

White Fringeless Orchid

Platanthera integrilabia

Conservation Status

Rounded Global Status: G2 - Imperiled

Reasons:

Platanthera integrilabia is currently known from about 50 irregularly scattered occurrences in the southeastern U.S., primarily on the Cumberland Plateau of Tennessee and Kentucky. Many occurrences consist of fewer than 100 plants. The species is rare throughout its range and is presumed extirpated in North Carolina and Virginia. Most surviving populations are not vigorous and exhibit very poor seed set and reproduction (reproduction is nearly exclusively sexual in this species). The habitat where this species grows has often been drained or turned into farm ponds or hog lots or has experienced residential and commercial construction. Active management may be required to inhibit woody succession and prevent canopy closure at sites where the species is found but timber harvest must be carried out carefully to protect the plants and their wetland habitat from damage. Development, canopy closure, improper timber harvest techniques, and invasive exotic plants such as kudzu (*Pueraria lobata*) remain threats.

State Status:

Alabama (S2), Georgia (S1S2), Kentucky (S1), Mississippi (S1), North Carolina (SX), South Carolina (S1), Tennessee (S2S3)

U.S. Endangered Species Act:

C: Candidate (12Sep2006)

Comments on official statuses:

Platanthera integrilabia has been considered a candidate for federal listing since 1980.

Threats:

Threats to *Platanthera integrilabia* include habitat degradation, plant damage and a low reproductive capacity. Habitat modification is the greatest potential threat to *Platanthera integrilabia*. Altering the hydrology is the most destructive threat to bog-like habitat. Logging operations, development, road projects, pond construction, and beaver activities can alter sites to become unnaturally wet by damming drainage. These activities disrupt and alter hydrological regimes, which have the most severe and long-term impacts on *P. integrilabia* populations (Shea 1992). Although *P. integrilabia* may show an increase in reproduction and growth immediately after a logging activity, which can continue for several years, the long-term effects have not been well studied (Shea 1992, Williams 2000). Logging that does not employ BMP's potentially may cause siltation impacts to the hydrology. Additionally, shrubby secondary growth often follows logging, which may result in a decline due to shading. The opening of the forest canopy may also provide habitat for aggressive exotic plant species, which can quickly dominate a site. The introduction of exotic or native aggressive weed(s) may also impact these populations through increased competition and alteration the hydrological conditions of the site. In 2000, M. Williams noted native species such as sedges, grasses, and other herbaceous species quickly out compete *Platanthera* in sites lacking an overstory. Additional activities, which modify *Platanthera* habitat by disrupting surface water flow, include use of ATVs, off-highway vehicles, and horseback riding. Plant damage is not a primary threat but is a secondary threat, which may be important to this species. Damage to actual plants includes the collection of plants for retail sale or commercial propagation, over collection by botanists, herbivory, and use of herbicides. In 1991, at least two nurseries in TN were reported to have collected *Platanthera integrilabia* plants for sale. Field collection by botanists for educational or documentation purposes should be discouraged. It has been suggested the type locality in KY was extirpated by plant collectors (Ettman and McAdoo 1979). Collection of flowering or fruiting material from a site over consecutive years reduces the wild genotype in the population and creates a genetic bottleneck, lowering the genetic diversity and creating a potential for inbreeding depression. Additional plant impacts result from herbivory. Flowering stalks can be

clipped off and devoured by herbivores thus affecting reproduction. Many orchids cannot replace loss of tissue until the next growing season. The loss of tissue from foraging animals could result in death for the plant (Sheviak 1990). Feral hogs also root up the soil and disturb the habitat and plants. In addition to low fruit set and germination rates, herbivory can have a long-term negative impact upon the site viability for the species (Zettler and Fairley 1990). Management activities for lands may play a role in the decline of a population. The use of herbicides to control vegetation growth within powerline right-of-ways can devastate *Platanthera* populations when treated in consecutive years. The manual or mechanical clearing of vegetation from under the powerlines is of benefit to the species, however, the use of herbicides is no doubt detrimental and populations may be harmed over the long-term (Shea 1992). *Platanthera integrilabia* has also been reported to be susceptible to fungal infections. *Alternaria*, *Pestalotia*, *Nigrospora* and *Cercispora* have been isolated from the dead tissues of *Platanthera integrilabia*. These fungi genera contain known plant pathogens (Zettler and Fairley 1990).

Low Reproductive Capacity and Isolated Populations: Low levels of flower and seed production of the species may also threaten its survival. The low seed set may be related to herbivory and lack of successful pollinators (Zettler and Fairley 1990, Shea 1992). Isolation may be an additional barrier to the success of these populations (Williams 2000 and Bailey 2001).

This species of limited distribution is highly threatened by land-use conversion, habitat fragmentation, succession, pollution, and to a lesser degree by forest management practices (Southern Appalachian Species Viability Project 2002).

Distribution

Global Range Comments:

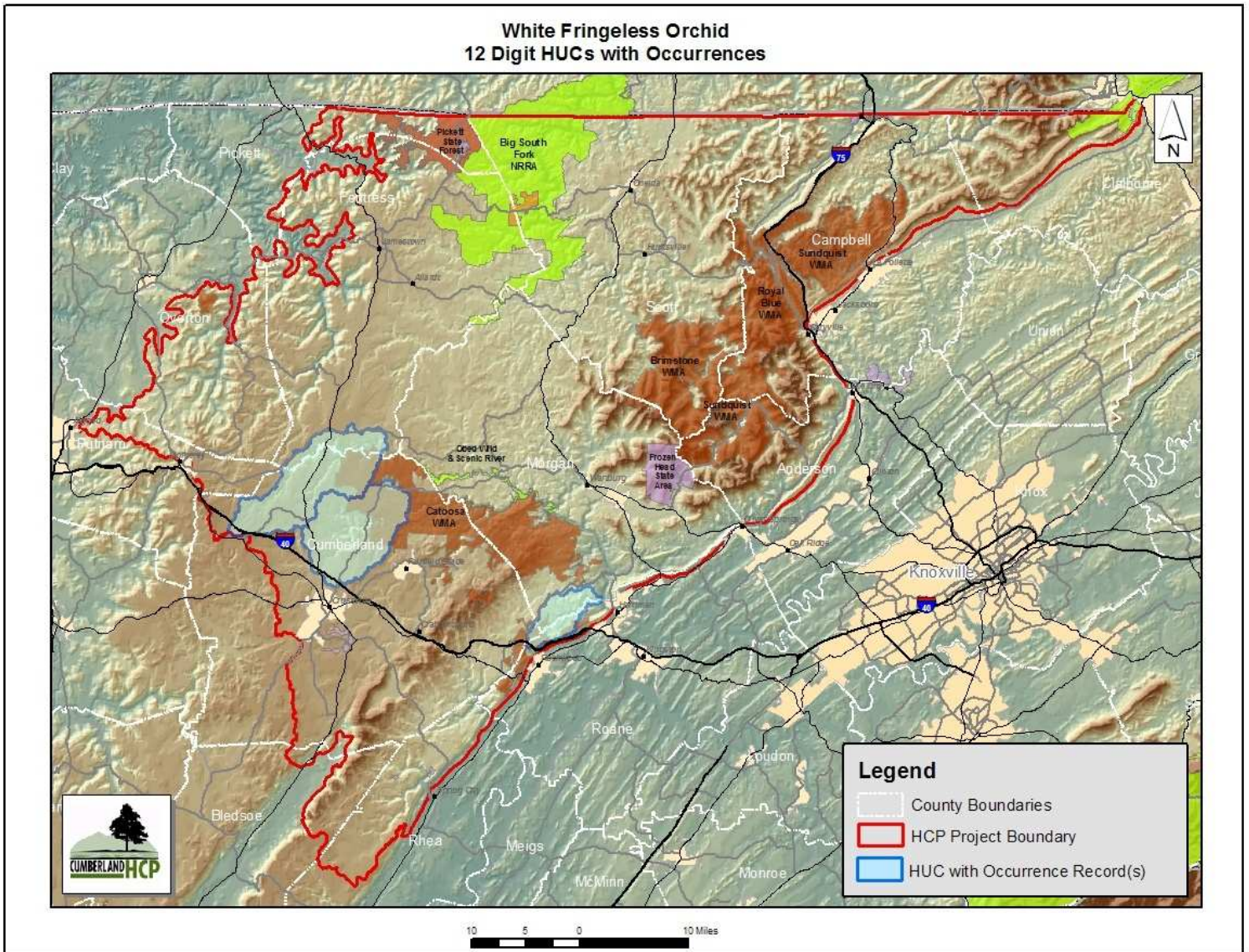
Platanthera integrilabia occurs in the following Tennessee counties: Bledsoe, Cumberland, Fentress, Franklin, Grundy, Hamilton, Marion, McMinn, Monroe, Polk, Roane, Sequatchie, Van Buren, and Warren.

Platanthera integrilabia is documented from 53 extant locations within the seven states.

P. integrilabia is considered extirpated or historical in Virginia and North Carolina, and reports from Louisiana and Texas are doubtful.

Tennessee Distribution Map

White Fringeless Orchid 12 Digit HUCs with Occurrences



Ecology and Life History

Technical Description:

Technical Description (Luer 1975) PLANT: slender, erect, glabrous, leafy, up to 60 cm tall. ROOTS: several fleshy. LEAVES: 2 to 3, elliptic to lanceolate, green, keeled up to 20 x 3 cm, sheathing the stem, below dwindling to a few bracts above. INFLORESCENCE: loosely few to many flowered, with 6-15 white flowers. FLORAL BRACT: lanceolate, 10 x 3 mm. OVARY: slender pedicellate, 15 x 2 mm. DORSAL SEPAL: suborbicular, concave, 8 x 6 mm. LATERAL SEPAL: broadly ovate, obtuse, oblique, reflexed, 9 x 7 mm. PETALS: oblong, entire 7 x 2.5 mm. LIP: spatulate-lanceolate, narrowed in lower third, margin finely serrated, 13 x 3 mm; spur slender, curved 4-5 cm long. COLUMN: large, 5 x 5 mm, anther sacs widely divergent. CAPSULE: ellipsoid 15 x 3 mm.

Diagnostic Characteristics:

When in flower, *Platanthera integrilabia* is very distinguishable from associated *Platanthera* species. Distinguishing characteristics are the presence of a fringeless, serrated, lower lip and white flowers. *Platanthera blephariglottis* is taxonomically most similar to *P. integrilabia*, but lacks an entire lower lip. The distribution of *P. integrilabia* is well defined and does overlap with *P. blephariglottis* var. *conspicua*. When compared to *P. blephariglottis* var. *conspicua*, the plants are small, bearing one or two leaves on a flowering stem; the others are reduced to bracts. *Platanthera nivea* and *P. clavellata* are also similar to *P. integrilabia* and the ranges do overlap. *Platanthera nivea* can be distinguished by its broad lip with a smooth margin as compared to *P. integrilabia*'s long, narrow lip with finely serrated margin. *Platanthera clavellata* has greenish flowers, which distinguish it from the bright white flowers of *P. integrilabia*. Species of *P. ciliaris* and *P. clavellata* can occur in the same habitat as *P. integrilabia*, and are not distinguishable without flowers or buds (Luer 1975; Shea 1992).

Reproduction Comments:

Platanthera integrilabia flowers from late July through early September. In the southern portion of its range (Alabama) flowers can be seen as early as June. However, flowers appear August through September throughout its range. Fruit is usually set after pollination and matures in October (Luer 1975; Gleason and Cronquist 1991; Shea 1992). Each *Platanthera* plant grows from a single rootstock or tuber. Plants can occur in large numbers, however no evidence suggests any form of vegetative reproduction. In the winter season, two tubers can be found on one plant; one large tuber and a smaller more recently formed tuber. By spring, the tuber from the previous season (larger) will dieback, and the new smaller tuber will supply energy for the upcoming growing season. The formation of the "same" plant from a new tuber can cause the vegetative shoot to "move" up to 15 cm from the previous years locale (Shea 1992; Zettler and Fairley 1990). The percentage of *Platanthera* individuals flowering within a population is generally very low. Like many Orchids, *Platanthera* uses pollinia (pollen sacs which adhere to pollinators) to be transferred from plant to plant. The primary chemical attractant, which is common, in orchid nectars with strong evening odors is linalool (Hill 1968). Although *Platanthera* have adapted out-crossing pollination methods, they can be self-fertile. When a flower has been open for about a week without fertilization, a membrane covering the pollinia deteriorates and self-pollination becomes possible. Fruit is readily set when hand-pollinated, however, natural fruit set is very low. Pollination of *Platanthera* flowers has been observed to be diurnal Lepidoptera, especially swallowtails. However, the strong fragrance, white color, and long nectiferous spur of the flowers suggest sphingid moth pollination. Zettler Ahuja, and McInnis (1996) did not document nocturnal pollinators, but suspect them to be sporadic or more prevalent. Vespids in search of nectar have also been known to visit and damage flowers by chewing through the sepals, petal and spurs. Only about 3% of the wind-dispersed seeds germinate, which means plants have to produce copious amounts of seeds to overcome the high seed/seedling mortality. Recent studies of the other factors leading to low reproductive capacity are herbivory, inbreeding depression, and lack of effective pollinators ((Zettler and Fairley 1996) and (Bailey, 2001). Recent research on the mycorrhizal fungi, *Epulorhiza inquilina* sp. nov., relationship to *P. integrilabia* suggests that the symbiont's presence may play a key role in the rate of seed germination (Yoder, Zettler and Stewart 2000).

Ecology Comments

Platanthera integrilabia is a mycotrophic perennial herb that is an obligate wetland species. P.

integrilabia is a symbiont with a relationship with the mycorrhizal fungi, *Epulorhiza inquilina* sp. nov. (Currah, Zettler and McInnis 1997).

Habitat Comments:

Platanthera integrilabia is generally found in wet, flat, boggy areas at the head of streams or seepage slopes. The species is often found in association with *Sphagnum* species and *Osmunda cinnamomea*, *Woodwardia areolata*, and *Thelypteris novaboracensis*, in acidic muck or sand, and in partially, but not fully shaded areas. Populations of *Platanthera integrilabia* are associated with sandstones of the Appalachian Plateaus of Kentucky, Tennessee, and Alabama, the Coastal Plain of Alabama and Mississippi, the Blue Ridge Province of Georgia, North Carolina and Tennessee; the Ridge and Valley Physiographic Province in Alabama, and the Piedmont of Georgia and South Carolina. *Platanthera integrilabia* has been extirpated throughout from the Ridge and Valley and the Blue Ridge in VA (Bailey, 2001).

Management Summary

Stewardship Overview:

Platanthera integrilabia is rare throughout its range. Alteration of the habitat is the primary threat to *Platanthera integrilabia* populations. Altering the hydrology is probably the most destructive threat to bog-like habitat. Logging operations, road projects, pond construction, and beaver activities can alter sites to become unnaturally wet by damming a drainage. Conversely, the removal of beaver dams may have deleterious effects upon habitat. Commercial development, road projects, farming operations, and logging practices impact the sites by several means. These projects disrupt surface water flow by using fill material, heavy machinery, and herbicides to control hydrology and vegetation at sites as well as draining wet areas. The use of fill material and the drainage of wet sites can harm and destroy the hydrology necessary for *P. integrilabia* habitat. Heavy machinery can also alter the hydrology by producing excessive siltation and soil compaction resulting in diminished colonization by *P. integrilabia*. Alteration of hydrology is the most serious threat to long-term viability of *Platanthera* populations (Shea 1992). Although *Platanthera* plants show an increase in reproduction and growth immediately after a logging activity the long-term effects are not fully known (Shea 1992, Williams 2000). The method of harvesting timber and machinery used will likely have an impact upon the site hydrology and health of plants aggressive exotic plant species, which can quickly dominate a site. The introduction of exotic or native aggressive weed(s) may also alter the hydrological conditions of the site. Additional activities, which modify *Platanthera* habitat by disrupting surface water flow, include use of ATVs, off-highway vehicles, and horseback riding.

Restoration Potential:

Potential restoration of populations of *Platanthera integrilabia* will require a both active management as well as habitat preservation and restoration. Site preservation should be directed toward maintaining or restoring optimal growing conditions. This may include restoration of hydrology, establishment of upland buffers, removal of exotic and natural invasive species (both plant and animal) and active maintenance of light regimes to promote sexual reproduction.

Preserve Selection & Design Considerations:

Platanthera integrilabia appears to do well under two different types of light conditions: open and closed canopies. Many *Platanthera* sites have been found in powerline right of ways where woody vegetation is controlled. However, several excellent *Platanthera* sites are located under full canopy conditions. In either condition competition with shrubs and thick undergrowth are held in check. The thick vegetation associated with a transition between an open habitat to a mature canopy may not be suitable for the species. Some canopy thinning may be beneficial to the species. The use of fire has been documented as a beneficial vegetation control method but the relationship between the *P. integrilabia* and *Sphagnum* sp. should be considered when applying fire to this system. Control burns should be accompanied with extensive monitoring with permanent plots in control and treatment areas (Bailey 2001, Williams 2000, Shea 1992). Preserve designs should establish a buffer not only for the land but the hydrological resources for each population.

Management Requirements:

Logging in the vicinity of *P. integrilabia* should be avoided, as the plants are easily affected by siltation of their habitat. Buffer zones should be left around populations of *P. integrilabia* to prevent siltation associated with logging operations. Logging operations may also alter the hydrology of a site, disrupting surface flow and groundwater recharge. As a result, the best approach with regard to logging near these sites may be to avoid logging uplands associated with these sites. Manual removal of shrubs to keep sites open may benefit *P. integrilabia*, as there appears to be a critical light level needed to induce flowering. Carefully selected removal of some canopy trees would also increase light levels at forested site.

Monitoring Requirements:

Systematic surveys need to be carried out annually to determine and changes in the site conditions from the previous year. Habitat alteration, presence of exotic species, new additions to the flora, and evidence of poaching need to be considered on the survey. The survey is intended to be precursory to the following strategies. Secondly, studies of the abiotic and biotic features in the habitat should be undertaken. An understanding of the historic and present abiotic and biotic element of each site is essential to the long-term species management. Historic information and data should be considered prior setting monitoring goals. Monitoring goals should focus upon the abiotic and biotic factors of individual sites. Monitoring should be focused upon the community dynamics of each site. This information is necessary to determine if active management is needed to ensure the continued vigor of existing populations and to select sites for reintroduction strategies. An understanding of the community dynamics will allow the land manager to judge site vigor based on data other than number of flowering plants. Abiotic factors to consider are hydrology, sedimentation rates of immediate watershed, soils, light intensity, transpiration rates, disturbance regime, seasonal and annual fluctuations in soil moisture and pH. Land management of the surrounding site may impact the vigor of *Platanthera* in a positive or negative manner; therefore, need to be considered. Biotic factors to consider are competition with associated plant species (native and exotic), response to browsing and trampling, interactions with pollinators, mycorrhizal associations, and annual fluctuations in reproduction. Additional factors, which influence the vigor of *Platanthera*, need to be considered on some level.

Management Programs:

Management approaches for *P. integrilabia* in the Daniel Boone National Forest, KY. use burning instead of mowing for control of ground cover. Mowing in one of these seeps will result in compaction of soil (D. Taylor pers. comm.). Mr. Taylor also recommended burning a site only when the sphagnum is wet, as this is an important component of sites containing *P. integrilabia*. However, conditions are less than ideal for a good burn in the remaining vegetation when the sphagnum is wet and Mr. Taylor has had mixed results when burning in these areas. Mr. Taylor also suggested removal of some of the shrub layer to increase the amount of sunlight reaching the forest floor. The method he has employed is to cut the saplings approximately four (4) feet above the ground. In most instances, this promotes sprouting at the top of the "stump" instead of near the ground, making it easier to come back and remove this growth when the site is thinned again.

Monitoring Programs:

Current monitoring programs include an annual monitoring program established along transects in the Bullet Creek population to study the long term population trends and to study the effectiveness of fencing to prevent damage from feral hogs in the Cherokee National Forest. Contact Mark Pistrang.

Management Research Programs:

David Taylor of the Daniel Boone National Forest is currently conducting burn studies to investigate the effects of fire on *Platanthera integrilabia*.

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All information from NatureServe:

Citation for data on website including Watershed and State Distribution maps:

NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available

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