United States Department of the Interior

U.S. Fish and Wildlife Service
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 FAX: (602) 242-2513

In Reply Refer To:

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02-21-04-F-0484

December 14, 2004

Memorandum

To: Refuge Manager, San Bernadino and Leslie Canyon National Wildlife Refuges, Douglas, Arizona

From: Field Supervisor, Arizona Ecological Services Field Office, Phoenix, Arizona

Subject: Intra-Service Biological Opinion Regarding Huachuca Water Umbel (*Lilaeopsis schaffneriana* ssp. *recurva*) Research and Management

This memorandum is in response to your July 28, 2004, request for initiation of formal consultation on research and transplant efforts for Huachuca water umbel (HWU) (*Lilaeopsis scaffneriana* ssp. *recurva*) on the Leslie Canyon National Wildlife Refuge (LCNWR), in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq., Act). This biological opinion was prepared based on information provided in your July 28, 2004, Biological Evaluation and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file in the Arizona Ecological Services Field Office, Phoenix, Arizona.

Consultation History

- May 20, 2004, Biological Evaluation for HWU manipulations sent to us.
- July 22, 2004, Field trip to LCNWR to view and discuss the project; as a result of our discussions, the determination of effects to HWU were changed from may affect, not likely to adversely affect to likely to adversely affect.
- July 28, 2004, Revised Biological Evaluation received with a request for formal consultation.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action entails removing fourteen 7.5 x 7.5 cm. patches of HWU from the streambank of Leslie Creek. The plants will be taken to greenhouses at Refuge headquarters and exposed to various environmental treatments to determine how to best propagate HWU. Once the plants are stablized and reproducing, patches will be moved and transplanted to wetlands located at San Bernadino NWR. The wetlands that will receive plants are Tule springrun, Tule II, Twin II, and McKinley's. The plants will be placed in different microhabitats and monitored to determine their growth and expansion. Placement of HWU at other sites on the Refuge will be guided by the results of this work.

HUACHUCA WATER UMBEL

Status of the Species

We listed the Huachuca water umbel as an endangered species on January 6, 1997 (USFWS 1997). Critical habitat was designated on the upper San Pedro River; Garden Canyon on Fort Huachuca; and other areas of the Huachuca Mountains, San Rafael Valley, and Sonoita Creek on July 12, 1999 (USFWS 1999). The umbel is an herbaceous, semiaquatic perennial plant with slender, erect leaves that grow from creeping rhizomes. The leaves are cylindrical, hollow with no pith, and have septa (thin partitions) at regular intervals. The yellow/green or bright green leaves are generally 0.04-0.12 in. in diameter and often 1-2 in. tall, but can reach up to 8 in. tall under favorable conditions. Three to ten very small flowers are borne on an umbel that is always shorter than the leaves. The fruits are globose, 0.06-0.08 in. in diameter, and usually slightly longer than wide (Affolter 1985). The species reproduces sexually through flowering and asexually from rhizomes, the latter probably being the primary reproductive mode. An additional dispersal opportunity occurs as a result of the dislodging of clumps of plants which then may reroot in a different site along aquatic systems.

The Huachuca water umbel was first described by Hill (1926) based on the type specimen collected near Tucson in 1881. Hill applied the name *Lilaeopsis recurva* to the specimen, and the name prevailed until Affolter (1985) revised the genus. Affolter applied the name *L. schaffneriana* ssp. *recurva* to plants found west of the continental divide.

The Huachuca water umbel has been documented from 27 sites in Santa Cruz, Cochise, and Pima counties, Arizona, and in adjacent Sonora, Mexico, west of the continental divide (Haas and Frye 1997, Saucedo 1990, Warren *et al.* 1989, Warren *et al.* 1991, Warren and Reichenbacher 1991, Service files). The plant has been extirpated from 6 of the 27 sites. The 21 extant sites occur in four major watersheds - San Pedro River, Santa Cruz River, Rio Yaqui, and Rio Sonora. All sites are 3,500 to 6,500 ft. in elevation.

The Huachuca water umbel has an opportunistic strategy that ensures its survival in healthy riverine systems, cienegas, and springs. In upper watersheds that generally do not experience scouring floods, the umbel occurs in microsites where interspecific plant competition is low. At these sites, the umbel occurs on wetted soils interspersed with other plants at low density, along the periphery of the wetted channel, or in small openings in the understory. The upper Santa Cruz River and associated springs in the San Rafael Valley, where a population of Huachuca water umbel occurs, is an example of a site that meets these conditions. The types of microsites required by the umbel were generally lost from the main stems of the San Pedro and Santa Cruz rivers when channel entrenchment occurred in the late 1800's to early 1900's. Habitat on the upper San Pedro River is recovering, and Huachuca water umbel has recently been found along short reaches of the main channel.

In stream and river habitats, Huachuca water umbel can occur in backwaters, side channels, and nearby springs. After a flood, it can rapidly expand its population and occupy disturbed habitat until interspecific competition exceeds its tolerance. This response was recorded at Sonoita Creek in August 1988, when a scouring flood removed about 95 percent of the Huachuca water umbel population (Gori *et al.* 1990). One year later, the umbel had recolonized the stream and was again codominant with watercress, *Rorippa nasturtium-aquaticum* (Warren *et al.* 1991). The expansion and contraction of Huachuca water umbel populations appear to depend on the presence of "refugia" where the species can escape the effects of scouring floods, a watershed that has an unaltered hydrograph, and a healthy riparian community that stabilizes the channel.

Density of umbel plants and size of populations fluctuate in response to both flood cycles and site characteristics. Some sites, such as Black Draw, have a few sparsely-distributed clones, possibly due to the dense shade of the even-aged overstory of trees, dense nonnative herbaceous layer beneath the canopy, and deeply entrenched channel. The Sonoita Creek population occupies 14.5 percent of a 500.5 square meter (5,385 square foot) patch of habitat (Gori *et al.* 1990). Some populations are as small as 1-2 square meters (11-22 square feet). The Scotia Canyon population, by contrast, has dense mats of leaves. Scotia Canyon contains one of the larger Huachuca water umbel populations, occupying about 57 percent of the 1,450 meter (4,756 foot) perennial reach (Gori *et al.* 1990, Falk and Warren 1994).

While the extent of occupied habitat can be estimated, the number of individuals in each population is difficult to determine because of the intermeshing nature of the creeping rhizomes and the predominantly asexual mode of reproduction. A "population" of Huachuca water umbel may be composed of one or many genetically distinct individuals.

Overgrazing, mining, hay harvesting, timber harvest, fire suppression, and other activities in the nineteenth century led to widespread erosion and channel entrenchment in southeastern Arizona streams and cienegas when above-average precipitation and flooding occurred in the late 1800's and early 1900's (Bahre 1991, Bryan 1925, Dobyns 1981, Hastings and Turner 1980, Hendrickson and Minckley 1984, Martin 1975, Sheridan 1986, Webb and Betancourt 1992, Hereford 1993). A major earthquake near Batepito, Sonora, approximately 40 miles south of the upper San Pedro Valley, resulted in land fissures, changes in groundwater elevation and spring

flow, and may have preconditioned the San Pedro River channel for rapid flood-induced entrenchment (Hereford 1993, Geraghty and Miller, Inc. 1995). These events contributed to long-term or permanent degradation and loss of cienega and riparian habitat on the San Pedro River and throughout southern Arizona and northern Mexico. Much habitat of the Huachuca water umbel and other cienega-dependent species was presumably lost at that time.

Wetland degradation and loss continues today. Human activities such as groundwater overdrafts, surface water diversions, impoundments, channelization, improper livestock grazing, chaining, agriculture, mining, sand and gravel operations, road building, nonnative species introductions, urbanization, wood cutting, and recreation all contribute to riparian and cienega habitat loss and degradation in southern Arizona. The local and regional effects of these activities are expected to increase with the increasing human population.

Dredging extirpated the Huachuca water umbel from House Pond, near the extant population in Black Draw (Warren *et al.* 1991). The umbel population at Zinn Pond in St. David near the San Pedro River was probably lost when the pond was dredged and deepened. This population was last documented in 1953 (Warren *et al.* 1991).

Livestock grazing can affect the umbel through trampling and changes in stream hydrology and loss of stream bank stability. However, existence of the umbel appears to be compatible with well-managed livestock grazing (Service 1997). In overgrazed areas, stream headcutting can threaten cienegas where the umbel occurs. Such headcutting occurs at Black Draw just south of the international boundary and at Los Fresnos, in the San Rafael Valley, Sonora. Groundwater pumping has eliminated habitat in the Santa Cruz River north of Tubac and threatens habitat in the San Pedro River. Portions of the San Pedro River occupied by the umbel could be dewatered within a few years unless measures are implemented very soon to halt or mitigate groundwater pumping in the Sierra Vista-Fort Huachuca area (ASL 1998). Severe recreational impacts in unmanaged areas can compact soils, destabilize stream banks, and decrease riparian plant density, including densities of the Huachuca water umbel. Populations in Bear Canyon in the Huachuca Mountains have been impacted by trampling and OHVs.

A suite of nonnative plant species has invaded wetland habitats in southern Arizona (Stromberg and Chew 1997), including those occupied by the Huachuca water umbel (Arizona Department of Water Resources 1994). In some cases their effect on the umbel is unclear. However, in certain microsites, the nonnative Bermuda grass, *Cynodon dactylon*, may directly compete with the umbel. Bermuda grass forms a thick sod in which many native plants are unable to establish. Watercress is another nonnative plant now abundant along perennial streams in Arizona. It is successful in disturbed areas and can form dense monocultures that can outcompete Huachuca water umbel populations.

Limited numbers of populations and the small size of populations make the Huachuca water umbel vulnerable to extinction as a result of stochastic events that are often exacerbated by habitat disturbance. For instance, the restriction of this taxon to a relatively small area in southeastern Arizona and adjacent Sonora increases the chance that a single environmental catastrophe, such as a severe tropical storm or drought, could eliminate populations or cause

extinction. Populations are in most cases isolated, as well, which makes the chance of natural recolonization after extirpation less likely. Small populations are also subject to demographic and genetic stochasticity, which increases the probability of population extirpation (Shafer 1990, Wilcox and Murphy 1985).

Environmental Baseline

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

HWU was known to occur at SBNWR, but it was apparently extripated by some dredging activity in the 1990's. The species occurs along the banks of Leslie Creek, within LCNWR. The amount of area occupied by HWU in Leslie Creek is estimated to be 27.11 m^2. Patch size and density of HWU varies along Leslie Creek; but, overall the population seems stable. The Refuge has raised concerns regarding the long-term persistence of HWU at this site. U.S. Geological Service (USGS) maintains a flow monitoring station along Leslie Creek and must periodically remove soil and vegetation from around the gauge. HWU patches have been removed during these activities. The Refuge will now coordinate with USGS and salvage HWU for their transplant work. In 2003, a trespass bull was found in the Leslie Creek area, and it trampled HWU and habitat. In addition, water levels have been declining in Leslie Canyon. For these reasons and since the species is known only from this site on the LCNWR, the refuge would like to establish other populations, especially in areas on SBNWR that previously supported the species, to ensure the persistence of HWU on the Refuge.

The action area is defined as those areas within SBNWR and LCNWR that are currently occupied by HWU or have the ability to support HWU. This will give the refuge staff the maximum flexibilty, in consultation with us, to decide the best locations for the HWU transplants. Previous Federal actions that have been consulted on in the action area are: Tule Spring Restoration (02-21-03-F-0261) and Reintroduction of Yaqui catfish and Yaqui sucker on SBNWR (02-21-97-F-0143).

Effects of the Action

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, which will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

The removal of HWU plants from their habitat will most likely result in the mortality of some plants. Not all plants will survive in the greenhouse environment, and some plants will not survive the transplant effort. A reintroduction effort undertaken by The Nature Conservancy in Sonoita Creek resulted in the mortality of all transplanted patches (P. Warren, pers. comm.). Less than 2% of the HWU population at Leslie Creek will be removed. We believe that the long-term benefits of investigating the appropriate techniques for propagation and the potential for the establishment of new populations outweigh the short-term adverse effects of some HWU mortality. If successful, these actions will contribute to the recovery of the species. We are not anticipating any indirect effects as a result of these actions. We have designated critical habitat for HWU, but the action area is not within critical habitat. Therefore, these actions will not affect HWU critical habitat.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The action area is defined as the SBNWR and LCNWR; therefore all proposed activities within the action area will be subject to future section 7 consultattion if they may affect listed species. There are the ongoing border issues (heavy human use across all lands) in this area that may degrade HWU habitat in the Refuge. Areas with water are usually high-use areas.

Conclusion

After reviewing the curent status of HWU, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of HWU. No critical habitat occurs within the action area; therefore, none will be affected. In making our determination we considered the following:

- The overall status of HWU seems stable. The proposed actions, if successful, will result in the establishment of additional populations in areas that previously supported the species. We believe these actions will contribute to the species' conservation and recovery, along with providing useful information that may be valuable for the recovery plan. We acknowledge the short-term adverse effects (some HWU mortality), but we believe these are outweighed by the beneficial effects of the action.

- Human traffic associated with undocumented alien and drug smuggler migration contribute to HWU habitat degradation. The establishment of additional populations of HWU will help ensure the continued existence of HWU on the Refuge.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law. Your actions are covered under our Regional pemit.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

> We recommend that detailed records are kept of the results from the greenhouse work and transplant efforts. These reports will be important for future recovery actions.

REINITIATION NOTICE

This concludes formal consultation on your proposed HWU recovery actions on SBNWR and LCNWR. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate your efforts to recover endangered species. If we can be of further assistance, please contact Mima Falk (520) 670-6150 (x225) or Sherry Barrett (520) 670-6150 (x223). Please refer to consultation number 02-21-04-F-0484 in future correspondence regarding this project.

/s/ Steven L. Spangle

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)

Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ

Arizona Department of Agriculture, Phoenix, AZ (Attn: Jim McGinnis)
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ

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