# ARIZONA GAME AND FISH DEPARTMENT
# HERITAGE DATA MANAGEMENT SYSTEM

**Plant Abstract** **Element Code:** PDAPI19051
**Data Sensitivity:** Yes

## CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

**NAME:** *Lilaeopsis schaffneriana* (Schlecht) ssp. *recurva* (A.W. Hill) Affolter
**COMMON NAME:** Huachuca water umbel, Huachuca water-umbel, Huachuca waterumbel, Schaffner's grasswort, Cienega False-rush
**SYNONYMS:** *Lilaeopsis recurva* A.W. Hill, *L. schaffneriana* var. *recurva*
**FAMILY:** Apiaceae

**AUTHOR, PLACE OF PUBLICATION:** A.W. Hill, J. Linn. Soc. Bot. 47: 525-551. 1927.

**TYPE LOCALITY:** Santa Cruz Valley near Tucson, Pima County, Arizona, U.S.A.

**TYPE SPECIMEN:** LT: GH. C.G. Pringle s.n. 19 May 1881. LT: US. ST: NY, GH.

**TAXONOMIC UNIQUENESS:** In the genus *Lilaeopsis*, the species *schaffneriana* is 1 of 5 species in North America, and contains 2 varieties; *recurva* and *schaffneriana*.

The USFWS listed this taxon under the name *Lilaeopsis schaffneriana* ssp. *recurva* (Federal Register, Jan. 6, 1997), and uses this taxonomy for the 5-year review (USFWS 2014). As of 10/06/2020, *Lilaeopsis schaffneriana* var. *recurva* is used in its List of Endangered and Threatened Plants. The latter rank is also used by Kartesz (1999), Duncan and Slagle (2005), and Malcom et al. (2017). Subspecies is the rank used by Affolter (1985), Titus and Titus (2008), and Fehlberg (2017).

**DESCRIPTION:** Herbaceous, semi-aquatic to aquatic perennial. The root system consists of long horizontal rhizomes and shorter vertical rhizomes. Hollow linear leaves that taper to a point occur singly or in clusters at the top of short rhizomes. Leaves vary greatly, with lengths from 2.5 to 33 cm (0.98 to 12.99 in). Shorter leaves are found in dryer environments, while submerged leaves are longer. Umbels comprised of 3-10 flowers are born on stalks shorter than the leaves. Flowers are perfect, 1-2 mm (0.04-0.08 in) wide, with five white to maroon-tinted petals and maroon anthers. Fruits spherical and dry, 1.6-2.3 mm (0.06-0.09 in) long, slightly longer than wide. Five distinct and spongy ribs make the seed buoyant (USFWS 2014).

**AIDS TO IDENTIFICATION:** Wavy, yellowish-green leaves best field characteristic (Warren 1994). Leaves curve slightly above the water surface. This characteristic distinguishes it from young or small *Eleocharis*. *Lilaeopsis* has semi-succulent leaves that are somewhat flexuous, while *Eleocharis* leaves are pithy, strictly straight and not at all succulent. Leaf color of *L. s.* var. *recurva* is pale yellow-green compared to the darker green

of most co-occurring herbaceous species. Distinguished by its small size, rhizomotous habit and the cylindrical, hollow leaves with septa (internal horizontal divisions forming chambers), which hold oxygen and are an adaptation to the partially submerged, aquatic lifestyle. The tiny flowers are borne in umbels which are always shorter than the leaves (SEINet, 2015.)

**ILLUSTRATIONS:** Line drawing of habit, flower and fruit (Affolter, 1982: Fig.9, p.52).
Color photo (Lynda Pritchett-Kozak, *in* CPC 2003: CPC #9357)
Line drawing (*in* Falk, Jenkins et al., 2001)
Color photo of plant (FWS, *in* Falk, Jenkins et al., 2001)
Color photo of habitat (Peter Warren/TNC, *in* Falk, Jenkins et al., 2001)
Color photo (DBG, *in* Kelly and McGinnis 1994)
Line drawing (Michael Chamberland, *in* Kelly and McGinnis 1994).

**TOTAL RANGE:** Southwestern New Mexico, southeastern Arizona and adjacent Sonora, Mexico. Naturally occurring locations that currently support or historically supported this taxon occur within the Santa Cruz, San Pedro, Rio Yaqui, Rio Sonora, and Rio Conception watersheds.

**RANGE WITHIN ARIZONA:** Approximately 15-20 locations believed to support extant populations at disjunct locations in Cochise, Pima, Santa Cruz, counties. The majority of *L. schaffneriana* ssp. *recurva* occur along the San Pedro River, in the Huachuca Mountains, and along Cienega Creek in the San Pedro River and Santa Cruz River watersheds. 6 occurrences believed extirpated. Historically in Pinal County.

## SPECIES BIOLOGY AND POPULATION TRENDS

**GROWTH FORM:** Herbaceous, semi-aquatic to aquatic perennial.

**PHENOLOGY:** Flowering observed March through October, peaking in July (DBG, accessed 2001), giving way to red fruits in late fall (Warren et al. 1991). Germination occurs one to two weeks after seed dispersal (Gori 1995). Reproduction occurs both sexually via seed and asexually via rhizomatous spreading, though vegetative reproduction is most likely the primary form of reproduction (Vernadero Group and the Desert Botanical Garden 2012).

**BIOLOGY:** Rhizomes branch freely, may form dense mats (carpet) in sand or mud streambed, making it impossible to identify individual plants. Flowers may be self-fertile. Seeds may be viable for five to ten years, enabling survival in times of drought (Titus and Titus 2008). Rapid colonization of newly constructed pond at San Bernardino National Wildlife Refuge suggests that species may have extended seed dormancy (K. Cobble, pers comm.). *Lilaeopsis* seems to require an intermediate level of flooding frequency to keep competition manageable. Plant does not compete well with larger, semi-aquatic species (sedges, bulrushes) but populations can be destroyed when floods are too frequent and intense. They are vegetatively reduced during cooler months, resuming active growth in the

spring. After spring floods scour out a riparian system, *Lilaeopsis* is one of the first plants to establish itself.

**HABITAT:** Restricted to cienegas, rivers, streams, springs, or marshy wetlands, within Sonoran desertscrub, grassland or oak woodland, and conifer forest. Plants found in unshaded or shaded sites in shallow and slow-flowing water, saturated soil near seeps, springs and streams. *Lilaeopsis* requires perennial water, gentle stream gradients, small- to medium-sized drainage areas, and (apparently) mild winters. Usually found in water depths from 5.0-15.0 cm (2.0-16.0 in.), but occasionally to 25.0 cm (10.0 in.) deep.

**ELEVATION:** 2,800 - 7,100 ft. (855 - 2170 m).

**EXPOSURE:**

**SUBSTRATE:** Permanently to nearly permanently wet muddy or silty substrates with some organic matter.

**PLANT COMMUNITY:** Within Sonoran desertscrub, grassland or oak woodland, and conifer forest. Associated vegetation includes: *Alnus* sp. (alder), *Baccharis* sp. (willow) and *Populus* sp. (cottonwood), along with *Aster* (*Almutaster*) *pauciflorus*, *Berula erecta* (water (or wild) parsnip), *Carex* sp. (sedge), *Eleocharis acicularis* (needle or least) spikerush), *E. parishii* (Parish's spikerush), *Ludwigia palustris* (Marsh seedbox), *Rorippa* sp. (watercress), *Scirpus americanus* (three-square bulrush), *Typha domingensis* (southern cattail), *Veronica americana* (American speedwell), and algal mats, grasses and rushes.

**POPULATION TRENDS:** Although new occurrences have been discovered in recent years, and some introductions and augmentations have been successful, eight occurrences are known to be extirpated and multiple occurrences have not been relocated in recent years. Known populations are stable to decreasing.

## SPECIES PROTECTION AND CONSERVATION

**ENDANGERED SPECIES ACT STATUS:** LE (USDI, FWS 1997) with Critical Habitat
[PE USDI, FWS 1995]
[C1 USDI, FWS 1994]
[PE USDI, FWS 1993]
[C1 USDI, FWS 1993]
[C2 USDI, FWS 1983]

**STATE STATUS:** Highly Safeguarded (ARS, ANPL 2016)
[Highly Safeguarded (ARS, ANPL 1993, 1999)]

**OTHER STATUS:** Bureau Sensitive (USDI Bureau of Land Management, AZ 2017)

Not Forest Service Sensitive (USDA Forest Service Region 3 2013, 1999)
[Forest Service Sensitive, USDA Forest Service Region 3, 1990]

**MANAGEMENT FACTORS:** Perennial water flow and excessive erosion are key issues of management. A small number of *Lilaeopsis* populations are restricted to wetland habitats that are rare in the southwest United States and adjacent Mexico. The most pressing threats to the species include groundwater pumping and drought. Other threats include increased human population growth, climate change, increases in wildlife and sedimentation, increases in invasive exotic plants, increases in mining and recreation activities, and degradation of habitat, trampling, and grazing by livestock.

**PROTECTIVE MEASURES:** Inventory, monitoring, and management of Huachuca water umbel have been implemented on Fort Huachuca since 1999, and an inventory of all potential habitat is conducted every four years on the fort. *L. s.* ssp. *recurva* occurring on Bureau of Land Management lands are monitored regularly. Populations occurring on Forest Service, U.S. Fish and Wildlife Service, and Pima County lands have been monitored periodically (USFWS 2014).

Introduced and augmented occurrences have been successfully established at the Audubon Research Ranch, Las Cienegas National Conservation Area, San Pedro National Conservation Area, and Fort Huachuca. Introductions have failed at Leslie Canyon National Wildlife Refuge and Sonoita Creek. Introductions at San Bernardino National Wildlife Refuge have had mixed results. Introduced and augmented populations decrease the vulnerability of the taxon to stochastic events. The Desert Botanical Garden and the Arizona Sonora Desert Museum maintain populations of *L. schaffneriana* ssp. *recurva* for use in education, research, and potential reintroduction efforts.

Several easments along the Babacomari River and Sonoita Creek protect habitat that supports *L. schaffneriana* ssp. *recurva.* In 1999, Arizona State Parks purchased 1,440 ha (3,557 ac) of land in the San Rafael Valley, in part to protect, preserve and enhance habitat for listed species (Arizona State Parks 2013). Three conservation plans currently in place benefit this taxon; the 2008 Malpai Borderlands Habitat Conservation Plan, the 2009 Leslie Canyon Watershed Safe Harbor Agreement, and the 2016 Pima County Multi-Species Conservation Plan (MBHCPTWG and Lehman 2008, USFWS 2009, Pima County 2016). The Bureau of Land Management operates Las Cienegas National Conservation Area under a comprehensive management plan which includes assurance that riparian and wetland sites are properly functioning (BLM 2003).

**SUGGESTED PROJECTS:** Finalization of the Draft Recovery Plan; Studies on impacts of water withdrawal and drought on rootstock and seedbank; Studies on impacts of livestock grazing; Studies to determine pollinator(s) and if self-pollination is possible; Standardized and regular monitoring of occurrences; Regular monitoring of surface and subsurface water levels

in areas of occupancy; Genetic studies to better understand relationship of occurrences within and between the United States and Mexico (USFWS 2014).

**LAND MANAGEMENT/OWNERSHIP:** BLM - Tucson Field Office; DOD - Fort Huachuca Military Reservation; USFS - Coronado National Forest; USFWS - San Bernardino National Wildlife Refuge; Cienega Creek Natural Preserve; TNC - Bingham Cienega and Cottonwood Spring Preserves; Arizona State Parks – San Rafael Ranch Natural Area; Private.

## SOURCES OF FURTHER INFORMATION

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**MAJOR KNOWLEDGEABLE INDIVIDUALS:**

Kevin Cobble - USFWS
Dave Gori - The Nature Conservancy, Tucson, Arizona
Peter Warren - Tucson, Arizona

**ADDITIONAL INFORMATION:**

Specimens from three populations have been sent to Dr. Peggy Fiedler, California State University at San Francisco for DNA analysis to compare genetic relatedness to two California species of *Lilaeopsis*.

"Currently, *Lilaeopsis* is held at the Desert Botanical Garden in the form of live plants. Although the plants are easily grown and propagated vegetatively, they seldom flower in conventional cultivation. There is a crucial need to establish a genetically representative seed bank of this plant, and to investigate seed storage and germination requirements." (CPC 2003).

Experimental transplant study, was conducted by The Nature Conservancy back in 1990-1991 on the San Bernardino NWR. The first site failed, the second site did not grow beyond its original 5 inch diameter, but the third site grew from 5 inch to approximately 2 feet in

diameter. The major conclusion is that *Lilaeopsis* can not survive where there is heavy competition from other herbaceous aquatic plants. (NatureServe 2003).

**Revised:** 1990-12-26 (SR)
1991-10-18 (BKP)
1994-10-17 (PLW)
1995-05-15 (DBI)
1997-01-07(SMS)
1997-10-23 (SMS)
2003-11-13 (SMS)
2020-10-07 (KSL)