

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:
AESO/SE
22410-2007-F-0324

June 19, 2007

Mr. Doug Hardy
District Ranger
Sierra Vista Ranger District
Coronado National Forest
5990 South Highway 92
Hereford, Arizona 85615

Dear Mr. Hardy:

This letter constitutes our biological opinion (BO) for the proposed Scotia Canyon Riparian Restoration Project, Huachuca Mountains, Cochise County, Arizona. We received your May 9, 2007 request for formal consultation on May 10, 2007. In that request, and in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*), you determined that the proposed action may adversely affect the endangered Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*) and its critical habitat. You also requested our concurrence that the proposed action may affect, but is not likely to adversely affect, the threatened Mexican spotted owl (*Strix occidentalis lucida*, MSO), the threatened Chiricahua leopard frog (*Rana chiricahuensis*), and the endangered Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*). Our concurrences are provided in Appendix A.

This BO is based on information provided in the May 9, 2007, biological assessment (BA), discussions with your staff, and information in our files. Literature cited in this BO is not a complete bibliography of all literature available on the species of concern, riparian restoration projects and their effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

CONSULTATION HISTORY

-February 15, 2000: A field trip to Scotia Canyon was attended by numerous Coronado National Forest and Fish and Wildlife Service personnel, as well as Tom Moody, a hydrologist. Options for restoring the hydrology and biological diversity of the canyon were discussed. This initial trip resulted in a proposal from Tom Moody to the Coronado National Forest and subsequent proposals by the Sky Island Alliance and others to the Arizona Water Protection Fund. None of these proposals were funded. Additional

meetings were held in 2007 to discuss restoration options. The current proposal is a result on interagency collaboration, as well as coordination with stakeholders, the Nature Conservancy, and Sky Island Alliance.

-May 10, 2007: We received your request for formal consultation. The Forest Service asked that we not provide a draft biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Sierra Vista Ranger District proposes to modify four existing water impoundments in Scotia Canyon, Huachuca Mountains, to eliminate habitat for non-native American bullfrogs (*Rana catesbeiana*) and to restore more natural cienega and riparian function. Road work is also proposed to halt erosion and gullyng that is occurring along the Scotia Canyon access road. The following work is proposed:

Peterson Pond: This is the lower impoundment, constructed across the stream channel. A headcut on the south side of the berm threatens to cause massive erosion and sedimentation in the channel. Using exposed bedrock in the existing channel as a vertical control feature, the Forest Service will excavate a new channel from the headcut-damaged spillway into the pond to the depth of the pond bottom. The existing meander through the pond will be left undisturbed. The new channel slope from the bottom of the spillway to the bottom of the pond will be about 4 percent, which is the natural slope of the channel downstream of the pond. The pond will likely become a wet, boggy area, capable of supporting Huachuca water umbel but not suitable for bullfrog tadpoles. A rubber-treaded excavator with a long reach will be used to dig the channel, and a front-end loader (with backhoe) will be used to remove and spread the dirt on the dam and adjacent surfaces that have been used in the past for this purpose. Rock or bagged cement may be used to prevent headcutting. Additional minor channel modification may be necessary after the new channel has been in place long enough and through at least one wet season to exhibit channel instability.

Travertine Impoundment: This is a small impoundment apparently built on top of what was a travertine spring. It is the next impoundment above the Peterson Pond and is located on the north side of the canyon above the channel. The open water will be removed by lowering the current embankment to the level of the stable travertine formations. Excess material will be used to fill the pond sections. The result will be a gently sloping wetland landscape supported by the natural travertine walls below. If sufficient water were available to produce surface water, it will be allowed to flow over the travertine sideslope into the existing drainage southwest of the wetland. Terrain and depth of cut will determine whether the excavator or backhoe will be used. Care will be taken not to inadvertently create an artificial drainage that could eliminate the wetland through gullyng and/or create a wet or boggy area in the road below.

Peterson Ranch Pond: This is the largest impoundment in the canyon. The perennial pond is fed by Sylvania Spring just above the pond. It is the next pond above the Travertine Impoundment, and like that impoundment, is located on the north side of the canyon above the channel. A

trench with a sluice gate will be constructed below Sylvania Spring, outside the 10 foot legal easement around the spring, to capture and divert the spring flow around the pond while the pond is being drained. Water diversions will not interfere with the legal easement.

Bullfrog removal will be a coordinated effort among the Coronado National Forest, Fish and Wildlife Service, Arizona Game and Fish Department, and other cooperators. Using a siphon, the pond will be drained to the desired depth for removal of bullfrog larvae and adults. Control methods will include gigging, seining, capture by hand, and other methods as appropriate and legal under Arizona Game and Fish Department regulations. Bullfrogs captured using these methods will be euthanized on site. Bullfrog control will take from one to two weeks to complete, at which time the sluice gate will be closed and the spring water will be allowed to re-fill the pond. It is anticipated that some bullfrogs will escape detection, and follow up treatments will be needed. Draining and refilling the pond will be repeated as often as needed based on results from annual monitoring of the bullfrog population in Scotia Canyon. If bullfrogs were detected during the monitoring, we will control them through the afore-mentioned methods.

Upper Impoundment: Located above the Peterson Ranch Pond on the north side of the canyon, this is a permanent, spring fed pond. Lowering or notching the current embankment and allowing overflow to drain through the existing channel will remove habitat for bullfrog tadpoles. This work will be accomplished by hand with shovels and/or with heavy equipment. Terrain and depth of cut will determine whether the excavator or backhoe will be used.

Road Stabilization: In addition to the proposed modifications to impoundments and bullfrog control measures, a limited amount of soil erosion control work will be done on the existing road system, focusing on a few key spots, such as between the Peterson and Travertine ponds. This work will entail constructing water bars and filling in the gullies. Bagged cement and rebar will be used for water bar construction where needed. It is anticipated that approximately 1,500 feet of road surface will be repaired.

CONSERVATION MEASURES

The following conservation measures are part of the proposed action. They are intended to minimize or avoid adverse impacts to sensitive species.

- Best Management Practices will be followed in all treatment areas (Forest Service Handbook FSH 2509.22 entitled Soil and Water Conservation Practices Handbook 12/3/90 version). (<http://www.fs.fed.us/im/directives/dughtml/fsh2000.html>)
- Huachuca water umbel habitat within the impact area will be surveyed prior to construction, and occupied habitat will be marked and avoided to the maximum extent possible.
- Huachuca water umbel critical habitat will be monitored following the project and every other year thereafter, in accordance with the Livestock Grazing BO (2-21-98-F-399-R1).

- Prior to initiating the earthwork, the impoundments will be surveyed for native amphibians and reptiles. Open water areas will be seined where feasible, and all other areas will be surveyed using dipnets.
- Earthwork will occur outside the summer monsoon season (July – August) and when the ground surface is most capable of supporting heavy equipment without causing significant soil compaction or erosion.
- Low ground pressure equipment such as rubber treaded excavator with long reach will be used to reduce need for entering areas with wet soils.
- Sediment filters will be placed in the wetted channel immediately below Peterson Pond.
- Equipment staging and fueling areas and other areas of significant human activity will be located at previously disturbed sites (Arizona trailhead parking area) and not in Huachuca water umbel critical habitat.
- Project personnel will be instructed to not drive vehicles across Scotia Canyon except when no other means of transport to the job site is available and it is essential to have a vehicle in the canyon.
- A Forest Service hydrologist and/or wildlife biologist will be present at the project site or accessible during the earthwork to provide guidance to the heavy equipment operator(s).

HUACHUCA WATER UMBEL

STATUS OF THE SPECIES

The Huachuca water umbel is an herbaceous, semi-aquatic to occasionally fully aquatic, 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 to 0.12 inch in diameter and often 1 to 2 inches tall, but can reach up to 8 inches 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 to 0.08 inch in diameter, and usually slightly longer than wide (Affolter 1985).

On January 6, 1997, we listed the Huachuca water umbel as an endangered species (U.S. Fish and Wildlife Service 1997). Critical habitat was designated on the upper San Pedro River, Garden Canyon on Fort Huachuca, Scotia Canyon and other areas of the Huachuca Mountains, the San Rafael Valley, and Sonoita Creek on July 12, 1999 (U.S. Fish and Wildlife Service 1999). No recovery plan has been developed.

Distribution/Abundance

Huachuca water umbel has been documented from 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).

Lilaeopsis has recently been found at several sites in western Chihuahua (J. Rorabaugh, pers. comm. 2007), but verification to subspecies has not yet occurred. The plant has been extirpated from six sites. The extant sites occur primarily in four major watersheds - San Pedro River, Santa Cruz River, Rio Yaqui, and Rio Sonora. All sites are between 3,500 and 7,250 feet in elevation.

Habitat

The Huachuca water umbel grows in cienegas (marshy wetlands), and along streams, rivers, and springs in southern Arizona and Sonora and Chihuahua, Mexico, typically in mid-elevation wetland communities often surrounded by relatively arid environments (U.S. Fish and Wildlife Service 1997). These wetland communities are usually associated with perennial springs and stream headwaters, have permanently or seasonally saturated highly organic soils, and have a low probability of flooding or scouring (Hendrickson and Minckley 1984). The water umbel can grow in saturated soils or as an emergent in water depths up to about 10 inches. Cienegas support diverse assemblages of animals and plants, of which many species are of limited distribution, such as the Huachuca water umbel (Hendrickson and Minckley 1984). The surrounding non-wetland vegetation can be desert scrub, grassland, oak woodland, or conifer forest (Arizona Game and Fish Department 1997).

Lilaeopsis 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, *Lilaeopsis* occurs in microsites where interspecific plant competition is low. At these sites, *Lilaeopsis* 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. In stream and river habitats, *Lilaeopsis* can occur in backwaters, side channels, and nearby springs. The upper Santa Cruz River and associated springs in the San Rafael Valley, where a population of *Lilaeopsis* occurs, is an example of a site that meets these conditions. The types of microsites required by *Lilaeopsis* were generally lost from the main stems of the San Pedro and Santa Cruz rivers when channel entrenchment occurred in the late 1800s. Habitat on the upper San Pedro River is recovering, and *Lilaeopsis* has recently recolonized small reaches of the main channel.

Cienegas, perennial streams, and rivers in the desert southwest are extremely rare. The Arizona Game and Fish Department (1993) estimated that riparian vegetation associated with perennial streams comprises about 0.4 percent of the total land area of Arizona, with present riparian areas being remnants of what once existed. The State of Arizona (1990) estimated that up to 90 percent of the riparian habitat along Arizona's major desert watercourses has been lost, degraded, or altered.

The physical and biological habitat features essential to the conservation of *Lilaeopsis* include a riparian plant community that is fairly stable over time and not dominated by non-native plant species, a stream channel that is relatively stable but subject to periodic, non-scouring flooding, refugial sites (sites safe from catastrophic flooding), and a substrate (soil) that is permanently wet or nearly so, for growth and reproduction of the plant.

Life History

The Huachuca water umbel flowers from March through October with most flowering in June through August (Arizona Game and Fish Department 1997). The species reproduces sexually through flowering and asexually from rhizomes, the latter probably being the primary reproductive mode. The Huachuca water umbel is also suspected of self-pollination (Johnson *et al.* 1992). An additional dispersal opportunity occurs as a result of the dislodging of clumps of plants, which then may re-root in a different site along aquatic systems (U.S. Fish and Wildlife Service 1997). Fruits develop from July through September and water disperses the seeds (Arizona Game and Fish Department 1997). Seeds from plants grown in an aquarium have been seen sticking to the aquarium sides and germinating 1-2 weeks after falling from the parent plant (Johnson *et al.* 1992).

After a flood, *Lilaeopsis* 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 *Lilaeopsis* 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 non-native herbaceous layer beneath the canopy, and deeply entrenched channel. The Sonoita Creek population occupies 14.5 percent of a 5,385 square foot patch of habitat (Gori *et al.* 1990). Some populations are as small as 11 to 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 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.

Threats

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 1800s and early 1900s (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, non-native 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.

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 areas of Mexico 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).

Critical Habitat

Seven critical habitat units have been designated for Huachuca water umbel; all are in Santa Cruz and Cochise counties, Arizona, and include stream courses and adjacent areas out to the beginning of upland vegetation. The Scotia, Sunnyside, and Bear canyon units (3, 4, and 6) are within the Coronado National Forest. The remaining Units are in lands adjacent to Forest lands. The following general areas are designated as critical habitat (see legal descriptions for exact critical habitat boundaries):

Unit 1-approximately 1.25 mile of Sonoita Creek southwest of Sonoita;

Unit 2-approximately 2.7 miles of the Santa Cruz River on both sides of Forest Road 61, plus approximately 1.9 miles of an unnamed tributary to the east of the river;

Unit 3-approximately 3.4 miles of Scotia Canyon upstream from near Forest Road 48;

Unit 4-approximately 0.7 mile of Sunnyside Canyon near Forest Road 117 in the Huachuca Mountains;

Unit 5- approximately 3.8 miles of Garden Canyon near its confluence with Sawmill Canyon;

Unit 6- approximately 1.0 mile of Rattlesnake Canyon and 0.6 mile of an unnamed canyon, both of which are tributaries to Lone Mountain Canyon; approximately 1.0 mile of Lone Mountain Canyon; and approximately 1.0 mile of Bear Canyon; an approximate 0.6-mile reach of an unnamed tributary to Bear Canyon; and

Unit 7—approximately 33.7 miles of the San Pedro River from the perennial flow reach north of Fairbank (Arizona Department of Water Resources 1991) to 0.13 mile south of Hereford, San Pedro Riparian National Conservation Area.

The primary constituent elements of critical habitat for *Lilaeopsis* include, but are not limited to, the habitat components that provide:

- (1) Sufficient perennial base flows to provide a permanently or nearly permanently wetted substrate for growth and reproduction of *Lilaeopsis*;
- (2) A stream channel that is relatively stable, but subject to periodic flooding that provides for rejuvenation of the riparian plant community and produces open microsites for *Lilaeopsis* expansion;
- (3) A riparian plant community that is relatively stable over time and in which non-native species do not exist or are at a density that has little or no adverse effect on resources available for *Lilaeopsis* growth and reproduction; and
- (4) In streams and rivers, refugial sites in each watershed and in each reach, including but not limited to springs or backwaters of mainstem rivers, that allow each population to survive catastrophic floods and recolonize larger areas.

Activities that may destroy or adversely modify critical habitat include those that alter the primary constituent elements to the extent that the value of critical habitat for both the survival and recovery of *Lilaeopsis* is appreciably diminished. We note that such activities will also likely jeopardize the continued existence of the species.

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 that 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.

The action area includes the project sites (four impoundments, and access road) and areas downstream and upstream of those sites that may be affected. We consider the action area to be along the canyon from approximately 100 feet above the upper impoundment to about 0.5 mile below the Peterson Pond. Descriptions of the four impoundments and associated project areas are contained in the BA for the project.

Scotia Canyon has been surveyed for water umbel at least once every three years beginning in 1995. Most wet reaches of the canyon bottom through the action area support the species. Distribution appears to vary with the availability of moist substrate. The extent of moist substrate is dependent on seasonal and yearly precipitation patterns, changes in riparian

vegetation and stream morphology, and frequency and intensity of flooding. Thus, even if an entire stretch of drainage is mapped to contain Huachuca water umbel, the plant probably does not occur continuously throughout the drainage or at the same frequency every year.

The Scotia Canyon population is most dense and continuous from immediately below the first stream crossing on Forest Road 4759 upstream through the project area for about 0.5 mile. The species has consistently occurred in the stream channel below and above Peterson Pond. Approximately 0.04 acre of habitat occurs along the shoreline of Peterson Pond. In addition to these areas, water umbel is found at the spring-fed impoundments, including approximately 0.02 acre of occupied habitat at the inlet to Peterson Ranch Pond and 0.06 acre of occupied habitat at the Upper Impoundment.

The entire section of stream bottom through the project area is mapped as critical habitat; however, some sections are not perennial and do not support water umbel. Off-channel springs and impoundments are not designated critical habitat.

Activities in Scotia Canyon that affect water umbel and its habitat include recreation, livestock grazing, Border Patrol activities (primarily vehicle patrols), and illegal immigration and smuggling. In regard to recreation and Border Patrol activities, use of the road, which crosses the wetted canyon bottom in several places, directly affects water umbel. The road is also a source of sediment to the stream. Livestock grazing has been the subject of section 7 consultation, and several modifications to the grazing regime in the canyon have been made to improve conditions for water umbel (see U.S. Fish and Wildlife Service 2002 and amendments to that BO).

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 and 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 actions 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 proposed action is anticipated to have short-term direct and indirect adverse effects to the water umbel and its critical habitat; however, in the long term, the species should benefit. Conservation measures that are part of the proposed action will minimize adverse effects, speed recovery of habitat, and reduce the time until benefits are realized.

Direct Effects

Loss of individual plants is anticipated from operation of heavy equipment in occupied habitat, including use of a backhoe or other equipment to restructure impoundments and berms, as proposed. An estimated 0.01 acre of occupied habitat is anticipated to be directly affected (page 10 of the BA). The conservation measures, which include marking occupied habitat and avoiding those areas to the maximum extent possible, use of Best Management Practices,

locating staging and fueling centers outside of critical habitat and in previously disturbed areas, and other such measures act to significantly reduce potential direct adverse effects.

Indirect Effects

Indirect effects may occur to the species and its critical habitat via a number of mechanisms, including 1) downstream sedimentation due to disturbance of soils in and near the channel, 2) temporary drawdown of water at the Peterson Ranch Pond and diversion of water out of the headcut at Peterson Pond, which will reduce, temporarily in the case of Peterson Ranch Pond, and permanently at Peterson Pond, water umbel habitat, 3) reducing the likelihood of a berm failure at the Peterson Pond, which benefits the water umbel and its habitat, 4) repairing eroded areas of the road, which will reduce sediment inflow into the stream and water umbel habitat, but will also likely promote greater use of the road, and 5) reducing open water areas and increasing boggy conditions, which should improve and expand habitat for water umbel.

Incidental discharge of topsoil or pond sediments into the stream where water umbel occurs is anticipated from working upslope of the stream channel. Sediments deposited in the stream channel may smother water umbel; however, the sediments would move downstream with the first major rains. Placement of sediment filters below Peterson Pond and avoiding work in occupied habitat to the extent possible will reduce those effects.

Once repaired, the road through Scotia Canyon may receive more use by vehicles, but that use will probably have fewer indirect effects to water umbel and its habitat because eroded sections of the road will be repaired and sedimentation into the stream should be much reduced, despite possible increased vehicle use. Peterson Ranch Pond will be temporarily drawn down to eliminate bullfrogs. That drawdown will reduce habitat quality for water umbel for one to two weeks, during which time some water umbel on the current margin of the pond may die. However, some rhizomes will likely survive. If work is accomplished during a stormy period, no mortality may occur. If plants are lost, recolonization is anticipated from plants remaining within the wetted area of Sylvania Spring. At Peterson Pond, water currently flowing through the headcut and channel immediately below the headcut will be rerouted through a new channel. Water umbel growing in the channel below the headcut may be killed or reduced as that channel dries out. However, it may not dry out completely due to subflow and bedrock near the surface.

Rerouting and stabilizing the channel below Peterson Pond will reduce or eliminate the risk of catastrophic berm failure at that site. The current headcut threatens to blow out the impoundment and cause a massive erosional and sedimentation event that could decimate water umbel downstream of the impoundment for many hundreds of feet. Water umbel and its critical habitat would benefit from this much reduced risk. Proposed work at all impoundments except the Peterson Ranch Pond will reduce open water and increase boggy conditions. These created or enhanced wet soil habitats should be ideal for water umbel. In time, the species is expected to colonize these new habitats and benefit from their creation.

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.

Only Forest Service lands occur within the action area, thus most activities likely to occur will have some Federal nexus. The effects of such activities are subject to section 7 consultation, and are not cumulative effects. Exceptions include possible private activities in the easement around Sylvania Spring above Peterson Ranch Pond and illegal immigration and smuggling. No private actions are currently anticipated or known at Sylvania Spring. The spring has been used as a water source for cattle. Border Patrol activities have increased along the international boundary, and currently illegal immigration and smuggling are in decline. However, some level of illegal activities will continue to occur in Scotia Canyon for the foreseeable future. Individuals involved in these activities create trails, camp sites, and may start fires. The latter could have catastrophic effects to water umbel and its habitat through ash and sediment flow, and associated erosion of the channel.

CONCLUSION

After reviewing the current status of the Huachuca water umbel and its critical habitat, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is our biological opinion that the action, as described, are neither likely to jeopardize the continued existence of the water umbel, nor likely to result in destruction or adverse modification of water umbel critical habitat. We note that this BO does not rely on the regulatory definition of “destruction or adverse modification” of critical habitat at 50 C.F.R. 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

Our findings are based on the following:

- Although some adverse effects are anticipated to water umbel and its critical habitat, these effects are 1) limited in extent, 2) are largely temporary, and 3) conservation measures proposed as part of the proposed action will much reduce the extent and permanency of those adverse effects.
- In the longer term, water umbel and its critical habitat will benefit due to 1) much reduced likelihood of catastrophic berm failure at Peterson Pond, 2) increased boggy conditions that will increase the extent of water umbel habitat, and 3) repairs to the Scotia Canyon access road that will reduce sedimentation into the stream channel.

INCIDENTAL TAKE STATEMENT

Note that in regard to “take” of listed species in sections 7(b)(4) and 7(o)(2) of the Act, these sections generally do not apply to listed plant species, thus no incidental take statement is included here for the Huachuca water umbel; 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 and malicious damage of such plants on areas under Federal

jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or during any violation of a State criminal trespass law.

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.

1. We recommend that you provide us with a report within 90 days of completion of construction summarizing the work accomplished, effects to water umbel and its critical habitat, as well as an assessment of how well the conservation measures worked and whether adjustments should be considered for similar, future projects.
2. We recommend that you continue to develop long-term resource management planning for the Scotia Canyon area that would comprehensively address the suite of resource issues in the area, including wildfires and fuels management.
3. We recommend that you work with us on reestablishment of the Chiricahua leopard frog and Sonora tiger salamander, as well as conservation of Mexican gartersnake and Huachuca springsnail in Scotia Canyon.
4. When we begin the recovery planning process for water umbel, we invite you to actively participate in plan development, as well as subsequent plan implementation.

In order to keep us informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitat, we request notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the Scotia Canyon Riparian Restoration Project. 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 retained (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 that causes an effect to the 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 a listed species or critical habitat that was 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 consideration of listed species. We also encourage you to coordinate the review of this project with the Arizona Game and Fish Department. For further information, please contact Jim Rorabaugh (520) 670-6150 (x230), or Sherry Barrett (520) 670-6150 (x223). Please refer to the consultation number 22410-2007-F-0324 in future correspondence concerning this project.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc: Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ (Attn: Sherry Barrett)

Forest Supervisor, Coronado National Forest, Tucson, AZ
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ

REFERENCES CITED

- Affolter, J.M. 1985. A Monograph of the Genus *Lilaeopsis* (Umbelliferae). Systematic Botany Monographs Volume 6: 1-140.
- Arizona Department of Water Resources. 1991. Preliminary hydrographic survey report for the San Pedro River watershed. Volume 1: General Assessment. Phoenix, Arizona. 548 pp.
- Arizona Game and Fish Department. 1997. *Lilaeopsis schaffneriana* var. *recurva*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona.
- Arizona Game and Fish Department 1993. Arizona Riparian Inventory and Mapping Project. Phoenix, Arizona.
- Bahre, C.J. 1991. A legacy of change: Historic human impact on vegetation of the Arizona borderlands. University of Arizona Press, Tucson, Arizona. 231 pp.
- Bryan, K. 1925. Date of channel trenching (arroyo cutting) in the arid southwest. Science 62:338-344.
- Dobyns, H.F. 1981. From fire to flood: historic human destruction of Sonoran Desert riverine oases. Ballena Press, Socorro, New Mexico. 222 pp.
- Falk, D. and P.L. Warren. 1994. Rare plants of the Coronado National Forest: Population studies and monitoring recommendations. Report to the Coronado National Forest, Tucson, Arizona.
- Geraghty and Miller, Inc. 1995. Historical flows and conditions in the San Pedro River. Report to the Water Action Task Force, Sierra Vista Economic Development Foundation, Project No. AZ0473.001. 33pp +figures.
- Gori, D.F., P.L. Warren, and L.S. Anderson. 1990. Population studies of sensitive plants of the Huachuca, Patagonia, and Atascosa Mountains, Arizona. Unpublished report. Coronado National Forest, Tucson. 114pp.
- Haas, S.K., and R.J. Frye. 1997. Hydrology and water quality effects on *Lilaeopsis schaffneriana* ssp. *recurva*. Report to Arizona Dept. of Agriculture and Fort Huachuca.
- Hastings, J.R. and R.M. Turner. 1980. The changing mile. University of Arizona Press, Tucson. 327pp.
- Hendrickson, D.A., and W.L. Minckley. 1984. Cienegas - vanishing climax communities of the American southwest. Desert Plants 6(3):131-175.

- Hereford, R. 1993. Geomorphic evolution of the San Pedro River channel since 1900 in the San Pedro Riparian National Conservation Area, southeast Arizona. US Geological Survey, Open File Report 92-339. 71 pp.
- Johnson, K., P.L. Warren, D.F. Gori, and E.S. Monarque. 1992. Species management evaluation, cienega false rush (*Lilaeopsis schaffneriana* ssp. *recurva*). Unpublished report. The Nature Conservancy, Tucson, Arizona.
- Martin, S.C. 1975. Ecology and management of southwestern semidesert grass-shrub ranges: the status of our knowledge. US Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. 39 pp.
- Saucedo Monarque, E. 1990. Proyecto: Prospeccion de plantas raras en el Norte de Sonora. Centro Ecologico de Sonora, Subdireccion de Investigacion, Area de Ecologia Terrestre, Hermosillo, Sonora, Mexico. 65 pp.
- Shafer, C.L. 1990. Nature reserves, island theory and conservation practice. Smithsonian Institution Press, Washington D.C. 189pp.
- Sheridan, T.E. 1986. Los Tucsonenses: the Mexican community in Tucson, 1854-1941. University of Arizona Press, Tucson. 327 pp.
- State of Arizona. 1990. Final report and recommendations of the Governor's riparian habitat task force. Executive Order 89-16. Streams and riparian resources. Phoenix, Arizona. October 1990. 28 pp.
- U.S. Fish and Wildlife Service. 1997. Endangered and threatened wildlife and plants; determination of endangered status for three wetland species found in southern Arizona and Northern Sonora, Mexico. Federal Register 62(3):665-689.
- U.S. Fish and Wildlife Service. 1999. Endangered and threatened wildlife and plants; designation of critical habitat for the Huachuca water umbel, a plant. Federal Register 64 (132); 37441-37453.
- U.S. Fish and Wildlife Service. 2002. Final Biological and Conference Opinion: Continuation of Livestock Grazing on the Coronado National Forest. U.S. Fish and Wildlife Service, Arizona Ecological Services Office, Phoenix, Arizona.
- U.S. Fish and Wildlife Service. 2007. Chiricahua leopard frog recovery plan. U.S. Fish and Wildlife Service, Region 2, Albuquerque, New Mexico.
- Warren, P.L., L.S. Anderson, and P.B. Shaffroth. 1989. Population studies of sensitive plants of the Huachuca and Patagonia Mountains, Arizona. Unpublished Report, Coronado National Forest, Tucson. 99 pp.

- , D.F. Gori, L.S. Anderson, and B.S. Gebow. 1991. Status report for *Lilaeopsis schaffneriana* ssp. *recurva*. US Fish and Wildlife Service, Arizona Ecological Services State Office, Phoenix. 30 pp.
- , and F.R. Reichenbacher. 1991. Sensitive plant survey of Fort Huachuca, Arizona. Unpublished Report for the US Army, Fort Huachuca, Arizona.
- Webb, R.H., and J.L. Betancourt. 1992. Climatic variability and flood frequency of the Santa Cruz River, Pima County, Arizona. US Geological Survey, Water-supply Paper 2379.
- Wilcox, B.A., and D.D. Murphy. 1985. Conservation strategy: The effects of fragmentation on extinction. *American Naturalist* 125:879-887.

Appendix A

CONCURRENCES

This appendix contains our concurrence with your determination that the proposed Scotia Canyon Riparian Restoration Project may affect, but is not likely to adversely affect, the MSO, Chiricahua leopard frog, and Sonora tiger salamander.

Mexican Spotted Owl

The MSO was listed as a threatened species in 1993 (58 FR 14248). A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO is found in the Final Rule listing the MSO as a threatened species (U.S. Fish and Wildlife Service 1993). The entire action area lies within critical habitat. The primary threats to the species are even-aged timber harvest and the threat of catastrophic wildfire, although grazing, recreation, and other land uses are also factors influencing the MSO population. We appointed the MSO Recovery Team in 1993, which produced the recovery plan for the MSO in 1995. The recovery plan is currently being revised and is scheduled for public review in 2007.

We concur with your finding for the MSO based on the following reasons:

- The action area does not overlap any Protected Activity Centers (PACs).
- No records for the species exist in the action area.
- Construction would not occur during the MSO breeding season (February 1 – August 31).
- Specific project areas (roads and impoundments) are lacking constituent elements of critical habitat. No effects to constituent elements are anticipated.

Chiricahua Leopard Frog

The Chiricahua leopard frog was listed as a threatened species without critical habitat in a Federal Register notice dated June 13, 2002. Included was a special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. Threats to this species include predation by non-native organisms, especially bullfrogs, fish, and crayfish; disease; drought; floods; degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, altered fire regimes due to fire suppression and livestock grazing, mining, development, and other human activities; disruption of metapopulation dynamics; increased chance of extirpation or extinction resulting from small numbers of populations and individuals; and environmental contamination. A recovery plan was recently finalized (U.S. Fish and Wildlife Service 2007).

We concur with your finding for the Chiricahua leopard frog based on the following reasons:

- Although the frog occurred historically in Scotia Canyon (last record was 1986), none have been found there since despite numerous surveys. They have likely been eliminated by bullfrog predation and/or other factors.
- The project will improve recovery potential for the species through elimination of bullfrogs and bullfrog habitat. The project could set the stage for future reestablishment of the Chiricahua leopard frog.

Sonora Tiger Salamander

The Sonora tiger salamander was listed as endangered on January 6, 1997. No critical habitat has been proposed or designated. A final recovery plan was finalized in September 2002. Primary threats to the salamander include predation by non-native fish and bullfrogs, diseases, catastrophic floods and drought, illegal collecting, introduction of other subspecies of salamanders that could genetically swamp *A. t. stebbinsi* populations, and stochastic extirpations or extinction characteristic of small populations. Scotia Canyon historically provided habitat for the Sonora tiger salamander, but they have not been observed there since 1995, despite numerous surveys. They may have been eliminated by a combination of factors, including predation by bullfrogs and disease.

We concur with your finding for the Sonora tiger salamander based on the following reasons:

- Although the salamander occurred historically in Scotia Canyon (last record was 1995), none have been found there since despite numerous surveys.
- By eliminating bullfrogs and bullfrog habitat, the proposed action will improve recovery potential for the species, including setting the stage for colonization by salamanders or active reestablishment.