1.0 INTRODUCTION

This preliminary resource assessment describes the current status and habitat requirements of plant species of concern that occur in the Southern Edwards Plateau Habitat Conservation Plan (SEP-HCP) Plan Area. The purpose of this assessment is to help provide the basic background information for the Habitat Conservation Plan and associated Environmental Impact Statement.

This list of plant species of concern was generated from the species tracked on the Texas Parks and Wildlife Department (TPWD) annotated county lists of rare species for the counties of Bandera, Bexar, Blanco, Comal, Kendall, Kerr, and Medina of the SEP-HCP Plan Area on December 30, 2009. These county lists identify vertebrates, invertebrates, and vascular plants of conservation concern within the state of Texas. Information provided by the TPWD county rare species lists includes federal and state regulatory status, county occurrence, and brief life history and habitat descriptions.

Resources assessed for further information regarding species descriptions, regulatory status, and habitat descriptions for the plant species of concern included U. S. Fish and Wildlife Service (USFWS) Federal Register publications and web-based species databases, TPWD wildlife fact sheets and books, journal articles, natural history books, and NatureServe’s Online Encyclopedia of Life. NatureServe assesses the conservation status, taxonomy, distribution, and life history information of species and ecosystems throughout North America by utilizing databases maintained by natural heritage program scientists and other collaborators. They use this information to assign global, national, and state conservation status ranks to each species it tracks (see www.natureserve.org for more information).

Table 1 includes the regulatory status, occurrence, and habitat characteristics for plant species of concern within the SEP-HCP Plan Area (TPWD 2010).
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Federal Regulatory Status</th>
<th>State Regulatory Status</th>
<th>Counties of Potential Occurrence</th>
<th>Habitat Characteristics within the Plan Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elmendorf's onion</td>
<td>Allium elmendorfii</td>
<td></td>
<td>Bexar</td>
<td></td>
<td>Texas endemic; grassland openings in oak woodlands on deep, loose, well-drained sands; in Coastal Bend, on Pleistocene barrier island ridges and Holocene Sand Sheet that support live oak woodlands; to the north it occurs in post oak-black hickory-live oak woodlands over Queen City and similar Eocene formations; one anomalous specimen found on Llano Uplift in wet pockets of granitic loam; flowering March-April, May</td>
</tr>
<tr>
<td>Hill Country wild-mercury</td>
<td>Argythamnia aphoroides</td>
<td></td>
<td>Bandera</td>
<td>Bexar, Blanco, Comal, Kendall, Kerr</td>
<td>Texas endemic; mostly in bluestem-grama grasslands associated with plateau live oak woodlands on shallow to moderately deep clays and clay loams over limestone on rolling uplands, also in partial shade of oak-juniper woodlands in gravelly soils on rocky limestone slopes; flowering April-May with fruit persisting until midsummer</td>
</tr>
<tr>
<td>basin bellflower</td>
<td>Campanula reverchonii</td>
<td></td>
<td>Kendall</td>
<td></td>
<td>Texas endemic; among scattered vegetation on loose gravel, gravelly sand, and rock outcrops on open slopes with exposures of igneous and metamorphic rocks; may also occur on sandbars and other alluvial deposits along major rivers; flowering May-July</td>
</tr>
<tr>
<td>Comal snakewood</td>
<td>Colubrina stricta</td>
<td></td>
<td>Comal</td>
<td></td>
<td>in El Paso County, found in a patch of thorny shrubs in colluvial deposits and sandy soils at the base of an igneous rock outcrop; the historic Comal County record does not describe the habitat; in Mexico, found in shrublands on calcareous, gravelly, clay soils with woody associates; flowering late spring or early summer</td>
</tr>
<tr>
<td>Sabinal prairie-clover</td>
<td>Dalea sabinalis</td>
<td></td>
<td>Bandera</td>
<td></td>
<td>Texas endemic; information sketchy, but probably in rocky soils or on limestone outcrops in sparse grassland openings in juniper-oak woodlands; flowering April-May or May-June</td>
</tr>
<tr>
<td>Common Name</td>
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</tr>
<tr>
<td>sandhill woollywhite</td>
<td>Hymenopappus carrizoanus</td>
<td></td>
<td>Bexar</td>
<td>Texas endemic; disturbed or open areas in grasslands and post oak woodlands on deep sands derived from the Carrizo Sand and similar Eocene formations; flowering April-June</td>
<td></td>
</tr>
<tr>
<td>longstalk heimia</td>
<td>Nesaea longipes</td>
<td></td>
<td>Bandera</td>
<td>Kerr</td>
<td>moist or subirrigated alkaline or gypsiferous clayey soils along unshaded margins of cienegas and other wetlands; occurs sparingly on an alkaline, somewhat saline silt loam on terraces of spring-fed streams in grassland; also occurs common in moderately alkaline clay along perennial stream and in subirrigated wetlands atop poorly-defined spring system; also occurs in low, wetland area along highway right-of-way; flowering May-September</td>
</tr>
<tr>
<td>canyon mock-orange</td>
<td>Philadelphus ernestii</td>
<td></td>
<td>Blanco</td>
<td>Comal Kendall</td>
<td>Texas endemic; usually found growing from honeycomb pits on outcrops of Cretaceous limestone exposed as rimrock along mesic canyons, usually in the shade of mixed evergreen-deciduous canyon woodland; flowering April-June, fruit dehiscing September-October</td>
</tr>
<tr>
<td>Texas mock-orange</td>
<td>Philadelphus texensis</td>
<td></td>
<td>Bandera</td>
<td>Comal Kendall</td>
<td>limestone outcrops on cliffs and rocky slopes, on boulders in mesic canyon bottoms, usually in shade of mixed evergreen-deciduous slope woodland forest; flowering April-May, but readily recognizable throughout the growing season</td>
</tr>
<tr>
<td>Correll's false dragon-head</td>
<td>Physostegia correllii</td>
<td></td>
<td>Bexar</td>
<td></td>
<td>wet, silty clay loams on streambeds, in creek beds, irrigation channels and roadside drainage ditches; or seepy, mucky, sometimes gravelly soils along riverbanks or small islands in the Rio Grande; or underlain by Austin Chalk limestone along gently flowing spring-fed creek in central Texas; flowering May-September</td>
</tr>
<tr>
<td>Common Name</td>
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</tr>
<tr>
<td>Parks’ jointweed</td>
<td>Polygonella parksii</td>
<td></td>
<td></td>
<td>Bexar</td>
<td>Texas endemic; mostly found on deep, loose, whitish sand blowouts (unstable, deep, xeric, sandhill barrens) in Post Oak Savanna landscapes over the Carrizo and Sparta formations; also occurs in early successional grasslands, along right-of-ways, and on mechanically disturbed areas; flowering June-late October or September-November</td>
</tr>
<tr>
<td>canyon rattlesnake-root</td>
<td>Prenanthes carrii</td>
<td></td>
<td></td>
<td>Bandera Kerr</td>
<td>Texas endemic; rich humus soils over limestone in upper woodland canyon drainages, upper small spring fed drainages, typically near springs in deep soils around the springs and on limestone shelves, honeycomb rock (porous rock); flowering and fruiting late August-November</td>
</tr>
<tr>
<td>big red sage</td>
<td>Salvia pentstemonoides</td>
<td>P</td>
<td></td>
<td>Bandera Bexar Kendall Kerr</td>
<td>Texas endemic; moist to seasonally wet, steep limestone outcrops on seeps within canyons or along creek banks; occasionally on clayey to silty soils of creek banks and terraces, in partial shade to full sun; basal leaves conspicuous for much of the year; flowering June-October</td>
</tr>
<tr>
<td>Tobusch fishhook cactus</td>
<td>Sclerocactus brevihamatus ssp tobuschii</td>
<td>LE E</td>
<td></td>
<td>Bandera Kerr</td>
<td>Texas endemic; shallow, moderately alkaline, stony clay and clay loams over massive fractured limestone; usually on level to slightly sloping hilltops; occasionally on relatively level areas on steeper slopes, and in rocky floodplains; usually open areas within a mosaic of oak-juniper woodlands, occasionally in pine-oak woodlands, rarely in cenizo shrublands or little bluestem grasslands; sites are usually open with only herbaceous cover, although the cactus may be somewhat protected by rocks, grasses, or spikemosses; flowering late January–March (rarely early April)</td>
</tr>
</tbody>
</table>
### TABLE 1: REGULATORY STATUS, OCCURRENCE, AND HABITAT CHARACTERISTICS FOR PLANT SPECIES OF CONCERN WITHIN THE SEP-HCP PLAN AREA

<table>
<thead>
<tr>
<th>Common Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>bracted twistflower</td>
<td><em>Streptanthus bracteatus</em></td>
<td></td>
<td></td>
<td>Bandera, Bexar, Comal, Medina</td>
<td>Texas endemic; shallow, well-drained gravelly clays and clay loams over limestone in oak juniper woodlands and associated openings, on steep to moderate slopes and in canyon bottoms; several known soils include Tarrant, Brackett, or Speck over Edwards, Glen Rose, and Walnut geologic formations; populations fluctuate widely from year to year, depending on winter rainfall; flowering mid April-late May, fruit matures and foliage withers by early summer</td>
</tr>
<tr>
<td>granite spiderwort</td>
<td><em>Tradescantia pedicellata</em></td>
<td></td>
<td></td>
<td>Blanco</td>
<td>Texas endemic; mostly in fractures on outcrops of granite, gneiss, and similar igneous and metamorphic rocks, or in early successional grasslands or forb-dominated assemblages on well-drained, sandy to gravelly soils derived from same; flowering at least April-May</td>
</tr>
</tbody>
</table>

E - ENDANGERED; T - THREATENED; P - PETITIONED

2.0 SPECIES DESCRIPTIONS, REGULATORY STATUS, AND HABITATS

2.1 ELMENDORF’S ONION

Elmendorf’s onion (*Allium elmendorfii*) is an herbaceous perennial of the Lily family that flowers from March through April or May. This species is found in deep, loose, well-drained sands among the grassland openings in oak woodlands occurring over Eocene sands in south-central Texas, south to the Pleistocene and Holocene sands of the Coastal Bend, and the Llano Uplift (Poole et al. 2007).

This species is endemic to Texas and is known from only 11 counties (Atascosa, Bee, Bexar, Gonzales, Guadalupe, Kennedy, Llano, Nueces, Refugio, San Patricio, and Wilson). However, populations from Bexar, Kennedy, and Llano counties are historical (Poole et al. 2007). Elmendorf’s onion is not likely to occur widely across the SEP-HCP Plan Area, since only one historic occurrence of the species has been recorded in this area (from Bexar County) and deep sandy soils are limited to the far south and east edges of the Plan Area.

Elmendorf’s onion is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. NatureServe identifies the conservation status of the species as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).

Primary threats to this species include agriculture, grazing, and housing development, with the primary threat being grazing since the species occurs in pasture lands (NatureServe 2009).
2.2 HILL COUNTRY WILD-MERCURY

Hill Country wild-mercury (*Argythamnia aphoroides*) is a herbaceous perennial found growing mostly in bluestem-grama grasslands associated with plateau live oak woodlands on shallow to moderately deep clays and clay loams over limestone on rolling uplands (Poole et al. 2007). This species is endemic to the Edwards Plateau in central Texas. Hill Country wild-mercury has been known to occur within six of the seven counties within the SEP-HCP Plan Area (Bandera, Bexar, Blanco, Comal, Kendall, and Kerr counties) (TPWD 2010).

In 1980, the USFWS identified Hill Country wild-mercury as a candidate species for federal listing as threatened or endangered (48 FR 82480). Upon further review in 1993, the species was removed from the list of candidates (58 FR 51144). Currently, the species is not listed as threatened or endangered by the USFWS or the State of Texas, nor is the species currently a candidate for such listing. However, the USFWS informally identifies Hill Country wild-mercury as a species of concern (USFWS 2010a, 2009). NatureServe identifies the conservation status of the species as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).

Primary threats to this species include overgrazing and housing and recreation development (NatureServe 2009).

2.3 BASIN BELLFLOWER

Basin bellflower (*Campanula reverchonii*) is an herbaceous annual of the Bluebell family that produces light-blue, funnel-shaped flowers from May to July. Endemic to the Llano Uplift of Central Texas, this species occurs on loose gravel, gravelly sand, and rock outcrops on sparsely vegetated open slopes with exposures of igneous and metamorphic rocks. Outside of the Llano uplift, historic records for this species are known from Kendall and Travis counties that suggest that it may also occur along major rivers on other alluvial deposits or sand bars (Poole et al. 2007). Within the SEP-HCP Plan Area, this species is only known from an historic record in Kendall County.

Basin bellflower is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. This species was previously listed by the USFWS as a candidate species; however, after further review in the 1990’s, it was removed from the list of candidate species. NatureServe identifies the global conservation status of the species as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).

Primary threats to this species include granite mining and recreational activities, such as hiking and rock climbing (NatureServe 2009).

2.4 COMAL SNAKEWOOD

Comal snakewood (*Colubrina stricta*) is a small, alternate-leaved, shrub that ranges from 3 to 13 feet in height, with small greenish-yellow flowers producing black, shiny seeds. Within Texas, this species is known from only El Paso and Comal counties, of which the Comal County is a historic location. Populations of this species are also known from Coahuila and Nuevo Leon, Mexico. Within El Paso County, the Comal snakewood population is found over colluvial deposits and sandy soils at the base of an igneous rock outcrop within a patch of thorny shrubs. In Mexico, this species is found in
shrublands over calcareous, gravely, clay soils. The historic population within Comal County is the only record of Comal snakewood occurring within the SEP-HCP Plan Area, and the population has not been rediscovered within Comal County (Poole et al. 2007).

The USFWS previously identified Comal snakewood as a candidate for federal listing as threatened or endangered (48 FR 82480); however, upon further review in 1993, it was removed from the list of candidate species (58 FR 51144). Currently, Comal snakewood is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. Hand identified as a species of concern. Although, Comal snakewood is informally identified by the USFWS as a species of concern (USFWS 2010a, 2009). NatureServe identifies the state conservation status of the species as “critically imperiled” because of extreme rarity or because of some factors, such as very steep declines, making it especially vulnerable to extirpation from the jurisdiction (NatureServe 2009).

Little documentation is available regarding potential threats to this species. However, Comal snakewood may be threatened by brush control activities (NatureServe 2009).

2.5 SABINAL PRAIRIE-CLOVER

An herbaceous perennial of the Legume Family, the Sabinal prairie-clover (Dalea sabinalis) is a small forb with alternately arranged, yellowish-green, pinnately compound leaves with a terminal pink to rose-colored multi-flowered cylindrical spike. This species is thought to flower from April to May or May to July. It is assumed that the Sabinal prairie-clover occurs on sparse grassland openings within oak-juniper woodlands over rocky soils or limestone outcrops; however, no precise information is known about this species habitat requirements (Poole et al. 2007, NatureServe 2009).

Endemic to the Edwards Plateau, the Sabinal prairie-clover has not been observed since the 1950’s, and no extant populations are known (NatureServe 2009). Very few historical occurrences of this species are known, but the species has been recorded from from Bandera County and Val Verde County (NatureServe 2009). Poole et al. (2007) also describes this species as historically occurring in Uvalde County. The historic record from Bandera County is the only record within the SEP-HCP Plan Area.

The Sabinal prairie-clover was designated as a candidate species by the USFWS in the 1980’s (45 FR 82480 and 48 FR 53640), but was removed from the list in 1993 (58 FR 51144). Currently, Sabinal prairie-clover is informally identified by the USFWS as a species of concern (USFWS 2010a). However, this species is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. NatureServe identifies the global conservation status of the species as "possibly extinct" since it is known from only historical occurrences, but there is still some hope of rediscovery. Although there is evidence that the species may be extinct or may be eliminated throughout its range, there is not enough information available to state this with certainty (NatureServe 2009).

NatureServe (2009) identifies the primary threats to this species as overgrazing, introduction of exotic animals, and resort development.
2.6 SANDHILL WOOLLYWHITE

Sandhill woollywhite (**Hymenopappus carrizoanus**), also known as Carrizo Sands woollywhite, is an erect, herbaceous biennial of the Sunflower family. Flowering from late spring to early summer, this species has numerous small white flowers and grows up to approximately 5 feet tall (Poole et al. 2007, NatureServe 2009).

A Texas endemic, the sandhill woollywhite only occurs in disturbed or open areas in grasslands and post oak woodlands within the narrow band of the Carrizo Sands and similar Eocene. This species is found over sands within sand post oak-bluejack oak woodlands that support a variety of xeric species and foliose lichens (Poole et al. 2007, NatureServe 2009). Within the SEP-HCP Plan Area, this species has been documented in Bexar and Medina counties.

Sandhill woollywhite is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. NatureServe identifies the global conservation status of the species as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).

Urban sprawl from San Antonio is the primary threat to this species across much of its range (Poole et al. 2007).

2.7 LONGSTALK HEIMIA

Longstalk heimia (**Nesaea longipes**) is also known as gray stalkflower or stalkflower heimia and has conspicuous, long-stalked magenta flowers that grow from numerous prostrate or semi-scandent stems. An herbaceous perennial of the Loosestrife Family, this species is restricted to wet areas, including desert springs-runs of the Chihuahuan Desert region and seepage slopes and perennial streams on the Edwards Plateau (Poole et al. 2007, NatureServe 2009).

Mostly endemic to the Chihuahuan Desert region of Texas and New Mexico, longstalk heimia is only known from a few widespread pockets of appropriate habitat within its range (NatureServe 2009). It is also known to occur on the Edwards Plateau of south-central Texas. Within the SEP-HCP Plan Area, longstalk heimia has been recorded in Bandera, Kerr, and Medina counties (Poole et al. 2007, NatureServe 2009). However, this species is thought to be possibly extirpated from Bandera County (NatureServe 2009).

Longstalk heimia is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. NatureServe identifies the global and state conservation status of the species as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).

Longstalk heimia requires desert spring-runs or moist to wet areas around spring outlets, seeps, and perennial streams. Activities that disrupt the spring-runs flow or diminish vegetation in the vicinity of springs are the primary threat to this species (NatureServe 2009).

2.8 CANYON MOCK-ORANGE

Canyon mock-orange (**Philadelphus ernestii**) is a deciduous shrub with loose bark and white showy flowers. The species grows in varying amounts of sunlight on honeycomb pits, rimrock, or other
outcrops of Cretaceous limestone along mesic canyons within juniper woodlands. Common woody vegetation associated with canyon mock-orange habitat includes shrubby boneset, elbowbush, shin oak, Lindheimer’s silk tassel, and Texas mulberry (McNeal 1989, Poole et al. 2007).

This species is endemic to the eastern portion of the Edwards Plateau where it is known from only 6 counties (Bandera, Blanco, Comal, Hays, Kendall, and Travis). Canyon mock-orange occurs within four of the seven counties within the SEP-HCP Plan (Poole et al, 2007, NatureServe 2009).

Canyon mock-orange was identified as a candidate species by the USFWS in the 1980’s (45 FR 82480 and 48 FR 53640). However, upon further review in 1993, it was removed from the list of candidate species (58 FR 51144). The USFWS currently considers canyon mock-orange as an informal species of concern (USFWS 2010a). However, this species is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. NatureServe identifies the conservation status of the species as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).

Habitat that supports the canyon mock-orange is heavily grazed by sheep, goats, deer, and exotic ungulates. This species is preferred by herbivores and is heavily browsed when accessible. Susceptible to browsing pressure, this species will produce a short plant with little reproductive success (Poole et al. 2007, NatureServe 2009). Primary threats to this species include grazing, residential development, and recreational development (NatureServe 2009).

2.9 TEXAS MOCK-ORANGE

Texas mock-orange (Philadelphus texensis) is a deciduous shrub with loose bark and solitary, but closely spaced, white flowers that blooms from April to May. This species is found mostly in the shade of mixed evergreen-deciduous slope woodland forest along limestone outcrops on cliffs and rocky slopes, and on boulders in mesic canyon bottoms (Poole et al. 2007, NatureServe 2009).

In Texas, Texas mock-orange occurs in the southern portion of the Edwards Plateau; however, a few disjunct populations are known from the limestone mountains of Coahuila and Durango, Mexico (Poole et al. 2007, NatureServe 2009). Within the SEP-HCP Plan Area, this species is known from Bandera, Comal, Kendall, and Medina counties, however, the Comal County record is historic.

Texas mock-orange is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. NatureServe identifies the global and state conservation status of the species as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).

Texas mock-orange, like canyon mock-orange, suffers from browsing pressure and habitat that supports this species is heavily grazed by sheep, goats, deer, and exotic ungulates. Grazing and browsing pressure is the primary threat to this species (NatureServe 2009, Poole et al. 2009).

2.10 CORRELL’S FALSE DRAGON-HEAD

Correll’s false dragon-head (Physostegia correllii) is an herbaceous, somewhat succulent and robust perennial with spikes of lavender flowers that have purple streaks. The plant blooms from late-June through late-September. This species is found in wet habitats associated with streamsides,
creekbeds, irrigation channels, and roadside ditches on silty clay loams (Poole et al. 2007, NatureServe 2009). Along riverbanks and small islands of the Rio Grande, this species occurs on seepy, mucky, and sometimes gravelly soils and has also been found at a site along a springfed creek in Travis County underlain by Austin Chalk (Poole et al. 2007).

Ranging from Northern Mexico, through Texas to Louisiana, Correll’s false dragon-head is a fairly widespread, but rare, wetland obligate species. In Texas, this species is known from Bexar, Galveston, Gillespie, Kenny, Montgomery, Travis, Val Verde, and Zapata counties. However, the records from Bexar and Montgomery counties are historic, and it has been extirpated from Gillespie County (Poole et al. 2007, NatureServe 2009).

Correll’s false dragon-head is informally identified as a species of concern by the USFWS (USFWS 2010a). However, this species is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. The species had been identified as a candidate for federal listing by the USFWS in the 1980’s (45 FR 82480 and 48 FR 53640). However, it was subsequently removed from the list of candidate species in 1993 (58 FR 51144). NatureServe identifies this species global conservation status and state conservation status for Texas as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).

Primarily known from habitats subject to disturbance and human use (e.g., roadsides, irrigation ditches, and creekbeds), Correll’s false dragon-head is highly vulnerable. Altogether, less than 15 occurrences of this species are known, and many historic populations have not been verified recently. Primary threats to this species involve loss or degradation of the wetland habitats that occur within the xeric region that the Correll’s false dragon-head is found (NatureServe 2009).

2.11 PARKS’ JOINTWEED

Parks’ jointweed (Polygonella parksii) is an herbaceous annual within the Knotweed or Buckwheat family that blooms from September to November. This species ranges in height from approximately 1 to 5 feet, with erect, almost leafless, slender stems that are green in youth and turn red with age. The plant also has grass-like leaves and small white flowers. Parks’ jointweed occupies post oak savanna landscapes on loose, deep, whitish sand blowouts (i.e., unstable, deep, xeric, sandhill barrens). This species is also found in early successional grasslands on mechanically disturbed areas and along rights-of-way (Poole et al. 2007, NatureServe 2009).

An endemic to the Post Oak Belt of Central Texas, Parks’ jointweed is known to occur predominantly over the Carrizo and Sparta geologic formations in eight Texas counties (Atascosa, Bexar, Burleson, Guadalupe, Leon, Milam, Robertson, and Wilson) (Poole et al. 2007, NatureServe 2009). Within the SEP-HCP Plan Area, Parks’ jointweed is only known to occur in Bexar County.

Parks’ jointweed is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. However, in the 1980’s it was identified by the USFWS as a candidate species (45 FR 82480 and 48 FR 53640); however, upon further review in 1993, it was removed from that list (58 FR 51144). NatureServe identifies the global and state conservation status of the species as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).
The primary threat to this species is habitat loss. Many of the soil types that occur within habitat for the Parks’ jointweed are being put into cultivation and irrigated (NatureServe 2009).

2.12 CANYON RATTLESNAKE-ROOT

Canyon rattlesnake-root (*Prenanthes carrii*) is an alternate-leaved, milky sapped, herbaceous perennial with a tuberous taproot. The plant has a flowering head that contains 9 to 15 flowers and blooms from late August to November. It is found in the upper portion of woodland canyon drainages on rich humus soils associated with Lacey oak, chinquapin oak, Texas red oak, or bigtooth maple. It also occurs in creekside seepage shelves in close association with American sycamore, buttonbush, southern maiden-hair fern, and sawgrass (Poole et al. 2007).

A Texas endemic, canyon rattlesnake root is only known to occur in the southern and southwestern areas of the Edwards Plateau, within Bandera, Gillespie, Kerr, and Real counties (Poole et al. 2007, NatureServe 2009). This species is known to occur within the SEP-HCP Plan Area in Bandera and Kerr counties.

Canyon rattlesnake-root is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. NatureServe identifies the global and state conservation status of the species as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).

No information was available regarding primary threats to this species (NatureServe 2009).

2.13 BIG RED SAGE

Big red sage (*Salvia pentstemonoides*), a member of the Mint Family, is a robust herbaceous perennial with erect, square stems and a tall flower spike that produces large showy wine-red flowers at regular intervals. Blooming from June to October, this species is found within canyons along moist to seasonally wet steep limestone outcrops or along creek banks. Occasionally it is found in clay or silt soils along rocky creekbeds, floodplains, and terraces in areas of partial shade to full sun (Poole et al. 2007, NatureServe 2009).

Endemic to the Edwards Plateau, big red sage was thought to be extinct until the late 1980s when a single large and several very small populations were found. However, in 1997, the majority of the largest population was killed in an early and long summer flood, leaving only a few hundred total individuals left in the wild. Historically, this species was known from Bandera, Bexar, Gillespie, Guadalupe, Kendall, Kerr, Real, and Wilson counties; with Bexar, Gillespie, Guadalupe, Kerr, and Wilson currently identified as areas of historical occurrence (Poole et al. 2007, NatureServe 2009). Within the SEP-HCP Plan Area, big red sage is identified as occurring in Bandera, Bexar, Kendall, and Kerr counties, although Bexar and Kerr counties are historical occurrences (TWPD 2010).

The species was identified as a candidate for federal listing by the USFWS in the 1980’s (45 FR 82480 and 48 FR 53640), but upon further review in 1993, it was removed from that list (58 FR 51144). Big red sage is informally considered a species of concern by the USFWS (USFWS 2010a). In 2007, a petition to list 475 species in the southwestern United States was submitted to the USFWS. On December 16, 2009, the USFWS issued their 90-day finding on 192 of the 475 petitioned species, identifying big red sage as a species for which information in the petition and otherwise readily available
is substantial and indicates that listing as threatened or endangered may be warranted (74 FR 66866). However, this species is not currently listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. NatureServe identifies the global and state conservation status of the species as “critically imperiled” and at very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors (NatureServe 2009).

Subject to weather conditions, particularly rain, the number of individuals of big red sage varies annually. It was estimated that population totals were probably less than a few hundred as of 1997. The small population size and restricted geographical distribution of the big red sage is the foreseeable threat with the greatest impact (NatureServe 2009). Other significant threats to the big red sage include the present threatened destruction, modification, or curtailment of its habitat or range resulting from aquifer drawdown; overutilization for commercial, recreational, scientific, or educational purposes as a result of commercial uses, and/or other natural or manmade factors affecting its continued existence resulting from flooding (74 FR 66866).

2.14 TOBUSCH FISHHOOK CACTUS

The Tobusch fishhook cactus (*Sclerocactus brevihamatus* subsp. *tobuschii*), also known as the shorthook fishhook cactus, is a small, round perennial cactus (usually 2 to 3 inches tall) with light yellow spines with red tips. The cactus has a short taproot and/or many fine fibrous roots, and yellow to cream flowers that bloom during February through March (Poole et al. 2007, TPWD 2009). This species occurs in moderately alkaline, shallow, stony, clay, clay loams, and gravelly soils among blocks of exposed Cretaceous limestone on relatively open, level to slightly sloping hilltops, relatively level areas on steeper slopes, or rocky floodplains within oak-juniper woodlands,. It is also occasionally found in pine-oak woodlands, and rarely within cenizo shrublands or little bluestem grasslands (Poole et al. 2007, USFWS 2010b).

An endemic to the Edwards Plateau of Texas, the Tobusch fishhook cactus is known to occur in Bandera, Edwards, Kerr, Kimble, Kinney, Real, Uvalde, and Val Verde counties (Poole et al. 2007). The Tobusch fishhook cactus is known to occur in two of the seven counties of the SEP-HCP Plan Area (i.e., Bandera and Kerr counties).

The Tobusch fishhook cactus was federally listed as an endangered species, without a critical habitat designation, on November 7, 1979 (44 FR 64736). In 1983, this species was also listed as endangered by the State of Texas. NatureServe identifies the global conservation status of the species as “vulnerable” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extinction or elimination (NatureServe 2009). The USFWS issued a recovery plan for the Tobusch fishhook cactus in 1987.

Seven major objectives for recovery were identified in the recovery plan for the species, but only one downlisting criterion was given for the first objective and delisting criteria were not established. For the Tobusch fishhook cactus to be downlisted to threatened status, four safe sites containing at least 3,000 plants each would need to be established (USFWS 1987). The seven major objectives for recovery of the Tobusch fishhook cactus are:

- **Objective 1. Remove immediate human threats by protecting known populations for collecting and habitat destruction.**
Objective 2. Establish a permanent living collection at a botanical garden or university.

Objective 3. Minimize long-range threats by development of biological information relevant to recovery.

Objective 4. Establish a long-term (five year) survey program to more precisely determine the true distribution of the species.

Objective 5. Develop a comprehensive trade management plan for all cacti.

Objective 6. Develop a program to provide propagated plants and seeds to the commercial market.

Objective 7. Develop public awareness, appreciation, and support for the preservation of the species.

The USFWS completed a 5-year review of this species in January 2010 (USFWS 2010b). The review found that the Tobusch fishhook cactus has been documented on 10 protected sites; however, none of the populations come close to containing 3,000 individuals, and have fluctuated greatly in size. Currently, this species does not have an established permanent living collection at a botanical garden or university that has been verified. To date, nine research projects, including a master's thesis and a doctoral dissertation, have been published that contribute to the knowledge of the biology, life history, and management of the Tobusch fishhook cactus. Annual monitoring surveys of known populations have been conducted by TPWD and other organizations since 1991, which track the life histories of several thousand individuals of the species. A comprehensive trade management plan for all species of cacti has yet to be developed, although a project in 1991 did investigate the extent of legal trade in a number of rare, threatened, and endangered cactus species. Results of this project identified six occurrences of legal trade in seeds of the Tobusch fishhook cactus. However, the species has been difficult to maintain in cultivation, and it appears to be of little commercial interest. A pamphlet containing photographs and information on the Tobusch fishhook cactus was produced by TPWD and the Natural Resource Conservation Service (NRCS) to be distributed to private landowners in the counties where this species is known to occur (USFWS 2010b).

Some of the major recommendations of 5-year status review for the Tobusch fishhook cactus include downlisting the Tobusch fishhook cactus to threatened status, assigning a new recovery priority number of 9C (meaning that the degree of threat is moderate, it has a high potential for recovery, and there is a potential conflict with economic activity), revising the current recovery plan to include both downlisting and delisting criteria that address each recovery object in terms of threats to the species, and modifying the existing downlisting criterion (USFWS 2010b).

Primary threats to this species include insect parasitism, land subdivision and residential development, land use changes, fire suppression, and extreme overgrazing. Overgrazing has caused loss of plant cover and subsequent soil erosion in much of this species’ habitat (NatureServe 2009).

2.15 BRAC TED TWISTFLOWER

The bracted twistflower (*Streptanthus bracteatus*), also known as the bracted jewelflower, is an herbaceous annual with showy purple flowers that bloom in April to late May. This species is associated with well-drained, gravelly clays and clay loams over limestone within canyon bottoms and openings on
slopes of oak-juniper woodlands. It is often found amid dense shrub growth where some protection from browsing animals is afforded (NatureServe 2009, Poole et al. 2007).

The bracted twistflower is endemic to the Edwards Plateau, and is known to occur in Bandera, Bexar, Comal, Medina, Real, Travis, and Uvalde counties, of which occurrence records from Bandera, Comal, and Real counties are historic (Poole et al, 2007, NatureServe 2009). Within the SEP-HCP Plan Area, the bracted twistflower has been reported to occur in Bandera, Bexar, Comal, and Medina counties; however, the Bandera and Comal county records are historic occurrences.

The bracted twistflower was identified as a candidate species by the USFWS in the 1980’s (45 FR 82480 and 48 FR 53640), but was removed from the list of candidate species in 1993 (58 FR 51144 51190). Bracted twistflower is currently informally considered a species of concern by the USFWS (USFWS 2010a). The bracted twistedflower is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. NatureServe identifies the conservation status of the species as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).

Primary threats to this species include housing development, browsing pressure, and flooding and farming in the vicinity of Austin, Texas. Many occurrences of this species are within rapidly developing urban areas, and housing developments have extirpated several sites. The introduction of domestic and exotic animals, as well as an overabundance of white-tail deer (particularly in urban areas), has drastically increased the browsing pressure on this species. Known riverine habitat in the Austin area is threatened by flooding and farming (Poole et al, 2007, NatureServe 2009).

2.16 GRANITE SPIDERWORT

The granite spiderwort (Tradescantia pedicellata), also known as Edwards Plateau spiderwort, is a short stemmed, erect perennial herb with dark green to light yellowish-green linear-lanceolate leaves and terminal clusters containing a few three-petaled flowers. There is some question about the taxonomic status of this species, with some believing this species to be a hybrid cross. Granite spiderwort is found growing in clumps in fractures on outcrops of granite, gneiss, and similar igneous and metamorphic rocks, early successional grasslands, or forb-dominated assemblages on well-drained, sandy to gravelly soils derived from granite (Poole et al. 2007, NatureServe 2009).

Endemic to igneous and metamorphic rocks of Central Texas, mostly in the Llano Uplift area, this species is only known to occur in Blanco, Burnet, Llano, and Mason counties (Poole et al. 2007, NatureServe 2009). Populations within Blanco County are the only known locations within the SEP-HCP Plan Area.

Granite spiderwort is not listed as threatened or endangered by the USFWS or the State of Texas; nor is the species currently a candidate for such listing. NatureServe identifies the global conservation status of the species as “imperiled” due to a very restricted range, very few populations, steep declines and/or other factors that make it vulnerable to extirpation (NatureServe 2009).

Primary threats to this species include browsing by livestock, granite quarrying, and recreational development (NatureServe 2009).
3.0 SIGNATURES

This report was prepared by professional wildlife biologists at the consulting firm of Loomis Partners, Inc. in conformance with the methods and limitations described herein.

PREPARED BY:                                                                                      APPROVED BY:

SIGNATURE                                                                                      SIGNATURE

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PRINTED NAME                                                                                     PRINTED NAME

DATE                                                                                             DATE

4.0 REFERENCES


