

# Interim Core Map Documentation for Slender rush-pea

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**Draft Interim Core Map Developer:** Compliance Services International (CSI)

## Species Summary

The slender rush-pea (*Hoffmannseggia tenella*; Entity ID 739) is a dicotyledonous endangered plant found in Texas. The U.S. Fish and Wildlife Service (FWS) has not assigned designated critical habitat for the slender rush-pea. This species occurs in barren openings or patches of native remnants of shortgrass prairie. The species prefers soils of the Victoria Association, which are highly desirable for farming; however, the species does not inhabit agricultural fields. Additional habitat information is provided in **Appendix 1**.

## EPA Review Notes

The developers created this core map using the U.S. Environmental Protection Agency's (EPA) process available at: <https://www.epa.gov/endangered-species/process-epa-uses-develop-core-maps-pesticide-use-limitation-areas>. EPA reviewed the draft interim map and documentation and evaluated if: (1) the map and documentation are consistent with EPA's process; (2) areas included or excluded from the interim core map are consistent with the biology, habitat, and/or recovery needs of the species; (3) data sources are documented and appropriate; and (4) the GIS data and mapping process are consistent with the stated intention of the developer. EPA agrees that this map is a reasonable depiction of core areas for this species and was consistent with the agency's mapping process.

This map is consistent with an 'average' level of best professional judgment. The developer used known locations and landcover modifiers to develop the core map. More information about the best professional judgement classification system and its definitions can be found in the core map process document (EPA 2024). The core map developed for the slender rush-pea is considered interim. This core map can be used to develop pesticide use limitation areas (PULAs). This core map incorporates information developed by FWS and made available to the public; however, the core map has not been formally reviewed by FWS. This interim core map may be revised in the future to incorporate expert feedback from FWS.

## Description of Core Map

The core map for the slender rush-pea is based on biological information, specifically known occurrences that included only identified areas of extant population sites. Some of these were buffered by 300 m to account for uncertainty in geospatial data processing. The extant population sites were obtained from a map provided in the most recent Recovery Plan for the species (FWS 2018). Other available known location information from the Global Biodiversity Information Facility (GBIF), the iNaturalist database, and NatureServe Explorer were not used for core map

development in favor of FWS's more specific and precise dataset.

The core map developed in this document for the slender rush-pea spans 5,427 acres (Figure 1). A summary of core map acreage by National Landcover Database (NLCD) land use type is provided in Table 1.



Figure 1. Interim core map for the slender rush-pea.

NLCD_Land_Cover_Class	Acres
Shrub/Scrub	2,379
Barren Land	1,252
Emergent Herbaceous Wetlands	760
Woody Wetlands	173
Evergreen Forest	171
Mixed Forest	151
Developed, Open Space	104
Herbaceous	100
Hay/Pasture	99
Open Water	68
Deciduous Forest	58
Developed, Low Intensity	53
Developed, Medium Intensity	26
Cultivated Crops	15
Developed, High Intensity	7

*Table 1. Acres by National Land Cover Database (NLCD) class within the core map of the Slender rush-pea. Total core map area (based on NLCD pixel count): 5,419 acres<sup>1</sup>.*

## Evaluation of Known Location Information

There were four evaluated datasets with known location information:

- Descriptions of locations provided by FWS;
- Occurrence locations in iNaturalist;
- Occurrence locations in Global Biodiversity Information Facility (GBIF); and
- Occurrence locations in NatureServe.

Compliance Services International evaluated these four datasets before developing the core map. Overall, there were seven research-grade observations found in iNaturalist<sup>2</sup>. The GBIF dataset comprised just 15 georeferenced observations. Both datasets were useful as validation against other datasets, but did not otherwise contribute to the core map development process.

FWS location information includes extant location information that positively identifies areas of species presence, which can be brought into a Geographical Information System (GIS) and

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<sup>1</sup> This acreage is slightly different from the core map acreage (5,427) due to the pixelation of NLCD land cover. The core map is not developed from raster data.

<sup>2</sup> According to iNaturalist, an observation is designated as “research grade” if it 1) is verifiable with date, coordinates, photos/sounds, and not captive; 2) achieves community agreement defined as “more than 2/3 of identifiers needs to agree on the species level ID or lower;” and 3) “must pass a data quality assessment, which includes checks for accurate date and location, evidence of a wild organism, and clear evidence of the organism itself”

(<https://help.inaturalist.org/en/support/solutions/articles/151000169936-what-is-the-data-quality-assessment-and-how-do-observations-qualify-to-become-research-grade->).

contribute to the core map development process. These locations are consistent with species range and represent a more refined area that is appropriate for use in core map development.

NatureServe public element occurrence (EO) data were also evaluated and are considered by CSI to be as robust as the iNaturalist and GBIF datasets for this species, but not as precise as the locations identified in the Recovery Plan (FWS 2018). These data appear at a coarser resolution than could be obtained directly from FWS.

## Approach Used to Create Core Map

The core map was developed using the process developed by EPA for developing core maps for species listed by the FWS and their designated critical habitat<sup>2</sup> (referred to as “the process”). This core map was developed by CSI using the four steps described in the process document:

1. Compile available information for a species;
2. Identify core map type from among the following defined types: Designated Critical Habitat, Range, and Biological Information. From EPA, summaries of each core map type are provided below (EPA 2024).
3. Develop the core map for the species; and
4. Document the core map.

For step 1, CSI compiled available information for the slender rush-pea from FWS, as well as observation information available from various publicly available sources including iNaturalist, GBIF, and NatureServe. The information compiled for the slender rush-pea is included in **Appendix 1**. Influential information that impacted the development of the core map includes a description of known locations in the most recent 5-year FWS review.

For step 2, CSI used the compiled information including the species range, known locations, and habitat location information to determine the core map type. Compliance Services International compared the known location data to the range and found that known locations from larger databases (iNaturalist, GBIF, and NatureServe) were too limited in extent compared to the extant population sites identified by FWS to be used as more than validation in core map development. By contrast, known location information from FWS—specifically extant population sites—were consistent with range and presented an opportunity for use in this effort. The uncertainty in accuracy of the spatial analysis process used informed the buffer distance (300 m) applied to convert point or line location data into polygonal area. The slender rush-pea was judged by CSI to be “off-field.” When weighing that information together, CSI selected the biological information core map type, limiting the core map to known occurrences. Compliance Services International used a combination of range, known observation/occurrence location data, and EPA’s Cultivated areas > 25 acres layer to derive this core map.

For step 3, CSI used the best-available data sources to generate the core map. Data sources are discussed in the EPA’s core map process document. For this interim core map, CSI followed EPA’s decision framework to arrive at a core map type of biological information (based on known occurrences). Designated critical habitat was quickly eliminated as a core map type because the slender rush-pea does not have a critical habitat. The range core map type was not used because

it contains areas where the species does not currently reside based on known occurrences. CSI judged that there were known occurrence/location data that would better represent the current distribution of extant populations of the species and used these data to refine the extent of the core map to an area smaller than the species range. That extent was established using extant population location sites across the species range. The National Wetlands Inventory (NWI) and National Conservation Easement Database (NCED) datasets were queried for areas relevant to the slender rush-pea within its range to form the basis of core map areas within the core map extent (which is different from its range). Finally, cultivated lands were removed from this area; this did not remove a substantial fraction of area because the habitat-based areas definitionally exclude cultivated land. **Appendix 2** provides more details on the GIS analysis and data used to generate the core map.

## Discussion of Approaches and Data that were Considered but Not Included in Core Map

### NLCD, LANDFIRE, and other land cover datasets

Typically, it would be reasonable to refine a core map for a species with a large and/or unrefined range based on descriptions of its habitat, which can be mapped to land cover datasets such as NLCD, LANDFIRE, and others. For the slender rush-pea, the core map locations were precise enough that any additional refinement from those datasets risked decreasing, rather than increasing, confidence in the overall extent of the species. In CSI's opinion, the accuracy of delineating occupied areas, which consist mainly of parks, cemeteries, and other easily identifiable land tracts for this species, provides sufficient refinement for the core map and precludes need to further refine with land cover.

## Appendix 1. Information compiled for the slender rush-pea

### 1. Recent FWS documents

- 5-Year Review (2022) [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/3810.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/3810.pdf)
- 5-Year Review (2008) [https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public\\_docs/species\\_nonpublish/1246.pdf](https://ecosphere-documents-production-public.s3.amazonaws.com/sams/public_docs/species_nonpublish/1246.pdf)
- Recovery Plan (2018) [https://ecos.fws.gov/docs/recovery\\_plan/Texas%20Coastal%20Bend%20Shortgrass%20Prairie%20Multi-Species%20Recovery%20Plan\\_August%202018\\_2.pdf](https://ecos.fws.gov/docs/recovery_plan/Texas%20Coastal%20Bend%20Shortgrass%20Prairie%20Multi-Species%20Recovery%20Plan_August%202018_2.pdf)

### 2. Background information

- Status: Federally listed as endangered in 1985.
- Resiliency, redundancy, and representation (the 3Rs)
  - The 3 Rs were not specifically described in the species recovery plan or most recent 5-year review for this species and there is no species status assessment (FWS 2022).

- Habitat, Life History, and Ecology
  - Habitat: “Vegetative Community: All rush-pea sites occur in barren openings or patches of native remnants of shortgrass prairie and are associated with both short and mid-grass species (Table 2). Additional native shortgrass species associated with rush-pea include Texas grama, curly-mesquite, and Texas wintergrass (Poole et al. 2007). Although rush-pea and ambrosia share similar prairie vegetation associations of the Coastal Bend (Table 2), rush-pea has specific associates (Table 7). The shortgrass prairie site with the most intact native vegetation is the St. James Cemetery, where rush-pea co-occurs with ambrosia” (FWS 2018).
  - “Soils: Primary soils of rush-pea habitat are of the Victoria Association, occupying more than 60 percent of Nueces County (Franki et al. 1965). A similar proportion of Victoria soils are believed to underlie Kleberg County as well. Victoria soils are highly desirable for farming, producing some of the highest crop yields for corn and sorghum (Franki et al. 1965). Nevertheless, the known extant and historic sites of slender rush-pea all occur near streams, where erosion may have exposed narrow bands of subsoil or different soil types that, due to their small size, are not indicated on soil maps” (FWS, 2018).
  - Pollinators: “Effective pollinators of rush-pea have not been observed in the field or in a greenhouse setting, however a generalist floral visitor was observed on rush-pea once at the St. James Cemetery (Dr. Patrock, pers. comm. 2014). Rush-pea is thought to self-pollinate as the rate of fruit set is high despite the lack of observed floral visitors (Pressly 2002). Flowers are perfect monoclinal, containing both male and female reproductive parts. Pressly (2002) demonstrated that flowers that were isolated from insects with micro-mesh cloth bags prior to anthesis still produced mature fruits with viable seeds, thereby providing additional evidence of the species’ capability to self-fertilize” (FWS 2018).
  
- Taxonomy
  - “Slender rush-pea is in the class Magnoliopsida, order Fabales, and family Fabaceae (Poole 1988). There are currently no other scientific or common names for this species (Poole 1988). Although the final rule (FR) listed SRP as belonging to the pea family, Fabaceae, it was later listed under the family Leguminosae. These two family names are used interchangeably. Family Fabaceae is the more widely accepted classification for legumes like the SRP. In addition, the International Union for Conservation of Nature and Natural Resources (IUCN) clarified the correct spelling of the genus as *Hoffmannseggia*, not *Hoffmanseggia*” (FWS 2008).
  
- Relevant Potential Pesticide Use Sites
  - “A tailored herbicide application has shown to be suitable to control select invasive grasses in some Texas prairie habitats (Simmons et al. 2007). McCloughan et al. (2017) investigated four control treatments on invasive grasses and the implications for rush-pea management. The four treatments included: prescribed burn; weed-eating to remove above-ground competing vegetation; herbicide to

remove above- and below-ground competition; and, a control (no treatment). Results of the study show that rush-pea appears to be a resilient species with high survival regardless of treatment; plastic in morphological expression; and, able to adapt to changing environmental conditions” (FWS 2018).

- “There is also ongoing, significant habitat degradation from encroachment as a result of nonnative, invasive pasture grasses; some localized disturbance from management techniques (mowing) and road construction, brush incursion, fire cessation; and, minimal damage from herbicide drift incidents onto highway rights-of-way (ROW)” (FWS 2018),
- Relevant Recovery Criteria and Actions
  - Recovery Plan (2018) – Downlisting Criteria (According to the recovery plan, slender rush-pea will be considered for downlisting when the following conditions are achieved):
    - Downlisting Criteria 1: To downlist rush-pea, 15 populations should have an estimated 1,500 mature individual plants per population. Downlisting may be possible if each of these populations is stable or increasing over the next 35 years. The extant populations (eight total), as well as any that may be restored, augmented, or created, should be maintained with at least five natural populations located in the drainage systems (Petronila, Oso, Chilipitin Creek-San Fernando, Alazan Bay-Baffin Bay Creek basins) where the species is known to naturally occur to ensure genetic representation.
    - Downlisting Criteria 2: Each rush-pea site should be managed for and support high quality shortgrass prairie habitat. High quality shortgrass prairie habitat has these characteristics: 1) occurs in unplowed, relatively undisturbed soils; 2) has a high diversity and high vegetative cover of native grasses and forbs; 3) has a low vegetative cover of introduced grasses; and, 4) has a low vegetative cover of woody species (i.e. native brush). High-quality shortgrass prairie habitat should contain species commonly associated with rush-pea (Table 7). As is true with ambrosia, prolific and aggressive nonnative grasses should not constitute more than small patches within each high-quality shortgrass prairie site and invasive grasses and woody species should not be spreading throughout the site or inhibiting growth and reproduction of rush-pea. Each rush-pea site should be managed and monitored appropriately to ensure the maintenance and restoration of high-quality shortgrass prairie habitat conditions and to minimize and control threats over a period of 35 years.
  - Recovery Plan (2018) – Delisting Criteria (According to the recovery plan, the slender rush-pea will be considered for delisting when the following conditions are achieved):
    - Delisting Criteria 1: A minimum of 20 populations are necessary for delisting and should have at least 1,500 mature individual plants per population. Delisting may be possible if each of these populations remains stable or increasing over a period of 60 years. All existing populations, including those that have been restored, created, or reintroduced, are protected and a minimum of five natural populations are extant within each drainage system (Petronila, Oso, Chilipitin Creek-

- San Fernando, Alazan Bay-Baffin Bay Creek basins).
- Delisting Criteria 2: Populations will be protected long-term (protection in perpetuity being optimum) through fee title acquisition, conservation easements, or conservation or management agreements. Species-specific, FWS-approved annual monitoring and management plans will guide these efforts. Each population site should have high quality shortgrass prairie habitat (see rush-pea’s Downlisting Criteria 1 for a description).

### 3. Range

Range is geographically restricted to coastal shortgrass prairie habitat within Nueces and Kleberg counties. As of 2014, there are seven extant, or presumed extant, ambrosia populations from north-central Kleberg County through north-central Nueces County. One site occurs on state land, on both the north and southbound ROWs of US Hwy 77. The largest population occurs on Federal land at the Naval Air Station Kingsville (NASK) (FWS 2018). The ECOS range for the slender rush-pea is 1,445,344 acres.

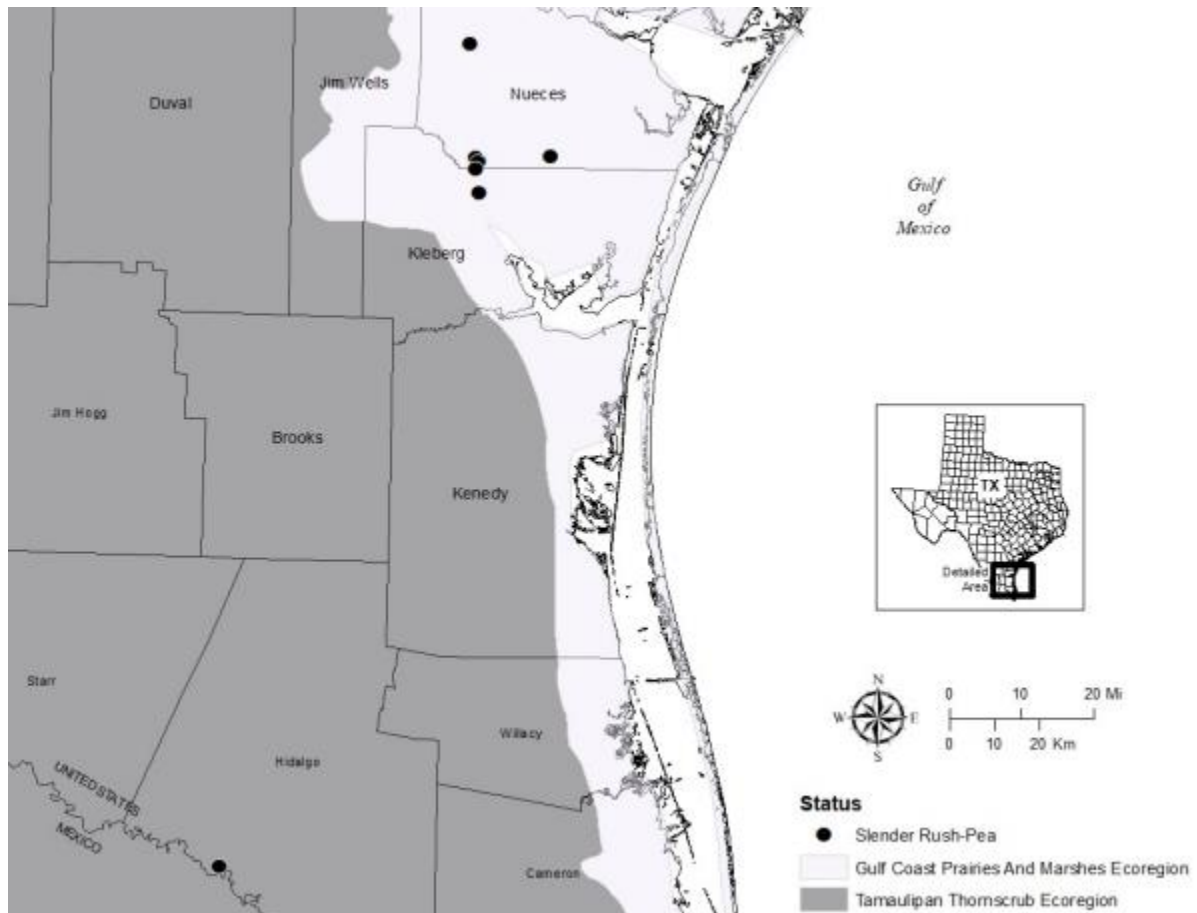


Figure 1. Map of extant populations of the slender rush-pea populations in Texas from Texas Natural Diversity Database (TXNDD) data. Note: The site in Hidalgo County is an introduced population and is not within the range of the species (FWS 2018).

### 4. Critical Habitat

The slender rush-pea does not have a designated critical habitat.

## 5. Known Locations

- FWS
  - Only eight slender rush-pea populations remain extant (FWS 2018). These observations are described relatively precisely in the “Site Description” field, although site feature types vary among points, lines, and polygons. However, each location is easily identifiable and therefore enables a precise rendering for use in core map development.

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P o p. #	E O #	First Observer; Observation	Last Observer; Observation	County	Site Description	Watershed/ Basin	Voucher	Population Size and Observations	Status	Ownership
1	1	Correll; 1964	FWS, TXDOT; 2017	Nueces	20 acres of a 1,014-acre tract at Petronila Creek and SH 70 bridge ROW.	Petronila Creek	Correll 28989 (1964, LL); Correll 38906 (1970, TEX, SMU); Ajilvsgi 8239 (1982, SMU), FSU, CCM	In 1986, site contained about 100 plants. This site has been visited several times since 1982, with the number of plants varying probably due to observer effort. As of 2004, plants were no longer visible at the site. In 2010, site was mowed and spot-sprayed with <i>Select</i> (Reilley pers. comm. 2010). In May 2011 and 2012, 194 and 303 seeds, respectively, were collected by PMC. Only 50-100 plants within 0.34 acres exist (FWS 2012). Site was visited in Oct. 2013 to collect seeds; however habitat has not recovered from vehicular damage (and drought?), therefore few plants and no seed were observed. TXDOT installed fencing and bollards to restrict vehicles from the side (Summer 2013). The Nueces County Sheriff's Department plans to patrol the area. Posted signs have also been planned for the site and will likely be put up in 2014. In March 2014, TXDOT walked the hillside where they found new plants in previously disturbed areas; plants had produced seed (C. Amy, pers. comm. 2014). In July 2016, site was very dry and overgrown with invasive grasses-plants were not doing well. A few plants could be found in spring 2017, but site is very overgrown with invasive grasses.	E	State
2	5	J. Poole; 1985	C. Amy, R. Cobb; 2017	Nueces	St. James Cemetery, Bishop	Chiltipin Creek-San Fernando Creek	Neff 88-11-4-1 (1988, TEX); Simpson 05-15-92-1 (1992, TEX)	Site has been visited frequently between 1985 and 2011. Population estimated >1,000 plants in 1992. The population is still large but declining due to Kleberg bluestem Experimental mowing and herbicide treatments have been completed. As of 2007, there were about 10,000 plants. About 100 seeds were collected in 2011 and are being maintained at the PMC. Site has been revisited frequently between 1985 and 2011. In 2012, Dr. Rideout-Hanzak began studies on the impacts of shading. Studies to look at rush-pea's response to fire were to begin in Dec. 2012, but have not been completed. Rush-pea and ambrosia are both being investigated by Dr. Overath at this site; however, no studies were anticipated for rush-pea in 2013. Site observed in fall 2015; both rush-pea and ambrosia were present and appeared to be thriving during visits	E	Private

P o p. #	E O #	First Observer; Observation	Last Observer; Observation	County	Site Description	Watershed/ Basin	Voucher	Population Size and Observations	Status	Ownership
								in 2016 and 2017. Appropriate moisture levels and mowing in the cemetery in late 2016 and what appears to be sometime in early spring 2017 produced good growing conditions for both species.		
3	5	L. Elliot, R. O'Brien; 1993	A. Hempel, A. Strong; 2016	Nueces and Kleberg	U.S. Hwy 77 ROW on Nueces-Kleberg County line, both east and west side	Chilpitin Creek-San Fernando Creek		Population had an estimated 5,709 plants in May 2008. Herbicide spray incident occurred in September 2008 but plants were stable. Seeds were collected in May 2008. A bulldozing incident in ROW occurred in September 2009 and gravel was dumped on plants in April 2011. Preventing Extinction grant funded the completion of a rush-pea Monitoring Plan in Nov. 2012. The plan will allow for the assessment of current population trends, will help to determine if management is beneficial, and verify unconfirmed and identify new populations. Population was monitored according to the plan in 2013 and 2016.		
4		S. Maher; 2008	2016	Nueces	Private home near Bishop and cemetery; across the creek from St James Cemetery.	Chilpitin Creek-San Fernando Creek		First identified in 2008 with 50-100 plants. A total of 1,197 seeds were collected on May 13, 2010, and were stored at PMC. Population is stable and is within remnant shortgrass habitat. Landowner was known in 2013, but the property was sold. We no longer have access to the site therefore must request permission but plants still there as of 2016. *This population is not the vacant lot discovered in 1976.*	E-UV	Private
5		A. Hempel; 2010	R. Cobb, C. Amy; 2017	Nueces	Bishop City Park; street side and water side of the sidewalk	Chilpitin Creek-San Fernando Creek		A few plants were found in the cracks of the asphalt of a small walking path and on the water side of the path in buffalograss. The side suffers from Kleberg bluestem invasion. Seeds have been collected from this site (S. Maher, pers. comm. 2018). In December 2012, the site was overrun with grass but both rush-pea and ambrosia were present (R. Cobb, A. Miller). Plants were still alive in 2015, 2016 and 2017). Most plants have been found on the street side of the sidewalk but more recently, one plant was found on the waterside of the sidewalk. A couple of plants were found along walking path on the interior of the park (J. Singhurst).	E	City
6		A. Hempel; 2010	R. Cobb; 2016	Nueces	Sablatura County Park	Oso Creek		This location may be the historical record of rush-pea from 1913, but location info is too vague to determine if they are the same site or not. Hundreds of plants first observed on March 19, 2010. Seeds were collected in Feb. 2011 as well as later in that year; 42 seeds and over 1,0000 seeds, respectively. Seedlings were used for reintroduction pilot in 2011 at NABA, in Mission, TX. A visit in Oct. 2012 found the population severely drought stressed. The area had also been mowed very short. Site visits since 2012 have confirmed the continued existence of the rush-pea at the park.	E	County
7	7	W. Carr, L. Elliot; 1993	W. Carr, L. Elliott; 1993	Kleberg	KRTA-National Guard training area lease-both sides of	Alazan Bay-Baffin Bay		In 1993, two populations were located at San Fernando Creek, 3 populations at the KRTA, and one population at the Bordo Nuevo Windmill. Later in April 1993, several hundred plants with flowers and fruit were found along intermittent	E-Uv	Private

P o p. #	E O #	First Observer; Observation	Last Observer; Observation	County	Site Description	Watershed/ Basin	Voucher	Population Size and Observations	Status	Ownership
					intermittent creek, Bordo Nuevo Windmill, San Fernando Creek.			creek. In Mayb 1993, approximately 50 plants with fruit were seen across three locations. The KRTA is likely a metapopulation.		
8		C. Best, A. Hermpel ; 2011	M. Rice; 2015	Hidalgo	Introduced site at NABA-NBC, in Mission			<b>Introduced site.</b> Seedlings from Sablatura Park were collected in 2011 and planted in a shortgrass refugium on Oct. 27-28, 2011. In July 2012, NABA biologists mowed the site and reported that native grasses along with rush-pea were doing well. As part of the Monitoring Plan, C. Best (FWS) and J. Reilly (PMC) collected data in Jan. 2013. The NABA director reported that the plants were doing okay on site (R. Cobb, pers. comm. 2016).	E	Private

Table 2. Counties with extant occurrence of the slender rush-pea. Copied from Table 5 of the Recovery Plan (FWS 2018).

- iNaturalist: [https://www.inaturalist.org/observations?taxon\\_id=163817](https://www.inaturalist.org/observations?taxon_id=163817)
  - Nine verifiable observations, seven of which are research-grade with public coordinate data. These locations align well enough with species range and the known extant populations in the most recent recovery plan to corroborate those data; however, the precision of the observations limit their utility beyond comparison with other datasets for consistency.
- GBIF: <https://www.gbif.org/species/5347508>
  - GBIF includes 19 occurrence records; 15 of which are georeferenced. However, only 14 of these had usable coordinate data based on latitude/longitude precision (3+ decimal places) and relative recency (2010-present).
- NatureServe Explorer: <https://explorer.natureserve.org/>
  - NatureServe public EO information from NatureServe Explorer is consistent the iNaturalist and GBIF databases, and the extant population locations enumerated in the most recent Recovery Plan (FWS 2018). However, as with the iNaturalist and GBIF databases, the information was less precise than the extant location information.

## Appendix 2. GIS Data Review and Method to Develop Core Map

The core map for this species is based on biological information, which includes the habitat used by this species found within a spatial extent based on known observations. The core map identifies all areas within the extent (described below) matching its habitat description of “wetlands including sinkhole ponds, wet depressions, vernal pools... beaver flowages, and other riparian areas,” using professional judgment to match classes in the NWI dataset (FWS 2025). The NWI dataset is regarded as a high quality national-level dataset that is appropriate to identify aquatic habitat for plant species such as the slender rush-pea.

### 1. References and Software

- National Conservation Easement Database: <https://www.conservationeasement.us/>
- Esri. *Basemap*. <https://developers.arcgis.com/documentation/mapping-and-location-services/mapping/basemap-layers>.
- Google. *Google Maps*. Accessed April 29, 2025. <https://maps.google.com/>
- National Wetlands Inventory: <https://www.fws.gov/program/national-wetlands-inventory>.
- Software used: ArcGIS Pro version 3.2.
- EPA Modified Cultivated Layer: <https://cdn.arcgis.com/home/item.html?id=159e70ce4c284f5b972c687037f8a668>.
- FWS Species Range: <https://ecos.fws.gov/ecp/species/5298>.

### 2. Datasets Used in Core Map Development

#### 2.1. Range

The range for this species was last updated on January 27, 2018. A shapefile including species range for all listed species was downloaded from the FWS ECOS website on January 24, 2025. The shapefile was converted to a feature class stored in a file geodatabase and reprojected to WKID #4269 (“North America Albers Equal Area Conic”).

1. Using an ArcGIS Web Map the species was queried based on the ECOS listed “Entity ID” of 739 and exported as a feature class to a temporary file geodatabase as a standalone Entity ID-specific layer.
2. The area of the range was calculated automatically by loading it into the software (ArcGIS Pro version 3.2) and reading its area from the attribute table (“Shape\_Area”), then converting its units (square meters) into acres with a conversion rate of 0.000247105. The range totaled 1,445,344 acres.
3. This shapefile was added to an ArcGIS Pro map and compared against the available known locations described in the FWS Species Status Assessment (SSA), and the available occurrence information from the GBIF, iNaturalist, and NatureServe databases.

#### 2.2. FWS Recovery Plan (FWS 2018)

The most recent Recovery Plan for the slender rush-pea includes a map identifying extant populations of the slender rush-pea; these locations are also described in a table. The tabular descriptions enable more precise identification, even where polygons are not already present in existing datasets.

### **2.3. National Conservation Easement Database (NCED)**

The NCED is an initiative of the U.S. Endowment for Forestry and Communities, and comprises a database of conservation easement information from land trusts and public agencies throughout the United States (<https://www.conservationaleasement.us/about/>). The NCED was queried for two locations: Bishop City Park and Sablatura Park. In these instances, attribute data were used to identify locations for these populations. Further details on this process are given in Section 3 below.

### **2.4. National Wetlands Inventory (NWI)**

The NWI dataset was used to query for a waterway within the King Ranch Training Area location. The NWI is publicly available as state-level downloads, so the layer for Texas was used. Because the dataset was used to render already-identified water bodies (streams in this case), the dataset was not queried for specific water body types. Instead, selections were made and edited according to the procedure developed in Section 3 below.

### **2.5. EPA Cultivated Lands Layer**

EPA has developed and published its own cultivated layer for use in core map development as a potential refinement of extent. For the slender rush-pea, extent was refined by this layer using the Pairwise Erase tool to remove significant areas of agriculture because the species habitat is not consistent with cultivated land and is therefore considered by CSI to be “off-field.” This removed relatively little area but is considered a reasonable refinement for core map development for off-field species.

## **3. Creating the Core Map**

### **3.1. Creating Extent Polygons**

The slender rush-pea core map type is based on biological information (known occurrences), consisting of the range modified to include only the eight known extant populations within the range. The extent was established for each of the species’ known extant locations as described below. Two populations, the King Ranch Training Area and Population 1, were buffered to 300 meters<sup>3</sup>.

#### King Ranch Training Area

The extant population located at the King Ranch Training Area (KRTA) was developed based on this description from the species Recovery Plan: “KRTA – National Guard training area lease – both sides of intermittent creek, Bordo Nueveo Windmill, San Fernando Creek.”

1. Georeference an image of the KRTA area obtained from Wermund 1993. Use control

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<sup>3</sup> In the case of the King Ranch Training Area, this was done to capture all stream shore areas observed from an underlying imagery layer. Population 1 was buffered to the same distance to account for known uncertainty and maintaining consistency with the KRTA polygon.

- points to fit the map to identifiable features in the vicinity of the land parcel.
2. Create a new empty polygon feature named "KRTA." In an edit session, create a single feature by tracing vertices along the perimeter of the KRTA boundary, using the georeferenced image in the previous step as a guide.
  3. Import the National Wetlands Inventory layer for Texas. Use the Select by Location tool to select NWI features that intersect with the polygon created in the previous step. Export as a new layer ("NWI\_TX\_selKRTA").
  4. In an edit session, select features from the previous layer ("NWI\_TX\_selKRTA") that are not associated with the stream and delete these features. These deleted features are catalogued in Table 3.

OBJECT ID *	Shape *	ATTRIBUTE	WETLAND_TYPE	ACRES	NWI_ID	Shape_Length	Shape_Area
1	Polygon	PEM1A	Freshwater Emergent Wetland	3.08834	202409CSw{C5B7B798-1B66-4D49-AE57-222590D4A8543}_01	468.9516	12498.08
2	Polygon	PEM1A	Freshwater Emergent Wetland	1.76663	202409CSw{C2C7C1C5-621C-4E08-A7E3-8AD1963B9632F}_01	309.3351	7149.33
3	Polygon	PEM1A	Freshwater Emergent Wetland	1.10321	202409CSw{3B856985-22D6-4697-8178-37D387201C1AB}_01	299.6702	4464.546
4	Polygon	PEM1A	Freshwater Emergent Wetland	1.30409	202409CSw{4FCB5C35-A352-45E2-A48D-3D686B7C85162}_01	353.2356	5277.477
5	Polygon	PEM1A	Freshwater Emergent Wetland	1.29998	202409CSw{BAF47020-757F-4195-9E95-48D5B6F086264}_01	384.2884	5260.848
6	Polygon	PEM1A	Freshwater Emergent Wetland	0.76351	202409CSw{748C01AF-01B5-4ECE-98C5-408D21D3230A4}_01	293.8896	3089.836
7	Polygon	PEM1A	Freshwater Emergent Wetland	0.27958	202409CSw{693DC220-3BB4-49BA-A68C-8E292F78B35DD}_01	135.9536	1131.451
8	Polygon	PEM1C	Freshwater Emergent Wetland	1.8408	202409CSw{85061C2D-6FC2-49DB-AE69-F0C1EB264E67}_01	325.1991	7449.453
9	Polygon	PEM1C	Freshwater Emergent Wetland	0.38861	202409CSw{74A967CB-FAE2-4FAD-9721-B1500FA8C3E6}_01	168.0752	1572.66
10	Polygon	PEM1Ch	Freshwater Emergent Wetland	0.20964	202409CSw{E05BAEE8-5A05-4F06-B589-2D9D8D866FC7}_01	125.0656	848.3812
11	Polygon	PEM1Ch	Freshwater Emergent Wetland	0.46208	202409CSw{87B506C9-4A62-4602-9748-681FF6BFCAAD}_01	175.3366	1869.997
12	Polygon	PEM1Ch	Freshwater Emergent Wetland	0.21642	202409CSw{7F75745E-F7AE-4692-9514-E601E638BFD6}_01	116.3003	875.8291
13	Polygon	PEM1Cx	Freshwater Emergent Wetland	0.40435	202409CSw{85C95E5C-DE5B-4B51-9A8A-E775B724B4FD}_01	158.7838	1636.361
14	Polygon	PSS1A	Freshwater Forested/Shrub Wetland	0.31483	202409CSw{9A217851-C100-4050-A8E5-290D8F68F5C0A}_01	197.2065	1274.077
15	Polygon	PSS1A	Freshwater Forested/Shrub Wetland	0.40846	202409CSw{7B29E870-28FF-4725-9E3C-CCAB6A6E81ED}_01	230.262	1652.98
16	Polygon	PUBFh	Freshwater Pond	0.32704	202409CSw{5132B15E-6D1D-4DFD-8A71-588F56826EA2F}_01	147.0559	1323.505
17	Polygon	PUBFx	Freshwater Pond	0.59631	202409CSw{0D1D937B-2B32-488E-9804-9A7E4597E8A8}_01	186.3489	2413.182
18	Polygon	PUSC	Freshwater Pond	0.13502	202409CSw{1F8BAB4E-C137-4B64-AD15-6D74EE7075BE}_01	90.81703	546.4085
19	Polygon	PUSCx	Freshwater Pond	0.26585	202409CSw{375DDAFA-4172-478F-B5BF-2BC20A6A9B957}_01	161.261	1075.865

OBJECT ID *	Shape *	ATTRIBUTE	WETLAND_TYPE	ACRES	NWI_ID	Shape_Length	Shape_Area
20	Polygon	R4SBA	Riverine	0.671378	202409CSw{DB46F4A1-71CD-41CD-B759-527CE311F846}_01	947.6339	2716.974
21	Polygon	R4SBA	Riverine	1.241754	202409CSw{1DF72704-0EF3-4CAD-90EB-1906024D7D70}_01	1702.525	5025.193
22	Polygon	R4SBA	Riverine	0.186463	202409CSw{5383BFDA-82C9-49F4-966C-F33F43EF8362}_01	274.2504	754.5844
23	Polygon	R4SBA	Riverine	0.62712	202409CSw{AB8E1C85-4ECE-4C84-85C0-24CE6E563449}_01	876.1984	2537.867
24	Polygon	R4SBA	Riverine	0.311921	202409CSw{6962ABF2-247A-409B-A777-18362145D8897}_01	448.8849	1262.298
25	Polygon	R4SBA	Riverine	1.566837	202409CSw{9FB9CDFC-5403-4F3D-98C0-736DB24B48408}_01	2173.469	6340.775
26	Polygon	PEM1Cx	Freshwater Emergent Wetland	0.14625	202409CSw{5095859F-AA85-4919-BDD7-8E717E68F979}_01	95.74651	591.8506
27	Polygon	PUBFx	Freshwater Pond	0.809237	202409CSw{46ED1E7C-55CF-401A-A030-A54AA51COD13}_01	210.3178	3274.865
28	Polygon	R4SBA	Riverine	0.908772	202409CSw{D5BC9229-E1DF-469B-8DBB-B0B5350AF126}_01	1196.413	3677.676
29	Polygon	R4SBC	Riverine	1.752575	202409CSw{61786B88-7C32-47FE-9F25-519130F0D0A1D}_01	2392.697	7092.418
30	Polygon	R4SBCx	Riverine	2.371278	202409CSw{B16C349A-D0EE-4DFD-8C06-B120E3BCC946}_01	3296.651	9596.213
31	Polygon	R4SBA	Riverine	6.635777	202409CSw{F1CBA095-141D-446D-8E86-797F605208147}_01	8996.265	26854.02

Table 3. Deleted NWI features in creating a shape for the KRTA extant population (NWI 2023).

5. Create a new empty polygon feature named “KRTA\_mod.” In an edit session, create a single feature by creating vertices surrounding the intermittent stream features
6. Use the Pairwise Clip tool to clip the “NWI\_TX\_selKRTA” layer by the modified KRTA shape (“KRTA\_mod”) and save as a new layer (“NWI\_TX\_selKRTA\_pcKRTAmod”).
7. Use the Pairwise Buffer tool to buffer the previous layer by 300 m. This distance was examined against underlying imagery and judged by CSI to be appropriate to include any slender rush-pea populations lining the selected stream features. Choose the option to dissolve the output into a single feature, saved as a new layer “NWI\_TX\_selKRTA\_pcKRTAmod\_pb300m.”



Figure 2. Core map shape (blue) for the KRTA population.

### Bishop City Park

The extant population located at Bishop City Park was developed based on this description from the species Recovery Plan: “Bishop City Park; street side and water side of the sidewalk.” Compliance Services International judged that it would be appropriate to use the entire park for the core map.

1. Import the NCED database into a GIS. Use following SQL query to find the relevant feature(s): sitename LIKE '%Bishop City%' And state = 'TX'. A single feature was identified and validated against a map of the park in Google Maps.
2. Export the selected feature from the previous step as a new layer named “BishopCityPark.”

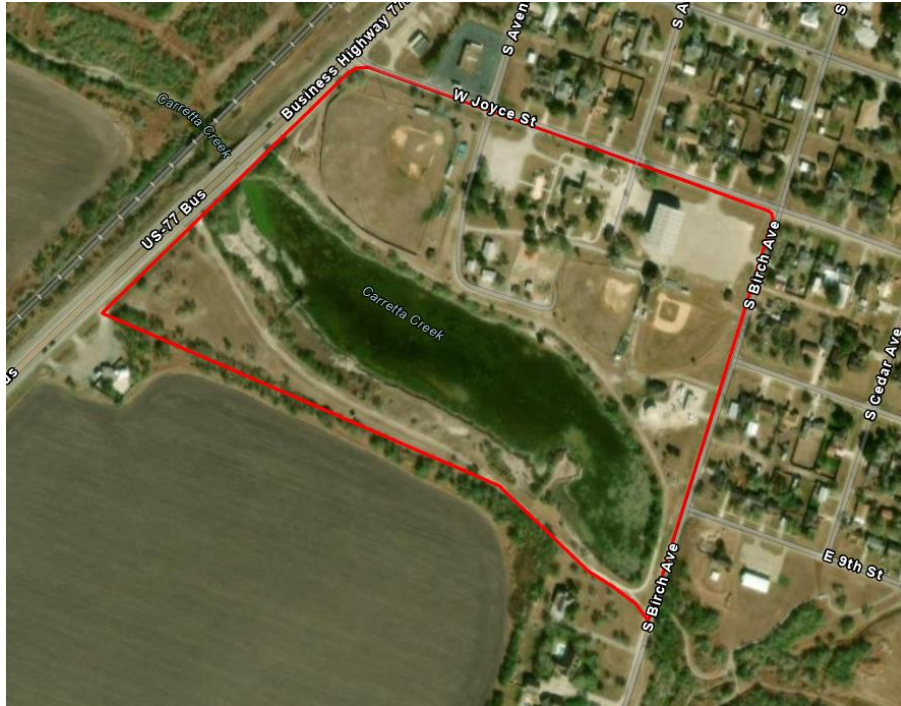


Figure 3. Core map shape (red outline) for Bishop City Park.

### Sablatura Park

1. Import the NCED database into a GIS. Use following SQL query to find the relevant feature(s): sitename LIKE '%Sablatura%' And state = 'TX'. A single feature was identified and validated against a map of the park in Google Maps.
2. Export the selected feature from the previous step as a new layer named "Sablatura."



Figure 4. Core map shape (red outline) for Sablatura Park.

### Population 1

The first listed extant population in Table 5 of the recovery plan has the following description: “20 acres of a 1,014-acre tract at Petronila Creek and SH 70 bridge ROW.” Compliance Services International could not confidently identify where the extant population would be found, so instead identified the intersection of the creek and highway and buffered to 300 m. For reference, a 20-acre circle would have a radius of about 160 m. This was judged to be sufficiently conservative in including the tract described and is consistent with the buffer distance chosen for the King Ranch Training Area (KRTA) site.

1. Create a new empty points feature named “Pop1.” In an edit session, create a single point feature at the intersection of Petronila Creek and State Highway 70.
2. Use the Pairwise Buffer tool to buffer the previous layer (“Pop1”) by 300 m. Save as a new layer (“Pop1\_pb300m”).



Figure 5. Population 1 identified at the intersection of Petronilla Creek and State Highway 70, buffered by 300 meters.

### Saint James Cemetery

The extant population located at Saint James Cemetery was searched for but not found in a landcover dataset that includes cemeteries (TomTom 2024). A search in Google Maps found that the property has decimal coordinates of (27.680448, -97.771728). This point was searched for in ArcGIS Pro and identified a tract of land for the Saint James Cemetery. The corresponding core map shape was developed as follows.

1. Identify the point in ArcGIS Pro using its coordinates.
2. Create a new empty polygon feature class ("Saint\_James"). In an edit session, create a feature by tracing vertices along the visible border of the cemetery. See Figure 6.



Figure 6. Core map shape (red outline) for Saint James Cemetery.

### Population 3

One extant population in Table 5 of the recovery plan has the following description: “U.S. Hwy 77 [right-of-way] on Nueces-Kleberg County line, both east and west side.” This location was identified in ArcGIS Pro and professional judgment used to create a polygon that includes both east and west sides of the right-of-way (ROW) as follows:

1. Identify the intersection of US Highway 77 and the Nueces-Kleberg county line.
2. Create a new empty polygon feature named “Pop3.” In an edit session, create a single polygon feature inclusive of both east and west sides of the highway in proximity to the county border.



Figure 7. Core map shape (red outline) for Population 3.

#### Population 4

This population is based on its description: “Private home near Bishop and cemetery. Across the creek from St. James Cemetery.” The creek in question is the same as the street (FM 665) abutting the property and was identified after having found St. James Cemetery.

1. Identify St. James Cemetery and zoom to it.
2. Create a new empty polygon feature class (“Pop4”). Use underlying imagery to trace vertices to create a feature along the road and within the grassy front of the property across the street from St. James Cemetery.



*Figure 8. Core map shape (red outline) for Population 4.*

#### North American Butterfly Association – National Butterfly Center (NBC)

The extant population located at the NBC was not readily identified using aforementioned datasets. A search in Google Maps identified the property's location. This location was identified as a tract of land outside of the species range. The corresponding polygon was developed as follows.

1. Identify the location in ArcGIS Pro using Google Maps and ESRI Basemaps.
2. Create a new empty polygon feature class ("NBC"). In an edit session, create a feature by tracing vertices along the visible border of the tract.



Figure 9. Core map shape (red outline) for the National Butterfly Center (NBC).

### 3.2. Combining Extent

The polygons created in the previous step were aggregated and processed to produce a core map extent according to the steps below.

1. Use the Merge tool to merge polygons developed above representing each of the eight extant populations. Save as a new layer ("SRP\_polygon\_merge").
  - a. Bishop City Park
  - b. King Ranch Training Area
  - c. NBC
  - d. Population 1
  - e. Population 3
  - f. Population 4
  - g. Sablatura
  - h. St. James cemetery
2. Use the Pairwise Dissolve tool to dissolve the previous layer ("SRP\_polygon\_merge") into a single polygon feature. Save as a new layer ("SRP\_polygon\_merge\_pd").
3. Use the Pairwise Clip tool to clip the previous layer ("SRP\_polygon\_merge\_pd") by the species range ("SRP\_range"). Save as a new layer ("SRP\_polygon\_merge\_pd\_pcRange"). Additionally export this layer with a new name easily identifying this as the core map extent ("SRP\_extent").

### 3.3. Cultivated Lands-based Refinement and Finalization of Interim Core Map

EPA has developed and published its own cultivated layer for use in core map development as a potential refinement of extent. For the slender rush-pea, extent was refined by this layer using the Pairwise Erase tool to remove significant areas of agriculture because the species habitat is not consistent with cultivated land and is therefore considered by CSI to be “off-field.” This removed relatively little area but is considered a reasonable refinement for core map development for off-field species

1. Use the Pairwise Erase tool to erase areas of cultivated land > 25 acres from EPA’s Modified Cultivated Areas from the previous layer (“SRP\_extent”) and save as a finalized interim core map layer (“SRP\_CoreMap”).

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