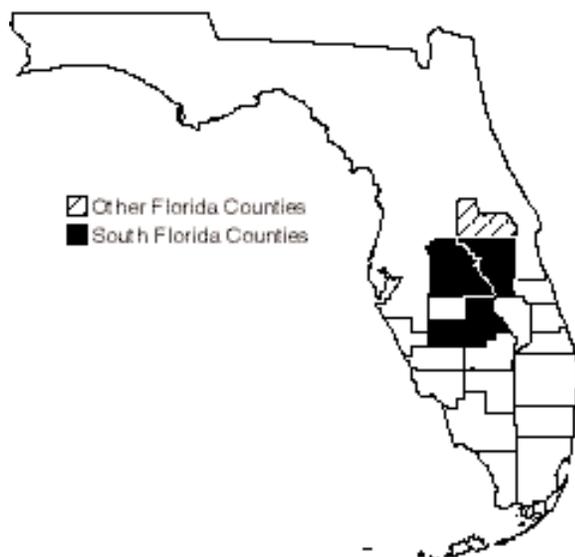

Sandlace

Polygonella myriophylla (Small) Horton

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 sandlace.



The sandlace is one of many plants endemic to central Florida's upland ridge that have been listed as endangered because of increasing threats from agricultural, commercial, residential, and recreational conversion of natural habitat. This species is found in moderately disturbed scrub. It probably requires regular fires to persist, although competition may also be limited by allelopathy. Even though the number of individuals and range of this species has been substantially reduced, the prognosis for its survival is better than for most other endemic scrub plants. The sandlace occurs on many sites that are currently protected or on sites that are proposed for acquisition and management of scrub habitat.

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

Description

Polygonella myriophylla is a sprawling shrub that looks somewhat like the ornamental creeping juniper (*Juniperus horizontalis*). Its many branches zigzag along the ground and root at the nodes, forming low mats. The lower parts of the creeping branches have bark that cracks and partly separates in long, flat, interlacing strips. The short lateral branches end in flowering racemes. *P. myriophylla* has the sheathing leaf stipules (ocreae and ocreolae) typical of the jointweed family. The leaves are needle-like and are from 0.3 to 10.0 mm long. The small, white or cream colored flowers have white petal-like sepals up to 3.4 mm long (Kral 1983).

Taxonomy

Sandlace is one of 11 species of North American *Polygonella* and one of three species of *Polygonella* that occur in scrub habitat in south Florida (Lewis and Crawford 1995). The sandlace was first collected in the early 1920s and was subsequently identified and named by Small (1924) as *Dentoceras myriophylla*. Horton (1963) combined two of Small's genera with the genus

Polygonella. *P. myriophylla* has been commonly called sandlace (Christman 1988), Small's jointweed and woody wireweed (Wunderlin 1982).

Distribution

Polygonella myriophylla occurs within scrub habitats that covered about 10,000 ha when inventoried by Christman (1988) (Figure 1). It is found in three sites in western Orange County where it occurs with the endangered scrub lupine (*Lupinus aridorum*) (Wunderlin 1984) and at one site in Osceola County near Interstate 4. In Polk County, *P. myriophylla* is found on the Lake Wales Ridge from the Davenport-Poinciana area. It is also found well west of the Lake Wales Ridge in a highly altered area just southeast of Bartow. In Highlands County, *P. myriophylla* is found on the Lake Wales Ridge south to Archbold Biological Station. Kral's (1983) distribution map places this plant in DeSoto County, based on a specimen collected by J. K. Small and J. B. DeWinkler in 1919, before Highlands County was created in 1921.

Habitat

This low, spreading shrub thrives in areas of bare white or yellow sand created by moderate disturbance.

It is not known whether regular fires are needed to maintain bare sand habitat for this species. *Polygonella myriophylla* is believed to be an allelopathic species (Richardson 1985). This allelopathic nature may create suitable conditions to maintain sufficient bare sand for the species to persist. Where found, *P. myriophylla* is a dominant part of the ground cover vegetation in young scrubs. In many localities, however, the herbaceous layer is poorly developed because of the xeric conditions. The shrub layer of this habitat is dominated by oaks (*Quercus* spp.) and ericaceous plants. Any overstory trees are usually widely spaced, forming an open canopy (Wunderlin *et al.* 1980).

Reproduction

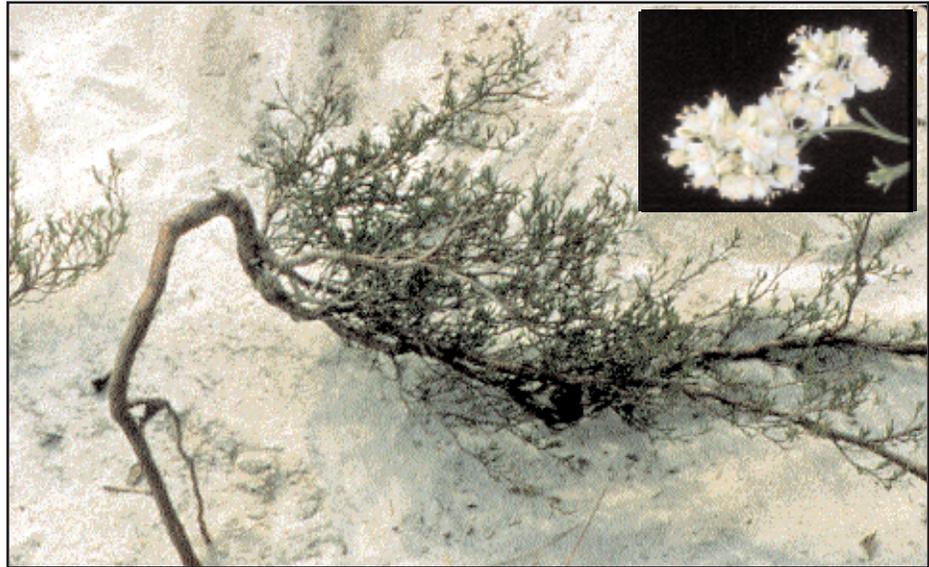
This species reproduces sexually and asexually. Pollinators of *P. myriophylla* include small halictid bees (*Perdita polygonellae*), a genus-specific pollinator. Pollinators of another *Polygonella* include Eumenidae wasps and *Glagellula* spp. which may also be responsible for pollination of *P. myriophylla* (FWS 1996). The species also reproduces by suckering and/or adventitious rooting of decumbent stems. Information on seed production and germination is not available for this species. However, we do know that due to the allelopathic effects of this species, seedlings do not survive in the vicinity of mature plants.

Relationship to Other Species

Polygonella myriophylla become established in bare spots within scrub that are created by intense fires within sand pine (*Pinus clausa*) scrub. Once established, the allelopathic tendencies of *P. myriophylla* may limit growth and survival of other herbs and shrubs.

Sandlace.

Original photograph by Harold Malde; original flower photograph by Steve Shirah.



Status and Trends

Sandlace was known from about 119 scrubs as of the late 1980s (Christman and Judd 1990). These habitats covered about 10,000 ha along the Central Florida Ridge. Like most other endemic plants, habitat for this species is being acquired for conservation purposes. Unfortunately, only a small fraction of remaining habitat will be preserved with the limited conservation funds available. About 15 sites are protected or will be protected through acquisition, conservation, and management. These sites represent a small fraction of the historic numbers and range of this species. Estimates of remaining scrub range from 60 (Southeast Environmental Research Program and Center for Plant Conservation 1995) to 75 percent (Christman 1988). Using these values, we estimate that *P. myriophylla* probably occupied 300 to 475 scrub sites. Protection of 15 sites, therefore, represents conservation of only four percent of the sites that historically contained sandlace.

Management

Polygonella myriophylla persists in scrub habitats with substantial bare ground. These patchy habitats are commonly found after intense fires in sandpine scrub. This habitat condition is also common within rosemary scrub due to extreme xeric conditions and the allelopathic nature of several species that limits vegetative growth. Persistent, patchy, open sands are not prevalent in oak dominated scrubs, since fires are more frequent and less devastating.

The importance of open, patchy, sand to the persistence of *P. myriophylla* has not been studied. Though specific life-history information for *P. myriophylla* is unavailable, many of the factors that influence *P. basiramia* (wireweed) distribution, abundance, and recruitment may also affect *P. myriophylla*.

Management for *P. myriophylla* will probably require development of long-term burning regimes that mimic the 50 to 100 year natural fire cycles of sandpine/rosemary scrub and rosemary balds (Wunderlin *et al.* 1980). The interaction of allelopathic effects and fire frequency needs to be investigated. If allelopathic effects are sufficient to maintain open sand patches in some areas, fire may not be necessary as a management tool. However, the effects of fire timing and intensity on other scrub endemics should be considered before excluding fire.

The species' tendency to colonize disturbed areas along easily accessible road cuts and right-of-ways can result in overestimations of the species' abundance and health. On publicly managed lands, we caution against using species presence or abundance in altered habitats as the benchmark from which management decisions are made. Instead, management decisions should be made to maintain and enhance the dynamic diversity of Florida's scrub vegetation.

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Recovery for the Sandlace

Polygonella myriophylla (Small) Horton

Recovery Objective: RECLASSIFY to threatened, then delist.

Recovery Criteria

Polygonella myriophylla 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. myriophylla*, are adequately protected from further habitat loss, degradation, and fragmentation; when these sites are managed to maintain the seral stage of xeric oak scrub communities to support *P. myriophylla*; and when monitoring programs demonstrate that populations of *P. myriophylla* on 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 *P. myriophylla*.** A thorough survey is needed to determine the distribution for this species.
 - S1.1. Conduct surveys for populations of *P. myriophylla*.**
 - S1.1.1. Continue surveys in Polk, Osceola, and Highlands counties.** The Lake Wales Ridge has been well surveyed, though 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 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, 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.** Carter Creek and Flamingo Villas on the Lake Wales Ridge are crucial to the recovery of this species. Flamingo Villas is currently being acquired by the FWS, but Carter Creek acquisition will be difficult due to a number of factors.
- 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* and germ plasm collections of *P. myriophylla*.** *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. myriophylla*.
- S2.4. Enforce available protective measures.** Use local, State and Federal regulations to protect this species. Regulations should also be used to protect xeric vegetative communities where *P. myriophylla* 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 Endangered Species 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 much of the basic biology and ecology of this species is understood, to 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. myriophylla*.** Determine which natural populations can be stabilized or increased by habitat management. Surveys, research, and monitoring 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. myriophylla*.**
- S4.1. Develop monitoring protocol to assess population trends for *P. myriophylla*.**
- 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. myriophylla*.** Assess any changes in demographic characteristics of *P. myriophylla* 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. myriophylla*.** 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 should also be gathered about each plant's microsite (vegetation cover, litter depth, substrate, and closest neighbors).
- S5. Provide public information about *P. myriophylla*.** 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 where *P. myriophylla* is found.
- 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. myriophylla* 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 15 protected or acquisition sites for *P. myriophylla*.
- H1.1. Secure habitat through acquisition, landowner agreements, and conservation easements.** Little xeric scrub habitat is remaining for this species. Any method of securing unprotected populations should be sought.
- H1.2. Manage and enhance habitat.** Manage habitat to maintain *P. myriophylla* 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.

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. myriophylla*.

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. myriophylla* 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, on the habitats where *P. myriophylla* 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.