be addressed through the recovery process and the Section 7 jeopardy standard.

The Forest Service will be able to incorporate management measures for *Pinguicula ionantha* into its planning and management systems, probably by formal agreement with the Fish and Wildlife Service. Principal private landowners can be notified of locations and the importance of protecting this species' habitat through several mechanisms, including Florida's system for protecting endangered and threatened species from pesticide (including herbicide) application, and Florida's procedures for regional and local planning.

For the Okeechobee gourd, the Service finds that designation of critical habitat is not prudent because of the populations of Okeechobee gourd are very small and localized. Designation of critical habitat could attract collectors and curiosity-seekers, inasmuch as there is hobbyist interest in gourds. Although

Federal listing as endangered provides penalties in addition to those provided in Florida law against unauthorized removal of Okeechobee gourd plants from public land, such prohibitions against take are difficult to enforce, and publication of critical habitat descriptions and maps would only add to the threats faced by this species. The Army Corps of Engineers and the South Florida Water Management District are aware of the Okeechobee gourd on areas they manage. Restoration and protection of this species' habitat will be addressed through the recovery process and through the Section 7 consultation process.

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 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 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 such a 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 populations of *Conradina brevifolia* on public and private conservation lands will require management of the vegetation, as part of management to benefit other endangered and threatened plant and animal species in the same habitat (Fish and Wildlife Service 1990). Land acquisition within the range of *Conradina brevifolia* is planned by the State of Florida and the Fish and Wildlife Service.

Protection of the threatened Florida scrub jay from take due to destruction of its scrub habitat may benefit *Conradina brevifolia* and *C. etonia*, both of which occur in scrub vegetation inhabited by scrub jays.

Conservation of *Conradina glabra* may require ensuring that use of herbicides in forestry or road right-of-way maintenance does not jeopardize this plant.

The populations of Okeechobee gourd at the periphery of Lake Okeechobee will require careful management, possibly including a program of habitat modification and enhancement, should such measures prove feasible. Control or extirpation of exotic pest plants such as melaleuca and Brazilian pepper and planting of pond apple may be necessary or desirable to protect existing populations of Okeechobee gourd or to restore former habitat.

Pinguicula ionantha's federally listed status will encourage efforts to conserve it in Apalachicola National Forest. The Florida Department of Agriculture and Consumer Services will ensure that it is not jeopardized by herbicide use under a program approved by the Environmental Protection Agency. Listing of *Pinguicula ionantha* also will encourage its conservation through Florida's planning procedures, supervised by the Florida Department of Community Affairs, and may encourage land acquisition or other land conservation measures by the State.

The Fish and Wildlife Service will prepare recovery plan(s) for all five species and encourage conservation efforts by the State, private landowners, and private conservation groups.

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 for all endangered or threatened 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 species under certain circumstances.

Enforcement of the Endangered Species Act's trade prohibitions on *Conradina glabra* and *C. brevifolia* could be difficult because *Conradina canescens*, a widespread, secure species, is morphologically variable, and some individuals belonging to this species may be indistinguishable from individuals belonging to *C. glabra* and *C. brevifolia*. The Endangered Species Act (Sec. 4(e)) would allow for *Conradina canescens* to be treated as a threatened or endangered species, even though not listed as such, to facilitate enforcement of trade prohibitions, if doing so would "substantially facilitate the enforcement and further the policy of this Act" (Sec. 4(e)(C)). However, this course of action is unnecessary because none of the species of *Conradina* is presently threatened by taking for purposes of horticultural trade. Information available to the Service indicates that *Conradina* plants in trade are of cultivated origin. It is anticipated that trade permits will be sought and issued for members of the genus *Conradina* because every member of the genus is currently in commerce across state lines.

It is also anticipated that trade permits will be sought and issued for Okeechobee gourd because its seeds are transported across state lines, and probably internationally, in the course of plant breeding activities and maintenance of cultivated stocks of germplasm. Hobbyists may also trade seeds or possibly cuttings. The Okeechobee gourd does not appear to be sold across state lines to any large extent.

For *Pinguicula ionantha*, it is anticipated that relatively few trade permits will be sought or issued because this plant is not known to be traded at the present time. 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 Cited

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

Author

The primary author of this final 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, Transportation.

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. 1531-1544; 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 to read as follows:

§ 17.12 Endangered and threatened plants.

* * * * *
(h) * * *

Species		Historic range	Status	When listed	Critical habitat	Special rules
Scientific name	Common name					
Cucurbitaceae—Gourd family:						
<i>Cucurbita okeechobeensis</i>	Okeechobee gourd.	U.S.A. (FL)	E	507	NA	NA
Lamiaceae—Mint family:						
<i>Conradina brevifolia</i>	Short-leaved rosemary.	U.S.A. (FL)	E	507	NA	NA
<i>Conradina etonia</i>	Etonia rosemary	U.S.A. (FL)	E	507	NA	NA
<i>Conradina glabra</i>	Apalachicola rosemary.	U.S.A. (FL)	E	507	NA	NA
Lentibulariaceae—Bladderwort family:						
<i>Pinguicula lonantha</i>	Godfrey's butterwort.	U.S.A. (FL)	T	507	NA	NA

Dated: June 8, 1993.

Bruce Blanchard,

Acting Director, Fish and Wildlife Service.

[FR Doc. 93-16302 Filed 7-9-93; 8:45 am]

BILLING CODE 4310-65-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 630

[Docket No. 910640-1140; LD. 070193A]

Atlantic Swordfish Fishery

AGENCY: National Marine Fisheries Service (NMFS), NOAA, Commerce.

ACTION: Closure of the drift gillnet fishery.

SUMMARY: The Secretary of Commerce (Secretary) closes the drift gillnet fishery for swordfish in the Atlantic Ocean, including the Gulf of Mexico and Caribbean Sea. The Secretary has determined that the entire annual quota for swordfish that may be harvested by drift gillnet will be reached on or before July 16, 1993. This closure is necessary to prevent the catch of swordfish by drift gillnet vessels from exceeding the quota established for this category.

EFFECTIVE DATES: Closure is effective 1200 hours local time July 16, 1993, through 2359 hours local time December 31, 1993.

FOR FURTHER INFORMATION CONTACT: Richard B. Stone, 301-713-2347.

SUPPLEMENTARY INFORMATION: The Atlantic swordfish fishery is managed

under the Fishery Management Plan for Atlantic Swordfish and its implementing regulations at 50 CFR part 630 under the authority of the Magnuson Fishery Conservation and Management Act and the Atlantic Tunas Convention Act.

By final rule effective August 4, 1992 (57 FR 34246, August 4, 1992), the Secretary implemented quota provisions for Atlantic swordfish. A quota of 47,583 pounds (21,584 kg) was established for swordfish that could be harvested by drift gillnet during each of two periods, January 1 through June 30, and July 1 through December 31. On June 17, 1993 (58 FR 33568, June 18, 1993), the 1993 Atlantic swordfish TAC adjustment was filed with the Office of the Federal Register as an interim final rule. This adjustment, based on revised historical data, increased the semi-annual swordfish quota for the drift gillnet category. From this revised semi-annual swordfish drift gillnet quota of 69,286 pounds (31,428 kg), a total of 39,820 pounds (18,062 kg) were landed by drift gillnet vessels during the January 1 to June, 30, 1993, season opening. The underharvest of 29,466 pounds (13,366 kg) is therefore added to the second semi-annual quota to yield a total of 98,752 pounds (44,794 kg).

Under 50 CFR 630.25(a), the Secretary is required to close the drift gillnet fishery for swordfish when its quota is reached, or is projected to be reached, by filing a notice with the Office of the Federal Register at least 8 days before the closure is to become effective.

The Northeast Fisheries Science Center, NMFS, estimates that 11 drift

gillnet vessels will begin fishing on or about July 1, 1993. Based on recent average catch per set data for the months of June and July, NMFS has determined that the adjusted drift gillnet quota for the July 1 through December 31, 1993 period of 98,752 pounds (44,794 kg) of swordfish will be reached on or before July 16, 1993. Hence, the drift gillnet fishery for Atlantic swordfish is closed effective 1200 hours local time July 16, 1993, through 2359 hours local time December 31, 1993.

During the closure of the drift gillnet fishery, a person aboard a vessel using or having aboard a drift gillnet (1) may not fish for swordfish from the North Atlantic swordfish stock; (2) may not possess more than two swordfish per trip in the North Atlantic Ocean, including the Gulf of Mexico and Caribbean Sea, north of 5°N. lat.; and (3) may not land more than two swordfish per trip in an Atlantic, Gulf of Mexico, or Caribbean coastal state.

Classification

This action is required by 50 CFR 630.25(a) and complies with E.O. 12291. Notice of this action will be mailed to permit holders and dealers.

Authority: 16 U.S.C. 1801 *et seq.* and 16 U.S.C. 971 *et seq.*

List of Subjects in 50 CFR Part 630

Fisheries, Fishing, Reporting and recordkeeping requirements, Treaties.