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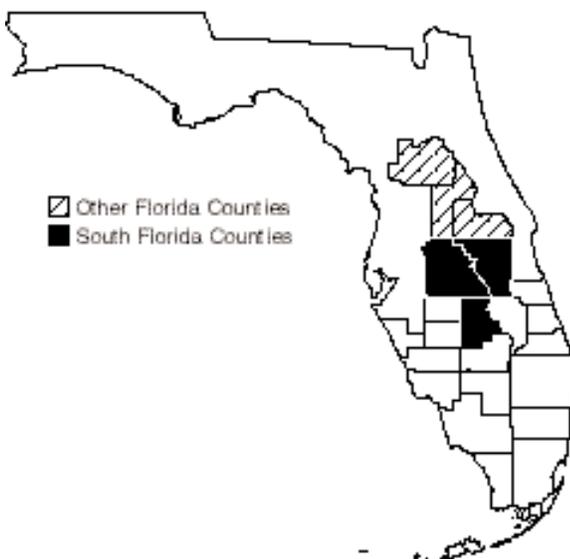
# Lewton's Polygala

*Polygala lewtonii* Small

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Federal Status:	Endangered (April 27, 1993)
Critical Habitat:	None Designated
Florida Status:	Endangered
Recovery Plan Status:	Revision (May 18, 1999)
Geographic Coverage:	Rangewide

Figure 1. County distribution of Lewton's polygala.



Lewton's polygala is a perennial herb that occurs in oak scrub and in high pine, but is more common in the transitional areas between these two community types. Oak scrub and high pine have been and continue to be destroyed for agriculture and residential housing construction. As with many other rare endemic plants, protection of this species must be achieved through habitat acquisition and implementation of appropriate land management measures to protect the structure and composition of oak scrub and high pine communities.

This account represents a revision of the existing recovery plan for Lewton's polygala (FWS 1996).

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## Description

*Polygala lewtonii* is a relatively short-lived (5 to 10 year) perennial herb. Each plant produces one to several annual stems, which are spreading, upward-curving or erect, and are often branched. The leaves are small, sessile, rather succulent, broader toward the tip, and are borne upright, tending to overlap along the stem, like shingles. The normally opening flowers are in erect, loosely flowered racemes about 1.5 cm (Wunderlin *et al.* 1981) or 3.3 cm (Weekley 1996) long. The flowers are about 0.5 cm long and bright pink (Wunderlin *et al.* 1981) or purplish-red (Ward and Godfrey 1979). Two of the five sepals are enlarged and wing-like, between which the largest of the three petals forms a keel that ends in a tuft of finger-like projections (Ward and Godfrey 1979). The plant also produces two types of small, cleistogamous (non-sexual) flowers (L. Miller, Ocala NF, personal communication 1996, Weekley 1996). This species is closely related to the widespread *P. polygama*, which forms larger clumps and has a longer root, narrower leaves, and differently shaped wing sepals. It also has short branches that hug the ground, bearing inconspicuous self-pollinating flowers.

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## Taxonomy

This small herb was first collected near Frostproof, Florida by F. L. Lewton in 1894, and was named by J.K. Small (1898). The status of *P. lewtonii* as a distinct species was affirmed by Blake (1924) and James (1957). There have been no other taxonomic treatments of this species.

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## Distribution

*Polygala lewtonii* occurs in oak scrub and high pine communities of Highlands, Polk, Osceola, Orange, Lake, and Marion counties (Figure 1), within the Lake Wales and Mount Dora ridges of central Florida.

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## Habitat

*Polygala lewtonii* is not strictly a scrub species and is found in widely scattered populations that frequently occur in transitional habitats between high pine and turkey oak barrens. *P. lewtonii* also occurs in both habitats (Wunderlin *et al.* 1981, Christman 1988). *P. lewtonii* depends on fire to maintain its habitat. It is found in sunny openings and often colonizes disturbed sites, such as roadsides and fire lanes. *P. lewtonii*'s preference for transitional habitats between high pine and turkey oak barrens suggests a preference for a burn frequency that is less frequent than high pine, but more frequent than turkey oak barrens.

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## Reproduction

Confusion has existed about whether *P. lewtonii* has cleistogamous flowers (James 1957, Wunderlin *et al.* 1981, Ward and Godfrey 1979, FWS 1996). More recently, Weekley (1996) and Miller (Ocala NF, personal communication 1996) confirmed the presence of two types of cleistogamous flowers. The first are solitary flowers in the axils of the lower leaves and the second are few-flowered racemes on underground rhizomes that are usually 5 to 15 cm long (Weekley 1996).

*Polygala lewtonii* blooms from February to May with chasmogamous flowers dominating from February to April. Chasmogamous flowers have an average of four to six racemes per plant, though one extreme individual had 30 racemes (Weekley 1996). Each raceme has 20 to 25 flowers 85 to 100 percent of these set fruit. This high percentage of fruit set suggests that flowers self-pollinate when insect pollinators are not present. A variety of insects have been observed visiting *P. lewtonii*, but insect pollinators of this plant are unknown (Weekley 1996).

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## Relationship to Other Species

*Polygala lewtonii* can be found with other federally listed plants: *Warea amplexifolia* in high pine in central Florida, *Ziziphus celata*, *Prunus geniculata*, and *Nolina brittoniana* in the scrub, and *Eriogonum longifolium* var. *gnaphalifolium* in scrub, high pine, and the ecotones between these

**Lewton's polygala.**

Original photographs by Steve Shirah.



habitats.

The pollinators for Lewton's polygala are unknown, though a variety of insects are frequent visitors, including butterflies (Lepidoptera), flies (Diptera), and wasps (Hymenoptera). Seeds of this species are probably dispersed by ants, but this relationship has not been confirmed (Weekley 1996).

**Status and Trends**

*Polygala lewtonii* was listed as an endangered species on April 27, 1993, due to land conversion and habitat destruction for agriculture and residential housing construction (58 FR 25754). It is estimated that Florida has lost 88 percent of its high pine habitat and 59 percent of its scrub communities since settlement by Europeans (Kautz *et al.* 1993). As habitat loss continues, the limited geographic distribution of the scrub plant species, the fragmentation of remaining habitat, and the small numbers of individuals in remaining habitat, exacerbate other threats faced by this species (58 FR 25754). For example, small tracts of scrub are degraded by trash dumping, recreational use of off-road vehicles, and disturbance caused by harvesting of rusty lyonia (*Lyonia ferruginea*) stems for the silk-plant industry. In publicly owned high pine habitat, all-terrain vehicles and motorcycles severely impact *P. lewtonii* and other listed species.

*Polygala lewtonii* is easily overlooked and often confused with *P. polygama*. Its identification requires scrutiny during surveys. With more survey work, *P. lewtonii* may prove to be somewhat less rare and spotty in occurrence than indicated by existing surveys. For example, intensive surveys identified 48 occurrences of *P. lewtonii* in Ocala NF (Clutts 1995). However, habitat loss has been severe throughout its range, especially in Lake County, where large areas of high pine once supported a number of endangered plants, including *Prunus geniculata*, *Nolina brittoniana* (Wunderlin *et al.* 1981), and *Warea amplexifolia* (Judd 1980). Today this habitat is nearly gone.

In South Florida, an aggressive land acquisition program is underway to

conserve the remaining parcels of natural habitats along the central ridges. There are six protected sites in Polk and Highlands counties. The largest site in South Florida is Carter Creek, which has not been acquired yet. Acquisition of this site is crucial to the security of this plant.

Protected sites for *P. lewtonii* include: Ocala NF, Lake Wales Ridge SF, Arbuckle SP, Catfish Creek SP, Tiger Creek Preserve, Pine Ridge Preserve at Bok Tower Gardens, and Highlands Hammock SP. These sites represent only a small fraction of habitat that was once available.

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## Management

*Polygala lewtonii* occurs in the highly fire-dependent high pine community and the less-frequently burned oak scrub community. It seems to favor the ecotonal habitat where the burn frequency is highly variable. In general, this species responds favorably to fire, as it resprouts quickly and there is an increase in seedling recruitment. After an initial increase in recruitment, populations tend to fluctuate widely. However, large changes in population size coupled with its cryptic nature makes monitoring difficult in many situations. Though more research is needed on the species' response to different fire frequencies and intensities, it is clear that periodic fire is needed for the persistence of this species.

*Polygala lewtonii* may have experienced some degree of range expansion due to artificial fire regimes (Clutts 1995). The practice of winter burning may have allowed *P. lewtonii* to expand its distribution from scrub vegetation into high pine. Winter burns prohibit the sexual reproduction of wiregrasses in the high pine habitat and have resulted in an increase in the openings that would have naturally occurred in this habitat. More open areas favor establishment and persistence of *P. lewtonii*. Ocala NF personnel are studying this relationship.

Because of *P. lewtonii*'s presence in Ocala NF, prospects for conserving this species are probably quite good. In the Lake Wales Ridge, the south portion of Carter Creek has the largest known population and acquisition of this site is possible. Continued surveying for this species should include areas with large tracts of turkey oak barrens and the ancient dunefields on the east side of the Lake Wales Ridge in Polk and Highlands counties (K. DeLaney, Environmental Research Consultants, Inc., personal communication 1995).

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# Recovery for the Lewton's Polygala

## *Polygala lewtonii* Small

**Recovery Objective:** RECLASSIFY to threatened.

### Recovery Criteria

*Polygala lewtonii* may be reclassified from endangered to threatened when: enough demographic data are available to determine the appropriate numbers of self-sustaining populations and sites needed to assure 20 to 90 percent probability of persistence for 100 years; when these sites, within the historic range of *P. lewtonii*, are adequately protected from further habitat loss, degradation, and fragmentation; when these sites are managed to maintain the seral stages of high pine and xeric oak scrub to support *P. lewtonii*; and when monitoring programs demonstrate that these sites support the appropriate numbers of self-sustaining populations, and those populations are stable throughout the historic range of the species.

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 and status of *P. lewtonii*.** This species' distribution is somewhat questionable since individuals are easily overlooked. A thorough survey is needed to determine the distribution for this species.
  - S1.1. Conduct surveys for populations of *P. lewtonii*.**
    - S1.1.1. Survey scrub, high pine, and turkey oak habitats in Osceola and Hardee counties.** Adequate survey work has not been performed off the Lake Wales Ridge. Sites on private property cannot be protected without survey knowledge.
    - 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.** Use GIS to map existing populations and to 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, has become isolated. For this reason, existing populations are in need of protection from a variety of threats.
- S2.1. Protect populations on private land through acquisition, conservation easements, or agreements with landowners.**
- 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. Develop *ex situ* collection.** *Ex situ* collections are important for preserving genetic diversity, preventing extirpation, and determining ecological characteristics and habitat management needs of species.
- S2.4. 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 *P. lewtonii* lives.
- S2.4.1. Initiate section 7 consultation when applicable.** Initiate section 7 consultations when Federal activities may affect this species.
- S2.4.2. Enforce take 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.** Much of the basic biology and ecology of this species remains poorly understood. 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 *P. lewtonii*.** Determine which natural populations can be stabilized or increased by habitat management. Surveys, research, and monitoring on the localities of *P. lewtonii* sites, 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 existing populations of *P. lewtonii*.**
- S4.1. Develop monitoring protocol to assess population trends for *P. lewtonii*.**
- 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 *P. lewtonii*.** Assess any changes in demographic characteristics of *P. lewtonii* 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 *P. lewtonii*.** 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 collect individual plants, data about each plant's microsite (vegetation cover, litter depth, substrate, and closest neighbors).
- S5. Provide public information about *P. lewtonii*.** 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. Care is needed, though, to avoid revealing specific locality information about *P. lewtonii*.
- 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 to species, since the recovery of *P. lewtonii* and other rare species requires a self-sustaining, secure, number of natural populations.

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### 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. To date, there are six protected or acquisition sites for *P. lewtonii* in South Florida.
- H1.1. Secure habitat through acquisition, landowner agreements, and conservation easements.** Since little xeric scrub habitat is remaining for this species, any method of securing protected populations should be sought.
- H1.2. Manage and enhance habitat.** Manage habitat to maintain *P. lewtonii* populations by preventing 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. A variable interval in fire return and in season is 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. The scrub is naturally made up of islands of suitable and unsuitable habitat. To repeat this landscape pattern, sites should be burned as a mosaic when possible to allow for variation.

- 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 communities 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 *P. lewtonii*.
- 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 sites remaining, these sites 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 can be reintroduced if natural colonization is not possible.
- H3. Conduct habitat-level research projects.** Study the response of *P. lewtonii* 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 *P. lewtonii* occurs.
- H5. Provide public information about scrub and its unique biota.** Educational efforts, 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 educational efforts 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 knowledge about these unique communities.