



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
2005 NE Green Oaks Blvd., Suite 140
Arlington, Texas 76006

March 2, 2020

Memorandum

To: File (S:\T&E\ESA Section 7\IPaC\Determination Keys\ARLES DKey Finals)

From: Robert Allen, Wildlife Biologist; Nacogdoches, Texas

Through: Debra Bills, Field Supervisor, Omar Bocanegra, Supervisory Fish & Wildlife Biologist; Arlington ES Office

Subject: Geocarpon (*Geocarpon minimum*) Determination Key

This memo is a record of the rationale behind the determination key section for the threatened Geocarpon (*Geocarpon minimum*) within the 112 counties covered by the Arlington Ecological Services Office (ARLES). This determination key is a logically structured set of questions to assist a user in determining whether a proposed project qualifies for a predetermined consultation outcome based on USFWS standing analysis. General biology and other information is included to support the standing analysis and key. This key is intended to be delivered through the USFWS' Information for Planning and Consultation (IPaC) web application.

Geocarpon was listed by the Service as threatened on July 16, 1987 (52 FR 22930). No critical habitat has been designated for Geocarpon. A summary of the status of the species in Texas and throughout its range can be found at: <https://www.fws.gov/species/tinytim-geocarpon-minimum>.

Species Description

Geocarpon is a diminutive winter annual succulent in the Caryophyllaceae (pink or carnation) family. Plants are typically visible for three to six weeks and the plant typically completes its life-cycle in four weeks. Stems grow from .39 inch (1 centimeter) to 1.57 inches (4 centimeters) tall and vary in color from green to pink to reddish purple. Stems may be single or multi-stemmed, branching at the base. Leaves are opposite in arrangement along the stem, oval-shaped and have smooth edges. Flowers are attached directly to the main stem and connect to the main stem at the same point as the leaf (sessile). Number of flowers varies plant to plant with some producing five to seven stems with two to four flowers while other plants are single stemmed producing one to two flowers (Morgan 1986). Flowers lack petals (apetalous), but display five, diminutive reddish to red-green, succulent leaf like structures and five male pollen bearing structures. The fruit mature into a three chambered capsule, which desiccates then

ruptures to release numerous funicular seeds. Across the species range, emergence varies and is likely temperature dependent with early emergence dates (January) associated with mild winter temperatures (Bridges 1986). The flowering and fruiting period when the plant is usually most visible ranges from late February to early June (Bates 1994, McInnis and Larke 1997, Smith in litt. 2008, MDC 2000 and TNC 2004 and TNC 2005). The flowering date appears to be earlier in the southern range presumably due to milder temperatures. March and April are the most common survey dates reported throughout the range and this likely corresponds to the peak flowering period. The factors affecting the timing and success of germination are not fully understood, although many researchers suggest that temperature and weather conditions are the two primary factors (Bates 1994, Logan 1998, TNC 2004, Witsell 2003 and Singhurst in litt. 2006).

Geocarpon habitat consists of open, sparsely vegetated glades on shallow soils over sandstone outcrops, including depressions within such areas, as well as sparsely vegetated areas (slick spots) of saline prairies (Morgan 1980, Palmer and Steyermark 1950, Steyermark *et al.* 1959, Thurman 1989, and USFWS 1993). Saline prairie habitats exhibit thin soils high in magnesium and sodium (Rettig 1983). Geocarpon is mostly found on the cryptogamic lip along the edge of slick spots.

Historic and Current Distribution

The geographic range of Geocarpon includes Arkansas, Louisiana, Missouri and Texas. In Texas, Geocarpon occurs on both sand stone glades and saline prairies. In the eastern portion of its range, the species is confined to saline prairies (Keith *et al.* 2004) and is known to occur Anderson, Gregg, Harrison, and Panola Counties. In the western portion of its range, it occurs on sandstone glades/outcrops in Parker and Palo Pinto Counties (Keith per. Comm. 2020) (see Figure 1).

Reasons for Decline and Threats to Survival

Geocarpon is vulnerable to local extirpations because it occurs in isolated populations and depends on the presence of specific microhabitats in order to compete with other plants. Although extirpations of subpopulations due to encroachment of other vegetation have been observed (Witsell 2004), no known populations have disappeared due to this factor. Loss of microhabitats such as thin soils within sandstone glades and the margins of slick spots within saline prairies appear to be the biggest threat to the long-term survival of Geocarpon. Geocarpon thrives in harsh conditions that exclude competing plant species. Accumulation of more suitable soils quickly leads to an invasion of other plants that shade Geocarpon. The presence of natural disturbances such as fire, movement of sheet water, and periodic use by large mammals may play a key factor in the maintenance of these microhabitats (Smith and Ely 2006; Witsell pers. comm. 2006). Fire suppression, alteration of microhydrology, and extirpation of large grazing mammals may result in the long-term loss of microhabitats that support Geocarpon. The rooting activity of feral hogs has recently been identified as a potential threat and may be responsible for the partial loss of a subpopulation in Arkansas (Witsell pers. comm. 2015).

Proposed activities may occur with no effect if the project area is not within suitable Geocarpon habitat or indirectly impacts suitable Geocarpon habitat. If the project area is within suitable habitat, presence/absence should be determined. If absence is verified, proposed activities may occur with no effect. If present, consultation would likely be necessary with concurrence requiring a case-by-case review. Utilize the key below evaluates potential effects to Geocarpon.

Key for evaluating potential impacts to the Geocarpon within the ARLES area of responsibility.

- A. Does project intersect Geocarpon Area of Influence (hidden SEMANTIC)
 - a. If yes.....Go to B
 - b. If no.....Exit
- B. Does the action area contain **sandstone glades/outcrops** or **saline prairies** (add pop-up definition: "**Saline prairies** are characterized by low, extensive coverage of sedges, grasses, and forbs, with few to no trees or shrubs. Within these prairies, interspersed "slicks," with little to no emergent vegetation, provide habitat for earth fruit. **Sand stone glades** are characterized by sand stone outcrops with sandy loams or sandstone rock outcroppings or similar soils with varying amounts of subsurface seepage. It is also found on bare sand in heavily disturbed ground created by feral hogs")?
 - a. If yes.....Go to C
 - b. If no.....No effect
- C. Will the proposed project involve human and/or ground disturbance (such as foot traffic, vehicles, tracked equipment, excavating, grading, placing fill material, etc.)?
 - a. If yes.....Go to D
 - b. If no.....NLAA
- D. Has a presence/absence survey been conducted in the action area?
 - a. If yes.....Go to E
 - b. If no.....May affect, conduct presence/absence survey and submit results to field office.
- E. Do the results of the survey indicate Geocarpon are present within the action area?
 - a. If yes.....May affect, contact field office.
 - b. If no.....NLAA

END KEY

Literature Cited

- Bridges, E.L. 1986. Population inventory and monitoring of *Geocarpon minimum* at Warren Prairie Natural Area. Arkansas Natural Heritage Commission, Little Rock, Arkansas.
- Bates, V. 1994. Searches for *Geocarpon minimum* in western Arkansas and eastern Oklahoma. A report to the U.S. Fish and Wildlife Service. 33pp. + appendix.
- Keith, E. L., J. Singhurst, and S. Cook. 2004. *Geocarpon minimum* (Caryophyllaceae), new to Texas. Sida, Contrib. Bot. 21(2): 1165-1169.

- Keith, E. L. 2020. Personal communication: February 26, 2020 email sent to Robert Allen USFWS regarding new *Geocarpon minimum* observations at Fort Wolters, Palo Pinto County.
- Logan, J. 1998. Summary of Section 6 Research for 1998, E-9 segment 2: *Geocarpon minimum* survey and research. A report to the U.S. Fish and Wildlife Service. 2 pp.
- McInnis, N. and J. Larke. 1997. *Geocarpon minimum* monitoring research Winn Parish, Louisiana. A report to the U.S. Fish and Wildlife Service. 3 pp.
- Missouri Department of Conservation. 2000. Best Management Practices: *Geocarpon*. 1 pp.
- Morgan, S. 1980. Status report on *Geocarpon minimum* in Missouri. Missouri Department of Conservation, Jefferson City, Missouri.
- Morgan, S. 1986. A study of a population of *Geocarpon minimum* in Missouri. Missouri Department of Conservation, Jefferson City, Missouri.
- Palmer, E.J. and J. Steyermark. 1950. Notes on *Geocarpon minimum*, MacKenzie. Bull. Torrey Bot. Club 77:266 – 73.
- Rettig, J.H. 1983. A new Arkansas station for *Geocarpon minimum* MacKenzie (Caryophyllaceae). Bull. Torrey Bot. Club 110:213.
- Singhurst, J. July 26, 2006 e-mail. In Literature. Jason Singhurst. Regarding the number and protective status of extant *Geocarpon minimum* populations in Texas. Botanist/Plant Community Ecologist. Texas Parks and Wildlife Department. Austin, Texas.
- Smith, T. E. and J. S. Ely. 2006. A demographic and ecological analysis of *Geocarpon minimum* (Caryophyllaceae): a federally threatened species in southwest Missouri. SIDA 22(2):1145-1157.
- Smith, T.E. 2008 memo. In Literature. Tim E. Smith. Regarding monitoring of an established *Geocarpon minimum* population at Bluff Springs C.A. Botanist. Missouri Department of Conservation. Jefferson City, Missouri.
- Steyermark, J., J.W. Voigt, and R. H. Mohlenbrock. 1959. Present biological status of *Geocarpon minimum* MacKenzie. Bull. Torrey Bot. Club 86: 228 – 35.
- The Nature Conservancy. 2004. Kingsland Prairie Conservation Area Conservation Plan. Internal TNC planning document. 32 pp. + appendices.
- The Nature Conservancy. 2005. Restoration and enhancement of habitat at Kingsland Prairie. Final report submitted to the U.S. Fish and Wildlife Service. 2 pp. + attachments.

Thurman, C. M. 1989. A Missouri survey of six species of federal concern. Final report. Missouri Department of Conservation.

Witsell, T. 2003. Final report on *Geocarpn minimum* monitoring and survey work in Arkansas, 2002. A report to the U.S. Fish and Wildlife Service. 4 pp. + appendices.

Witsell, T. 2004. Final report on *Geocarpn minimum* Mackenzie (Caryophyllaceae) monitoring and survey work in Arkansas, 2003. A report to the U.S. Fish and Wildlife Service. 6 pp. + appendices.

Witsell, T. 2006. Personal Communication. Theo Witsell. Regarding updated survey efforts throughout Arkansas; the protective status of the population at New Edinburg Prairie in Cleveland County, Arkansas; and possible modes of seed distribution. Botanist. Arkansas Natural Heritage Commission. Little Rock, Arkansas.

Witsell, T. 2015. Personal Communication. Theo Witsell. Regarding the impacts of feral hogs on *Geocarpn* populations and the incorporation of existing feral hog damage into their experimental trials assessing the role of disturbance in the maintenance of this species. Botanist. Arkansas Natural Heritage Commission. Little Rock, Arkansas.

U.S. Fish and Wildlife Service (USFWS). 1993. *Geocarpn minimum* recovery plan. Jackson, Mississippi: U.S. Fish and Wildlife Service.

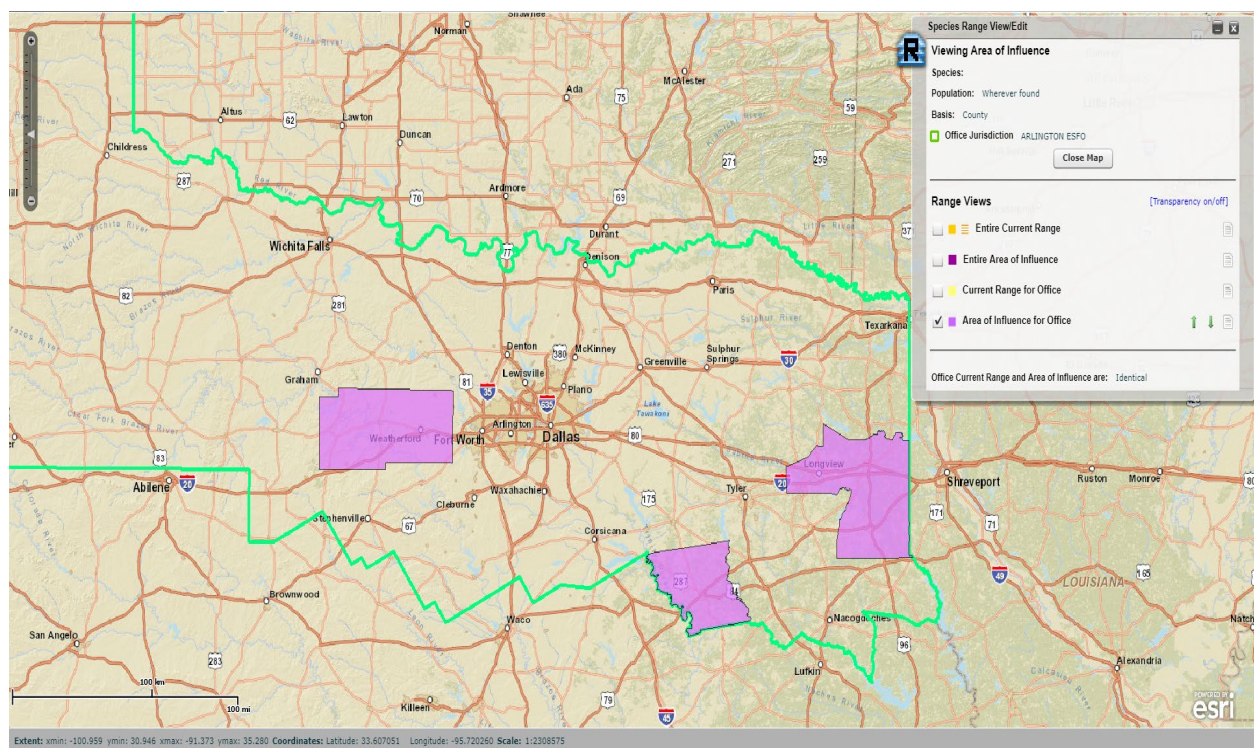


Figure 1. Current *Geocarpn* range map from USFWS ECOS Mapper