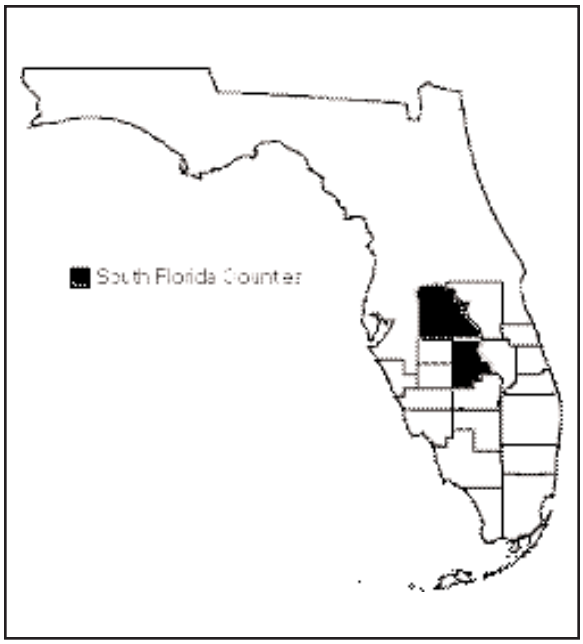
Short-leaved Rosemary

Conradina brevifolia Shinners

Federal Status:	**Endangered (July 12, 1993)**
Critical Habitat:	**None Designated**
Florida Status:	**Endangered**
Recovery Plan Status:	**Revision (May 18, 1999)**
Geographic Coverage:	**Rangewide**

Figure 1. Distribution of the short-leaved rosemary.



The short-leaved rosemary is one of five shrubby mints found in the central Florida scrub. It inhabits white sand scrub on the Lake Wales Ridge in Polk and Highlands counties. The short-leaved rosemary occurs in about 30 sites whose combined areas total less than 2,000 ha. This species is threatened with extinction because of its restricted range and habitat destruction from residential, commercial, and agricultural land conversions. It is currently protected or will be protected within three parcels of public land. Specific land management practices that benefit this species are not known, but management for other associated scrub endemics may ultimately be useful in protecting and managing the short-leaved rosemary.

This account represents a revision of the existing recovery plan for the short-leaved rosemary (FWS 1996).

Description

The short-leaved rosemary (*Conradina brevifolia*) is a short-lived, erect, woody, perennial shrub that reaches about 1 m in height (Kral 1983). It is very similar to the relatively widespread, and quite variable *C. canescens* of the Florida panhandle, Alabama, and Mississippi, and it is similar to the endangered *C. glabra* of the Apalachicola bluffs (Gray 1965, FWS 1994). As its name implies, *C. brevifolia's* alternate leaves are shorter than *C. canescens.* The larger leaves on well-developed flowering branches are 6.0 to 8.2 mm long, and mostly shorter than the internodes, whereas *C. canescens'* leaves are 7 to 20 mm long and are mostly longer than the internodes. *C. brevifolia* also tends to have more flowers per axil than *C. canescens*: one to six per axil versus one to three in *C. canescens*.

Taxonomy

The short-leaved rosemary is one of five shrubby mints in the interior central Florida scrub. The others are *Calamintha ashei*, *Dicerandra frutescens, D. christmanii*, and a

Dicerandra population whose taxonomic status is unresolved. *C. brevifolia* was described as a new species by Shinners (1962).

Taxonomic reviews of *Conradina* have upheld *C. brevifolia's* treatment as a distinct species (Gray 1965, Wunderlin *et al*. 1980, Kral 1983, Kral and McCartney 1991). However, Wunderlin (1982) and DeLaney and Wunderlin (1989) included *C. brevifolia* in *C. canescens*, without noting *C. brevifolia* as a synonym. Gray (1965) showed that *C. brevifolia*, like *C. glabra*, is morphologically not strongly differentiated from, and is less variable than, *C. canescens*.

Distribution

This species has a very restricted range in the middle of the Lake Wales Ridge. It occurs at only about 30 sites whose total area is less than 2,000 ha in the Sebring-Avon Park area of Highlands and Polk counties (Christman 1988, Christman and Judd 1990) (Figure 1).

Habitat

Conradina brevifolia inhabits white sand scrub with a scattered overstory of sand pine (*Pinus clausa*), interspersed with evergreen scrub oaks (*Quercus* spp.). *C. brevifolia* is usually found interspersed in clearings with other small shrubs and herbs (FWS 1992). Like all other xeric scrub communities, oak scrub is a fire-dependent vegetative complex that persists when burned at intervals of 10 to 20 years. In the slower-growing oak scrub of Florida's ridges, including Highlands and Polk counties, fire frequencies of 15 to 20 years are sufficient to maintain the vegetative diversity of the scrub habitats.

Reproduction

We have no species-specific data on the reproductive biology of *C. brevifolia.* In fire-dependent scrub habitat, most plants respond to fire by sprouting while a few recruit from seed that is stored in the sand (Johnson and Abrahamson 1990). Anecdotal information suggests that *C. brevifolia* does not persist when burned, clipped, or defoliated (FWS 1996). If this is true, sprouting and other forms of asexual reproduction are unlikely.

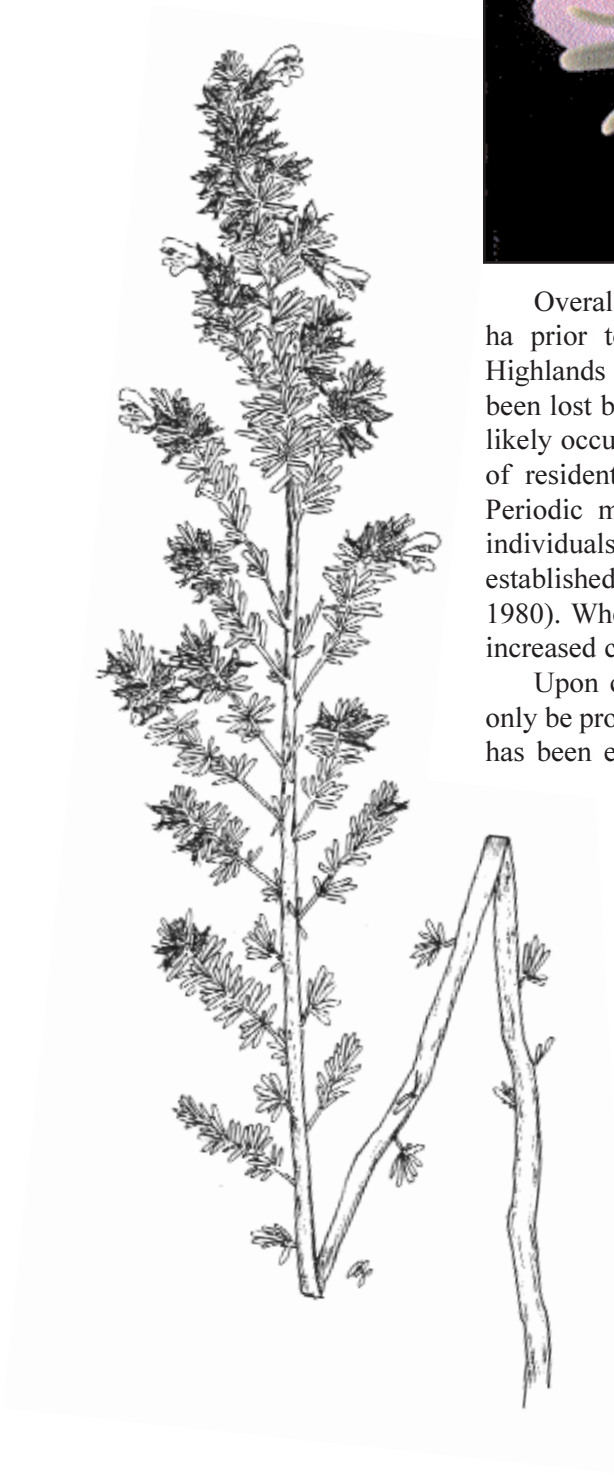
Relationship to Other Species

The ecology of *C. brevifolia* has not been studied and special or unique relationships with other species are not known.

Status and Trends

The distribution of *C. brevifolia* is more restricted than most other rare endemic scrub plants. This species was probably never common nor widely distributed since apparently suitable, but unoccupied habitat exists outside of its current range. However, since surveys in the 1980s, there have been substantial losses and fragmentation of scrub habitat in Highlands and Polk counties (FWS 1992, 1996).

Short-leaved rosemary. *Original drawing by Anna-Lisa King; original flower photograph by Steve Shirah.*



Overall, scrub habitat has declined in total area from an estimated 32,000 ha prior to human settlement to about 11,000 ha (Christman 1988). In Highlands County, it was estimated that about 74 percent of scrub habitat had been lost by 1981; by now the loss must be much greater. Similar losses have likely occurred in Polk County. Most habitat destruction has occurred because of residential and agricultural expansion in Highlands and Polk counties. Periodic mowing has apparently caused a decline in the total number of individuals in some locations; however, no permanent plots have been established to monitor the fate of individuals in mowed sites (Wunderlin *et al.* 1980). Where habitat has not been destroyed, it is often degraded because of increased competition due to fire suppression.

Upon completion of land acquisition efforts, *C. brevifolia* will probably only be protected at five of the 30 scrub sites where it is currently found. It also has been established at Bok Tower Gardens as part of the Center for Plant Conservation's National Collection of Endangered Species. Scrub sites at Avon Park Lakes, Carter Creek, and Saddle Blanket Lakes are critical for its conservation and additional acquisition in these areas is needed to secure *C. brevifolia*. Continued land acquisition is planned for all three sites, although residential development at Avon Park Lakes limits preserve options there (FWS 1996).

Management

No specific information is available on the ecological requirements of *C. brevifolia*. However, existing information on the natural fire regimes of various scrub communities suggest that the white sand, scrub oak-dominated vegetative complex within which *C. brevifolia* is commonly found, generally requires periodic, patchy, high-intensity fires. Fire cycles of 15 to 20 years reduce overstory competition and provide disturbed open sandy patches within which obligate seeding species may re-establish. We suspect that *C. brevifolia* does not persist after fire (FWS 1996), or other

disturbance, but readily germinates post-fire from seeds stored in the sand (Menges 1992).

In order to effectively conserve *C. brevifolia*, therefore, management of protected lands must restore and maintain scrub communities. To achieve this, land managers must mimic the timing and intensity of natural fire regimes. If adequate fire management programs are developed for protected lands, *C. brevifolia* is likely to persist in the wild.

The restricted range and distribution of this species may also require conservation measures to protect against the possibility of catastrophic, stochastic, natural events that could eliminate it from the wild or greatly reduce its genetic diversity. These measures may include augmentation of existing populations, introduction into suitable unoccupied habitat, and germ plasm conservation.

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Recovery for the Short-leaved Rosemary

Conradina brevifolia Shinners

Recovery Objective: STABILIZE, then reclassify to threatened.

Recovery Criteria

The short-leaved rosemary may be considered stabilized when existing populations, within its historic range, are adequately protected from further habitat loss, degradation, and fire suppression. These sites must also be managed to maintain sand pine scrub. Land acquisition is critical for this species. The most important sites for acquisition are the Carter Creek scrub tract and Avon Park Lakes site.

Reclassification to threatened of this species will be considered when: enough demographic data are available to determine the appropriate numbers of self-sustaining populations required to ensure 20 to 90 percent probability of persistence for 100 years; when these populations, within the historic range of *C. brevifolia,* are adequately protected from further habitat loss, degradation, and fire suppression; when these sites are managed to maintain sand pine scrub; and when monitoring demonstrates that these sites support sufficient population sizes, are distributed throughout the historic range, and are sexually or vegetatively reproducing at sufficient rates to maintain the population.

This recovery objective is an interim goal because of the limited data on the biology, ecology, and management needs of this species. The recovery objective will be reassessed annually based on new research, management, and monitoring information. Reclassification criteria may be refined if new information identifies ways of re-establishing populations of this species to expand its current distribution within its historic range.

Species-level Recovery Actions

S1. Determine current distribution of *C. brevifolia.* Some portions of *C. brevifolia*'s range have been well surveyed yet a total distribution has not been ascertained for this species. A thorough survey is needed to determine the distribution for this species.

S1.1. Conduct surveys for additional populations of *C. brevifolia*.

S1.1.1. Continue surveys in Polk and Highlands counties. The Lake Wales Ridge has probably been adequately surveyed, though new sites for *C. brevifolia* may still be found.

S1.1.2. Continue surveys on protected lands. New sites for listed species are still being found on protected lands. This survey work should be continued to catalog all existing protected sites and new sites as they are purchased.

S1.2. Maintain distribution of known populations and suitable habitat in GIS database. Map existing populations and assess the species' status and trends over time. The database should contain information on locations, population sizes, and status. This information should also be used for project review, in land acquisition activities, and to coordinate updates with the Florida Natural Areas Inventory database. Currently, the Lake Wales Ridge Ecosystem Working Group and Archbold Biological Station are proposing to map the entire central ridge. This information would show potential habitat for scrub endemics based on their habitat needs.

S2. Protect and enhance existing populations. Much of the native xeric uplands on the Lake Wales Ridge and surrounding counties have been converted to agriculture or urban development. The remaining habitat is fragmented into small parcels and in many cases, isolated. For this reason, existing populations are in need of protection.

S2.1. Acquire or protect privately owned habitat through acquisition, conservation easements, or agreements with landowners. Acquisition of Saddle Blanket Lakes, Carter Creek, and Avon Park Lakes is crucial to the survival of this species.

S2.2. Protect populations on public lands. Develop management guidelines that allow for a fire regime that includes a mosaic of successional stages.

S2.3. Use local or regional planning to protect habitat. Utilize available regional and county planning processes to encourage protection of suitable habitat, both unoccupied and occupied of *C. brevifolia*.

S2.4. Continue *ex situ* conservation. *Ex situ* collections are important for preserving genetic diversity, preventing extirpation, and determining ecological characteristics and habitat management needs of species. These collections will be instrumental in the recovery of *C. brevifolia*.

S2.4.1. Conserve germ plasm. The seed for this species is not presently in long-term storage.

S2.4.2. Maintain *ex situ* collection. Currently, the Center for Plant Conservation coordinates conservation activities and maintains a database for the National Collection. Bok Tower Gardens, as a participating institution, maintains and propagates *C. brevifolia* as part of the National Collection.

S2.5. Enforce available protective measures. Use local, State and Federal regulations to protect this species from overcollecting and damage from off-road vehicle use. Regulations should also be used to protect xeric vegetative communities where *C. brevifolia* is found.

S2.5.1. Initiate section 7 consultation when applicable. Initiate section 7 consultations when Federal activities may affect this species.

S2.5.2. Enforce take and trade prohibitions. This species is protected by take provisions of the ESA (including its prohibition against removing and reducing to possession any endangered plant from areas under Federal jurisdiction; maliciously damaging or destroying any such species on any such area; or removing, cutting, or digging up any such species), by the Preservation of Native Flora of Florida Act, and by the Florida rules regarding removal of plants from State lands.

S3. Conduct research on life history characteristics of *C. brevifolia*. Little is known of the basic biology and ecology of this species. To effectively recover this species more specific biological information is needed.

S3.1. Continue research to determine demographic information, such as numbers of sites and populations, numbers of individuals in a population, recruitment, dispersal, growth, survival, and mortality.

S3.2. Once demographic data are known, conduct population viability and risk assessment analysis to determine the numbers of plants, sites, subpopulations/populations, and spatial distribution needed to ensure persistence of the species.

S3.3. Conduct research to assess management requirements of *C. brevifolia*. Determine which natural populations can be stabilized or increased by habitat management. Surveys, research, and monitoring information will provide factors contributing to any declines at each site. Monitoring of populations should be in reference to various habitat management practices. Site-specific management guidelines should be provided to land managers and close coordination among land managers is essential to develop adaptive management techniques.

S4. Monitor populations of *C. brevifolia*.

S4.1. Develop monitoring protocol to assess population trends for *C. brevifolia*.

S4.1.1. Monitor to detect changes in demographic characteristics, such as reproduction, recruitment, growth, dispersal, survival, and mortality. Also monitor for pollinators, herbivory, disease, and injury.

S4.1.2. Monitor the effects of various land management actions on *C. brevifolia*. Assess any changes in demographic characteristics of *C. brevifolia* in response to land management activities, such as prescribed fire, exotic plant control, *etc.*

S4.2. Develop a quantitative description of the population structure of *C. brevifolia*. This description will provide a baseline for monitoring population dynamics in response to natural environmental changes and management treatments. Data recorded should include morphology, survivorship, mortality, and reproduction for individual plants. Data are also needed about each plant's microsite (vegetation cover, litter depth, substrate, and closest neighbors).

S5. Provide public information about *C. brevifolia*. It is important for the recovery of this species that governmental agencies, conservation organizations such as the Florida Native Plant Society, and private landowners be appropriately informed about this species.

Public outreach efforts must also continue to address the increasing concern that horticultural demand for this and other rare species may not benefit conservation of threatened and endangered species. Public education should identify that commercial production and horticultural uses of endangered species provide little benefit, since the recovery of *C. brevifolia* and other rare species requires a self-sustaining, secure, number of natural populations.

Habitat-level Recovery Actions

H1. **Prevent degradation of existing habitat.** Extensive habitat loss, degradation, and fragmentation have already occurred throughout the range of this species. Both urbanization and fire suppression have decreased the available habitat. Of the 30 sites known to support *C. brevifolia* in Polk and Highlands counties, only five are protected.

H1.1. **Secure habitat through acquisition, landowner agreements, and conservation easements.** With so little xeric scrub habitat left, any method of protecting habitat that supports *C. brevifolia* should be sought.

H1.2. **Manage and enhance habitat.** Manage habitat to maintain *C. brevifolia* populations by preventing habitat damage from off-road vehicle use and overcollection, and by providing proper management of habitat including prescribed fire.

H1.2.1. **Conduct prescribed burns.** Fire is a necessary and integral characteristic of the scrub community. Appropriate seasonality and a variable interval in fire return are important to mimic the natural fire regime. In addition, spatial variation in fire intensity and unburned patches is necessary to construct a natural fire landscape. Scrub vegetation is naturally made up of islands of suitable and unsuitable habitat. To replicate this landscape pattern, sites should be burned to create a mosaic of successional stages when possible.

H1.2.2. **Control and eliminate exotic and invasive plants and animals.** Exotic plant and animal species are not yet a major threat in Florida scrub as compared to other habitats in South Florida. However, in isolated areas, exotic species are becoming established. Without control, exotic/invasive plants may become a threat to the survival and recovery of *C. brevifolia*.

H1.2.3. **Control access to areas where listed plants are growing**. Collection, trampling, and off-road vehicles can severely threaten individual populations.

H2. **Restore areas to suitable habitat.** Native habitats that have been disturbed or that have experienced a long history of fire suppression may be good candidates for future reserves.

H2.1. **Restore natural fire regime.** Long periods without fire can change the species composition and the ability of the site to carry fire. Rehabilitation of a site may be a lengthy process, but with fewer and fewer areas remaining, they may become more valuable for future recovery. On these sites a seed bank may exist that could include rare endemic species.

H2.2. **Enhance sites with native plant species.** Because of logging or long periods without fire, certain native plant species that were present historically may now be absent from the natural composition of the community. These species may be reintroduced if natural colonization is no longer possible.

H3. **Conduct habitat-level research projects.** Study the response of *C. brevifolia* to various land management practices, such as prescribed fire regimes, vegetative thinning, and control of exotic/invasive vegetation.

H4. **Monitor habitat/ecological processes.** Monitor the effects of land management actions, such as prescribed fire, exotic plant control, *etc.*, on the habitats where *C. brevifolia* occurs.

H5. **Provide public information about scrub and its unique biota**. Educational programs, especially those conducted by Archbold Biological Station, have been successful. Without these successful efforts, the Lake Wales Ridge NWR would not have been created. Florida's system of biological preserves depends on a broad base of public understanding and support for its funding and future success. In addition to past and ongoing programs by The Nature Conservancy, Bok Tower Gardens, and Archbold Biological Station, future efforts by these organizations, and the Florida Park Service, the Florida Division of Forestry, the SFWMD, the Florida Native Plant Society, and local garden clubs are crucial in increasing public appreciation of scrub and high pine communities, and their associated plant species. The Arbuckle Appreciation Day sponsored by the Florida Division of Forestry has been especially successful in disseminating information about these unique communities.