Rec 12/6/16

Recovery Outline for White Fringeless Orchid (*Platanthera integrilabia*)

November 2016

I. INTRODUCTION

This document outlines a preliminary course of action for the recovery of the white fringeless orchid, to implement until a comprehensive recovery plan for this species is approved. White fringeless orchid is a perennial herb with a light green, 60-centimeters (cm) (23-inches (in)) long stem that arises from a tuber (modified underground stem of a plant that is enlarged for nutrient storage). The leaves are alternate with entire margins and are narrowly elliptic to lanceolate (broadest below the middle and tapering toward the apex) in shape. The white flowers are borne in a loose cluster at the end of the stem. The epithet "integrilabia" refers to the lack of any prominent fringe on the margin of the lower petal, or lip (Luer 1975).

Designation of critical habitat was determined to be not prudent for the white fringeless orchid when this plant was listed as a threatened species (September 13, 2016, 81 FR 62826).

Listing and Contact Information:

Listing Classification:	Threatened range-wide
Effective Listing Date:	October 13, 2016
Lead Agency, Region:	U.S. Fish and Wildlife Service (Service), Southeast Region
Lead Field Office:	Tennessee Ecological Services Field Office
Contact Biologist:	Geoff Call, 931-525-4983, *geoff_call@fws.gov*

II. RECOVERY STATUS ASSESSMENT

A. Distribution and Status

[Note: For a more detailed description of this plant's biology and an assessment of the listing factors as they relate to the plant, please see 81 FR 62826, published on September 13, 2016.]

The white fringeless orchid's distribution is concentrated in the Cumberland Plateau section of the Appalachian Plateaus physiographic province, with isolated populations scattered across the Blue Ridge, Piedmont, and Coastal Plain provinces (Fenneman 1938). As of 1991, there were 30 extant occurrences and 13 with uncertain status, distributed among 20 counties in 5 southeastern States. Currently, the species is extant at 58 occurrences distributed among 31 counties, spanning 5 southeastern States. There are an additional 23 occurrences whose current status is uncertain, which include one additional State and four additional counties (Table 1). We consider the species' current distribution to include the 6 States (AL, GA, KY, MS, SC, and TN) and 35 counties where Natural Heritage Program (NHP) database records for these extant and uncertain occurrences exist.

There are 33 extant occurrences that are located entirely, or in part, on lands owned or managed by local, State, or Federal government entities. Low numbers of flowering plants have been observed at most sites. For example, no more than 50 flowering plants have ever been observed at one time at 45 (64 percent) of the 70 extant and uncertain occurrences for which data are available.

TABLE 1.--County-level distribution of extant and uncertain status white fringeless orchid occurrences, circa 1991 (Shea 1992) and 2014 (ANHP 2014, GDNR 2014, KSNPC 2014, MDWFP 2014, NCDENR 2014, SCDNR 2012, Schotz 2015, and TDEC 2014).

State	County	1991		2014	
		Extant	Uncertain	Extant	Uncertain
Alabama	Calhoun	--	--	2	--
	Clay	--	1	1	--
	Cleburne	--	--	1	--
	DeKalb	--	--	1	--
	Jackson	--	--	--	1
	Marion	1	--	1	2
	Tuscaloosa	1	--	1	--
	Winston	1	--	1	--
Georgia	Bartow	--	--	1	--
	Carroll	2	--	2	--
	Chattooga	--	--	1	--
	Cobb	1	--	--	--
	Coweta	1	--	1	--
	Forsyth	--	1	--	1
	Pickens	--	--	1	--
	Rabun	1	--	1	--
	Stephens	1	--	1	--
Kentucky	Laurel	--	--	2	2
	McCreary	4	--	2	1
	Pulaski	1	1	2	--
	Whitley	--	--	1	--

State	County	1991		2014	
		Extant	Uncertain	Extant	Uncertain
Mississippi	Alcorn	--	--	--	1
	Itawamba	--	--	2	1
	Tishomingo	--	--	1	1
South Carolina	Greenville	1	--	--	1
Tennessee	Bledsoe	--	2	2	1
	Cumberland	--	--	1	--
	Fentress	--	--	2	--
	Franklin	3	2	5	5
	Grundy	5	5	4	4
	Marion	2	--	8	--
	McMinn	1	--	1	--
	Polk	--	--	1	--
	Scott	--	--	1	--
	Sequatchie	2	1	1	1
	Van Buren	2	--	6	1
TOTAL		30	13	58	23

B. Habitat

In Correll's (1941) description of white fringeless orchid as a distinct variety, he included notes from herbarium specimens that describe the species' habitat variously as "bog," "boggy sphagnum ravine," "sphagnum bog," "grassy swamps," and "marshy ground." Luer (1975) described the habitat as "...the deep shade of damp deciduous forests...in the thick leaf litter and sphagnum moss along shallow wet ravines and depressions." Zettler and Fairey (1990) observed the species growing in "shaded and level bogs, swamps or seepage slopes usually containing *Sphagnum*." Shea (1992) described the species' habitat as "wet, flat, boggy areas at the head of streams or on seepage slopes...with *Sphagnum*...usually grows in partial shade" and noted that most sites are on soils formed over sandstone bedrock, which usually are low in fertility and organic matter content and are acidic.

Hoy (2012) demonstrated that precipitation was the primary hydrologic source for three wetlands at a white fringeless orchid site on the Cumberland Plateau in Kentucky, which was commonly referred to as a seep. Thus, describing many of the sites where white fringeless orchid occurs as "seeps" or "seepage slopes" may contradict the typical characterization of seeps as wetlands where water from subsurface sources emerges at the surface (Soulsby *et al.* 2007). The term "bogs" refers to a specific wetland type that accumulates peat, lacks significant inflow or outflow, and harbors mosses adapted to acidic environments, particularly *Sphagnum* (Mitsch and Gosselink 2000). Peat is fibric organic soil material, meaning that some plant forms incorporated into the soil are identifiable (U.S. Department of Agriculture, Natural Resources Conservation Service 2006). However, despite the common usage of the terms "bog" or "boggy" to describe them and the nearly ubiquitous presence of *Sphagnum* spp. (sphagnum moss) in them, the wetlands that white fringeless orchid inhabits occur on mineral soils and do not accumulate peat. Further, they often are located at stream heads and connected to ephemeral streams via dispersed sheet flow or concentrated surface flow in incipient channels.

Weakley and Schafale (1994) commented on the discrepancy between regional use of the terms "bogs" and "fens" to describe non-alluvial wetlands of the Southern Blue Ridge in which sphagnum moss is prominently featured and their more traditional usage in peatland classifications. Noting that most of the region's non-alluvial wetlands lacked organic soils, these authors nonetheless chose to maintain the regional usage of these terms in their classification, to emphasize differences in sources of hydrology and their effects on water chemistry (nutrient-poor precipitation in "bogs" versus mineral-rich groundwater seepage in "fens"). Similar to the non-alluvial wetlands of the Southern Blue Ridge, further study is needed to characterize the range of variation in soils, hydrology, physicochemistry, and origin of wetlands throughout the range of white fringeless orchid.

C. Biology

Like most terrestrial orchids, white fringeless orchid depends on a symbiotic (interdependent) relationship with mycorrhizal fungi (an association of a fungus and a plant in which the fungus lives within or on the outside of the plant's roots) to enhance seed germination and promote seedling development and establishment (Zettler and McInnis 1992; Rasmussen and Whigham 1993). In addition to providing a carbon source for seedling development, mycorrhizal fungi enhance germination by promoting increased water uptake by orchid seeds (Yoder *et al.* 2000). Their small size permits dispersal of orchid seeds to new environments via wind currents; however, very few of the seeds likely encounter suitable habitats where host fungi are present (Yoder *et al.* 2010). This likelihood is further reduced in the case of species such as white fringeless orchid, which may rely on a single fungal host species, *Epulorhiza inquilina,* to complete its life cycle (Currah *et al.* 1997).

White fringeless orchid has a self-compatible breeding system, allowing individuals to produce seed using their own pollen; however, the proportions of fruits produced through self-pollination versus cross-pollination are not known (Zettler and Fairey 1990). Rates of fruit set, measured as the proportion of individual flowers that produced capsules, varied in studies of populations in Georgia (6.9 percent), South Carolina (20.3 percent) (Zettler and Fairey 1990), and Tennessee (56.9 percent) (Zettler *et al.* 1996). While these observations were made at these populations in different years, the Tennessee population, where pollination was observed, is considerably larger than the Georgia or South Carolina populations, where no pollination was observed. Zettler *et al.* (1996) reasoned that inbreeding depression was a likely cause for the lower fruit set in the smaller populations, noting that in a separate study both germination rates and propagation success were greater in white fringeless orchid seeds collected from the largest of these populations (Zettler and McInnis 1992). They speculated that higher rates of fruit set were probably more typical historically, when larger populations provided greater opportunities for cross-pollination to occur.

White fringeless orchid is capable of prodigious seed production, which might help to compensate for the likely dispersal of many seeds into unsuitable habitats. In the Tennessee population studied by Zettler *et al.* (1996), more than half of the flowers on inflorescences (the complete flower head of a plant including stems, stalks, bracts, and flowers) set fruit, resulting in a mean of 4.7 capsules per plant. The capsules produced an average of 3,433 seeds each, indicating that each inflorescence averaged over 16,000 seeds. With 577 inflorescences counted in the study area, Zettler *et al.* (1996) estimated that over 9,000,000 seeds were produced. However, in separate studies of *in vitro* and *in situ* seedling development, even with fungal inoculation less than 3 percent of seeds developed into protocorms (young seedlings) that could be established on soil (Zettler and McInnis 1992; Zettler 1994).

Known pollinators for white fringeless orchid include three diurnal species from two families of butterflies (Lepidoptera): silver spotted skipper (Hesperiidae: *Epargyreus clarus*), spicebush swallowtail (Papilionidae: *Papilio troilus*), and eastern tiger swallowtail (Papilionidae: *P. glaucus*) (Zettler *et al.* 1996).

D. Genetics

Birchenko (2001) analyzed genetic structure among 25 white fringeless orchid populations, distributed across Alabama, Georgia, Tennessee, and Kentucky. The majority (79 percent) of the genetic variation was present as variation within populations, while 21 percent of the variation was attributable to differences between populations (Birchenko 2001). While these results alone do not demonstrate that genetic variability in white fringeless orchid populations has been eroded by restricted gene flow, Birchenko (2001) cautioned that interactions between demographic and ecological factors could be a cause for some observed population declines and could ultimately cause declines in the species' genetic variation and increase differentiation among white fringeless orchid populations.

E. Threats Assessment

The primary threats to the species include habitat destruction, fragmentation, and modification, the last of which results in excessive shading, soil disturbance, altered hydrology, and proliferation of invasive plant species. Collecting for recreational or commercial purposes, herbivory, and small population sizes and dependence on specific pollinators and fungi to complete its life cycle are additional factors regulating population growth in this species.

F. Conservation Actions

The white fringeless orchid is listed, under state laws, as special concern, with historical status, by the State of North Carolina, as threatened by the State of Georgia, and as endangered by the Commonwealth of Kentucky and State of Tennessee. In addition to providing limited protections for the species, these laws authorize some states to undertake efforts to conserve white fringeless orchid and its habitat. This species is listed on CITES Appendix II (CITES 2015).

The white fringeless orchid occurs in several natural areas, parks, wildlife management areas, and public forests owned or managed by State conservation agencies. Federal conservation lands where the species occurs include the Chattahoochee, Cherokee, and Daniel Boone National Forests and the National Park Service's Big South Fork National River and Recreation Area. The Talladega National Forest treats white fringeless orchid as a sensitive species that could potentially occur on the forest. In some locations on these state and federal lands, agencies have actively managed habitat by thinning woody vegetation to increase light availability, attempting to restore hydrology in disturbed sites, managing invasive plants, and installing fences to exclude deer or hogs. Other conservation actions currently in practice across much of the species' range include monitoring occurrences for status of threats, site condition, and abundance of plants.

In 2014, the USFS established a Master Stewardship Agreement with the Atlanta Botanical Garden to support conservation efforts for white fringeless orchid and other federally listed or at-risk species of

plants. The Atlanta Botanical Garden has collaborated with many partners on efforts to conserve white fringeless orchid, providing habitat management expertise, collecting germplasm from many populations for propagation and safeguarding, reintroducing or augmenting populations, and actively surveying for additional populations.

Consultation on future construction projects, logging activities and right-of-way maintenance could help to lessen their impacts on the species and its habitat. For example, it is recommended that projects designed to control woody vegetation be carefully implemented to avoid or minimize adverse effects related to due to mechanical or chemical treatments. Measures should be taken to reduce siltation, soil disturbance or compaction, or disruption to natural surface water flow. And, minimum effective concentrations should be used when applying herbicides, with care taken to target application to species requiring control and minimize potential non-target effects to white fringeless orchid and associated species. The Tennessee Valley Authority has carefully applied herbicide to control woody vegetation where white fringeless orchid is present in electrical transmission rights-of-way that they own or maintain. The populations present in TVA rights-of-way where this practice has been used are among the largest known to exist.

Conservation of white fringeless orchid or its habitat could occur through implementation of Section 404 of the Clean Water Act (CWA; 33 U.S.C. 1251 et seq.), which establishes a Federal program for regulating the discharge of dredged or fill material into waters of the United States, including wetlands. Additionally, section 401 of the CWA forbids Federal agencies from issuing a permit or license for activities that may result in a discharge to waters of the United States until the State or Tribe where the discharge would originate has granted or waived certification. All of the States where white fringeless orchid occurs maintain regulatory programs providing a framework for issuance of section 401 certifications related to applications for section 404 permits. This legislation does not prohibit the discharge of these materials into wetlands; rather, it provides a regulatory framework that requires permits prior to such action being taken.

III. PRELIMINARY RECOVERY STRATEGY

A. Recovery Priority Number with Rationale

The white fringeless orchid is assigned a recovery priority of 8, which indicates the species faces a moderate degree of threat and has a high recovery potential. Recovery potential is considered high for this orchid for the following reasons: broad geographic range; relatively large number of occurrences, many located on protected conservation lands, and habitat is actively managed in some protected sites; and proven protocols for propagation of this species to support reintroduction or population management.

B. Recovery Strategy

Survival of white fringeless orchid depends on protecting the species' occupied and suitable habitat from further degradation and fragmentation; restoring potentially suitable habitat within its historical range for the purpose of reintroducing populations; evaluating and reducing threats from incompatible land uses, shading, and nonnative plants; increasing the current populations in size; conserving genetic diversity; and potentially establishing new populations where suitable conditions are present on protected lands.

We will initially focus on developing strategies for managing habitat at protected sites, to encourage population stability or growth. The Service will work with State conservation and forestry agencies, USFS, National Park Service, Atlanta Botanical Garden, Tennessee Valley Authority, University of Kentucky, University of Tennessee at Chattanooga, and others to implement and monitor effects of management actions intended to increase reproductive output and promote population growth. Monitoring data will be used to adapt management practices, where necessary. We will also work with partners to ensure that germplasm from an adequate representation of populations across the species' range is secured in *ex situ* collection at Atlanta Botanical Garden.

C. Initial Action Plan

1. Develop and implement agreements and plans for conservation of the white fringeless orchid and its habitat on State and Federally owned or managed conservation lands, including provisions for monitoring and adapting management practices as needed. Some opportunities include the following:
    a. Work cooperatively with North Carolina Plant Conservation Program, Atlantic Botanical Garden, and other partners to evaluate potential to reintroduce the species into suitable habitat on conservation lands to restore the species to North Carolina.
    b. Work with South Carolina State Parks to assess the need and potential for habitat restoration at the only known white fringeless orchid site in South Carolina. Due to the extremely small size, or possible extirpation, of this small population, determine whether reintroduction or augmentation is feasible.
    c. Work with the National Park Service to determine whether habitat restoration or population augmentation will be necessary to recover populations at sites damaged by feral hogs in 2015.
    d. Work with conservation partners to restore suitable hydrology and vegetation structure and composition, where populations have declined due to altered ecological conditions.
    e. Investigate effects of using fire to manage vegetation structure and composition in white fringeless orchid sites and surrounding uplands.
2. Work with Atlanta Botanical Garden to augment or restore populations where ecological conditions have been restored in sites where the species has suffered extreme declines or been extirpated.
3. Develop agreements with departments of transportation and utility companies to ensure protection and management of populations near rights-of-ways in Georgia, Kentucky, and Tennessee.
4. Identify populations not currently on conservation lands that should be priorities for protection. Work with landowners to obtain protection for populations on privately owned lands. Potential mechanisms include fee simple purchase, conservation easement, or establishing a conservation agreement to ensure habitat receives necessary management and is protected from incompatible land uses.
5. Collect germplasm for *ex situ* storage at Atlanta Botanical Garden, especially for populations vulnerable to extirpation due to small population size, collection or excessive visitation, or continued habitat degradation due to lack of needed management. Ensure that accessions are

secured from populations across the species' geographic range and encompass the range of habitat conditions the species occupies, in an attempt to maximize genetic variation represented in *ex situ* collections.

6. Investigate the influence of microhabitat on the species' distribution and abundance within occupied sites, incorporating both natural and introduced or augmented populations.
7. Conduct surveys for suitable habitat and previously undiscovered populations, both on protected and unprotected lands.

IV. PREPLANNING PROCESS

A Species Status Assessment (SSA) and a recovery plan will be prepared for the white fringeless orchid. The SSA will assess the white fringeless orchid's biological condition, describe the species' needs, current condition, and potential future condition, and will inform the recovery plan. The recovery plan will include objective and measurable criteria which, when met, will address all meaningful threats to the species and ensure its conservation. The plan will also estimate the time and the cost to achieve recovery. The SSA and the recovery planning effort will be led by the Tennessee Ecological Services Field Office in coordination with our partners. The Service anticipates either writing the recovery plan or appointing a recovery team to help us effectively draft a recovery plan for this orchid. If a team is formed, individuals on the recovery team would advise the Service and could include experts on the plant and other relevant areas.

During the recovery planning process, input, comments and review will be sought from multiple stakeholders within the States of Alabama, Georgia, Kentucky, Mississippi, South Carolina, and Tennessee. These will include State, Federal and local agencies, industrial and agricultural groups, universities, conservation organizations, and others. Many of these stakeholders are currently cooperating in on-going conservation efforts for white fringeless orchid and other species that occur in this orchid's habitat. Throughout the listing process, we worked closely with State, Federal, and local partners regarding needed and possible conservation efforts.

The draft recovery plan should be finalized and sent to the Regional Office for review by October 2018. The final recovery plan should be sent to the Regional Office for review by October 2019. These timelines may be affected by available resources and regional priorities.

Approve: _____ Date: 12-8-16
Assistant Regional Director, Region 4

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