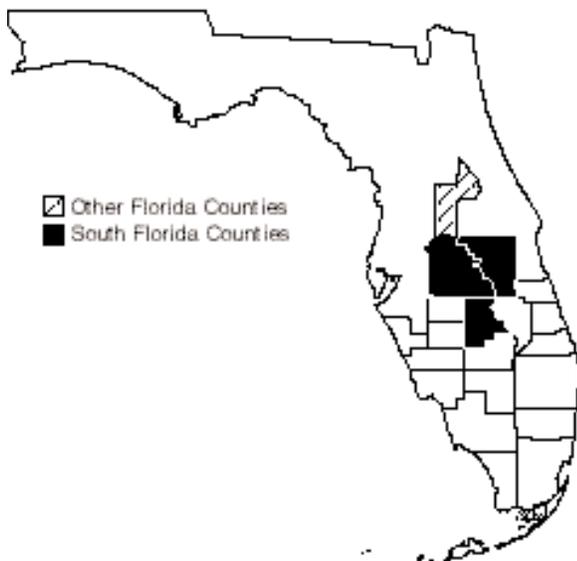

Pygmy Fringe-tree

Chionanthus pygmaeus Small

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|------------------------------|-------------------------------|
| Federal Status: | Endangered (January 21, 1987) |
| Critical Habitat: | None Designated |
| Florida Status: | Endangered |
| Recovery Plan Status: | Revision (May 18, 1999) |
| Geographic Coverage: | Rangewide |

Figure 1. County distribution of the pygmy fringe-tree.



Chionanthus pygmaeus is a large shrub that occurs primarily in scrub as well as high pineland, dry hammocks, and transitional habitats in central Florida. Much of this species' habitat has been lost because of land clearing for citrus production and residential development. As a result, it was listed as an endangered species on January 21, 1987. Habitat acquisition and development of suitable land management actions are helping to conserve this species.

This account represents a revision of the existing recovery plan for the pygmy fringe-tree (FWS 1996).

Description

Chionanthus pygmaeus is a shrub or small tree that is often less than 1 m tall, but can grow to 4 m tall. The twigs are opposite or sub-opposite and stiff, while the leaf scars and leaves are mostly opposite but sometimes alternate. The leaves are simple, mostly 3 to 10 cm long, and lacking stipules. They have short petioles, and the somewhat leathery blades are ovate to elliptic or obovate in shape, and acute to rounded at the tip. The base of the blade is attenuated to the petiole. The upper surface of the blade is dark yellow-green and smooth, but the lower surface is paler and reticulate.

The inflorescence is a leafy-bracted panicle that appears with the new shoots from the axils of most leaf scars from the previous season. The axis (main stem) of the inflorescence is rather short with numerous opposite branches that are spreading, slender and drooping, terminating in clusters of three to six flowers. Bracts toward the base of the inflorescence are similar to, but smaller than, the leaves.

The flowers are regular, perfect, and pleasingly fragrant. The four sepals are green, united at the base, and 1.5 to 2.0 mm long. The four petals are white, united at the base to a short, campanulate throat, with narrowly linear lobes, 1.0 to 1.5 cm long and somewhat spreading. The two stamens are fused (adnate) to the corolla base. The ovary is superior with a single style. The fruit is a drupe 2.0 to 2.5 cm long, oval, and green, becoming purplish-brown when ripe.

Taxonomy

Small (1933) named this species *Chionanthus pygmaea*. Since then there have been no other taxonomic treatments. There are no scientific synonyms, but the common name used in literature is pygmy fringetree and the spelling variation pygmy fringe-tree (Wood 1985, Ward and Godfrey 1979). The gender of the name has been unclear. When he named the species, Small (1933) used the Greek suffix *-aea* which indicates the species' status as a tree. The use of this ending has been questioned and every author since, including Hardin (1974), has used the suffix *-aeus* indicating its status as a shrub.

Distribution

Chionanthus pygmaeus is known from west of Lake Apopka in Lake County, northwestern Osceola County, and the Lake Wales Ridge in Polk and Highlands counties (Figure 1). It is no longer found in its historic habitat on the Mount Dora Range. One of the largest populations is in the Carter Creek scrubs in Highlands County where it occurs with turkey oak (*Quercus laevis*), a species more typical of high pine community (FWS 1996).

Habitat

Chionanthus pygmaeus inhabits excessively drained sandy soils on the Lake Wales Ridge (and historically on the Mount Dora Range) of central Florida. These high ridges are blanketed with soils that are classified as Quartzipsamments. This species is found on the low-nutrient St. Lucie fine sand which is subject to rapid drying (Wunderlin *et al.* 1981).

Chionanthus pygmaeus occurs primarily in scrub as well as high pine, dry hammocks, and transitional habitats. It is abundant at a few sites, where it may form thickets along with evergreen oaks and other shrubs such as *Ximania americana*, *Persea humilis*, and *Carya floridana*. In some locations, it may be the dominant plant while in others it may be codominant or subdominant (Wunderlin *et al.* 1981).

Reproduction

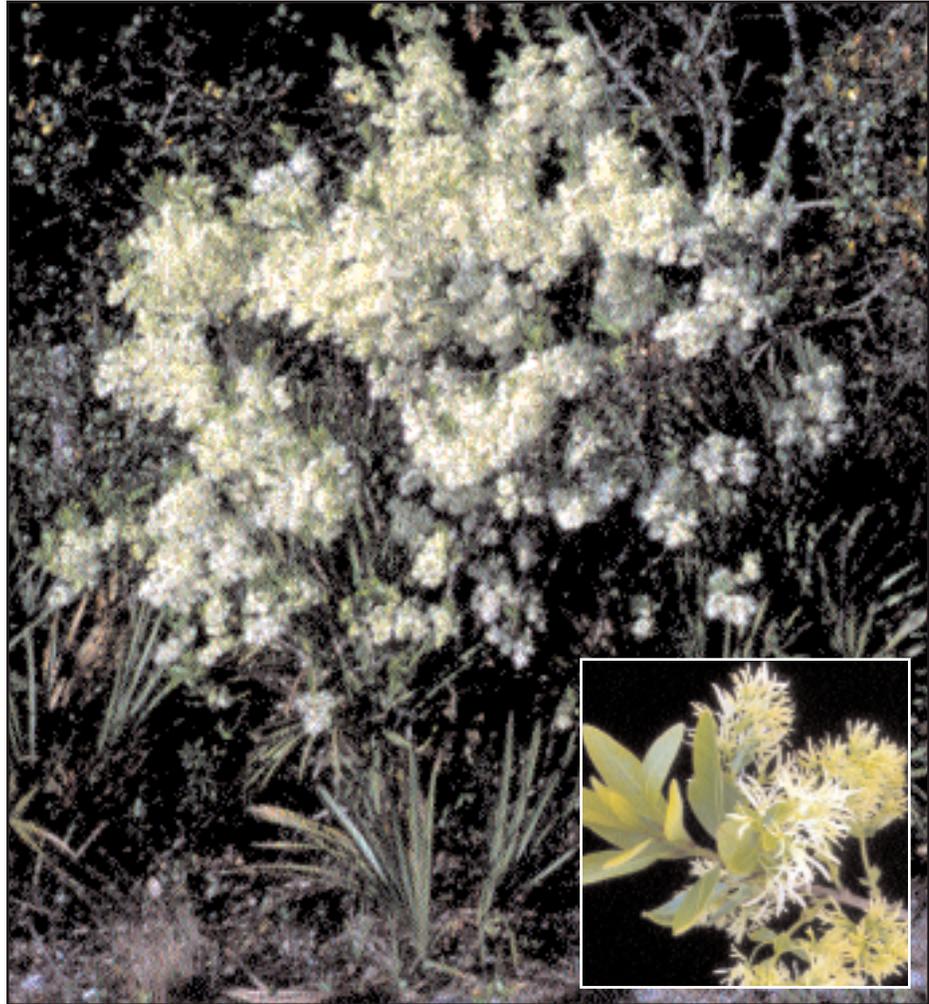
Although the reproductive biology of *C. pygmaeus* has not been thoroughly investigated, we know that it reproduces by root sprouts and occasionally by seed (Stout *in press*). The plants appear to be functionally dioecious (Gill and Pogge 1974), and the female flowers have stunted anthers that usually do not open (Goodrum and Halls 1961).

Little is known about seed dissemination of *C. pygmaeus*, and seed production is variable from year to year, with mixed reports for success of germination. In nursery conditions the best results are obtained with cleaned, air-dried seed, but whole fruits have also germinated. Bok Tower Gardens has achieved 60 to 70 percent germination rates under greenhouse conditions (T. Race, Bok Tower Gardens, personal communication 1996).

Germination dates for *C. pygmaeus* are unknown. Leafing occurs mid-March, budding occurs in March, and anthesis is from late March to early April.

Pygmy fringe-tree.

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



Fruiting probably occurs in June, with seed dispersal in September (Gill and Pogge 1974, Ward and Godfrey 1979). Seeds (drupes) may remain on the plants well into winter (Stout *in press*). Data on the phenology of this species are sparse.

Relationship to Other Species

Chionanthus pygmaeus is similar to the widespread *Chionanthus virginicus*, whose range extends into central Florida. The two species appear to hybridize in habitats other than scrub, though the two plants are distinct species (Elfers 1989). Plants that had been thought to be *C. pygmaeus* at Fort Cooper State Park south of Inverness, Citrus County, were assigned by Elfers to *C. virginicus*. Fort Cooper State Park has no scrub; it is mostly live oak hammock or high pineland. Both species of *Chionanthus* occur at Little Manatee River SRA in Columbia County. Although a hybrid population of *Chionanthus* occurs at O'Leno State Park, Manatee County, a population of *Chionanthus* that once existed in western Hillsborough County was probably *C. virginicus* (FWS 1996).

Though the pollination biology needs further research, Wunderlin *et al.* (1981) observed that the pollen dissemination agents are mainly honey bees (*Apis mellifera*). However, Stout (*in press*), observed no diurnal pollinators during his study, but suggested that nocturnal pollination by moths may be important.

Seeds are lost to a variety of animals. Small mammals appear to partially remove the seed coat and consume the seed. Many animals, including deer (*Odocoileus virginianus*), turkey (*Meleagris gallopavo*) and quail (*Colinus virginianus*), consume the seed of *C. virginicus* (Gill and Pogge 1974, Goodrum and Halls 1961). In addition, seeds may be destroyed by weevil infestations. However, these infestations are probably not inhibiting the natural rate of germination of this species, since recruitment is believed to be inherently low in this species (Stout *in press*).

Status and Trends

Chionanthus pygmaeus was listed as threatened on January 21, 1987 (52 FR 2234). This ruling was based on loss of habitat primarily by conversion of sand scrub habitat to citrus groves or residential subdivisions. The situation in Highlands County illustrates the severity of habitat loss. In this county, 64 percent of the xeric vegetation (sand pine scrub, scrubby flatwoods, and southern ridge sandhills) present before settlement was destroyed by 1981. An additional 10 percent of the xeric vegetation was moderately disturbed by road construction (Peroni and Abrahamson 1985). The situation is similar in Polk County.

Chionanthus pygmaeus colonize and thrive in areas of bare sand that are exposed to full sun, although it also occurs and flowers in areas of deep shade and pine canopy. Fire prevention, habitat fragmentation, or other factors that may preclude the creation or maintenance of a mosaic of open, sandy patches could threaten this species. Threats from land conversion due to agriculture are obvious, as this species does not persist in citrus groves or other agricultural areas (51 FR 12444). Threat from the horticultural trade is not likely, although both native species of *Chionanthus* are valuable ornamentals. Their availability is limited by the difficulty of propagation from cuttings (Dirr 1990).

Chionanthus pygmaeus is protected at Saddle Blanket Lakes, Lake Wales Ridge SF, Lake Arbuckle Preserve, Flamingo Villas, Tiger Creek Preserve, Catfish Creek Preserve, Horse Creek, Snell Creek, and is maintained as part of the National Collection of Endangered Plant Species at Bok Tower Gardens.

Management

This species is long-lived and persists in areas that are burned on a frequency between 20 and 70 years. Very little is known about the fire ecology of *C. pygmaeus*. However, we know that it is a fire-dependent species that resprouts after fire events. This species has above-ground stems growing from rootstocks or buried stems that have survived the infrequent fires that are characteristic of the habitat (Kral 1983, Ward and Godfrey 1979). It has been observed to resprout from rootstocks following a spring burn (Stout *in press*). Fires may have an important indirect effect on *C. pygmaeus* by regulating the numbers and sizes of plants that might shade or otherwise compete with it (Kral 1983).

In the spring and summer of 1997, The Nature Conservancy burned sections of Tiger Creek Preserve that contain *C. pygmaeus*. The effects of fire on these individuals is being monitored (I.J. Stout, University of Central Florida, personal communication 1997). The effectiveness of other management techniques has not been explored with this species.

Recruitment is exceedingly slow in this species. At The Nature Conservancy's Tiger Creek Preserve (Possum Creek Trail Scrub), over 100 individuals of *C. pygmaeus* have been tagged and are being monitored (I.J. Stout, University of Central Florida, personal communication 1997). In more than 10 years of monitoring, hundreds of root sprouts have been found, but only one seedling has been located. Despite this extremely low seedling recruitment, the number of individuals at the site appears to be stable. Further research is needed on recruitment in this species. In addition, surveys for the presence of *C. pygmaeus* in South Florida are needed south of Saddle Blanket Lakes in Highlands County, as well as in DeSoto and Hardee counties.

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Recovery for the Pygmy Fringe-tree

Chionanthus pygmaeus Small

Recovery Objective: STABILIZE, then reclassify to threatened

Recovery Criteria

Chionanthus pygmaeus may be considered stabilized when existing populations, within the historic range of *C. pygmaeus*, are adequately protected from further habitat loss, degradation, and fire suppression. Large areas of land are needed to support populations of this tree/shrub species. These sites must also be managed to maintain xeric oak scrub to support *C. pygmaeus*. Habitat destruction is occurring at an alarming rate. To ensure the survival of this species, actions must be taken to protect its remaining habitat. Difficulty in conserving this species may be compounded by the low seed germination rates that could affect this plant's ability to rebound from a reduction of adult individuals.

Once the existing populations are stabilized, *C. pygmaeus* may be considered for reclassification to threatened. Delisting will only be considered when: enough demographic data are available to determine the appropriate numbers of self-sustaining populations required to ensure 95 percent probability of persistence for 100 years; when these populations, within the historic range of *C. pygmaeus*, are adequately protected from further habitat loss, degradation, and fire suppression; when these sites are managed to maintain the serial stage of xeric oak scrub to support *C. pygmaeus*; 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. 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. pygmaeus*.** This species' distribution is somewhat questionable for taxonomic reasons and ease of overlooking individuals. A thorough survey is needed to determine the distribution for this species.
 - S1.1. **Conduct surveys for additional populations of *C. pygmaeus*.**
 - S1.1.1. **Survey scrub habitat in Hardee County.** Adequate survey work has not been performed off the Lake Wales Ridge. Sites on private property cannot be protected without survey knowledge, yet they may be difficult to survey.

- S1.1.2. Continue surveys in Polk and Highlands counties.** The Lake Wales Ridge has been well surveyed, though new sites may still be found. In Highlands County, the area south of Saddle Blanket Lakes needs more surveying.
- 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 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 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 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 results in the formation of 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 species. These collections will be instrumental in the recovery of *C. pygmaeus*.
- S2.3.1. Conserve germ plasm.** The seed for 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 *C. pygmaeus* 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 *C. pygmaeus* 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 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.** 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 number of sites and populations, numbers of individuals in a population, recruitment, dispersal, growth, survival, and mortality.** Information is especially needed on reproduction, pollination biology, and recruitment in this species.
- S3.2. Identify the relationship *C. pygmaeus* has with the weevils that infest its fruits.** This infestation is believed not to affect the species, but with such low recruitment, the weevils should be researched to verify their role in recruitment.
- S3.3. 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.**
- S3.4. Conduct research to assess management requirements of *C. pygmaeus*.** 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 existing populations of *C. pygmaeus*.**
- S4.1. Develop monitoring protocol to assess population trends for *C. pygmaeus*.**
- 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. pygmaeus*.** Assess any changes in demographic characteristics of *C. pygmaeus* 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. pygmaeus*.** 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) may prove to be helpful in future management.
- S5. Provide public information about *C. pygmaeus*.** 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. However, caution should be taken to avoid revealing specific locality information of *C. pygmaeus*.

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 *C. pygmaeus* 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 13 protected or acquisition sites for *C. pygmaeus*.
- H1.1. Secure habitat through acquisition, landowner agreements, and conservation easements.** 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 *C. pygmaeus* 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 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, and agricultural conversions are becoming more prevalent. Without control, exotic/invasive plants may become a threat to the survival and recovery of *C. pygmaeus*.
- 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 *C. pygmaeus* 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. pygmaeus* 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.

