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# Scrub Blazing Star

*Liatriis ohlingerae* (Blake) Robinson

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<b>Federal Status:</b>	Endangered (July 27, 1989)
<b>Critical Habitat:</b>	None Designated
<b>Florida Status:</b>	Endangered
<b>Recovery Plan Status:</b>	Revision (May 18, 1999)
<b>Geographic Coverage:</b>	Rangewide

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Figure 1. County distribution of the scrub blazing star.



The scrub blazing star belongs to the aster family (Asteraceae) within a genus of perennial herbs that live in open, usually fire-maintained, habitats. Two species and one variety of *Liatriis* are endemic to Florida; another species of *Liatriis* is endemic to Florida and the Bahamas. The scrub blazing star was listed as an endangered species in 1989 due to habitat loss. The principal cause of decline of central Florida's upland vegetation is conversion of habitat for agricultural, commercial, residential, and recreational purposes.

This account represents a revision of the existing recovery plan for the scrub blazing star (FWS 1996).

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## Description

The scrub blazing star (*Liatriis ohlingerae*) is a long-lived perennial herb having a thickened, cylindrical root. Its stems are erect, usually unbranched, and it can grow up to 1 m tall. Its leaves are fleshy and narrow (1 to 2.5 mm), and generally 3 to 8 cm long (Wunderlin *et al.* 1980). Flower heads are well separated on the stem with individual disc flowers up to 1 cm broad; the inflorescences are up to 3 cm across. The corollas are bright purplish-pink in color. The broad flower heads and narrow leaves distinguish *L. ohlingerae* from the eight other *Liatriis* species in central Florida.

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## Taxonomy

Blake (1923) placed *L. ohlingerae* in the blazing star genus, naming it *Lacinaria ohlingerae*. Small (1924) created a new genus for this plant, which became *Ammopursus ohlingeri*. Robinson (1934) reinstated the scrub blazing star in the large genus of the blazing stars as *Liatriis ohlingerae*. Gaiser's (1946) treatment of *Liatriis*, and Cronquist's (1980) floristic treatment of the aster family in the Southeast retains this plant in the genus *Liatriis*, although Lakela (1964) argued in favor of reinstating *Ammopursus* as a genus containing only one species.

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## Distribution

*Liatris ohlingerae* is endemic to the Lake Wales Ridge in Highlands and Polk counties (Figure 1). During comprehensive surveys in the mid-1980s, the scrub blazing star was found at 93 localities, 71 of them in Highlands County (Christman 1988). The species' range extends from Lake Blue in Polk County (FWS 1996), south along the Lake Wales Ridge to Archbold Biological Station at the south end of the Ridge in Highlands County.

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## Habitat

The scrub blazing star is one of the endemic plants found in rosemary balds. It is also found along the ecotone between these balds and surrounding scrub habitats on white or (rarely) on yellow sands (Christman and Judd 1990). It can also be found scattered in surrounding scrub. Rosemary balds are a unique community type within the scrub ecosystem. They are represented by small "islands" separated from each other, often by considerable distances. These "islands" provide suitable habitat for a number of scrub endemics (Christman and Judd 1990) that have evolved within the well-drained, droughty, low-nutrient soils. These limiting habitat conditions have resulted in a vegetative complex whose above ground biomass is sparse and does not support frequent fires. Rosemary balds typically burn every 40 to 100 years (Johnson 1982, Myers 1990), while the surrounding scrubs burn more frequently. Fire may either burn a section of rosemary scrub or it may sweep through the entire bald (Herndon 1996). The ecotone between rosemary balds and surrounding scrub is a dynamic vegetative complex dependent on the frequency and intensity of fire.

Herndon (1996) found that *L. ohlingerae* has important microhabitat requirements, particularly its preference for shade. Unlike most other scrub endemics, *L. ohlingerae* appears to thrive in lightly shaded areas. Generally, *L. ohlingerae* is found in highest densities on the lower slopes of rosemary balds especially where low, thin-canopied scrub oaks (*Quercus chapmanii*, *Q. geminata*, and *Q. inopina*) or patches of palms (*Sabal etonia* and *Serenoa repens*) dominate the vegetation and where patches of open sand exist. These habitat conditions are also frequently found under individual sand pine (*Pinus clausa*) crowns, but never in dense groves of sand pines.

Over time, however, shady microhabitats are not fixed within rosemary balds. Large-scale disturbance such as intense fire may change the mosaic pattern of scrub vegetation and thus decrease the amount of shade in scrub habitat. Twenty-five percent of *L. ohlingerae* are found in open areas in direct sun while 25 percent are found along the edges of canopies in partial shade. Half of the plants are typically found under canopies of other rosemary bald vegetation.

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## Reproduction

*Liatris ohlingerae* requires cross-pollination to reproduce. Butterflies, especially skippers (Hesperiidae), are thought to be the primary pollinators, although other insects may also contribute to pollination (FWS 1996).

**Scrub blazing star.**

Original photograph by Betty Wargo; original flower photograph by Steve Shirah.



Flowering and fruiting in this species all more abundant in shaded microhabitats. Individuals in open and edge habitats only produce one-quarter as many mature flower heads (Herndon 1996). The seeds of this species are short-distance wind dispersers, with bristles and hairs that assist in “planting” the seeds correctly. Low germination on leaf litter-covered soil suggests that many seeds in shade (the favored microhabitat) may get trapped in the leaf litter and fail to sprout or die shortly after sprouting (Herndon 1996).

Herndon (1996) found that the number of buds on *L. ohlingerae* plants is highly variable from year to year, from site to site, and from plant to plant. His study revealed an overall germination rate of 21 to 62 percent and hypothesized that the difference could be attributed to climatic factors such as rainfall and temperature. However, the factor most affecting germination rates was not the environmental conditions or where the plants were located, but the soil conditions in the vicinity of the plant. Seeds on bare sand had a higher germination rate, 30 percent in contrast with 21 percent for all of the plots. Though no difference in germination rates were observed in relation to light intensity, survival of seedlings was greater in the shaded sites.

There seems to be a high survival rate among germinated seedlings. In Herndon’s (1996) study, 11 of 18 naturally germinated seedlings survived until the end of the study. The juvenile stage lasted more than two growing seasons. After one growing season, most of the seedlings had one to two basal leaves (some had three). The leaves were less than 2 mm wide and lacked a prominent midrib. Many plants have been tagged for 5 years without signs of senescence; this plant’s life span is likely measured in decades.

According to Herndon (1996), the growth of new basal leaves begins in March and the elongation of stems begins in April. Flowering and fruiting occurs from summer through fall. Flowering begins in May and June, but the peak occurs in August with a rapid decline toward the middle of September. The

seeds start to disperse in August and peak in October. Each plant produces approximately eight filled (presumably viable) seeds a year. The plant's above ground parts die back in October to November or by the first freeze. *Liatris ohlingerae* can remain in a dormant state through at least one growing season.

The seedling growth rate for *L. ohlingerae* is slow compared to most other scrub endemics. Many others grow to reproductive maturity in only one season, while the juvenile stage for *L. ohlingerae* was found to be at least 2 years by Herndon (1996). Interestingly, cultivated *L. ohlingerae* mature to flowering in 8 months. Limited water and nutrients are believed to be responsible for the difference between wild populations and cultivated ones (Herndon 1996).

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### Relationship to Other Species

In contrast to other rosemary scrub endemics, *L. ohlingerae* prefers shade and is not as productive in sunny, open gaps. It occupies areas that would be too overgrown for other scrub endemics.

Some rosemary bald endemics, such as *Ceratiola ericoides*, (sand heath) produce chemicals that have allelopathic effects. *Liatris ohlingerae* probably is not affected by these chemicals, since it commonly grows under rosemary bushes (Herndon 1996). However, *L. ohlingerae* is missing from dense stands of *Ceratiola*. Herndon (1996) found the shade of dense stands of *C. ericoides* was more limiting than their allelopathic effects. However, single or widely spaced *C. ericoides* were not dense enough to preclude *L. ohlingerae* (Herndon 1996).

*L. ohlingerae* is restricted to the rosemary community and surrounding ecotones, while *L. laevigata* is found commonly in both rosemary balds and surrounding scrub. This indicates that the burn frequency may determine the habitat preference of these two species (Herndon 1996). *Liatris chapmanii* is distributed on roadsides at Archbold Biological Station in Highlands County, but it is not found in rosemary balds in this area. Both habitats appear to be similar in that they lack competing vegetation; however, the habitat selection of *L. ohlingerae* may be based on a favoritism for lightly shaded areas (Herndon 1996) on very well drained sands of ancient scrub.

Herndon (1996) also found that herbivory is a limiting factor for flower production, noting that flower-bearing vegetation would not be replaced if lost late in the season or if topped multiple times throughout the growing season. However, stems eaten early in the season will likely be replaced and produce flowers. An endemic grasshopper (*Melanoplus tequestae*) has been frequently observed on *L. ohlingerae* and may be an important herbivore. White-tailed deer (*Odocoileus virginianus*) and eastern cottontail (*Sylvilagus floridanus*) are also suspected of grazing on *L. ohlingerae*.

In addition to losses due to herbivory, 30 percent of all buds are destroyed by borers. The smaller buds are destroyed by an excavator that consumes the ovaries. On larger buds, a lepidopteran borer is responsible for entering the bud at an unknown stage and consuming the ovaries. These buds reach mature size, but fail to open. Overall, 42 percent of buds failed to reach maturity. Of those, 30 percent was due to herbivory and the remaining 12 percent had an unknown cause. Herndon (1996) noticed that herbivory rates vary with microclimate. In open areas stems are lost more frequently to herbivory (54 percent of the buds were lost, compared to 42 percent in the shaded microhabitats).

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## Status and Trends

*Liatris ohlingerae* was listed as endangered on July 27, 1989, due to rapid habitat loss associated with land clearing for agricultural, residential, and commercial purposes (54 FR 31190). Most remaining scrub habitat continues to be degraded due to fire suppression.

It has been estimated that Florida's scrub habitat has been reduced between 60 and 75 percent since settlement of the region. The most recent evaluations of scrub in central Florida indicate that only about 11,000 ha remain. Much of that scrub habitat is fragmented and has become overgrown due to fire suppression (Christman 1988, Christman and Judd 1990). In Highlands County, it was estimated that about 74 percent of scrub habitat had been lost by 1981. Because rosemary balds are typically higher and potentially more attractive for human uses than the surrounding landscape, it is possible that these sites may have sustained greater loss than other central Florida ridge communities.

Although *L. ohlingerae* was reported from 93 scrub sites in the late 1980s, the number of individuals within these sites may have been underestimated. Herndon (1996) suggested that it is difficult to survey *L. ohlingerae* with accuracy because the species is cryptic when not in bloom; it has a tendency to live nestled among other species. Topped individuals may be overlooked during flowering, and a proportion of individuals are not active in a given season. Even with inaccurate surveys, Herndon (1996) believed the population stable with no evidence of immediate decline. He reached this conclusion because the mortality of adult plants is low and the species can withstand moderate habitat succession without declining.

The scrub blazing star may have been extirpated from at least one site; it has not been seen at the Tiger Creek Preserve since 1992 (FWS 1996). Since regular monitoring plans are not in place, it is possible that other localized extirpations have occurred. Aside from the obvious adverse effects occurring from the direct loss of habitat, a multitude of other factors resulting from habitat fragmentation and fire exclusion may be acting individually or synergistically to reduce the viability of scrub endemics, including *L. ohlingerae*.

Though mortality of *Liatris ohlingerae* appears to be low, recruitment and colonization rates are severely limited, as indicated by the number of seedlings in the vicinity of adult plants. *L. ohlingerae* occurs sparsely over the landscape and is highly clumped within rosemary balds. Connectivity between the islands of habitat is very important to this species due to its cross-pollination needs. Lack of connectivity or loss of pollinators may be responsible for loss of *L. ohlingerae* at some isolated sites.

The genus *Liatris*, especially *L. spicata*, is economically important as a source of garden perennials and cut flowers. Though easily grown from seed, there is no widespread demand for *L. ohlingerae* in the horticultural trade (54 FR 31190), even though it may be taken opportunistically.

*Liatris ohlingerae* is or soon will be protected at a number of public and private scrub sites, including The Nature Conservancy's Saddle Blanket Lakes, Tiger Creek, Lake Apthorpe Preserves and Archbold Biological Station. The species is or will be protected within State-owned lands including the Catfish

Creek site; Lake Arbuckle tract of the Lake Wales Ridge SF; Highlands Hammock SP, Gould Road, and Holmes Avenue acquisitions. The FWS has protected several *L. ohlingerae* sites through establishment of the Lake Wales Ridge NWR. This species is represented in the Center for Plant Conservation's National Collection at Bok Tower Gardens and in long-term seed storage at Fort Collins, Colorado.

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## Management

*Liatris ohlingerae* occurs as individual plants or scattered individuals on rosemary balds and ecotones adjacent to rosemary balds. Effective management of rosemary balds and adjacent ecotones will require long-term protection, development and implementation of appropriate fire regimes. Though dependent on site-specific characteristics, we know generally that rosemary balds should burn every 40 to 60 years, while oak scrub should burn every 15 to 20 years. Under natural conditions, we expect oak scrub to burn up to and occasionally into rosemary balds. Over time, however, unburned rosemary balds develop canopies that are dense enough to support fire. While we have a basic understanding of the management requirements for rosemary balds and oak scrub, we know little of the requirements for rosemary bald-oak scrub ecotones. However, appropriate management of ecotone habitats will probably be achieved as we gain a better understanding of the management requirements for surrounding rosemary bald and oak scrub communities. Because ecotones are dynamic areas with vegetative mosaics that change over time depending on fire frequency and intensity and other natural stochastic events, it is unlikely that specific management prescriptions can be developed independently of surrounding scrub habitats. The habitat requirements of *L. ohlingerae* suggest that it prefers a burn frequency shorter than that of the rosemary bald but longer than the surrounding oak scrub.

*Liatris ohlingerae* is not abundant in rosemary balds because early seral stages do not provide sufficient shade. Following devastating fires, rosemary bald endemics generally recover via the seed bank (Menges and Kohfeldt 1995). Several years are then required to replace shade-bearing vegetation. For example, limited shade may be afforded to the scrub blazing star by *Ceratiola* or *Pinus clausa*. Mature individuals of these species may be killed by fire and must then recover from seedlings. The temporal lag of little or no shade is not suitable for the re-establishment of *L. ohlingerae*.

Vegetation occurring on the ecotone of rosemary balds and surrounding scrub reacts differently to fire events. These species typically respond to ground-clearing fires by re-sprouting (Menges and Kohfeldt 1995). Re-sprouting results in the re-establishment of shade-bearing vegetation within one to several years. *Liatris ohlingerae* may become re-established more rapidly under these conditions (Abrahamson 1984).

Whether a substantial number of adult *L. ohlingerae* plants are killed by a fire event is an important question that cannot yet be answered. We believe that recently burned areas may suffer more herbivory and produce fewer viable seeds than unburned areas. However, unless fire directly kills plants, these effects would not lead to a large change in the population. Herndon (1996)

estimates that the rosemary bald slopes examined in his study have been burned about every 20 years.

To assess the response of *L. ohlingerae* to land management practices effectively, and to more accurately quantify the *L. ohlingerae* population, Herndon (1996) recommends that five sites with tagged individuals (approximately 200 individuals each) be surveyed and regularly monitored. Changes in mortality rate are critical to any monitoring effort, and may require excavation and inspection of the taproot to verify mortality. If excavation is not possible, the mortality should not be assumed as many plants simply are not active during some years. Mortality can be assumed if individual plants are inactive for three consecutive years.

Additional information is needed on the effects of fire and other episodic events on the survival of this species. Though mortality appears to be low once plants are established, recruitment of juveniles is limited. Information on the genetic diversity and genetic viability of this species needs to be investigated. If a population is found to be excessively uniform, population augmentation may be considered.

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# Recovery for the Scrub Blazing Star

*Liatris ohlingerae* (Blake) Robinson

**Recovery Objective:** RECLASSIFY to threatened.

## Recovery Criteria

*Liatris ohlingerae* 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 *L. ohlingerae*, are adequately protected from further habitat loss, degradation, and fragmentation; when these sites are managed to maintain the rosemary bald of the xeric oak scrub community to support *L. ohlingerae*; 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 of *L. ohlingerae*.** This species is difficult to survey. It is easily overlooked when not in bloom and does not grow in the typical open gaps of scrub. A thorough survey is needed to determine the distribution for this species. Survey efforts should be focused from August through October.
- S1.1. Conduct surveys for additional populations of *L. ohlingerae*.**
    - S1.1.1. Continue surveys in Polk and Highlands counties.** Although the Lake Wales Ridge has been well surveyed, new sites 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 acquired.
  - S1.2. Maintain distribution of known populations and suitable habitat in a GIS database.** Use the database 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, isolated. For this reason, existing populations are in need of protection.
- 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. Continue *ex situ* conservation.** *Ex situ* collections are important for preserving genetic diversity, preventing extirpation, and determining ecological characteristics and habitat management needs of a species. These collections will be instrumental in the recovery of *L. ohlingerae*.
- S2.3.1. Conserve germ plasm.** The seed of this species is not presently in long-term storage.
- S2.3.2. 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 *L. ohlingerae* as part of the National Collection.
- 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 *L. ohlingerae* is found.
- 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 and trade prohibitions.** This species is protected by take provisions of the ESA Act (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.** Though recent work has greatly increased the base of knowledge for this species, more work on its basic biology and ecology is necessary for effective recovery.
- S3.1. Continue research to determine demographic information, such as numbers of sites and populations, numbers of individuals in a population, recruitment, dispersal, growth, dormancy, 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 *L. ohlingerae*.** Determine which natural populations can be stabilized or increased by habitat management. Surveys, research, and monitoring will provide information on the factors which contribute to population declines. 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 *L. ohlingerae*.**
- S4.1. Develop monitoring protocol to assess population trends for *L. ohlingerae*.** Since recruitment may be uncommon, the lifespan of adult plants is a key parameter.
- S4.1.1. Monitor to detect changes in demographic characteristics, such as reproduction, seed dormancy, germination, 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 *L. ohlingerae*.** Assess any changes in demographic characteristics of *L. ohlingerae* 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 *L. ohlingerae*.** 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 about each plant's microsite (vegetation cover, litter depth, substrate, and closest neighbors) should also be included.
- S5. Provide public information about *L. ohlingerae*.** 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 location information.
- 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 *L. ohlingerae* and other rare species requires a self-sustaining, secure, number of natural populations.
- S6. Develop delisting criteria.** Once reclassification is achieved, research and monitoring results may provide data necessary to develop delisting criteria.

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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 nine sites that are either protected or proposed for acquisition.

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- H1.1. Secure habitat through acquisition, landowner agreements, and conservation easements.** Little xeric scrub habitat remains for this species; any method of securing protected populations should be sought.
- H1.2. Manage and enhance habitat.** Manage habitat to maintain *L. ohlingerae* populations by preventing habitat damage from off-road vehicle use, and overcollection, and by providing prescribed fire.
- H1.2.1. Conduct prescribed burns.** Fire is a necessary and integral characteristic of the scrub community. A variable interval of frequency and seasonality 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 replicate this landscape pattern, sites should be burned in a mosaic when possible. This species is probably resilient to a range of fire regimes.
- 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 this species.
- 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 a 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 *L. ohlingerae* 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 *L. ohlingerae* 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 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 knowledge about these unique communities.

