ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract **Element Code:** PMPOA530T0

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Puccinellia parishii*
COMMON NAME: Bog Alkali Grass
SYNONYMS:
FAMILY: Poaceae

AUTHOR, PLACE OF PUBLICATION: Hitchcock, Albert Spear. Proceed. Biol. Soc. Washington 41: 157-158. 1928.

TYPE LOCALITY: California: San Bernadino Co.: at Rabbit Springs.

TYPE SPECIMEN: US 141281, 906851. S.B. Parish, #9799. April 24, 1915. (Holotype).

TAXONOMIC UNIQUENESS: *Puccinellia* is a relatively largely genus with 34 species and 10 subspecies or varieties in the U.S. There are four species that occur in Arizona: *P. distans*, *P. fasciculata*, *P. nuttalliana*, and *P. parishii*.

DESCRIPTION: Annual; culms cespitose, ascending from a decumbent base, 3 to 10 cm tall. Cauline leaf blade generally inrolled, less than 1 mm wide when flat. Inflorescence 1-8 cm; lower branches erect to reflexed in fruit; spikelet stalk scabrous. Spikelet lemma veins hairy in lower half, tip obtuse to truncate, margin near tip scabrous-serrate, lowest lemma approximately 2 mm; anthers of lowest floret approximately 0.5 mm.

AIDS TO IDENTIFICATION: Both *P. distans* and *P. nuttalliana* are perennials, whereas *P. fasciculata* and *P. parishii* are annuals. The lemmas for *P fasciculata* have coriaceous apical margins, but are mostly membranous or herbaceous for *P. parishii* (Barkworth et al 2007).

ILLUSTRATIONS:
Photo, line drawing, herbarium mounts: http://eol.org/pages/1114652/media.
Line drawing (Kelly 1994)
Line drawing (Falk et al. 2001)
Photo of Herbarium Mount and Habitat:
http://nmrareplants.unm.edu/rarelist_single_photo_thumb.php?SpeciesID=156&Phototype=N
Photo: http://plants.usda.gov/core/profile?symbol=PUPA.
Photos: http://swbiodiversity.org/seinet/taxa/index.php?taxon=Puccinellia%20parishii.

TOTAL RANGE: The range of *Puccinellia parishii* extends about 600 miles (1,000 km) east to west from Sandoval County, New Mexico, to San Bernardino County, California (including northern Arizona), and about 370 miles (600 km) north to south from San Miguel County, Colorado, to Hidalgo County, New Mexico. Historically, the limited number of known collection sites across its four State distribution range tend to be quite disjunct. No explanation for this phenomenon has been offered.

RANGE WITHIN ARIZONA: There are nine known occurrences in Arizona, some with more than one source feature. Three are in the extreme NE near Four Corners and another is in Cane Valley near the Utah border (all Apache County). Another four are on the southern Kaibito Plateau near and to the west of Tuba City in Coconino County. The ninth collection is disjunct and about 145 miles (240 km) to the SW in a tributary to Little Shipp Wash, near Bagdad in Yavapai County.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: A tufted winter annual grass.

PHENOLOGY: It is an ephemeral grass, beginning to produce stems near the end of winter, flowering in early spring, dying and withering away by July. Flowers in April and May, and set seed and die with the late spring drought. Arizona collections have noted both "in-flower" or "most dead, seed dropped" in May, which suggests the phenology may be dependent on variable weather factors as well. The lower elevation, disjunct collection site (near Bagdad, 2700 feet) noted both flowers and fruits in April.

BIOLOGY: Reproduction and dispersal is abiotic, wind and water facilitated. Numbers of plants of up to a few thousand are possible, depending on favorable spring water flows; seeds may survive for an undetermined number of years in the seedbed if dry conditions prevail.

HABITAT: Alkaline springs and seeps feeding canyon bottoms, playas, and marshes, as well as seasonally wet areas at the heads of drainages or on gentle slopes. Requires continuously damp soils during the late winter and spring growing periods. Habitats tend to be saline, often with a salty crust on the soil.

ELEVATION: Range-wide: 2295 – 7215 feet (700-2200m). Arizona collections on the Navajo Nation in Apache and Coconino Counties range from 4750 – 5440 feet (1450-1660m). A disjunct collection made near Bagdad in Yavapai County was made at 2700 feet (823m).

EXPOSURE: Open, flat, all aspects.

SUBSTRATE: Alkali spring or seep with sandy clay loam soil.

PLANT COMMUNITY: Common species found with *P. parishii* range-wide include *Distichlis spicata, Sporobolus airoides, Carex* sp., *Scirpus* sp., *Juncus* sp., *Eleocharis* sp., and *Anemopsis californica*. Associated species noted from Arizona collections include *Sporobolus airiodes, Eleocharis* sp., *Sarcobatus vermiculatus, Distichlis stricta, Juncus* sp., *Scirpus pungens, Triglochin* sp., *Equisetum* sp., *Polygonum, Juncus balticus, Oxytenia acerosa, Isocoma* and Tamarisk.

POPULATION HISTORY AND TRENDS: Range-wide, about 30 occurrences are known; about half in New Mexico, the other half in Arizona, with one occurrence each in Colorado Nevada and California. The one California population (San Bernardino County) is extirpated. The population in Clark County, Nevada is located within a highway cloverleaf, its status is unknown. The only location without serious habitat alteration or disturbance is at Faywood Hot Springs, New Mexico. This population occupies less than 8 hectares. Total Area of Occupancy is estimated to be only 116 square km. The US Fish and Wildlife Service (1998) notes that "the amount of available habitat [at each occupied or potential site] depends on the size of the wet area and can vary from a few square meters to 16 hectares." Few to very few of these occurrences are considered to have good viability (see Management Factors, below).

Data recorded at several of the Arizona collection sites, however, indicates the possibility of good viability. Site 1 has been observed and collected from 1935 to 2011. Various collections at Site 4 noted 100's to 1-2000 plants. Site 5 indicated "fair" viability, while Site 6 noted good viability. The only collection site not on the Navajo Nation (Site 8) noted that the species was "common."

So to date, a number of the Arizona populations can be considered at least relatively viable. *Puccinellia parishii* was proposed for listing as an endangered species on March 28, 1994. On September 25, 1998 the proposal was withdrawn based on the discovery of additional populations and on new information concerning the species' habitat requirements and apparent tolerance to habitat impacts. However, as is detailed below under Management Factors, Protective Measures and Suggested Projects, this species has significant potential risks, and certain actions are likely needed to secure its future.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS:	None. USDI, FWS 1998 [PE, USDI, FWS 1994, 1996 and 1997] [C1 USDI, FWS 1993]
STATE STATUS:	Highly Safeguarded (ARS, ANPL 1991, 1993, 1999, 2015)
OTHER STATUS:	Forest Service Sensitive (USDA FS Region 3 2007 and 2013). Apache-Sitgreaves NF. Category 4 (NNDFW, NESL 2008)

[Category 4 (NNDFW, NESL 2005)]
[Category 4 (NNDFW, NESL 2001)]

Note: *Puccinellia parishii* was proposed for listing as an endangered species on March 28, 1994. On September 25, 1998 the proposal was withdrawn based on the discovery of additional populations and on new information concerning the species' habitat requirements and apparent tolerance to habitat impacts.

MANAGEMENT FACTORS: Low population numbers and limited distribution make this species vulnerable to extinction from both natural and human threats. Major threats include alteration of habitat hydrology (by capture/diversion for livestock and domestic use, groundwater pumping, flood control activities, erosion and stream entrenchment, salt cedar invasion, climate change, etc.), conversion of habitat to agricultural or urban use, and overgrazing. One or more New Mexico populations may be threatened by mining. Potential for recovery and restoration are limited by the modification of its historic habitat and water table use. The water table would need to be restored and maintained at its historic level. (NatureServe 2014.)

At one of the Arizona collections (Site 7), 1000s of *P. parishii* were observed growing in a heavily grazed wet meadow. It was surmised that the species was possibly maintained here by the grazing, which keeps competition with other plants at a minimum. If this is correct, then grazing may be a positive, rather than negative, management factor.

PROTECTIVE MEASURES TAKEN: The known populations are not currently protected. A possible minor exception to this might be two 2x2m exclosures established on Arizona Site 5 in 1992, if they are still functional. *Puccinellia parishii* was proposed for listing as an endangered species on March 28, 1994. On September 25, 1998 the proposal was withdrawn based on the discovery of additional populations and on new information concerning the species' habitat requirements and apparent tolerance to habitat impacts. It is also listed as a Highly Safeguarded species in Arizona, a Category 4 species on the Navajo Nation, and a US Forest Service Sensitive species for Apache-Sitgreaves NF. In New Mexico, the landowner is aware of the existence of the plant and sensitivity of the site; and restricts access to the site.

SUGGESTED PROJECTS:

Management Programs: There are currently no known management programs for this element.

Restoration Potential: Potential for recovery and restoration are limited by the modification of its historic habitat and water table use. The water table would need to be restored and maintained at its historic level. Current locations would have to be modified to remove obstruction to natural spring or seep flows. Seed could be collected for multiplication in a greenhouse setting. The resulting multiplied seed could be either germinated in a greenhouse

and transplanted into the field or be broadcast directly in the field. This effort could take several years to obtain high enough seed numbers for the above methods.

Preserve Selection and Design Considerations: A preserve should include a natural alkali spring or seep with sandy clay loam soil. Alkaline saltgrass community species such as *Calochortus striatus*, *Anemopsis californica*, *Juncus*, *Distichilis stricta* , *Atriplex canescens*, and *Suaeda moquinii* would be present in suitable habitat.

Management Requirements: Recommended management procedures should include: 1) eliminating human and livestock impact (see observation above in Management Factors) on the remaining populations by fencing or gating the areas; 2) mapping and annual monitoring of known populations; 3) searching for previously unknown populations in probable habitat; 4) interaction with local water authorities regarding water table level, water use, and the measures necessary to restore the water table to its historic level; 5) if suggestion 4 is impossible supplemental water could be an alternative to keep remaining populations viable until other natural suitable habitat can be found; 6) natural suitable habitat with no current element occurrence, or disturbed habitat can be enhanced, and can be planted with seed from the remaining populations; 7) collection of no more than 5% of the available seed per year to use for seed multiplication and/or seed storage in a seed storage bank, such as Rancho Santa Ana Botanic Garden in Claremont, California, which has a rare plant seed storage and research facility.

Monitoring Programs: Monitoring is being conducted by Dave Charleton of Computer Sciences on the Edwards Air Force Base population, and USFWS monitoring is being conducted on the Rabbit Springs, California population (pers. comm. from D. Charleton to Julie A. Greene, March 19, 1995).

Management Research Programs: There are no known management research programs.

Management Research Needs: Current management needs would include the techniques necessary to germinate seed in greenhouse conditions for use in increasing population size, and research into the practicality of creating suitable habitat in a previously unsuitable area. Similar to the experiments done on creating artificial vernal pools. (NatureServe 2014.)

LAND MANAGEMENT/OWNERSHIP: All but one of the known occurrences in Arizona are on Navajo Nation lands in Apache or Coconino (not Navajo) Counties. The single collection outside of the Navajo Reservation is in Yavapai County, on both private and State lands.

SOURCES OF FURTHER INFORMATION

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MAJOR KNOWLEDGEABLE INDIVIDUALS:

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Paul M Peterson, Research Botanist and Curator, Smithsonian National Museum of Natural History, Washington, DC
Barbara G. Phillips, U.S. Forest Service, retired, Flagstaff, AZ

ADDITIONAL INFORMATION: It is possible that the species is not especially vulnerable to certain kinds of habitat disturbance. It appears to survive trampling due to cattle. As an annual, it can apparently survive drought periods as a dormant seed for an unknown length of time, which possibly buffers it from ephemeral drying out of its habitat. Its small size and the short duration of its active life cycle make it less likely to be discovered at new sites than larger, showier, or longer-lived species.

Presumed to be a relict species from the Holocene, persisting along the saline edges of drying lakebeds.

A specimen at Arizona State University (No. 9237) collected from along Aravaipa Creek has been identified as *P. parishii*. This specimen requires re-verification. However, until then it will be considered in error.

Revised: 1991-04-23 NMNHP)
1991-04-23 (BKP)
1992-09-21 (BKP)
1995-05-16 (DBI)
1997-07-21 (SMS)
1998-08-11 (SSS)
2004-01-30 (AMS)
2014-05-09 BDT
2015-06-19 BDT