Scutellaria floridana

(Florida skullcap)

5-Year Review:
Summary and Evaluation

Photos by Vivian Negron-Ortiz

U.S. Fish and Wildlife Service
Southeast Region
Panama City Field Office
Panama City, Florida

5-YEAR REVIEW
Scutellaria floridana (Florida skullcap)

I. GENERAL INFORMATION

A. Methodology used to complete the review

In conducting this 5-year review, we relied on the best available information pertaining to historical and contemporary distributions, life histories, genetics, habitats, and threats of this species. We announced initiation of this review and requested information in a published Federal Register notice with a 60-day comment period (83 FR 20092). We received no public comments during the 60-day open comment period. We used a variety of information resources, including the Recovery Plan of June 1994, 2009 5-yr review, unpublished field survey results, reports of current research projects, peer reviewed scientific publications, unpublished field observations by Service, State and other experienced biologists, and personal communications. These documents are on file at the Panama City Field Office. Comments and suggestions from peer reviewers were incorporated as appropriate (see Appendix A). This review was completed by the Service's lead Recovery botanist in the Panama City Field Office, Florida.

B. Reviewers

Lead Field Office: Panama City Field Office, Dr. Vivian Negrón-Ortiz, 850-769-0552 ext. 231

Lead Region: Southeast Region, Kelly Bibb, 404-679-7132

C. Background

1. FR Notice citation announcing initiation of this review: 83 FR 20092 (May 7, 2018).

2. Species status: Unknown; the species status is considered unknown until all the Element Occurrences[1] (EOs) are revisited. This has not yet been completed. Surveys indicate a decline in the number of sites: 10 EOs are extirpated in Gulf County. However, surveys over the past years show an increase of flowering stems in public managed areas such as Apalachicola National Forest (ANF) and St. Joseph Bay State Buffer Preserve (SJBSBP). Presently, we have 19 documented EOs with estimated viability (size of the EO, general condition of the EO at the site, and the conditions of the landscape

[1] Element Occurrence (EO): an area of land and/or water in which a species or natural community is, or was, present. For species, it corresponds with the local population (portion of a population or a group of nearby populations). It is also referred to as occurrence, location, or site.

surrounding the EO; FNAI 2019) ranging from excellent to poor. See section II.C.1.a for current information.

3. Recovery achieved: 2 (26-50% recovery objectives achieved); see section II.B.3 for details on recovery criterion and actions, and how each action has or has not been met.

4. Listing history

Original Listing

FR notice: 57 FR 19813-19819
Date listed: May 8, 1992
Entity listed: species
Classification: threatened

5. Associated rulemakings: Not applicable

6. Review History

Five-year reviews:
June 11, 2009 (status: unknown): No recommendation was made to change the status of this plant.

Recovery Plan: 1994
Each year, the U.S. Fish and Wildlife Service (Service) reviews and updates listed species information to benefit the required Recovery Report to Congress. Through 2013, we performed a recovery data call that included status recommendations, such as "Unknown" for this species. We continue to show this species' status recommendation in 5-year reviews. The last review conducted for the Recovery Report was conducted in 2018.

7. Species' Recovery Priority Number at start of review (48 FR 43098): 2C

Degree of Threat: high
Recovery Potential: high
Taxonomy: species
Conflict category ('C'): in conflict with development and growth

8. Recovery Plan or Outline

Name of plan: Recovery Plan for four plants of the lower Apalachicola Region, Florida: *Euphorbia telephioides* (telephus spurge), *Macbridea alba* (white birds-in-a-nest), *Pinguicula ionantha* (Godfrey's butterwort), and *Scutellaria floridana* (Florida skullcap).
Date issued: June 22, 1994

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) policy

The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any vertebrate wildlife. This definition limits listing DPS to only vertebrate species of fish and wildlife. Because *S. floridana* is a plant, the DPS policy is not applicable and not addressed further in this review.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan containing objective, measurable criteria?

The recovery plan includes a recovery objective for delisting the species as well as the criterion. The objectives are to guarantee that the populations in ANF are secure, and to conserve the species outside the ANF by protecting habitat through land acquisition, and changes in management practices on government land, rights-of way (ROW), and private land. For delisting the species the goal is to adequately protect and manage 15 populations distributed throughout the species' historical range for 10 years. The plan states that these goals are by necessity only preliminary, and they will be refined.

2. Adequacy of recovery criteria.

a. Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

No. The recovery criteria were based on the available data at the time the plan was published 25 years ago.

b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)?

Yes. The recovery plan addressed factors 1, 4, and 5. See section II.C.2 for description of current information and threats.

3. List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors[*] are

[1]1)Present or threatened destruction, modification or curtailment of its habitat or range;
2) Overutilization for commercial, recreational, scientific, or educational purposes;
3) Disease or predation;
4) Inadequacy of existing regulatory mechanisms;
5) Other natural or manmade factors affecting its continued existence.

addressed by that criterion. If any of the 5-listing factors are not relevant to this species, please note that here.

The recovery plan lists a delisting criterion to adequately protect and manage 15 populations distributed throughout the species' historical range for 10 years. This recovery criterion addresses factors 1, 4, and 5. Factors 2 and 3 are not relevant to *S. floridana*. Recovery actions 1.1, 1.3, 2, and 3 address factors 4 and 5. Recovery actions 1-5 address factor 1.

This plant, based on best available information, is known from four counties with the populations primarily found on ANF (Table 1). In section IV, we recommend for the plan's recovery criteria to be revised and better defined; in section II.C.1 and 2, we present current information on status and threats to the species.

At present, we have about 16 protected populations (Table 1); but monitoring throughout the species range has not been initiated. We summarize our progress below under existing recovery actions. Additional detail on all EOs can be found below in II.C.1.

Recovery action 1: Protect population in Apalachicola National Forest and on other public lands

This recovery action is ongoing/partially met.

1.1. Management is an ongoing action conducted by the U.S. Forest Service (USFS). The ANF has a yearly goal of burning 100,000 acres with prescribed fire (A. Edwards, USFS, 6/12/2019; J. Dunlap, USFS, 10/30/2017, pers. comm.). From 2012 to 2018, the USFS burned annually on average 83,744 acres, with an average of 32,431 of those acres being in the growing season (J. Anderson, USFS, 6/12/2019, calculated from the Forest Service Tracking System). USFS will continue to apply prescribed fire (dormant and growing season), in addition to include rare plant locations on their prescribed fire maps for both protection and to prioritize habitat areas for hand lighting prescribed fire (J. Drake, USFS, 07/24/2019).

Monitoring. 1) The Service (collaborative with A. Johnson, FNAI) established in 2017 a total of fifteen randomly selected 1 x 1 m quadrats within three sites at the ANF, Florida, representing two treatments (savanna and intermediate) and the control. Vegetative growth, flowering and survival of shoots are currently monitored three times a year to provide baseline data to relate survival of these ramets to the effect of thinning (pre- and post- timber harvest) and prescribed and wild fires.

2) Florida Natural Areas Inventory (FNAI) under contract to the USFS established in 2017 nineteen Carolina Vegetation Survey (CVS) monitoring plots to quantify forest structure and species composition before and after restoration efforts. *S. floridana* stems were counted within 20 subplots inside the CVS plot to evaluate known patches before and after restoration efforts to quantify population changes as a result of the restoration (A. Jenkins, FNAI, 06/12/2019). USFS will continue to revisit the monitoring plots after

management activities have occurred as well as to survey in proposed timber sale areas (J. Drake, USFS, 07/24/2019).
3) Also under its contract with the USFS, the Florida Natural Areas Inventory monitors 7 permanently marked plots on the ANF after every prescribed fire event. At these plots flowering stems are counted. Vegetative stems have been counted at the same time as flowering stems at one monitoring date in 3 of the plots. Habitat data (forest structure and composition) were collected in these plots when they were established.
4) The Friends of the Apalachicola National Forest, a group of citizens organized to provide input to the USDA-Forest Service on issues related to management of the Apalachicola National Forest, randomly located 25 CVS plots. These plots were set up in 2015 and 2016 to sample groundcover before and after thinning, and before and after fire; one random plot has *S. floridana* (A. Johnson, FNAI, 7/06/2019).

1.2. Conduct population biology studies
This recovery action is ongoing and will be met when demographic and fire, reproduction, and population genetic studies are completed.

Pollinators are critical to the long-term persistence of many flowering plant species because they provide a mechanism for ensuring seed set. Pitts-Singer et al. (2002) studied the pollinator-plant relationship of *S. floridana* at two sites in ANF. Ten inflorescences were observed for six hours over two days in 1999, and 10 flowers were monitored for six hours in 2000. Only megachilid bees and possibly halictid bees displayed behavior that may have resulted in pollination of the flowers.

1.3. Conduct botanical inventories on public land, possible purchase areas, and selected private land.
This recovery action is ongoing and conducted primarily by the US Forest Service, Florida Forest Service, SJBSBP, Service botanist, and FNAI.

No land acquisition has been accomplished for specific protection of *S. floridana*.

Recovery action 2: Manage rights-of-way
This recovery action is ongoing and conducted primarily by the Florida Department of Transportation (FDOT). Mowing is the common practice to maintain ROWs in Florida, and FDOT has implemented a program of reduced mowing along state highways in order to decrease costs for maintenance roadsides and to encourage the growth of native wildflowers. In addition, the Forest Service only allows spot treatment application of herbicide in the ANF.

Recovery action 3: Protect and manage these plants outside Apalachicola National Forest.
This recovery action has been partially met.

3.1. Secure protection

Eight populations have been secured to date: three populations on the SJBSBP, Gulf County; one population at Lathrop Bayou (LB), Bay County; three populations at Tate's Hell State Forest (THSF) and one at Box-R Management Area (Box-R), Franklin County. These populations are on public lands; monitoring has not been initiated.

No land acquisition has been accomplished for specific protection of *S. floridana.*

3.2. Develop and implement management and monitoring plans for protected sites

Management plans have been developed and implemented by the: 1) Bureau of Land Management (BLM) and the St. Joe Company for the Lathrop Bayou (LB; BLM 2003), and 2) Florida Department of Environmental Protection for the SJBSBP. The Plant Conservation Program of the Florida Forest Service provided management recommendations, i.e., application of prescribed fire, to assist THSF land managers in prioritizing stands that contain federally threatened plant species (FDF 2009).

Note: The 2008 BLM management plan for 539 acres of LB focuses on habitat improvements to benefit endemic plants and animals. In 2008, the island was owned by the BLM (189 acres), the St. Joe Company (206 acres), and the Genecov Group (144 acres; BLM 2008). In 2013, the St. Joe Company sold its land to AgReserves Inc. (ARI), another for-profit company, who may maintain timber and agricultural uses of the land.

Recovery action 4: Systematics and other studies

This recovery action has not been met.

Recovery action 5: Garden propagation and reintroduction
This action is partially met.

Propagation: Overall, *S. floridana* lacks a seed bank; *in-situ* seeds do not require specific germination treatments; stem cuttings and rhizomes are not optimal propagation techniques; and seeds can maintain viability under controlled conditions.

Using seeds collected by Bok Tower Gardens (Bok Garden), Lake Wales, Florida in 2007, Molano et al. (2014) observed that under proper storage conditions a 30% germination rate can be achieved. Similar germination percentage resulted for the control (i.e., no treatment; 33%) so treatments [e.g. stratification, scarification, Wright's All Natural Hickory Smoke Seasoning (liquid smoke solutions were prepared by diluting the smoke seasoning to three concentrations), plant debris smoke, and gibberellic acid] are not necessary for *S. floridana* germination. *S. floridana* seedlings did not emerge from the seed bank studies, thus, a persistent seed bank was not detected.

Seed germination and plant transplantation experiments were conducted at Bok Garden during 2006 and 2007. Three whole plants, 18 stem cuttings, seven rhizomes, and 16 seeds were collected from the ANF, Liberty County; 95 seeds were collected from SJBSBP, Gulf County; and 764 seeds were collected from LB, Bay County (Peterson and Campbell 2007). While whole plant survival was high, stem cuttings and rhizomes were not optimal propagation techniques for *S. floridana.* Seed germination was 1) high for seeds collected in October and sown five weeks post-collection, and 2) low for seeds collected in May and sown eight weeks post-collection. Currently, the Bok Gardens has 664 seeds in cold storage and no living plants in the collection beds; additional work has not been done (C. Peterson, Bok Gardens, 06/11/2019, pers. comm.).

Reintroduction. Reintroduction has not been initiated, but if necessary, results from the propagation studies provided sufficient information to initiate reintroduction.

C. Updated Information and Current Species Status

1. Biology and Habitat

a. Abundance, population trends

Scutellaria floridana is endemic to the Florida panhandle, documented in four counties (Table 1). There were originally 40 historically documented occurrences throughout this species range (USFWS 2009) but analyzing with NatureServe's separation distance guidelines (http://help.natureserve.org/biotics/Content/Methodology/PlantEOSpecs.htm and http://help.natureserve.org/biotics/Content/Methodology/PlantEOSpecs_DecisionTree.htm), points within 1 kilometer (km) are all considered part of one occurrence. Based on this method, the 40 historical occurrences represent 29 EOs (USFWS 2009).

Even though the number of EOs has remained the same as reported in the last 2009 review, the number of sites with *S. floridana* in ANF had nearly doubled since 2010 as a result of FNAI surveys under contract to the USFS as well as volunteer surveys (A. Johnson, FNAI, 7/09/2019). One problem still remains: we have been counting flowering stems and do not know how many genets (collection of 'clones' or ramets of identical genetic make-up), or even extent of interconnected ramets, these represent.

Development and dense slash pine plantations may have resulted in the extirpation of 10 historical EOs; these EOs were found on private property in Gulf County (FNAI 2019) and a few not observed since the late 1980s (Negrón-Ortiz 2009). Therefore, this information confirms 19 current EOs (Table 1) as well as a decline of more than 30% in the number of populations or EOs. Estimated viability of 10 extant EOs are considered excellent (A) or good (B), whereas three EOs have been ranked as poor (D). The other 6 EOs were ranked with an

estimated viability of good or fair (BC: 3EOs), fair (C: 2EOs), and fair or poor (CD: 1EO) (FNAI 2019).

Overall, we have limited information regarding trends because:
1) surveys were conducted irregularly (see #3 below) and based on either presence/absence and/or qualitative visual estimates of the density of *S. floridana* (Jenkins et al. 2007); most sites were visited only once.
2) this species spreads via rhizomes, making it challenging to distinguish how many flowering stems are produced per plant or belong to the same genet.
3) monitoring at level 2 (quantitative assessment of abundance) and 3 (demographic monitoring of marked individuals, to quantitatively assess parameters such as survivorship, growth, and fecundity) intensities, which provides the most rigorous analysis of population trends (specifically for level 3; Menges and Gordon 1996), has not been initiated across the species range.

Table 1. Estimated number of *S. floridana* Element Occurrences (EOs) and flowering stems per county. ♣ANF, ★Box-R, ⮟LB, ⮝SJBSBP, ●THSF.

County	*Historical EOs*	*# of EOs 1km NSdg*	*Current*	**Estimated flowering stems*	*Current EOs by Ownership Public*	*Private*	*Extirpated EOs*
Bay	1	1	1	167	⮟1		
Gulf	20	14	5	1,215	⮝3	2	10 (private land)
Franklin	9	8	8	5,871	♣★●7	1	
Liberty	10	5	5	> 100,000	♣5		
Total	40	29	19	> 107,253	16	3	10

ANF (Apalachicola National Forest), Box-R (Box-R Management Area), LB (Lathrop Bayou), SJBSBP (St. Joseph Bay State Buffer Preserve), THSF (Tate's Hell State Forest). NSdg (NatureServe's separation distance guidelines)

Table 1 shows numerous *S. floridana* flowering stems (ramets or clones) for the 19 extant EOs. However, flowering ramets were estimated using various methods: midpoint (if a number range was given), best comprehensive count available (for overlapping features), estimates, or actual counts (A. Jenkins, FNAI, 6/14/19). Thus, this is a rough calculation because what constitutes a "plant" (i.e. genet) in *S. floridana* is unknown at present since the species is rhizomatous, the actual counts of ramets were not provided, and some potential habitat areas have not been surveyed. The occurrence of clonality (ramets) may have significant impacts on levels of genetic diversity, population structure, recruitment, and the implementation of appropriate conservation strategies. Specifically, surveys based on ramets can overestimate population size (Tepedino 2012).

b. Genetics, genetic variation, or trends in genetic variation:
More information on the genetics on this plant is needed. Specifically, a study with a large sample size to assess the genetic diversity of *S. floridana* throughout its range that estimates the plant's degree of clonality is ideal. The study shared below is a good start toward this information need, but caution is recommended because the study was based on a small sample size.

Amplified Fragment Length Polymorphism (AFLP) on 192 samples from 7 populations [ANF (2), LB (1), SJBSBP (2), THSF (2)] indicated high levels of genetic diversity for most populations of *S. floridana*; the sampled populations did not show signs of inbreeding depression (Molano et al. 2015). These populations are genetically similar according to Nei's genetic distance, with high levels of polymorphism and heterozygosity, and without population structure associated with geography. Therefore, the sampled populations of *S. floridana* may have good levels of variation to help buffer against stochastic events. Also, the lack of population structure indicates that various combinations of populations could be used for seed collection and reintroduction efforts.

c. Taxonomic classification or changes in nomenclature:

Kingdom:	Plantae
Division:	Magnoliophyta
Class:	Magnoliopsida
Order:	Lamiales
Family:	Lamiaceae
Genus:	*Scutellaria*
Species:	*floridana* Chapman
Common name:	Florida skullcap

Description: The Florida skullcap is a perennial herb with quadrangular stems and opposite leaves. The flowers are solitary, with a bell shaped calyx and bright lavender-blue corolla. The corolla has two lips, the lower one being white in the middle. The stigma sticks out from under the flower hood with the anthers residing inside. Bumblebees, megachilids and halictids are probably important pollinators. Plants flower from mid-April through early December and principally after a fire. All members of the genus are recognized as a monophyletic clade (Ranjbar and Mahmoudi 2013).

d. Spatial distribution, trends in spatial distribution, **or historic range**

To date, *S. floridana* is still constrained to the same four counties. Based on information provided by FNAI (2019) and recent surveys, there were 29 historically documented EOs. Although FNAI documented three new sites since 2016 (06/13/2019, pers. comm.), technically, these sites are within the 19 currently extant EOs (several EOs were merged to comply with 1 km separation distance as explained in C1a). In addition, habitat modification, i.e., understory without ground cover, dense slash pine plantation, or habitat completely destroyed, has resulted in extirpation of 10 EOs.

Molano et al. (2015) revisited seven populations [ANF (2), LB (1), SJBSBP (2), THSF (2)] during 2012 and 2013, observed at least 192 flowering stems, but the total number of stems for each site was not noted. Locations of nine populations were revisited by FNAI, FFS, and Service botanist during 2007 and 2008 surveys. Plants were present at five of these populations. Based on the EOs evaluation,

this species appears to be declining in EO/population number (see sections C1a, and D for details).

e. Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

The primary habitat of Florida skullcap is wet longleaf pine flatwoods and wet prairie, within the grassy seepage bog communities at the edge of forested or shrubby wetlands, a habitat defined as a fire-dependent community. It is also found in the ecotones between mesic flatwoods and swamps sites or grassy margins of wetland habitats, and somewhat disturbed wetland savanna. Florida skullcap can be found growing in full sun or light shade, and in low nutrient, acid, or sandy soil (USFWS 1994, Jenkins et al. 2007).

It is locally abundant in the ANF and the SJBSBP, where fire management is maintained. This species has a strong flowering response to recent burns, blooming most abundantly the spring or summer following a fire.

2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

a. Present or threatened destruction, modification or curtailment of its habitat or range

Habitat modification is the primary threat identified in the Recovery Plan for *S. floridana*, and remains the main threat to date for this plant. Timber management, urban development, and fire management and suppression in this region have changed the ecosystems. The threats are discussed in more detail below:

1. Timber production in the outer Coastal Plain in the Apalachicola Basin

The timber industry in North Florida became well established in the 1850s (FNAI 2005). It started in Franklin County in the 1870s and continued to be a prominent industry until the mid-1990's (Howell and Hartsell 1995). The Timberland Company had close to a million acres in timber in the eastern region of the panhandle and they plan to continue to harvest and replant indefinitely. The Company also owned a paper mill in Port St. Joe until it was sold and shut down in 1999. In 2013, the St. Joe Company sold more than 380,000 acres of its land to AgReserves, Inc., another for-profit company with a history of conversion of timberlands to cattle grazing. The land sold included timberlands in Bay, Calhoun, Franklin, Gadsden, Gulf, Jefferson, Leon, Liberty and Wakulla counties.

Tree farming, i.e., privately owned forest managed (clearcutting, mechanical site preparation, and planting of pine plantations) for timber production, is a primary threat since there still is a mill in Panama City (Bay County) and there are many thousands of acres of tree farms). Hurricane Michael in October 2018 (described below in C2e) caused extensive damage to the timberlands in the affected area and will affect the timber market in the coming decades. However, the extent of

this affect is unknown. Florida skullcap has the capability of a prolonged vegetative dormancy persisting in dense pine plantation in the ANF, but reintroduction of fire to these areas has been the only way to determine the species was not extirpated. Additionally, the compatibility of specific timber management practices (e.g., clearcutting, site preparation) with this species persistence is unknown. Therefore, tree farming is a threat to this species.

2. Coastal real estate and road development

Urban development continues to threaten Florida skullcap. The St. Joe Company still owns extensive timberland in Northwest Florida, and focuses on commercial and residential development along roadways and near or within business districts in the region. More than a third of Florida's land is projected to be developed by 2070 along with a growth of about 33.7 million residents–almost 15 million more people than in 2010 (University of Florida GeoPlan Center 2017).

Several *S. floridana's* locations are found along U.S. and state roads. Construction activity may directly kill individual plants or convert habitat to unsuitable space; widening may convert native habitat to managed roadside; and culvert modification may change drainage patterns, which may change seasonal hydrology. Therefore, because they contribute to habitat loss, road widening and new roads continue to pose a threat to the species.

3. Fire suppression

Suppression of fire continues to threaten the pineland and savanna's flora since fire is essential for the maintenance of flatwoods (Abrahamson and Hartnett 1990). Fire influences community structure and composition (Abrahamson and Hartnett 1990), and with insufficient frequency in longleaf pine communities, a woody midstory quickly develops (Glitzenstein et al. 1995), negatively affecting the understory diversity.

Low intensity prescribed fire regimes are important for maintenance of flatwoods diversity (Hiers et al. 2007). Plot data suggests that wet flatwoods and wet prairies with *S. floridana* have significantly higher herbaceous cover (>68%) with significantly lower cover of shrubs (<18%) and pine cover (<25%) than unoccupied areas (FNAI 2019). Frequent fire both increases herbaceous cover and reduces shrub and pine cover. Therefore, frequent prescribed burnings, i.e., 1 to 3-yr interval, are needed to maintain optimal *S. floridana* populations. At present, the ANF utilizes a 3 to 5-yr interval burn rotation, LB uses a 2 to 7-yr interval but the last know prescribed fire was in 2009, and SJBSBP uses a 2 to 5-yr interval.

Fire suppression continues to be a threat to *S. floridana*. Lack of fire, and subsequent growth of shrubs (such as encroachment of *Cyrilla racemiflora* L., commonly known as swamp titi) and saplings in the understory, in addition to shading by planted pines, inhibits this species emergence (Negrón-Ortiz, 2018, pers. observ.; FNAI 2008). Titi percent cover was significantly lower ($p=0.013$, $z=2.48$) in plots with *S. floridana* [present: mean=1.9%, 95% CI= 0%-5.5%; absent: mean=22.7%, 95% CI=19.71-25.75; FNAI 2019, unpub. data). Plant

emergence is prolific within one year of a fire event (Negrón-Ortiz, 2018, pers. observ.), but declining fire frequency reduces flowering of *S. floridana.*

b. Overutilization for commercial, recreational, scientific, or educational purposes:
There is no evidence to suggest that this factor is a threat.

c. Disease or predation:
There is no evidence to suggest that this factor is a threat.

d. Inadequacy of existing regulatory mechanisms

Sections 7(b)(4) and 7(b)(2) of the Act generally do not apply to listed plants species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed threatened and endangered plants or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulations or in the course of any violation of a state criminal trespass law.

Several populations of *S. floridana* occur on private timberland and ROWs. While the Act requires federal agencies to carry out programs for the conservation of endangered and threatened species, no such programs are stipulated for private landowners. Neither section of the Act provides protection for plants on private lands as long as the activity is permissible under state/local laws. The State requires permission of private landowners for collecting of state-listed plants from their property.

Scutellaria floridana is protected under Florida State Law, chapter 581.185: Preservation of native flora of Florida (https://www.flsenate.gov/Laws/Statutes/2013/581.185), which includes preventions of take, transport, and the sale of the plants listed under the State Law. The rule Chap. 5B-40, Florida Administrative Code, contains the "Regulated Plant Index" (5B-40.0055) and lists endangered, threatened, and commercially exploited plant species for Florida; defines the categories; lists instances where permits may be issued; and describes penalties for violations (Coile and Garland 2003).

Bay County Comprehensive plan, under chapter 6, provides restrictions, constraints and requirements to protect and preserve designated habitat conservation areas for rare, threatened, or endangered species, and wetlands (http://baycountyfl.gov/276/Planning-Zoning). Gulf, Franklin, and Liberty Counties do not have such regulations.

Highway ROW maintenance activities are not always reviewed for threatened and endangered species impact. However, if there is an activity (e.g., construction, mowing, or maintenance projects) affecting protected species, then the Service can recommend consultation under the Act to the FDOT. The FDOT routinely consults with the Service on all major road construction activities. Currently,

these protections are inadequate; see section IV, action 5.

e. Other natural or manmade factors affecting its continued existence

Herbicide. While the Recovery Plan mentioned that the use of herbicide or the wrong type of herbicide is a threat when it is used to control vegetation on power line ROWs, we no longer consider this a threat to Florida skullcap because mowing is now the common practice to maintain ROWs in Florida. Franklin County allows only "spot treatment" due to impacts concerning the ANF and waters within Apalachicola Bay and River basin.

Sea level rise. Sea level rise (SLR) as a result of climate change is a growing concern for much of Florida's coastline and the endemic species that occur there because about 10% of Florida is less than 1 meter above current sea level. Using the NOAA Sea Level Rise and Coastal Flooding Impacts Viewer (https://coast.noaa.gov/digitalcoast/tools/slr), the projections indicated that coastal habitat areas in Bay, Franklin, and Gulf Counties would be largely inundated beginning at 0.305 m (one foot) of SLR. Therefore, SLR projections will most likely extirpate populations located in Gulf (4 EOs) and Franklin (2 EOs) counties by intrusion of saltwater beginning at one foot SLR.

Catastrophic events. Hurricanes have impacted the Florida Panhandle and this threat is expected to continue. On October 10, 2018, Hurricane Michael (HM) made landfall along the Florida Panhandle as a massive Category 5 hurricane with maximum sustained winds of 161 mph and a pressure of 919 millibars (https://www.weather.gov/tae/HurricaneMichael2018). The scale and severity of this hurricane impacted residents as well as wildlife and plants in the Florida Panhandle. According to pre/post-hurricane analyses by C. Anderson (FNAI, 8/21/2019, pers. comm.), natural communities such as sandhills were more affected, whereas scrub, scrubby flatwoods, wet flatwoods, and coastal grasslands were found more resistant to damage. *Scutellaria floridana* occurs in wet longleaf pine flatwoods and wet prairie, or in the ecotones between mesic flatwoods and swamps sites or grassy margins of wetland habitats. The Service and FNAI collaborator surveyed the 15 randomly-established plots in the ANF (see page 3 for details) in March 2019 (5 months post-HM) and found no evidence of damage to *S. floridana*. However, the effect of this disturbance on the 5 documented EOs in Gulf and Bay counties, areas that were severely affected by HM, is unknown.

D. Synthesis

Florida skullcap is presently located in four Florida panhandle counties (Table 1). It is vulnerable because of its limited distribution within its historic range and low number of populations. The species is particularly concentrated in a few locations, specifically in the ANF. The main threat for this species is habitat loss and modification. Development pressures in the Florida panhandle are extreme; urbanized land is projected to increase

two-fold in the near future. Overcollection is not a threat, and no problems have been detected with disease and predation.

Land conversion coupled with disruption of fire regimes of the longleaf pine ecosystem is responsible for the decline of the ecosystems where *S. floridana* is found. Observations and data collected within its habitat indicated that *S. floridana* is a fire-dependent species, thus where frequent fire is implemented, it stimulates the emergence of stems and maintains healthy, stable populations (e.g., populations at ANF, LB, and SJSBP). While either dormant or growing season fires can maintain *S. floridana* populations, lightning or growing- season burns help reduce woody competition in wetland edges and appear to be more effective in restoring habitat and populations than dormant season fires alone.

The species occurs on both private and public lands. The populations at ANF, which are the largest, are protected and adequately managed. But habitat on private lands has deteriorated in quality and extent due to conversion of much of the forest land to pulpwood plantations (e.g., clearcutting, conversion to improved pasture, drainage, and fire exclusion). Survey information indicates a decrease in the number of populations: >30% of EOs have been likely extirpated due to development and/or habitat modification and several populations have not been observed since the late 1980s. Habitat in these areas is currently highly degraded by intensive silviculture. However, Florida skullcap has been observed to persist dormant in dense pine plantation in the ANF and reintroduction of fire to these areas would be necessary to determine if they are truly extirpated.

Studies have demonstrated variation among the number of plants necessary for a population to survive risks of extinction (Given 1994, Matthies et al. 2004, Menges 1990). Presently, we have some estimation of stem counts per county, but because: 1) current surveys are based on stem counts using multiple estimation approaches, a comprehensive population survey throughout the species range using the same sampling method (action 1) is needed; 2) it is not possible to determine which plants belong to the same genetic individual (genet) in the field and the extent of sexual and asexual (clonality) reproductive strategies is unknown, appropriate identification and characterization of genets should be accomplished with genetic analysis; and 3) performance dynamics at the genet and ramet levels are unknown, a long-term monitoring study is necessary to help assess where in the life cycle the management should be targeted. These top actions will help evaluate the current status of this species in addition to improve population trends and trajectories.

Consequently, *S. floridana* continues to meet the definition of a threatened species as a result of habitat destruction or modification due to development and fire suppression, and the effect of these threats into this plant's present narrow distribution and low population numbers. For the species to be considered for delisting, the general criterion is to adequately protect and manage 15 populations distributed throughout the species' historical range for 10 years. This criterion has not been met.

III. RESULTS

A. Recommended Classification**:**
__X_ No change is needed

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

1. Estimate the levels of clonality and distribution of genetic diversity. Knowledge of the levels and distribution of genetic variation in species of conservation concern can be important for the development of efficient and effective conservation practices. Sampling should involve the established monitoring plots (see page 3 Recovery action 1)
    - By understanding clonality, the Service will be able to determine what is an individual and evaluate abundance. Specifically, we will be able to 1) relate flowering stems (both vegetative and flowering) to number of individuals in a given area, and 2) infer the effect of fire on flowering stems/individuals.
    - The identification of populations with rare alleles or with elevated levels of genetic diversity may lead to greater efforts for their preservation relative to less genetically unique populations.
2. Complete a comprehensive census (e.g., the total number of individuals, number of flowering vs. non-flowering plants, and whether seedling recruitment is occurring) throughout the present distribution including all the historical locations to determine the population numbers and range. Given the cryptic nature of this plant when it is not flowering, the density of surrounding vegetation and the number of locations, surveys are best recommended a ~5 weeks post-fire, if the fire is in the growing season; or in April or May if the fire was in Dec-Mar time period (A. Jonhnson, FNAI, 7/06/2019). A consistent and repeatable method should be employed.
    - Censuses are most critical for populations outside ANF. Surveys that have been accomplished following fire in the ANF (in the past 10 years by FNAI, Ann Johnson, and local botanists) have been extensive and thorough (A. Jenkins, FNAI, 6/27/2019).
3. Monitoring. It is recommended to set up more subplots and monitor both flowering and nonflowering individuals over time.
    - Population census data [e.g., the total number of individuals (flowering and nonflowering plants), and whether seedling recruitment is occurring] will help predict extinction risks and the smallest size at which a population can exist without facing extinction by using computer simulations known as population viability analyses. Emphasis should be given to clones and individuals with unique profiles identified by genetic study. If possible, investigate basic ecological questions [e.g., pollinators; flowering period; annual variability in flowering; seed production; and the effect of fire (if the areas are burned) on density, fecundity, and size structure]. See page 3 for details of ongoing investigations in the ANF.

- A repeatable method should be employed. If the target population is small (e.g., 200 m^2), it is recommended to walk the entire area and count each individual. If the target population covers a large area, then permanent marked transects should be established in key selected areas that reflect the larger area.

4. Conduct surveys/inventories on potentially new sites. This action can include the use of species distribution modeling methods to initially determine potential sites, with subsequent validation or inspection of the sites for plants.
    - FNAI developed occurrence-based suitable habitat model for *S. floridana* in 2011, and many new locations have been discovered since that time. Recommendation: Update the current model with most recent survey data (A. Jenkins, FNAI, 6/27/2019) and validate the model.
5. Manage ROWs

    Continue fostering conservation practices for utility and highway ROWs with the Forest Service, Talquin Electric, FDOT, and the Service; a management plan should be developed and implemented.
6. The recovery plan should be updated to define objective measurable criteria and better address the five factors.

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U.S. FISH AND WILDLIFE SERVICE 5-YEAR REVIEW
Scutellaria floridana (Florida skullcap)

Current Classification: Threatened

Recommendation resulting from the 5-Year Review
__x__ No change is needed

Appropriate Listing/Reclassification Priority Number, if applicable: Not applicable.

The review was completed by botanist Dr. Vivian Negrón-Ortiz, Panama City Field Office.

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve SEAN BLOMQUIST Digitally signed by SEAN BLOMQUIST Date: 2019.09.05 08:05:07 -05'00' Date 9/5/2019

APPENDIX A
Summary of peer review for the 5-year review of
***Scutellaria floridana* (Florida skullcap)**

A. Peer Review Method

The document was peer-reviewed internally by Drs. Adam Kaeser and Sean Blomquist of the Panama City Field Office. The document was sent to three outside reviewers that were chosen based on their qualifications and knowledge of the species.

B. Peer Review guidance: The below guidance was provided to the reviewers.

We indicated our interest in all comments the reviewers may have about the document, including validity of the data used, and identification of any additional new information on the *S. floridana* that has not been considered in this review

C. Summary of Peer Review Comments/Report

Reviewers provided comments related to plots monitored by FNAI, and updated plant/ramet abundance in ANF and THSF.

D. Response to Peer Review

All peer reviewer comments were evaluated and incorporated where appropriate.