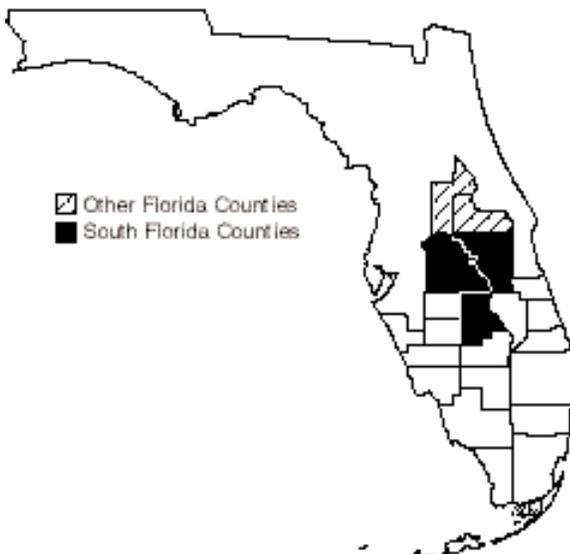

Scrub Plum

Prunus geniculata

Federal Status:	Endangered (January 21, 1987)
Critical Habitat:	None Designated
Florida Status:	Endangered
Recovery Plan Status:	Contribution (May 1999)
Geographic Coverage:	South Florida

Figure 1. County distribution of scrub plum.



The scrub plum is a small shrub endemic to the oak scrub and high pine communities of the Lake Wales Ridge. The scrub plum has declined with the destruction and fragmentation of its scrub habitat for agriculture and residential housing. The scrub plum is also collected by ornamentalists because of its small, fragrant flowers. Recovery of this species will require additional surveys, land protection, and prescribed burns.

This account represents South Florida's contribution to the existing recovery plan for the scrub plum (FWS 1996).

Description

The scrub plum is a heavily branched, broad-crowned shrub that can reach 2 m in height, although 0.5 m may be more typical at sites with frequent fires. It grows from gnarled, half-buried trunks and spreads by sucker shoots. Its young twigs are strongly geniculate (zig-zag shaped), while its lateral branches are either short, stubby, spur shoots bearing leaves and flowers, or are strongly tapering and spine-like. The bark of old stems is thin, gray, usually lichen-encrusted, and forms small rectangular or square plates. The bark of new shoots is lustrous reddish-brown or purplish and smooth.

The scrub plum's leaves are crowded on the spur shoots (an arrangement typical of the Rosaceae family) and are widely spaced on the normal shoots. The stipules are linear-subulate, roughly 5 mm long, green, and pectinately fringed at the margins with reddish glands. The leaf blades are ovate to obovate or elliptic, 1 to 3 cm long, short-acuminate, and serrulate with gland-tipped teeth. The leaf base is rounded or broadly cuneate. The leaf stalk is a third to half as long as the blade.

The scrub plum has small, fragrant flowers that are 11 to 13 mm across when open. Like the leaves, flowers found on the spur shoots are rather crowded, while those found on the regular shoots or the spine bases are spaced further apart. The pedicels extend only slightly beyond the bud

scales, so the flowers give the appearance of being sessile. The flowers are radially symmetrical with a 3 mm long hypanthium (the cup-shaped structure formed by the united portions of the bases of the sepals, petals, and stamens). The 5 calyx lobes are radially symmetrical, spreading to ascending triangular with acute apices, sparsely ciliate on the margins, reddish or green, with the bottom surfaces smooth and the upper surfaces white-tomentose. The 5 petals are white, spreading, and about 5 mm long. The petal blades are ovate to obovate with rounded tips and attenuated bases ending in short, ciliate-margined claws. The stamens are numerous, roughly 0.5 mm long, and borne on the rim of the hypanthium.

The fruit of the scrub plum is an ovoid or ellipsoidal drupe, 12 to 25 mm long, and dull reddish in color. It has a thin, bitter flesh and a slightly flattened seed.

Prunus geniculata is similar to other Florida plums, but it is the only one that has flowers which appear to be sessile. It most resembles the Chickasaw plum (*Prunus angustifolia*), which also has glands on the teeth of the leaves. However, Chickasaw plum has the leaves folded along the midrib and forms thickets by sprouting from sucker shoots. Scrub plum's fruit resembles that of the sloe or hog plum (*Prunus umbellata*) (Kral 1983).

Prunus geniculata is also similar to other scrub plants. It is one of several characteristic scrub plants with a geniculate (zig-zag stem), thorny habit of growth. Others are *Bumelia tenax*, *Ximenia americana*, *Ziziphus celata*, and a distinctive local variant of *Crataegus lepida beadle* (Judd and Hall 1984).

Taxonomy

Prunus geniculata was first described by Roland M. Harper in 1911 (Harper 1911). There has been no additional treatment of this species. The common name "scrub plum" was first used by Small (Small 1933).

Distribution

Prunus geniculata is a scrub endemic that is known to occur in three areas along the ridges of central Florida (Figure 1): Lake County, west and southwest of Lake Apopka; the southwest and northwest corners of Orange and Osceola counties, respectively; and Polk and Highlands counties, from the City of Lake Wales south to the Highlands County/Glades County border (FNAI 1996). In these areas, *P. geniculata* occurs in both high pine and in oak scrub communities (FNAI 1985, Johnson 1981, Stout 1982). The development of scrub and sandhill vegetation has left only remnants of scrub plum habitat available in these areas.

The historic distribution of *P. geniculata* has been described using only information from a few herbarium specimens that were collected after its discovery in 1909 (FNAI 1985, Harper 1911). Thus, the historic range may have been more extensive than originally believed. Floristic surveys (FNAI 1985, 1996; Johnson 1981; Stout 1982) and work underway at the Florida State Museum indicate that the general boundaries of the plant's present geographic distribution are accurately represented.

Scrub plum.

Original photograph by J.N. Layne; original flower photograph by Steve Shirah.

**Habitat**

The scrub plum prefers dry, sunny, nutrient-poor sites (Harper 1911). It has been found on soils of the St. Lucie series and on other fine sands or fine sand Entisols that are excessively drained. These soils are acidic, are subject to rapid drying, and have little silt, clay, or organic matter.

Prunus geniculata is native to the high pine and oak scrub community types. The high pine community has a grassy understory and is subject to frequent fires (every one to five years) of low intensity. The oak scrub community has shrubby vegetation and is subject to infrequent fires of greater intensity. Fires are important for the maintenance of both habitats. In the absence of frequent fires, high pine vegetation is typically invaded by sand pines and evergreen oaks, eventually succeeding to upland hardwood forest if fires do not occur for long periods (Myers 1985). Similarly, scrub is likely to succeed toward upland hardwood forest if fire is absent from the habitat for long periods (Myers 1985). This succession of scrub to upland hardwood forest is likely to result in the shading out of scrub plum.

Reproduction

In *P. geniculata*, both male and perfect flowers occur on the same plant, however, the male to perfect ratio is unknown (C. Weekley, Lake Wales Ridge SF, personal communication 1997). Insects (mainly bees) may disseminate the pollen of the scrub plum; its seeds are disseminated by birds, and possibly mammals.

Few seedlings have been found in the wild and there is concern that the scrub plum is not successfully reproducing. The low reproductive rate may be caused by a large proportion of male to perfect flowers, low fruit set due to the nutrient-poor condition of scrub habitat, and heavy predation (C. Weekley, Lake Wales Ridge SF, personal communication 1997). An experiment examined germination rates under various conditions. Seeds on bare ground, unshaded and open were removed from the plot within a few days. One seedling was located in an enclosed area of unshaded, bare ground. Seeds covered in litter and shaded had not been disturbed, and showed a germination rate of 18.75 percent as of January 1998 (C. Weekley, Lake Wales Ridge SF, personal communication 1998).

The phenology of *P. geniculata* appears to be similar to *P. angustifolia* (Ward 1979). Flowering occurs in January to February, leafing occurs from late February to March, fruit begins to develop in late February and may continue to early May, seed dispersal is in early May, but germination dates are unknown (Harper 1911, Ward 1979, C. Weekley, Lake Wales Ridge SF, personal communication 1998). Flowers may or may not open all at the same time, before the leaves expand (Harper 1911, C. Weekley, Lake Wales Ridge SF, personal communication 1998). Most of the published information on the phenology of this species is from R. Harper's account of his discovery of the plant.

Relationship to Other Species

Heavy predation has been observed on scrub plum fruit. Insects, such as the plum curculio (*Conotrachelus sp.*) appear to be responsible for most of the damage (C. Weekley, Lake Wales Ridge SF, personal communication 1997). The plum curculio is believed to feed on the fruit and another insect (not yet identified) eats the seeds. In addition to insects, rodents and armadillos are known to eat scrub plum fruits. This heavy predation may be part of the reason few seedlings have been found in the wild.

Shade from trees and taller shrubs is likely to affect *P. geniculata*. However, the response of scrub plum to different degrees of shading is uncertain. High pine plants that can be found in the vicinity of scrub plum include wide-leaf warea (*Warea amplexifolia*), Chickasaw plum (*Prunus angustifolia*), tallowwood (*Ximenia americana*), wiregrasses (*Aristida spp.*), broomsedges (*Andropogon spp.*), *Polanisia tenuifolia*, *Polygonella robusta*, and *Prunus gracilis*. Turkey oak (*Quercus laevis*), the dominant tree, and longleaf pine (*Pinus palustris*) are common trees in scrub plum habitat.

Status and Trends

Prunus geniculata was federally listed as endangered on January 21, 1987 (52 FR 2234) because of habitat loss due to conversion to agriculture (primarily citrus) and residential development. Removal by ornamental and rare plant collectors is an additional threat to the survival of this species.

High pine was once extensive on the Lake Wales Ridge (Myers 1990). Although many people involved in conservation of natural areas associate the Lake Wales Ridge with the scrub community, the public is much less aware that the scrub was originally surrounded by a larger matrix of high pine. Scrub

certainly has been reduced to a small percentage of its historic range, but high pine, which was more suitable for conversion to citrus, has been reduced to a much smaller percentage of its original range (DEP 1996).

The loss of scrub habitat on the Lake Wales Ridge has been severe. In Lake County, most of the xeric habitats occupied by scrub plum have been converted to citrus groves (52 FR 2234). In Highlands County, 64 percent of the xeric habitat (scrub, scrubby flatwoods, and high pine) present before settlement was destroyed by 1981. An additional 10 percent of the xeric vegetation was moderately disturbed, primarily by building roads to create residential subdivisions (Peroni and Abrahamson 1985). The situation is similar in Polk County.

Despite the destruction of suitable habitat, the scrub plum still occurs within most of its historic range. Historically, this plant was found in Lake, Polk, Highlands and Osceola counties. Presently, it is found in these four counties and a small portion of Orange County as well (FNAI 1996, Johnson 1981, Stout 1982). Although it still occurs in the same range, the distribution of scrub plum within this range has decreased.

In addition to habitat loss, two other factors pose threats to *P. geniculata*. One threat is fire suppression, which has degraded the quality of scrub and high pine habitats of the species. The other is the low number of seedlings that have been found in the wild (FWS 1996), suggesting that scrub plum may not be sufficiently reproducing.

In an attempt to preserve this and other Lake Wales Ridge species, sites at several locations in south-central Florida have been protected. In Polk County, protected sites containing scrub plum exist at the Arbuckle and the Lake Walk-in-the-Water tracts of Lake Wales Ridge SF, at the Pine Ridge Nature Preserve of Bok Tower Gardens, at Catfish Creek, and at Tiger Creek. Scrub plum may also exist at Saddle Blanket Lakes, although its occurrence there has not been confirmed. In Highlands County, the scrub plum is protected at Silver Lake, Carter Creek, Flamingo Villas, Lake Apthorpe Preserve, Holmes Avenue, Gould Road, Archbold Biological Station and at Lake June in Winter, Florida.

Management

Fire, or equivalent artificial disturbance, appears to be necessary for perpetuation of *P. geniculata* (Kral 1983, Myers 1985). This species readily resprouts after fires or mechanical disturbances (FWS 1996). In addition, fires may benefit scrub plum by regulating the numbers or sizes of plants that shade or otherwise compete with it (Kral 1983). Though the optimum frequency of disturbance is unknown, the fire frequencies typical of high pine (2 to 5 years) and scrub (15 to 20 years) are understood. Developing a prescribed burning program that mimics these typical frequencies and monitoring the response of scrub plum may be a prudent way to manage for this species.

Although *P. geniculata* does not persist in citrus groves or other agricultural areas, it may be capable of establishing itself and persisting in a variety of human-modified areas such as: road rights-of-way, abandoned agricultural land, and vacant lots. *Prunus angustifolia* and *P. umbellata* are widespread on such sites. Unfortunately, no information is available on the extent to which *P. geniculata* occurs at such sites.

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Recovery for the Scrub Plum

Prunus geniculata

Recovery Objective: RECLASSIFY to threatened, then delist.

South Florida Contribution: STABILIZE, and support reclassification.

Recovery Criteria

Prunus geniculata may be considered stabilized when existing populations, within the historic range of *P. geniculata*, are adequately protected from further habitat loss, degradation, and fire suppression. These sites must also be managed to maintain high pine and xeric oak scrub communities to support *P. geniculata*. Proper management for this species will include verification that this long-lived species is in fact reproducing. Currently, seedlings for this species are not being found. The status of *P. geniculata* cannot be determined until adequate reproduction is verified among all populations.

Once the existing populations are stabilized, *P. geniculata* may be considered for reclassification and, ultimately, delisting. Reclassification 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 *P. geniculata* are adequately protected from further habitat loss, degradation, and fire suppression; when these sites are managed to maintain the high pine and xeric oak scrub communities to support *P. geniculata*; and when monitoring programs demonstrate 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.

Species-level Recovery Actions

S1. Determine current distribution of *P. geniculata*.

S1.1. Conduct surveys for *P. geniculata*.

S1.1.1. Survey scrub habitat in Osceola County. Adequate survey work has not been conducted off the Lake Wales Ridge.

S1.1.2. Continue surveys in Polk and Highlands counties. The Lake Wales Ridge has probably been adequately surveyed, though new sites may still be found for *P. geniculata*.

- S1.1.3. 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 FNAI 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 has 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 from a variety of threats.
- S2.1. Protect privately owned habitat 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. Use local or regional planning to protect habitat.** Utilize available regional and county planning processes to encourage protection of suitable, unoccupied, and occupied habitat of *P. geniculata*.
- 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 *P. geniculata*.
- 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 *P. geniculata* 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 *P. geniculata* lives.
- 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 *P. geniculata*.** 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.** Given that no seedlings have been confirmed in the wild, recruitment and survival are of primary concern for this species.
- 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.**
- S3.2.1. Conduct research to assess management requirements of *P. geniculata*.** Determine which natural populations can be stabilized or increased by habitat management. Surveys, research, and monitoring at *P. geniculata* sites will provide information about 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 in the development of management techniques. *Prunus geniculata* grows in both scrub and high pine communities. In each of these habitats, *P. geniculata* is exposed to a different fire regime and the species reacts differently to these burn cycles. More information on these reactions is needed to develop management recommendations.
- S4. Monitor existing populations of *P. geniculata*.**
- S4.1. Develop monitoring protocol to assess population trends for *P. geniculata*.**
- 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. geniculata*.** Assess any changes in demographic characteristics of *P. geniculata* 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. geniculata*.** 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 *P. geniculata*.** 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 to species, since the recovery of *P. geniculata* 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. To date, there are six protected sites for *P. geniculata* in Polk and Highlands counties.
- H1.1. Secure habitat through acquisition, landowner agreements, and conservation easements.** With so little xeric scrub habitat left, any method of securing protected populations should be sought.
 - H1.2. Manage and enhance habitat.** Manage habitat to maintain *P. geniculata* populations by preventing damage from land off-road vehicle use, 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. geniculata*.
 - 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 historic, 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. geniculata* 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. geniculata* 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 South Florida Water Management District, 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.

