

Huachuca Water Umbel Report

Sonoran Desert Conservation and
Comprehensive Land Use Plan
Summer 2001

DRAFT

Pima County, Arizona

Board of Supervisors

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MEMORANDUM

Date: September 4, 2001

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator 

Re: Huachuca Water Umbel Report

Background

In 1997 the Huachuca water umbel was listed as endangered by the United States Fish and Wildlife Service. In July of 1999, critical habitat was designated in Cochise County and Santa Cruz County. One recorded location was known in Pima County at the time the draft *Priority Vulnerable Species* study was published through the Sonoran Desert Conservation Plan Science Team, in May of 2001: Empire Gulch in the Las Cienegas Conservation Area. A total of 26 sites had been documented in the three southern Arizona counties and Sonora, Mexico, although the Huachuca water umbel has been extirpated from six of those sites. Pima County undertook surveys of three County properties. This study describes findings and recommendations, based on the survey effort.

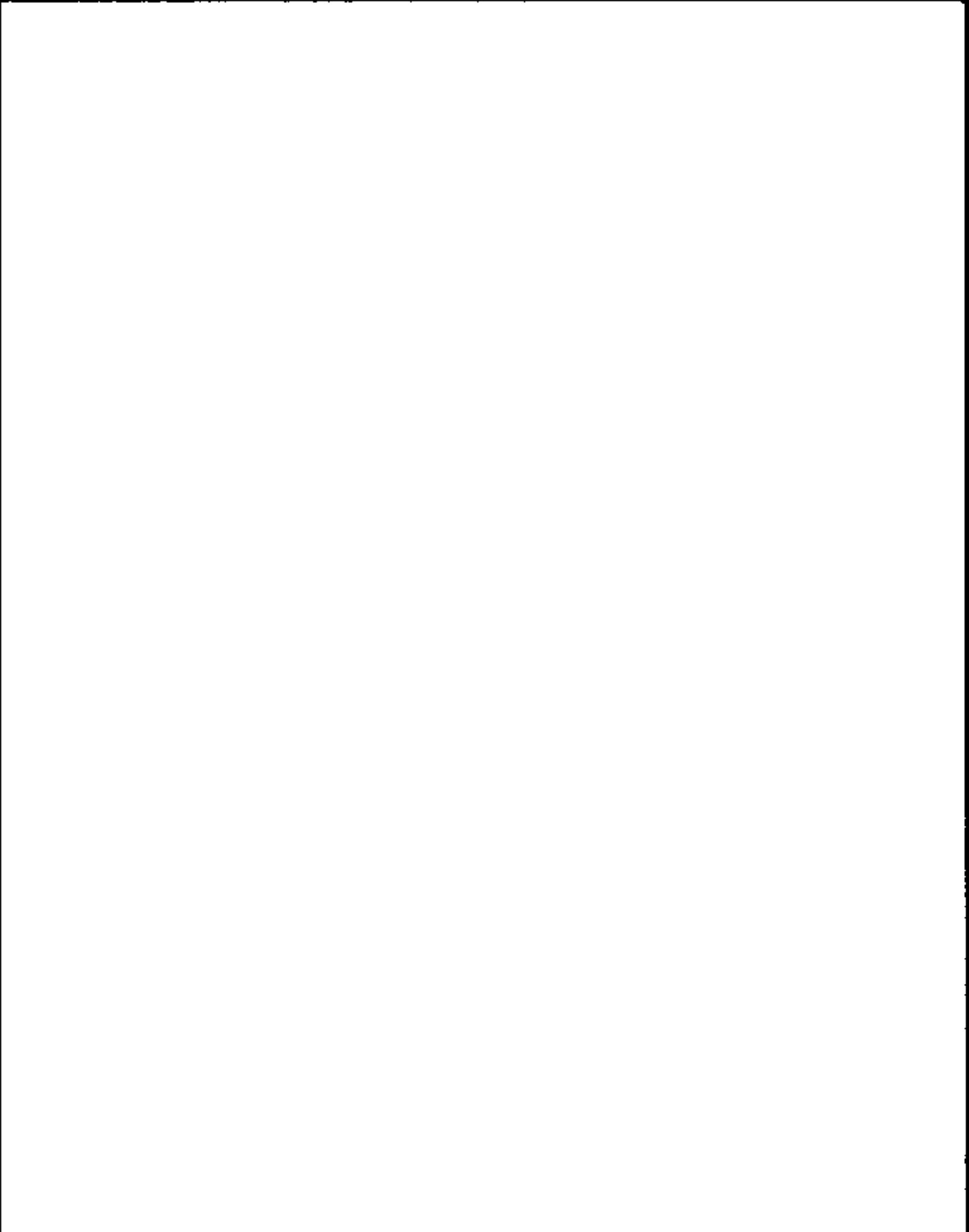
Survey Findings

Surveys were conducted for Huachuca water umbel at the Cienega Creek Natural Preserve, the Bingham Cienega Preserve, and the La Cebadilla property, which is south of Redington Road near the Tanque Verde Creek. The plant was detected at Cienega Creek, and a large metapopulation was detected at the Bingham Cienega Preserve.

Study Conclusion and Recommendations

Because the survey located Huachuca water umbel in sites that are further north and at lower elevations than previously considered, the study recommends that "assumptions regarding the potential presence of the species throughout Pima County should be re-examined, and further surveys may be warranted, especially within the Lower San Pedro watershed, Pima and Pinal Counties." Staff will forward this study to the United States Fish and Wildlife Service for consideration as part of the Recovery Plan, and to the Science Team for consideration in establishing species goals and program proposals under the Sonoran Desert Conservation Plan. A broader survey effort will also be undertaken.





EXECUTIVE SUMMARY

Huachuca water umbel (*Lilaeopsis schaffneriana* subspecies *recurva*) is a rare, herbaceous, semi-aquatic to fully aquatic perennial plant that is currently known to occur only in southeastern Arizona and northern Sonora, Mexico. The species was federally listed as endangered on January 6, 1997 (USFWS, 62 FR3, 1997) because of threats posed by the degradation and loss of the wetlands, which this species inhabits. Huachuca water umbel inhabits cienegas, marshes, rivers, streams, and springs, generally in perennial, shallow and slowly flowing waters.

As part of the Sonoran Desert Conservation Plan (SDCP), Pima County intends to develop population or habitat goals for this and other special status species. These goals may include efforts to introduce or re-establish Huachuca water umbel. As part of the endeavor, Pima County Flood Control District (PCFCD) implemented a survey for Huachuca water umbel at Cienega Creek Preserve, Bingham Cienega Preserve, and the La Cebadilla Property because each contains habitat types that have potential to be suitable for the species. Prior to this study, no thorough surveys for Huachuca water umbel had been conducted within these locations.

Prior to this study, Huachuca water umbel was documented from 26 sites in Santa Cruz, Cochise and Pima Counties, Arizona and adjacent Sonora, Mexico. The plant has been extirpated from 6 of these sites. At the time of this study, the only known extant sites within Pima County occurred in Empire Gulch in the Las Cienegas National Conservation Area.

Survey methods consisted of teams of two biologists walking transects through selected habitats while slowly and meticulously searching for the presence of the target plant. Off-channel habitats were also explored and surveyed if appropriate habitat was present. Survey segments, potential introduction sites, and other subjects of interest were photographed during the surveys.

As a result of the study, two new Pima County Huachuca water umbel populations were discovered: one small population of Huachuca water umbel was detected at Cienega Creek Natural Preserve and a large metapopulation of Huachuca water umbel was detected at Bingham Cienega Preserve. Both of these sites are located beyond the known northern extent of the species range and lower in elevation than all known extant sites. Huachuca water umbel was not found at the La Cebadilla Property, although habitats that support hydrophytic plants are present.

Huachuca water umbel requires mild disturbances that cause the plant community to remain in early seral stages (USFWS 1999). The discovery of Huachuca water umbel at Bingham Cienega Preserve indicates that the species is able to persist, and perhaps even flourish, through disturbances such as fire and prolonged drought.

Appropriate habitats for the introduction of Huachuca water umbel are present within Cienega Creek Natural Preserve and Bingham Cienega Preserve. Habitats at La Cebadilla may potentially become appropriate for introduction of Huachuca water umbel if the hydrological connection between the spring to the north and the subject property were restored. Plantings of many small plugs along transects that traverse numerous microsite types would most likely provide the best results and, if monitored, would add to the knowledge base regarding this species' unique requirements.

Potential alteration of native species assemblages by invasive and non-native plants may pose a threat to Huachuca water umbel and other wetland species as well.

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INTRODUCTION

Huachuca water umbel (*Lilaeopsis schaffneriana* subspecies *recurva*) is a rare, herbaceous, semi-aquatic to fully aquatic perennial plant that is endemic to southeastern Arizona and northern Sonora, Mexico. The species was federally listed as endangered on January 6, 1997 (USFWS, 62 FR 3, 1997) because of threats posed by the degradation and loss of the wetlands in the region, which this species inhabits. Critical habitat was designated by USFWS on July 12, 1999 and included a total of 83.9 kilometers of streams or rivers in Cochise and Santa Cruz counties, Arizona (64 FR 132). Huachuca water umbel is also designated a Highly Safeguarded Species under Arizona Native Plant Law and is listed as a Sensitive Species by the U.S. Forest Service, Region 3.

As part of the Sonoran Desert Conservation Plan (SDCP), Pima County intends to develop population or habitat goals for this and other special status species. These goals may include efforts to introduce or re-establish Huachuca water umbel. As part of the endeavor, Pima County Flood Control District (PCFCD) implemented a survey for Huachuca water umbel at Cienega Creek Preserve, Bingham Cienega Preserve, and the La Cebadilla Property because each contains habitat types that have potential to be suitable for the species. The location of each of these survey areas is illustrated in Figure 1. Prior to this study, no thorough surveys for Huachuca water umbel had been conducted within these locations.

PREVIOUS INFORMATION

Life History and Habitat Requirements

Huachuca water umbel inhabits cienegas, marshes, rivers, streams, and springs, generally in perennial, shallow and slowly flowing waters. The plant has yellowish-green or bright green leaves that are cylindrical, hollow, and have septa (thin partitions) at regular intervals. The leaves are slender and erect and are generally one to two inches tall, but can reach up to eight inches in height. This subspecies reproduces both sexually by flowering and seed production, and asexually by rhizomes (USFWS, 62 FR 3, 1997).

Flowering has been observed from March through October (Warren *et al.* 1991). The inflorescence consists of an umbel that arises from the rhizome with three to ten tiny flowers. The fruits are globose and are usually slightly longer than wide (Affolter 1985).

Survival of individual plants is impossible to assess because of the predominantly asexual method of reproduction. A "population" or "metapopulation," may be comprised of one or more genetically distinct individuals (USFWS, 64 FR 132, 1999a). Each drainage that the plant inhabits constitutes a segment of the metapopulation; groupings or clusters of plants within each drainage can expand and contract quickly or disappear altogether in response to seasonal hydrological conditions.

Huachuca water umbel has an opportunistic strategy that ensures its survival in healthy riverine systems, cienegas, and springs (USFWS, 62 FR 3, 1997). The species appears to be dependant on the presence of "refugia" where individuals can escape the effects of scouring floods. These types of refugia are found in watersheds that have an unaltered hydrograph and healthy riparian communities that stabilize drainage channels. Under the right conditions, a patch of Huachuca water umbel can rapidly expand; however, entire patches are sometimes lost during intense floods or are greatly reduced as a result of competition with other species.

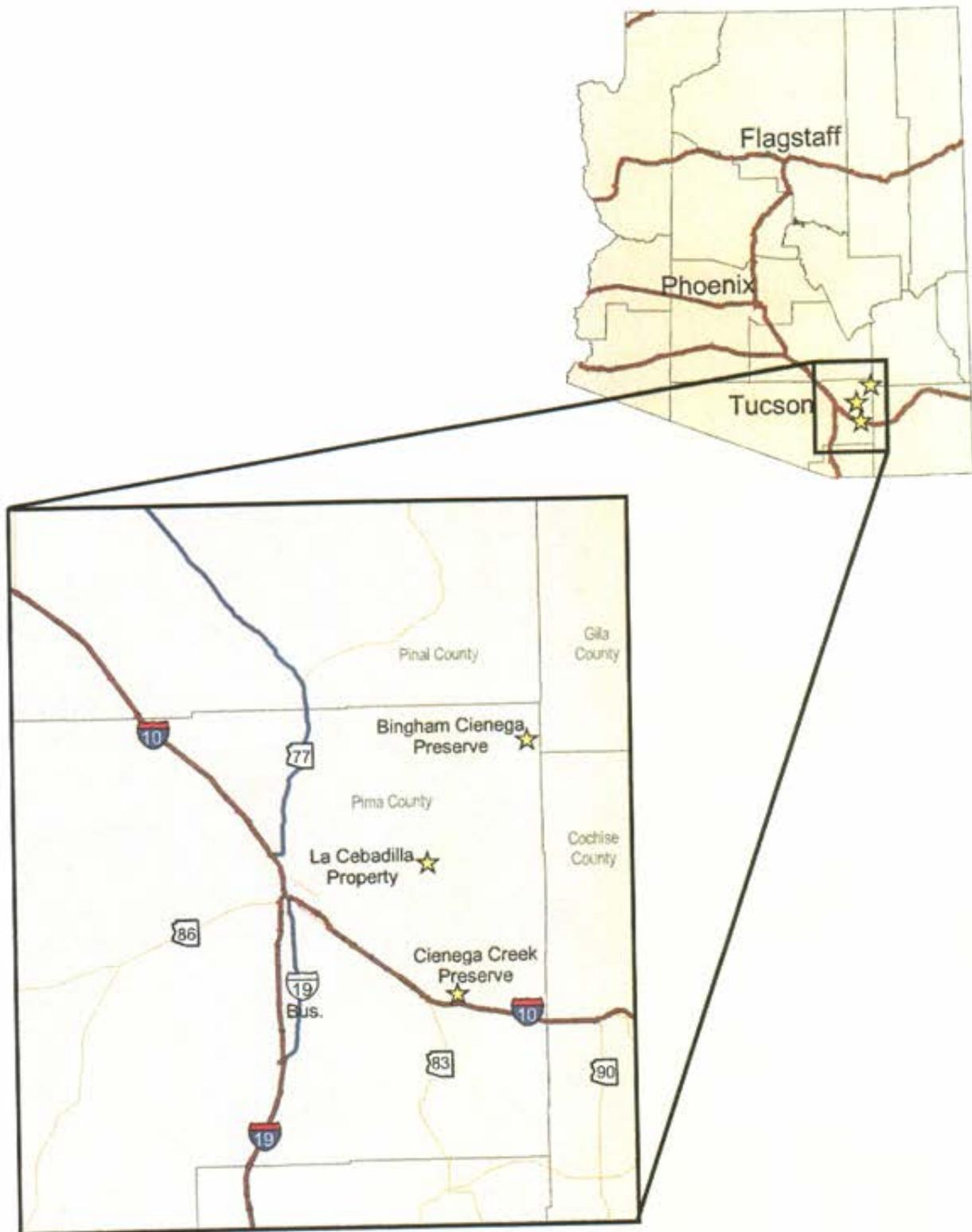


Figure 1: Location of Study Surveys



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Known Distribution and Occurrences

Prior to this study, Huachuca water umbel was documented from 26 sites in Santa Cruz, Cochise and Pima Counties, Arizona and adjacent Sonora, Mexico. The plant has been extirpated from 6 of these sites. Known extant sites occur within an elevational range of 3500 to 6500 feet within four major watersheds: the San Pedro River, Santa Cruz River, Rio Yaqui, and Rio Sonora.

Historically, Huachuca water umbel occurred within the floodplain of the Santa Cruz River in Tucson, however, that population was extirpated as changes in the habitat accompanied land altering activities and water withdrawals from the River. At the time of this study, the only known extant sites within Pima County occurred in Empire Gulch in the Las Cienegas National Conservation Area (formerly Empire-Cienega Resource Area).

DESCRIPTION OF THE SURVEY AREAS

Cienega Creek Natural Preserve

The Cienega Creek Natural Preserve was acquired by PCFCD in 1986 in recognition of its value as one of the region's few remaining perennial streams. The preserve is located in unincorporated eastern Pima County and encompasses a 12-mile stream reach from the former corners of the Empirita Ranch to Colossal Cave Road. The preserve includes 3,979 acres of habitat and is open to the public on a limited permit basis.

The preserve lies within SDCP Watershed Subarea Planning Unit 2 and is within the Rillito Watershed (EPA #15050302).

Eight stream survey segments known to have perennial flow were selected for examination during this study.

Bingham Cienega Preserve

Bingham Cienega Preserve was acquired by PCFCD in 1989 in order to protect a spring-fed marsh and forested wetland and a portion of riparian habitat along the Lower San Pedro River. The preserve is located in unincorporated eastern Pima County just north of Redington along the west side of the lower San Pedro River and encompasses 285 acres. The preserve is managed under contract by The Nature Conservancy and is not open for public visitation.

The preserve lies within SDCP Watershed Subarea Planning Unit 1 and is within the Lower San Pedro Watershed (EPA #15050203).

Four survey segments with wetland attributes were selected for examination during this study.

La Cebadilla Property

The La Cebadilla Property was acquired by PCFCD in order to protect the adjacent Tanque Verde Creek from further channel disturbance. The property is located in unincorporated eastern Pima County just south of Redington Road and approximately four miles east of the City of Tucson. The property encompasses approximately 10 acres. A spring is located on the parcel directly north of the subject property, and subsurface water supports a variety of wetland plants on both properties.

The La Cebadilla Property lies within SDCP Watershed Subarea Planning Unit 4 and is within the Rillito Watershed (EPA #15050302).

Three survey segments were delineated for examination during this study.

METHODS

Locating Huachuca water umbel within its restricted habitat takes practice (Warren et al., 1991). The species is difficult to find because of its small size and superficial resemblance to many small wetland plants and the seedlings of larger wetland plants with which the species often grows as illustrated in Figure 2.



Figure 2. Cattail Seedlings Look Superficially Similar to Huachuca Water Umbel.

Survey methods for this study consisted of a team of two biologists who slowly walked parallel transects along appropriate habitats. Each biologist who participated in the survey had prior experience locating and identifying Huachuca water umbel in field environments. In most cases, transects extended along the wetted edge of a drainage. Plant communities were slowly and meticulously searched for the presence of the target plant. Off-channel habitats were also explored and surveyed if appropriate habitat was present. Each survey area was thoroughly searched on at least two separate occasions. Surveys took place during the months of May and June, 2001. In addition, each of the subject areas were evaluated in terms of the ability of the area to serve as a potential introduction site for the species.

Survey segments, potential introduction sites, and other subjects of interest were photographed during the surveys. Locations were determined using a Garmin II Plus handheld Global Positioning System (GPS) unit in conjunction with USGS topographical maps. The manufacturer originally stated that the accuracy of this unit was 15 meters (49 feet); however, because intentional degradation of GPS signals by the U. S. Defense Department ended in Year 2000, GPS location accuracy of 1-5 meters (3-15 ft.) is possible and accuracy within 1 meter (3 ft.) is most likely. Information regarding the exact locations of plant populations and data regarding site conditions and plant community compositions were provided to PCFCD, U.S. Fish and Wildlife Service (USFWS), and Arizona Heritage Data Management System (HDMS) during the course of the study.

RESULTS

Cienega Creek Natural Preserve

One small population of Huachuca water umbel was detected at Cienega Creek Natural Preserve. The entire population is 4 inches by 12 inches and comprises 11 clusters totaling 30 leaves that are connected by a rhizome (Figure 3).



Figure 3. Huachuca Water Umbel Population at Cienega Creek.

The plants were found at the edge of a channel in a large marshy area. This portion of the creek widens and is best characterized as a large, broad cattail marsh bordered by riparian forest. At the time the plants were discovered the soil was saturated but no surface water was present in the location of the plants. The substrate is sand. The area surrounding the detected plants was searched intensively on two other occasions, but no other plants were discovered.

Potential introduction sites within the Preserve are numerous and diverse in character. The sites that appear most appropriate for introduction occur as side channels (Figure 4) and small off-channel microsites at the edge of the main channel (Figure 5). An extensive forested wetland is present south of the main channel and offers a variety of hydrological conditions that are potentially suitable for this species. All of these sites are generally less susceptible to intensive scouring during flooding and contain silty clay loams that are likely to be more favorable for persistence of Huachuca water umbel than the sandy substrates found in the main channel. Sites range from heavily shaded to relatively sunny locations. It is important to bear in mind that those sites that are heavily shaded in the summer may be sunny during winter months when deciduous trees have lost their leaves.



Figure 4. Cienega Creek Side Channel and Potential Introduction Site.

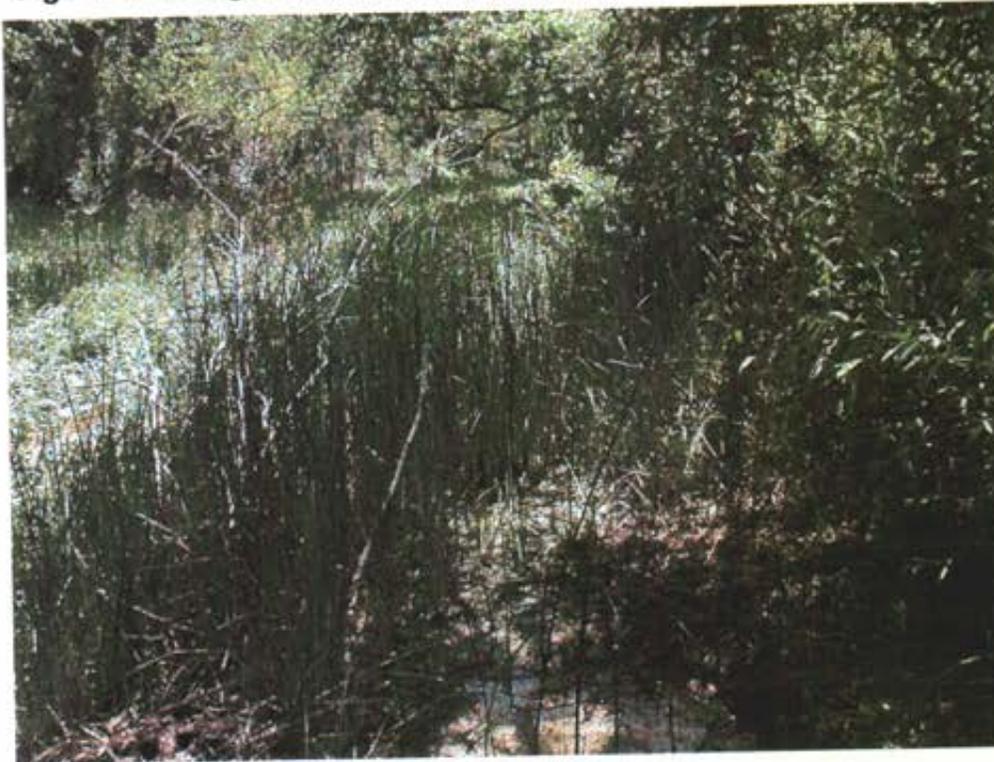


Figure 5. Off-channel Microsite at the Edge of the Main Channel of Cienega Creek.

Several other species of interest documented during our surveys at Cienega Creek Natural Preserve are listed in Table 1 along with their regulatory status

Common and Scientific Name	SDCP	USFWS	AGFD	USFS Region 3
Arizona giant sedge <i>Carex ultra</i>	Considered Rare; Status unknown	None	None	Sensitive
longfin dace <i>Agosia chrysogaster</i>	Priority Vulnerable Species	Species of Concern	Wildlife of Special Concern in Arizona	Sensitive
lowland leopard frog <i>Rana yavapaiensis</i>	Priority Vulnerable Species	Species of Concern	Wildlife of Special Concern in Arizona	Sensitive
Mexican garter snake <i>Thamnopsis eques megalops</i>	Priority Vulnerable Species	Species of Concern	Wildlife of Special Concern in Arizona	Sensitive

Table 1. Species of Interest Documented at Cienega Creek Natural Preserve.

Habitat that appears to be appropriate for Southwestern willow flycatcher, a species that is listed as endangered by USFWS, is present within the Preserve. We did not detect this species during our surveys, however most of the surveys were conducted prior to the onset of the breeding season for this species. Many non-native species, including bullfrog and tamarisk, were also noted during our surveys.

Bingham Cienega Preserve

A large metapopulation of Huachuca water umbel was detected at Bingham Cienega Preserve (Figure 6). A metapopulation is defined as a set of local populations that interact via individuals moving among populations (Hanski and Gilpin, 1991). The Huachuca water umbel metapopulation at Bingham Cienega Preserve consists of scattered groups of plants that extend throughout the Preserve, wherever plant competition is relatively low and water is consistently available at or very close to the surface.

At the time of our survey, many of the plants were flowering and some supported maturing seeds. The plants were growing in silty clay loam with 4 inches of surface water. A collection of Huachuca water umbel from Bingham Cienega Preserve was deposited at the University of Arizona herbarium.



Figure 6. Huachuca Water Umbel at Bingham Cienega Preserve.

Although Huachuca water umbel currently exists at Bingham Cienega Preserve, valuable opportunities for introduction of the species also exist. A spring-fed wetland (Figure 7) offers a variety of microsites, and a wide array of site-specific conditions. Although much of the area is heavily shaded, the canopy is deciduous, and Huachuca water umbel populations may be able to capture adequate sunlight for photosynthesis in early spring before the trees leaf out (Warren, Pers. Comm., 2001). Some areas are densely vegetated and plant competition is high, but scattered openings with low plant densities exist throughout the wetland. Multiple introductions in this portion of the preserve could allow insight into the habitat features that allow this plant to persist.



Figure 7. Spring-fed Wetland Located at Bingham Cienega Preserve.

The portion of the San Pedro River that flows through the Preserve does not appear to be a favorable introduction site because this portion of the river channel is fairly incised and few microsites exist that offer stable substrates and refuge from intensive scouring.

La Cebadilla Property

Huachuca water umbel was not found at the La Cebadilla Property, although habitats that support hydrophytic plants commonly found in wetland meadows are present (Figure 8). It is possible that Huachuca water umbel was once present in the subject area, and historic alteration of hydrology within the area including the construction of berms and drainage channels did not allow the species to persist. Surface water was present only as isolated puddles in Tanque Verde Creek at the time of the surveys.

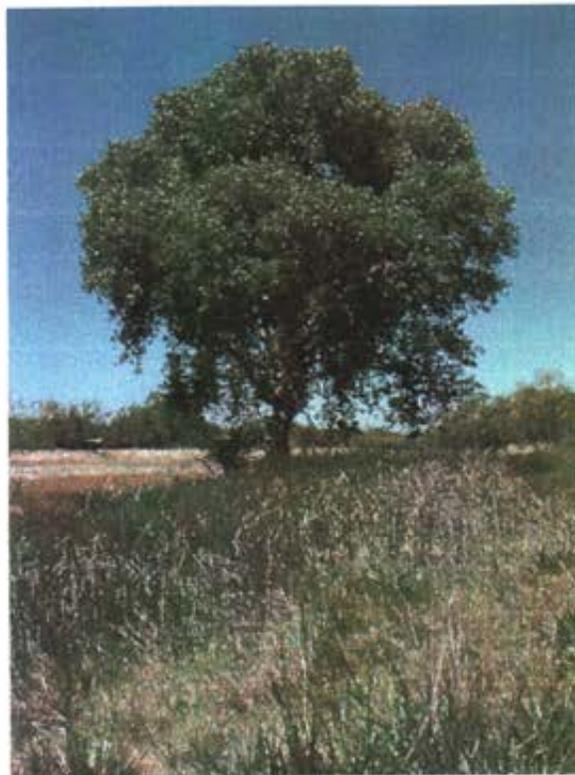


Figure 8. La Cebadilla Property-View of Wet Meadow.

Another species of interest documented during our surveys of the La Cebadilla property is ribbon button snakeroot (*Eryngium sparganophyllum*). The only known record for this plant in Pima County was at Agua Caliente Ranch and it was last documented in 1910 (Falk, Pers. Comm., 2001). Ribbon button snakeroot was thought to have been extirpated from Arizona when Pantano Wash dried, and urbanization took much of the area (Jenkins, Pers. Comm., 2001). Several hundred plants are present in the general subject area; most are located on the property north of the PCFCD property. Also present within the meadow is blue-eyed grass (*Sisyrinchium demissum*). According to Kearny and Peebles Arizona Flora (1951), this species generally occurs at elevations greater than 5000 feet. Collections of both ribbon button snakeroot and blue-eyed grass from the La Cebadilla property were deposited at the University of Arizona herbarium.

CONCLUSIONS AND RECOMMENDATIONS

The results of this study revealed that the range of Huachuca water umbel extends further north than previously known. Furthermore, the metapopulations documented herein are located at lower elevations than any other extant locations. Because the species is adapted to disturbance and is found in a wide range of ecological settings, it should be recognized that sites formerly considered unlikely to support Huachuca water umbel populations should be periodically checked for the presence of the species. Additionally, assumptions regarding the potential presence of this species throughout Pima County should be re-examined, and further surveys may be warranted, especially within the Lower San Pedro watershed in Cochise, Pima and Pinal Counties.

The presence of such a small population at Cienega Creek is perplexing. It is possible that a plant fragment washed downstream during winter flooding, perhaps from a portion of the creek that was not examined during this survey, or that the population originated from seed that germinated this spring.

Huachuca water umbel requires mild disturbances that cause the plant community to remain in early seral stages (USFWS 1999). Currently, the marsh at Bingham Cienega is subjected to fire and drought, which may effectively maintain the plant communities in early seral stage conditions. In spring of Year 2000, the marsh burned. In summer of 2000, the cienega desiccated due to drought. The discovery of Huachuca water umbel at Bingham Cienega Preserve indicates that the species is able to persist, and perhaps even flourish, through these habitat alterations. In the future, population monitoring would enable an assessment of the effects of these disturbances on the health and stability of the population.

Riparian and wetland habitats near Tanque Verde Creek are at risk due to development pressures and groundwater pumping which impairs streamflow and shallow groundwater conditions. The documentation of ribbon button snakeroot and blue-eyed grass within the La Cebadilla property illustrates the value of wetland communities in the region and underscores the importance of protecting these diverse and endangered habitats.

Appropriate habitats for the introduction of Huachuca water umbel are present within Cienega Creek Natural Preserve and Bingham Cienega Preserve. Habitats at La Cebadilla may potentially become appropriate for introduction of Huachuca water umbel if the hydrological connection between the spring to the north and the subject property were restored. Our current knowledge regarding the life history and ecology of this species suggests that the most successful sites would be those with perennial surface water with slow flow, low intra-specific plant competition, high organic matter soils, and minimal shade.

Much is still unknown regarding the life history requirements of this plant. For this reason, plantings of many small plugs along transects that traverse numerous microsite types would most likely provide the best results and, if monitored, would add to the knowledge base regarding this species' unique requirements.

Anthropogenic disturbances to plant communities, including trampling by cows, horses and humans, and damage caused by all-terrain vehicle traffic was evident within all of the survey areas. The potential consequences of these disturbances on Huachuca water umbel and potential habitat for the species are unclear. Potential alteration of native species assemblages by invasive non-native plants may pose a threat to Huachuca water umbel and other wetland species as well.

PREPARERS AND CONTRIBUTORS

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Thanks to Tony Burgess, Mima Falk, Phil Jenkins, Eric Stanford, Daniel Stanford, and Jonathan Titus for volunteer assistance with this project.

REFERENCES

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PERSONAL COMMUNICATIONS

- Falk, Mima. Botanist. U.S. Fish and Wildlife Service. Tucson, Arizona. Electronic Mail communication with Priscilla Titus of EEC on June 19, 2001.
- Jenkins, Phil. Interim Curator, University of Arizona Herbarium. Tucson, Arizona. Electronic Mail communication with Priscilla Titus of EEC on June 18, 2001.
- Warren, Peter. Botanist, The Nature Conservancy. Tucson, Arizona. Conversation with Priscilla Titus of EEC on May 8, 2001.