

**5-YEAR REVIEW: Summary and Evaluation**  
**Texas trailing phlox (*Phlox nivalis* ssp. *texensis*)**  
**Current Classification: *Endangered***

U.S. Fish and Wildlife Service  
Texas Coastal Ecological Services Field Office, Houston, Texas

## 1.0 GENERAL INFORMATION

### 1.1 Reviewers:

**Lead Regional Office:** Jennifer Smith-Castro, Southwest Region, Regional Recovery Biologist, (281) 212-1509.

**Lead Field Office:** Amber Miller, Fish and Wildlife Biologist, Texas Coastal Ecological Service Field Office, Houston

**1.2 Methodology:** Beginning in October 2017, the U.S. Fish and Wildlife Service (USFWS) began drafting a Species Status Assessment (SSA) of *Phlox nivalis* ssp. *texensis* (Texas trailing phlox). The SSA incorporates an updated review of the species' natural history, taxonomy, ecology, distribution, abundance, and populations; an assessment of individual, population, and species requirements, factors affecting the species' survival, current conditions, and conservation efforts; and, an evaluation of the current status and projected future viability in terms of resiliency, redundancy, and representation. In August 2018, we submitted a draft SSA report to the USFWS Southwest Region for review and comment. The draft SSA report can be found at <https://ecos.fws.gov/ServCat/DownloadFile/155770>. We anticipate conducting peer review with three expert reviewers in late September 2018. A final SSA should be complete in late October 2018. We based this 5-year review on the information and evaluations provided in the draft SSA report.

**1.3 Federal register citation announcing initiation of this review:** March 29, 2010 (75 FR 15454); May 31, 2018 (83 FR 25034).

## 2.0 REVIEW ANALYSIS

**2.1 Review Analysis:** Texas trailing phlox (*Phlox nivalis* ssp. *texensis*) is a non-woody herbaceous perennial found only in the open pine forests of the Pineywoods ecoregion of East Texas. The species is a rare endemic, with populations only known from Hardin, Tyler, and Polk counties. It was federally listed as endangered on September 30, 1991 (56 FR 49636) and listed by Texas Parks and Wildlife Department (TPWD) as endangered on March 30, 1993 (Poole *et al.* 2007). The species is listed as endangered without critical habitat. As a plant species, the 1996 Distinct Population Segment (DPS) Policy is not applicable. The Recovery Priority Number is currently a 3. We recognize the Texas trailing phlox as a distinct species.

The Texas trailing phlox is a member of the Polemoniaceae family (Fehlberg *et al.* 2008), and is considered an eastern-mat forming Phlox. When the species was listed as endangered in 1995, there were only 2 known populations in southeast Texas, one in Hardin County (the type locality) and another from Tyler County. Since then, 17 populations were observed in Hardin, Polk, and Tyler counties, however, these are considered extirpated.

The USFWS Recovery Plan (1995) provides a definition of a “population” and a “plant”. Based on this definition, the USFWS recognizes that there are 7 known extant populations in Hardin, Polk, and Tyler counties that include: 1) Sunflower road (Element of Occurrence (EO) 17) and Big Thicket National Preserve (BTNP), Big Sandy Creek reintroduction; 2) Farm-to-Market 1276 right-of-way (EO 21); 3) Campbell Units (EO 22 and 23); 4) The Nature Conservancy, Roy E. Larsen Sandylands Sanctuary (EOs 3, 5, 13); 5) Resource Management Services (EO 9); 6) Hancock Timber (introduced); and 7) BTNP, Turkey Creek reintroduction. Land ownership includes private, public, and state lands.

To guide future recovery efforts for a species, recovery plans typically discuss both downlisting and delisting recovery criteria necessary to either reclassify the species or remove from Endangered Species Act protections (delist). Currently, the downlisting criteria in the Recovery Plan state that a “population” must include a group of at least 300 plants. Poole *et al.* (2000) stated that, as a current minimum viable population (MVP) estimate, each population of Texas trailing phlox needs about 600 reproductive individuals. None of the populations has reached or exceeded these MVP values. The Recovery Plan (1995) also states that to downlist, 12 self-sustaining populations are needed in at least three counties. The Recovery Plan is currently being amended to include downlisting criteria using the best scientific information to date for the species. Delisting criteria will also be included in the amended Texas trailing phlox Recovery Plan, as the original plan did not establish criteria for removal of Texas trailing phlox from the endangered species list. Genetic analysis of Texas trailing phlox could assist in answering the questions of relatedness of individuals within a population and between individuals of separate populations; however, these investigations have not been conducted.

Texas trailing phlox is a perennial, evergreen species. Flowering generally occurs between late March and early April (Ajilvsgi 1979, Poole *et al.* 2007, U.S. National Park Service (USNPS) 2015), sometimes extending into May depending on precipitation and management (i.e. prescribed burning). Individual plants may produce between 3 and 50 flowers, depending on the size of the plant. Flowers can last 1-4 days and continue to be produced over a period of 1-5 weeks (Corlies and Warnock 1992, Maxey and Warnock 1996, TPWD 1997). Texas trailing phlox petal color usually ranges from light- or rose-pink to bluish lavender, lilac, or purple, often with deep-hued eye-striae (Wherry 1955, USFWS 1995). Rare cases of albinism are known to occur (Wherry 1955); a single instance of this has been observed at the natural population in Tyler County (Carr 1997).

Little is known about the reproduction of the Texas trailing phlox. Their populations are small and consist of a few scattered, inconspicuous individuals (Mahler 1980). This could make asexual reproduction very important for recruitment (Parker and Warnock 1993) but this frequency is unknown. Texas trailing phlox is mostly an outcrossing species pollinated by moths and butterflies (Bogler 1992). However, it is not known whether flowers are obligate or facultative outcrossers (Maxey and Warnock 1996, USFWS 1995). Pollinators include carpenter bees (M. Quinn, pers. comm. 2008), Nessus sphinx moth (*Amphion floridensis*) (G. Grant, pers. comm. 2017), and Tiger swallowtail butterfly (*Papilio glaucus*) (G. Grant, pers. comm. 2014). Other bees and butterflies, as well as flies could also serve as pollinators (USFWS 1995, Maxey and Warnock 1996, TPWD 1997). Poole *et al.* (2000) noted that there is the potential of large terrestrial arthropods to act as pollinators. Also, seed and seedling biology (seed maturation, dormancy, seed viability) are largely unknown for the Texas trailing phlox. We lack information about seed dispersal; however, dehiscence could play a role in local dispersal.

Texas trailing phlox populations are concentrated in a region known as the Big Thicket (Poole *et al.* 2007). Normal weather patterns for this region are warm and wet. Average annual precipitation is well-distributed throughout the year, receiving between 48 inches (in) (121 centimeters (cm)) and 60 in (152 cm) of rain (Diggs *et al.* 2006, USFWS 1995).

Fire is an important process to maintain optimal canopy structure in the Texas trailing phlox habitat, as well as a driver of the ecosystem structure and species composition of the region. Maxey and Warnock (1996) investigated the impacts of management (i.e. prescribed burning, canopy thinning, and combined management) on the species. They found that reproduction is best with an open canopy of pines (5-25 percent); less than 40 percent coverage of subcanopy pines (pines and hardwoods); and less than 40 percent shrub coverage (Maxey and Warnock 1996). The litter layer within habitat must be sparse and/or not compacted to allow for growth of Texas trailing phlox. Optimal litter depth is generally 1.2-2.0 in (3-5 cm), with 75-100 percent coverage of the site (USFWS 1995). Hardwood and grass leaves tend to compact less than pine needles, although the Texas trailing phlox sites are usually dominated by pines as canopy trees. The USNPS (2015), USFWS (1995), Ajivsgi (1979), Mahler (1980), and Poole *et al.* (2007) describe the plant associates for the Texas trailing phlox.

The SSA assesses the representation, redundancy, and resiliency of the Texas trailing phlox within its known range to estimate its current and future viability. Given that only 7 populations are known to exist, they are endemic to a small geographic area, and the species' genetic diversity is unknown, representation and redundancy values remain low. Known population estimates are well below the estimated MVP levels, thus the Texas trailing phlox exhibits low resiliency. Therefore, given its low representation, redundancy, and resiliency, we consider that the classification of the Texas trailing phlox should remain as endangered.

### 3.0 RESULTS

#### 3.1 Recommended Classification:

- Downlist to Threatened**
- Uplist to Endangered**
- Delist** (*Indicate reasons for delisting per 50 CFR 424.11*):
  - Extinction*
  - Recovery*
  - Original data for classification in error*
- No change is needed**

#### 3.2 Recovery Priority Number: No change (3).

**Brief Rationale:** The recovery priority number at the start of the review was determined to be 3. Our current assessment indicates that the degree of threat still remains high, the recovery potential remains high, and the taxon remains a species. Therefore, the current recovery priority number should remain a 3.

### 4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

**4.1 Conduct Genetics Investigations:** Conduct studies to determine genetic diversity of the Texas trailing phlox. Conduct studies to determine the genetic relatedness between individual plants within a population. Determine relatedness between populations across the species geographic range. Determine the relationship between Texas trailing phlox plants to *Phlox oklahomensis*, found in Texas, and to *Phlox nivalis*, found in Louisiana. Use this new genetic information to re-evaluate the criteria used in the Texas trailing phlox Recovery Plan to define a population and an individual plant.

**4.2 Promote Landowner Stewardship and Outreach:** Encourage awareness of Texas trailing phlox, its management needs within longleaf pine savanna habitat, and its habitat structure/composition. Develop outreach resources for landowners and land managers. Provide technical support for management, surveys, monitoring, and conservation efforts. Provide financial support for management and/or leverage funds for restoration and recovery efforts.

**4.3 Monitor Extant Populations:** Continue to monitor extant populations of Texas trailing phlox to assess species viability, habitat conditions, and management needs. Continue management on sites and acquire long-term conservation easements, where feasible, or conservation agreements.

**4.4 Survey for New Populations:** Develop a habitat suitability map to assist in identifying new parcels of land for surveying, restoration, and ex-situ opportunities. Outreach to new landowners and land managers. Conduct surveys of potential Texas trailing phlox habitat, with landowner permission, throughout species' known geographic range.

**4.5 Revisit Historic Populations:** Use herbarium records, field data, and expert input to determine and revisit sites presumed to be extirpated. Coordinate with landowners and land managers to access sites. Educate landowners and land managers about the Texas trailing phlox and its habitat. Conduct surveys of suitable areas with permission. Submit data to TPWD's Texas Natural Diversity Database.

**4.6 Actively Manage Habitat:** Develop management plans with landowners and land managers with the primary goal of restoring or maintaining longleaf pine savanna habitat for Texas trailing phlox. Investigate plant response to management practices (prescribed burning, mowing, thinning), conducted in various frequency and intensity schemes.

**4.7 Develop Reintroduction Plan:** Develop a Controlled Propagation and Reintroduction Plan (per USFWS policy). Limit reintroduction work to the known geographic range of the species (Hardin, Tyler, Polk counties). Coordinate with the Center for Plant Conservation Institutions' guidelines for augmentation procedures.

**4.8 Conduct Essential Life History Studies:** Investigate pollinating species of Texas trailing phlox and promote pollinator conservation. Conduct seed biology (seed maturation, fecundity, seedbank) and seedling studies (longevity of plant, mortality). Encourage collaboration, ingenuity, financial support, and technical support between partners and the USFWS to conduct these studies.

**REFERENCES** - Literature cited for this 5-Year Review is posted with the draft Texas Trailing Phlox Species Status Assessment at <https://ecos.fws.gov/ServCat/DownloadFile/155770>.

**U.S. FISH AND WILDLIFE SERVICE  
5-YEAR REVIEW of *Phlox nivalis* ssp. *texensis***

**Current Classification:** Endangered, without critical habitat

**Recommendation resulting from the 5-Year Review:**

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change is needed

**Review Conducted By:** Amber Miller, Fish and Wildlife Biologist, Texas Coastal Ecological Services Field Office

**FIELD OFFICE APPROVAL:**

**Lead Field Supervisor, Fish and Wildlife Service**

Approve  Date 8-30-18  
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