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In Reply Refer To:
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December 31, 2008

Memorandum

To: Field Office Manager, Tucson Field Office, Bureau of Land Management, Tucson, Arizona

From: Field Supervisor

Subject: Biological Opinion on Aquatic Species Conservation at the San Pedro Riparian and Las Cienegas National Conservation Areas, Arizona

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was received by us on October 15, 2007. At issue are impacts that may result from the proposed aquatic species conservation at the San Pedro Riparian (SPRNCA) and Las Cienegas National Conservation Areas (NCAs), in Pima, Cochise, and Santa Cruz counties, Arizona. You requested formal consultation on the endangered Chiricahua leopard frog (*Lithobates [Rana] chiricahuensis*), endangered Gila chub (*Gila intermedia*) with designated critical habitat, endangered Gila topminnow (*Poeciliopsis o. occidentalis*), the endangered desert pupfish (*Cyprinodon m. macularius*) with designated critical habitat, and the endangered Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*) with designated critical habitat.

You also requested formal consultation for the Mexican gartersnake (*Thamnophis eques*) and Sonoran mud turtle (*Kinosternon sonoriense*). Neither of these species are listed or proposed for listing. Therefore, section 7 consultation for them is not required; however, their incorporation into the proposed action is discussed in this biological opinion. You requested our concurrence that the proposed action was not likely to adversely affect the endangered southwestern willow flycatcher (*Empidonax traillii extimus*), and the endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*). The rationale for our concurrence with these determinations is found in Appendix A.

This biological opinion is based on information provided in your request, the biological assessment (BA) for the project (BLM 2008), field investigations, our files, and other sources of information. References cited in this opinion are not a complete bibliography of all references available on the listed species evaluated, effects of the proposed action, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

- 2006-2007 Various site visits to discuss native aquatic species conservation at Las Cienegas and San Pedro were held.
- October 15, 2007 We received your request for consultation and the BA for the project.
- February 15, 2008 We received your amended request for consultation and the revised BA.
- March 31, 2008 We sent you a 30-day letter and request for a 60-day extension.
- July 31, 2008 Jeff Simms of your office responded positively via electronic mail to our request for the 60-day extension.
- August 29, 2008 Jeff Simms of your office responded positively via electronic mail to our request for a 30-day extension.
- October 31, 2008 Jeff Simms of your office responded positively via electronic mail to our request for an extension to December 31, 2008.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Species Translocations

The Bureau of Land Management (BLM) Tucson Field Office, in coordination with the FWS and Arizona Game and Fish Department (AGFD), propose to create one wetland, restore two wetlands, and reestablish into another eight existing sites that have been determined to be suitable for one or more species, populations of the listed Chiricahua leopard frog (including the individuals from the Ramsey Canyon population), Gila chub, Gila topminnow, desert pupfish, and Huachuca water umbel; and the species of concern lowland leopard frog (*Lithobates [Rana] yavapaiensis*), Sonoran mud turtle, and Mexican gartersnake over 10 years (Tables 1, 2 and 3; Figures 1, 2, and 3). The subsequent use and management of those sites is also included in the proposed action. A complete description of the proposed action is in the biological assessment (BLM 2008).

The initial stockings would include an appropriate number of fish, and sites would be augmented with additional fish over the next nine years. Large founding populations with subsequent augmentation provide for a genetically diverse population. In conjunction with fish transplants, leopard frog eggs, tadpoles, or froglets would be released over a 10 year period. Fish, frogs, turtles, and snakes used for the translocation would come from an appropriate source as determined by the FWS and AGFD. The species mix for each habitat, exact quantity of individuals to be released, and timing of the releases would be decided by AGFD and FWS in cooperation with the BLM. The wildlife management agencies (AGFD and FWS) would be responsible for collecting and moving native fish and frogs under their section 10(a)(1)(A) permits. In the case of Spring Water, Cieneguita, and White House wetlands no fish or frogs would be transplanted until the wetland ponds are excavated and sufficient time has passed for water quality to stabilize and aquatic ecosystem functions related to the food web have progressed sufficiently. The BLM would monitor habitat and jointly monitor populations with the other agencies.

The release of Mexican garter snakes into these sites would follow the full establishment of fish and frog populations in each wetland. The garter snakes would be established over a 10-year period. The initial stocking numbers would be determined by the AGFD and FWS. Over the next nine years, additional garter snakes and Sonoran mud turtles would be added to each location. The addition of these predators would add components to the aquatic vertebrate community already comprised of fish and frogs. Mexican garter snakes and mud turtles used for the translocation would come from an appropriate source as determined by the AGFD and FWS. The exact quantity and timing of the releases would be decided by the AGFD and FWS. The AGFD or FWS would be responsible for collecting and moving Mexican garter snakes and mud turtles. No Mexican garter snakes would be transplanted until sufficient time has passed for frog and fish populations to become self-sufficient and numerous enough to become part of the food web for garter snakes.

Huachuca water umbel may be planted at all 11 locations over a 10 year period (Table 3). Plant stock used for the translocations will come from an appropriate source in Cienega Creek and San Pedro River as determined by the FWS in coordination with the BLM. It will be important to use the latest biogeographic and genetic information for this species to replicate the proper plant lineage in these locations. The suitability of the habitat for Huachuca water umbel will be assessed by a qualified botanist and a suitable number of umbel plants moved to each suitable site. The exact quantity and timing of transplants would be decided by the FWS. Fort Huachuca, in conjunction with the FWS, would be responsible for collecting, cultivating, and moving Huachuca water umbel. The BLM would monitor habitat and umbel populations annually and would work with the FWS and Fort Huachuca on a site plan for maintaining habitat for the water umbel at each location chosen for water umbel translocation.

Following the initial establishment of individual populations at each site, it may be necessary to augment when populations are reduced by flood, drought, habitat maintenance, disease, or for maintenance of genetic diversity. In the case of population failure at any site, the determination as to whether the site is suitable for continuing recovery efforts of the animal species will be reached jointly by the BLM, FWS, and AGFD. For plants the determination will be BLM and FWS. The primary factors that may affect the success of establishing a self-sustaining

population and long-term site suitability include the following items: 1) size of the founding population, which can be reduced by handling stress and delayed mortality; 2) water quality; 3) hydraulic character of the channel; 4) availability of open surface water; 5) environmental contaminants, 6) plant competition with water umbel; 7) predation; and 8) presence of nonindigenous aquatic organisms.

A monitoring plan will be developed for reestablished populations. Monitoring would be conducted to evaluate the success of the project as a cooperative effort between the BLM, FWS, and AGFD. Monitoring of habitat conditions to identify factors related to the success and failure of the newly established population would occur in conjunction with population monitoring. Monitoring will be done within existing agency budgets, except as identified below.

Road Canyon Tank

The proposed action at Road Canyon Tank would create open water habitat for Chiricahua leopard frog, Gila topminnow, desert pupfish, and Huachuca water umbel. These two ponds already support artificial wetlands with sufficient habitat for these species. Both ponds would have pipe fencing surrounding open water to control livestock watering (Figure 4).

Dredging of ponds may be necessary infrequently (10-15 years). Fish and frogs would be salvaged from the pond scheduled for deepening and stored in another pond while the operation is taking place. Vegetation management is also likely to be necessary at many of the sites.

Any incursions of bullfrogs (*Rana catesbeiana*) into the ponds would be controlled in the spring and fall by mechanical removal. If bullfrog tadpoles are discovered, the drying of the contaminated pond(s) would be accomplished by controlling inflow from the source or pumping.

Cieneguita and Spring Water Wetlands

The proposed action at the senescing Cieneguita and Spring Water wetlands is to restore and protect them from livestock disturbance (heavy grazing of plant community) and to create open water habitat for Chiricahua leopard frog, Gila topminnow, desert pupfish, Huachuca water umbel, Mexican garter snake, and Sonora mud turtle (Table 4). These wetlands are sites where mature wetland has filled in with sediment and detritus largely through natural processes. Both the Cieneguita Wetland and Spring Water Wetland would have steel pipe fencing and a double layer of frog fencing surrounding all perennial open water to stem the influx of bullfrogs and livestock (Figures 5-7). For Cieneguita and Spring Water wetlands, the AGDF has set up a \$10,000 monitoring and maintenance account to cover expenses for the first two years. Maintenance items may include repair of fencing, wildlife ramps, weed abatement, and additional sediment stabilization.

Cieneguita Wetland is a wetland complex located in the Empire Gulch drainage and receives flood flows from an ephemeral, secondary channel while the main channel carries both base flows and flood flows into Cienega Creek (Figure 3). These wetlands do not support surface water in the summer, except one small basin that has a perennial spring. Depth to water in most of the wetland complex lies at 2 to 3 feet below the soil surface (AGFD 2006).

Soils examined by USGS soil scientists indicate this wetland has an O horizon 12 inches below a clay loam. The horizon is a histisol that is saturated. It appears that the wetland was a peat bog historically. A Proper Functioning Condition (PFC) assessment was conducted in 2003. The wetland was found to be in PFC but not at its vegetative potential. This formerly open wetland has largely filled in with decaying plant material and has transitioned to a seasonal wetland.

Within the 40 acre Cieneguita Wetland enclosure, AGFD has proposed to dredge a series of wetland depressions, within the existing eight acres of wetland, modeling historical habitats, depending on the topography and local hydrology of the area. Three open water ponds (#1, #3, and #4) would be excavated to ¼ acre and 2 to 6 feet deep (Figure 5). Dredge material would be moved out of the floodplain. The remaining ponds would have up to two feet of dredge removed; this would prevent the formation of open water during the spring and fall because water levels would be low, while improving their wetland plant communities (seasonal wetlands). Any disturbance by project vehicles would be rehabilitated at the end of the operation by planting native vegetation from the area.

Spring Water Wetland is located on the floodplain of Cienega Creek south of the confluence with Spring Water Canyon (Figure 3). This wetland does not receive appreciable surface run off but is fed by a small spring on its southern edge. The wetland is well watered and supports a lush and diverse wetland plant community.

Soils examined by USGS soil scientists indicate this wetland has an aquent histisol under overlying sediment. It appears this wetland has expanded in area, but is confined by a bowl-shaped depression. A PFC assessment was conducted in 2003. The wetland was found to be in PFC but not at its vegetative potential. This open wetland is filling in with decaying plant material and transitioning to a bog. Little open water exists due to the abundant growth of emergent vegetation. No water quality information will be available until excavation is complete. Dredge material from the excavation of the ¼ acre pond at Spring Water wetland (Figure 8) would be moved to an abandoned channel on the flood plain.

White House Artesian Well

White House Artesian is located about 1/2 mile south of the Hereford Bridge (Figure 2). The well flows artesian from July to April, which has resulted in the creation of several small wetlands. The drainage pattern in the area does not include the area around the well, which would limit runoff and sediment inputs to the pond and wetland complex. The plant community is dominated by spikerush. The wetland would be developed by excavating a channel from the well to the wetland. The wetland would be constructed by excavating ¼ acre to a maximum depth of 6 feet. The bottom would be sealed with clay as the soils may be too porous to pond water on their own.

The proposed action at the White House artesian well is to create open water habitat for the Ramsey Canyon leopard frog population of Chiricahua leopard frog, or another appropriate population, desert pupfish, Gila topminnow, Huachuca water umbel, Mexican garter snake, and

Sonora mud turtle (Table 4). The wetland would have steel pipe fencing and frog fencing surrounding all open water to stem the influx of livestock and bullfrogs.

The pond would also be used for information and education. A hiking trail that runs through the area would have a spur that enters the fenced wetland area, leading to a board walk that extends to the center of the pond. Public viewing of fish, frogs, and aquatic reptiles would be encouraged and ecological concepts interpreted.

Little Joe Spring

The wetland at Little Joe Spring, which is part of the St. David Cienega complex, has sufficient open water habitat for leopard frogs (lowland or Chiricahua leopard frog), desert pupfish, Gila topminnow, Huachuca water umbel, Mexican garter snake, and Sonora mud turtle (Table 3). The wetland would have steel pipe fencing and frog fencing surrounding all open water to stem the influx of livestock and bullfrogs. Water quality is good with dissolved oxygen of 6.0 ppm and pH of nearly 8 (Table 4). The drainage pattern in the area does not include the spring, which limits runoff and sediment inputs to the wetland.

Horse Thief Draw Spring

Horse Thief Draw Spring has three pools and surface flow of 45 feet (Figure 2). The total surface area of pools in June of 2005 was 80 ft². Banks appear stable due to the proliferation of deergrass (*Muhlenbergia repens*). Substrate is rubble, cobble, gravel, and sand indicating that it handles large flows occasionally. Coyote willow (*Salix exigua*) is establishing along this spring. The flood plain is 40 feet wide and the slope is 3 percent. Water quality is good with dissolved oxygen measured at 3.8 ppm and pH nearly neutral. Aquatic insects at the site include damsel flies and mosquito larvae.

Murray Spring

Murray Spring is the most extensive aquatic habitat, flowing for more than 1 mile (Figure 2). The flow of this spring was 36 gallons per minute (gpm) in June of 2005. The habitat is varied with pool, run, and glide habitats available for fish and frogs. Bullfrogs have been observed at this spring but are rarely encountered (BLM 2008). Common streamside plants include deergrass, cattail (*Typha* sp.), spikerush (*Eleocharis* sp.), and cottonwood (*Populus fremontii*). Stream bank stability appears to be high while riparian over story that provides shading of habitats was low. Water quality is good with dissolved oxygen measured above 5 ppm and pH nearly neutral. The floodplain is about 50 feet wide and the slope is 2.2 percent. The stream channel upstream of the water source has been destabilized by excavation for prehistoric artifacts. In addition, the county road system upstream captures runoff and discharges it into the Murray Spring wash system. The spring appears to be augmented by recharge from wastewater treatment facilities upstream as flows have been increasing over time, despite a prolonged regional drought that has resulted in decreased flows elsewhere on the SPRNCA. It is possible that the discharge into Murray Spring is contaminated with persistent chemicals from pharmaceuticals to caffeine due to the wastewater. Aquatic insects observed were abundant and

include mayflies, water striders, damselflies, and dragonflies. Stabilization of upstream erosion is slated for 2008.

Frog Spring

Frog Spring had five pool habitats totaling 160 ft² in June of 2005 (Figure 1). The spring is in an incised channel with some head cutting and lateral adjustment apparent. Pool stability is created by root mats or grasses. The floodplain is about eight feet wide with a slope of 3.2 percent. Water quality was found to be good with dissolved oxygen measured at 3.9 ppm and pH nearly neutral. Damselfly and water striders are abundant in aquatic habitats. Pools have large mats of stonewort (*Chara* spp.) covering the bottom, indicating a long span of habitat stability.

Ben Spring

Ben Spring is located on exposed bedrock and fills three large tinaja type pools (Figure 1). The spring source emits from the base of a large willow tree. The three pools total 195 ft². The maximum depth of the pools ranged from 0.5 to 3 feet. In June 2005, the pools had filamentous algae covering approximately 25 percent of their surface in the form of floating mats. The slope down the series of pools is 12 percent. Water quality was found to be good with dissolved oxygen at 8.6 ppm and pH was 8.0.

Nogales Spring

Nogales Spring is an extensive aquatic habitat flowing for about 0.3 miles (Figure 3). The flow of the source was measured at 7.3 gpm (May 2005). This is likely a bare minimum flow as the area has been in a drought for five years and May is one of the driest months. The spring issues on BLM land and travels 0.55 miles until reaching land administered by the ASLD in Wakefield Canyon, which has perennial flow as well, and supports longfin dace (*Agosia chrysogaster*) and lowland leopard frog. In the 1990's the water flowed on the surface for about another 3.5 miles. This spring was stocked with 258 Gila topminnow in 1988. It is likely that the high CO₂ content of the water (54 mg/l, Table 4), predaceous insects, a relatively small founder population, or flooding eliminated fish at this spring. The floodplain is about 25 feet wide and the slope is 14 percent with a series of plunge pools. Other water quality parameters were relatively typical and the channel is extremely stable from the combination of riparian vegetation and travertine deposits. The habitat is largely run habitat with falls and cascades that create large punch-bowl type pools. These pools are likely to dissipate flood energies to the point that topminnow and Gila chub would likely persist in a number of pools only to spread out between flood events.

Little Nogales Spring

Little Nogales Spring is very similar to Nogales Spring and is located only a few hundred yards to the west. The spring discharge at the source was similar to Nogales Spring (Figure 3) but was not measured. The spring begins on BLM land and travels for 0.75 miles until reaching land administered by the ASLD. The extent of perennial surface water in June 2005 was about 0.3 miles. In the 1990's, before the current drought, the water flowed on the surface for about another 3.5 miles on land administered by the ASLD. This spring was stocked with 172 Gila topminnow in 1988. It is likely that the high CO₂ content of the water (56 mg/l), predaceous

insects, small founder population, or flooding eliminated fish before they could establish. The floodplain, habitat, and slope are very similar to that of Nogales Spring but were not measured. Other water quality parameters were relatively typical and the channel is extremely stable from the combination of riparian vegetation and travertine deposits.

Recreation

The proposed action is in two NCAs with extensive recreation visitation. Popular activities include hunting, off-highway driving, birding, camping and picnicking, and sightseeing. The NCAs are readily accessible and recreation use is increasing. Some of the sites are remote (e.g., Nogales and Little Nogales springs, Ben Spring, Little Joe Spring, Frog Spring, Horse Thief Spring, Cieneguita Wetland). Other sites have easy access (e.g., Road Canyon Tank, Murray Spring, and Spring Water Wetland).

At White House Artesian Well, a foot trail would lead to a spur trail into the pond area. An elevated “board walk” would provide observation of aquatic life in the center of the pond.

Livestock Management

Nogales Spring and Little Nogales Spring are part of the Empirita allotment; the area around these two springs is not grazed due to the rugged nature of the surrounding terrain and presence of travertine water falls. Downstream from these two springs is land owned by Arizona State Land Department (ASLD) (Empirita Ranch). Cieneguita Wetland and Spring Water Wetland are part of the Empire allotment and are within the Cieneguita and Five-wire Pastures. Road Canyon Tank is in the lower Hilton Pasture and is part of a grazing allotment leased to the BLM from the ASLD. The water source would be allocated to both wildlife and livestock. Currently, two adjacent ponds are supplied with water from a solar pump. The proposed action is to control livestock use at the ponds with fencing and gates to protect aquatic habitat enough for aquatic species to thrive, while managing livestock access to increase effectiveness of pasture rotations and to manage vegetation. The SPRNCA does not have permitted livestock grazing.

Conservation Measures

Standard protocols prescribed by the FWS for protecting newly established frog populations from chytridiomycosis would be followed during collection, transplantation, and subsequent monitoring by FWS, AGFD and BLM. The proposed action is a conservation measure designed to contribute toward the recovery of these species. Other conservation measures include:

- 1) Salvage species before dredging tanks or wetlands for maintenance or any other management, as determined by AGFD and the FWS, in consultation with the BLM;
- 2) Frog fences installed to limit bullfrog access to ponds would be monitored and maintained;
- 3) Monitoring sites for bullfrogs twice a year to detect and eliminate them before they can breed;

4) Seasonal monitoring of water supply conditions at Road Canyon Tank and White House Well to ensure aquatic habitat quality and persistence;

5) Augmentation of numbers and genetic diversity through multiple stockings over the first 10 years;

6) Interpretive signage designed to promote awareness and stewardship of aquatic ecosystems and endangered species;

7) Reestablishing populations in the case of a catastrophic event such as disease outbreak, flood, fire, water quality contamination, or other unforeseen circumstances;

8) Monitoring fish and aquatic habitat to identify factors related to the success and failure of the newly established population would occur in the spring and fall. Some of the factors that may be investigated include the following:

- Size of the founding population
- Temperature regime of higher elevation sites
- Hydraulic character of channels
- Availability of open water (effective habitat size)
- Dissolved oxygen content of the water
- CO₂ content of the water
- Environmental contaminants
- Number and types of predacious insects at time of stocking and time of population failure
- Handling stress and delayed mortality
- Temperature or pH shock upon release
- Presence of nonindigenous aquatic organisms
- Habitat size minima and other conditions during drought
- Population size following large flood event.

Factors for monitoring would be determined jointly by BLM, FWS, and AGFD. Those factors chosen would be measured using standard methods and analysis.

- 9) Should invasive nonnative species invade and become problematic, the BLM, FWS, and AGFD would renovate the habitat by desiccation where possible or by piscicide when necessary;
- 10) Removal of invasive, emergent plant species which may eventually crowd open water;
- 11) Delineate and protect water umbel patches before dredging tanks or wetlands;
- 12) Trespass livestock would be removed shortly after detection in areas with exclosures;
- 13) Monitoring the plant community to identify factors related to the success and failure of the newly established population(s) would occur in the summer and fall. Factors for monitoring would be determined jointly by the Bureau, FWS and Department. Those factors chosen would be measured using standard methods and analysis;
- 14) Mechanically remove invasive riparian plants that appear to be threatening water umbel transplant sites

STATUS OF THE SPECIES

Chiricahua leopard frog (*Lithobates [Rana] chiricuahuensis*)

The Chiricahua leopard frog was listed as a threatened species without critical habitat in 2002 (67 FR 40790). 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. The Ramsey Canyon leopard frog (*L. subaquavocalis*) is similar in appearance to the Chiricahua leopard frog, but may grow larger and has a call that is typically given under water (Platz 1993). Recent genetic work suggests *L. subaquavocalis* and *L. chiricuahuensis* may be conspecific (Goldberg et al. 2004) and the Ramsey Canyon leopard frog is now considered a population of the Chiricahua leopard frog.

Threats to this species include predation by nonindigenous organisms, especially bullfrogs, fish, and crayfish; disease; drought and climate change; 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. Numerous studies indicate that declines and extirpations of Chiricahua leopard frogs are at least in part caused by predation and possibly competition by nonindigenous organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs, tiger salamanders (*Ambystoma* spp.), crayfish (*Orconectes virilis* and possibly others), and several other species of fish (Clarkson and Rorabaugh 1989; Sredl and Howland 1994; Fernandez and Bagnara 1995; Rosen et al. 1995; Snyder et al. 1996; Fernandez and Rosen 1996a and b, 1998). For instance, in the Chiricahua region of southeastern Arizona, Rosen et al. (1995) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported Chiricahua leopard frogs. All waters except three that supported introduced vertebrate predators lacked Chiricahua leopard frogs. Sredl and Howland (1994) noted that Chiricahua leopard frogs were nearly always absent from sites supporting bullfrogs and nonindigenous predatory fish. Rosen et

al. (1995) suggested further study was needed to evaluate the effects of mosquitofish, trout, and catfish on frog presence.

The status of Chiricahua leopard frog has changed little since our February 11, 2008, Intra-Service Biological and Conference Opinion on Issuance of an Enhancement of Survival Permit (TE-083686-0) to the Arizona Game and Fish Department (file number 22410-2003-F-0022). We incorporate by reference the Status of the Species section of that biological opinion (USFWS 2008). Additional information about the Chiricahua leopard frog can be found in Platz and Mecham (1979, 1984), Sredl and Howland (1994), Rosen et al. (1995), Jennings (1995), Degenhardt et al. (1996), Sredl et al. (1997), Painter (2000), Sredl and Jennings (2005), and USFWS (2008).

Our records indicate that, in Arizona, 46 formal conferences or consultations have been completed for actions affecting Chiricahua leopard frog.

Gila chub (Gila intermedia)

We listed the Gila chub as endangered with critical habitat in 2005 (70 FR 66664). Historically, Gila chub have been recorded from rivers, streams, and spring-fed tributaries throughout the Gila River basin in southwestern New Mexico, central and southeastern Arizona, and northern Sonora, Mexico (Miller and Lowe 1967, Rinne and Minckley 1970, Minckley 1973, Rinne 1976, DeMarais 1986, Propst 1999, and Weedman et al. 1996). Today the Gila chub has been restricted to small, isolated populations scattered throughout its historical range. Critical habitat includes about 160 miles of stream reaches in Arizona and New Mexico, organized into seven river units (70 FR 66664).

Decline of Gila chub is due to habitat loss from past and current dewatering of rivers, springs, and cienegas (e.g. from diversions, impoundments, and groundwater pumping), poor land management practices (e.g. excessive livestock grazing) resulting in erosion and arroyo formation, and the concomitant introduction of predacious and competing nonindigenous fish species (Miller 1961, Minckley 1985). Life history information can be found in the status review (Weedman et al. 1996), the final rule (70 FR 66664), and references cited there.

Critical habitat for Gila chub includes about 163 miles of stream reaches in Arizona and New Mexico (70 FR 66664). There are seven primary constituent elements. Constituent elements include those habitat features required for the physiological, behavioral, and ecological needs of the species. For Gila chub, these include:

- 1) Perennial pools, areas of higher velocity between pools, and areas of shallow water among plants or eddies all found in headwaters, springs, and cienegas, generally of smaller tributaries;
- 2) Water temperatures for spawning ranging from 63 to 75 °F (17-24 °C), and seasonally appropriate temperatures for all life stages (varying from about 50 to 86 °F [10 °C to 30 °C]);

- 3) Water quality with reduced levels of contaminants, including excessive levels of sediments adverse to Gila chub health, and adequate levels of pH (e.g. ranging from 6.5-9.5), dissolved oxygen (e.g. ranging from 3.0-10.0 ppm) and conductivity (e.g. 100-1000 mmhos);
- 4) Food base consisting of base consisting of invertebrates (e.g. aquatic and terrestrial insects) and aquatic plants (e.g. diatoms and filamentous green algae);
- 5) Sufficient cover consisting of downed logs in the water channel, submerged aquatic vegetation, submerged large tree root wads, undercut banks with sufficient overhanging vegetation, large rocks and boulders with overhangs, a high degree of streambank stability, and a healthy, intact riparian vegetation community;
- 6) Habitat devoid of nonindigenous aquatic species detrimental to Gila chub or habitat in which detrimental nonindigenous species are kept at a level that allows Gila chub to continue to survive and reproduce; and
- 7) Streams that maintain a natural flow pattern including periodic flooding.

Our records indicate that, range wide, seventeen formal conferences or consultations have been completed for actions affecting Gila chub.

Gila topminnow (Poeciliopsis o. occidentalis)

Gila topminnow was listed as endangered in 1967 without critical habitat (32 FR 4001). Only Gila topminnow populations in the United States, not those in Mexico, are listed under the Act. The reasons for decline of this fish include past dewatering of rivers, springs and marshlands, impoundment, channelization, diversion, regulation of flow, land management practices that promote erosion and arroyo formation, and the introduction of predacious and competing nonindigenous fishes (Miller 1961, Minckley 1985). Other listed fish suffer from the same impacts (Moyle and Williams 1990). Life history information can be found in the 1984 recovery plan (USFWS 1984), the draft revised Gila topminnow recovery plan (Weedman 1999), and references cited in the plans.

The status of Gila topminnow has changed little since our February 11, 2008, Intra-Service Biological and Conference Opinion on Issuance of an Enhancement of Survival Permit (TE-083686-0) to the Arizona Game and Fish Department (file number 22410-2003-F-0022). We hereby incorporate by reference the Status of the Species section of that biological opinion (U.S. Fish and Wildlife Service 2008). For additional information about the Gila topminnow see Desert Fishes Team (2003), Minckley (1999), Hedrick et al. (2001), and Voeltz and Bettaso 2003.

Our records indicate that, range wide, 72 formal conferences or consultations have been completed for actions affecting Gila topminnow.

Desert pupfish (*Cyprinodon m. macularius*)

The desert pupfish was listed as an endangered species with critical habitat in 1986 (51 FR 10842). Historical collections occurred in Baja California and Sonora, Mexico and in the United States in California and Arizona. Historical distribution of desert pupfish in Arizona included the Gila, San Pedro, Salt, and Santa Cruz rivers, and likely the Hassayampa, Verde, and Agua Fria rivers, although collections are lacking for the latter three. The desert pupfish was also found in the Lower Colorado River, Rio Sonoyta basin, Salton Sink basin, and Laguna Salada basin (Eigenmann and Eigenmann 1888, Garman 1895, Gilbert and Scofield 1898, Evermann 1916, Miller 1943, Minckley 1980, Black 1980, Turner 1983, Miller and Fuiman 1987). Additional life history information can be found in the recovery plan (USFWS 1993) and other references cited there.

One or more threats imperil most natural and transplanted populations. Since the 19th century, desert pupfish habitat has been steadily destroyed by stream bank erosion, the construction of water impoundments that dewatered downstream habitat, excessive groundwater pumping, the application of pesticides to nearby agricultural areas, and the introduction of nonindigenous fish species. Nonnative bullfrogs may also prove problematic in the management of desert pupfish. The bullfrog is an opportunistic omnivore with a diet throughout its range that includes fish (Cohen and Howard 1958, Clarkson and deVos 1986). There is also a concern that introduced salt cedar (*Tamarix* spp.) next to pupfish habitat may cause a lack of water at critical times (Bolster 1990). The remaining populations continue to face these threats, and the Salton Sea area populations, in particular, are severely threatened.

Our records indicate that in Arizona, 37 formal conferences or consultations have been completed for actions affecting desert pupfish.

Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*)

We listed the Huachuca water umbel as an endangered species in 1997 (62 FR 665). 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 in 1999 (64 FR 37441). The umbel is an herbaceous, semi-aquatic perennial plant with slender, erect leaves that grow from creeping rhizomes. Critical habitat was designated for Huachuca water umbel in 1999 (64 FR 37441). All 11 sites are outside of critical habitat and will not be affected by the proposed project.

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 (Bryan 1925, Martin 1975, Hastings and Turner 1980, Dobyms 1981, Hendrickson and Minckley 1984, Sheridan 1986, Bahre 1991, Webb and Betancourt 1992, Hereford 1993). A major earthquake near Batepito, Sonora, about 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 then.

Wetland degradation and loss continue today. Human activities such as groundwater overdraft, surface water diversion, impoundment, channelization, improper livestock grazing, agriculture, mining, sand and gravel operations, road building, urbanization, wood cutting, nonindigenous species introductions, 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 ever increasing human population.

Our records indicate that, range wide, 32 formal conferences or consultations have been completed for actions affecting Huachuca water umbel.

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.

The project area is where the proposed action will occur. The action area is that area in which effects of the action will occur. The project area and action area are largely the same for this proposed action, as there will be few affects outside the actual footprint of the proposed action.

The proposed action occurs in two Congressionally-designated NCAs. Both NCAs were created to “conserve, protect and enhance” biological and other natural resources. Subsequent planning efforts for both areas have in place restrictions on multiple use activities that would impair ecological processes on watersheds and riparian areas. The NCAs are described in BLM’s BA (BLM 2008).

With the arrival of Europeans, major alterations began in the Gila River Basin (Rea 1983). As a result of these changes, the riverine communities of the Gila Basin, including the San Pedro and Santa Cruz, became fragmented, and connectivity was substantially reduced. Populations of fish or other aquatic species eradicated by perturbation were not replaced by colonization. Habitat fragmentation contributes to the genetic isolation of populations. Population fragmentation can reduce genetic variation and viability. This, in turn, can increase the risk of extirpation and extinction by reducing survival, reproduction, and dispersal. Isolation also precludes re-colonization should one or more populations be eliminated. When an inhospitable environment that imposes a high degree of threat on the remnant habitat surrounds isolated populations, these risks are compounded.

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 (Bryan 1925, Martin 1975, Hastings and Turner 1980, Dobyns 1981, Hendrickson and Minckley 1984, Sheridan 1986, Bahre 1991, Webb and Betancourt 1992, Hereford 1993). A major earthquake near Batepito, Sonora, about 40 miles south of the upper San Pedro Valley, resulted in land fissures, changes in groundwater elevation and spring flow (Hereford 1993, Geraghty and Miller, Inc. 1995). These events contributed to long-term or permanent degradation and loss of cienega and riparian habitat in the San Pedro basin and throughout southern Arizona and northern Mexico.

Cienega Creek is subject to a number of human uses, including livestock grazing, recreation, urban and suburban development, groundwater pumping, and roads. Before BLM acquired the area, it was primarily used for grazing, but there were also extensive agricultural fields along the creek (Eddy and Cooley 1983). These fields were irrigated by a system of canals and dams that locally destroyed Gila topminnow habitat and created severe erosion. The BLM is removing these developments and has reconstructed part of the creek to restore more natural geomorphic and hydrologic conditions (USFWS 1998a, Simms 2001). The NCA presently receives heavy human visitation, and most of the stream is readily accessible. Recreational use is largely “dispersed” and occurs year round, but because of climatic conditions and visitors’ preferences, use is higher during the cool weather months of fall and spring. Popular activities include hunting, off-highway driving, birding, camping and picnicking, and sightseeing. Recreational use of the NCA will likely increase due to population growth in southern Arizona.

Upstream, the valley is mostly used for livestock grazing. However, there is extensive proliferation of ranchette development in the area surrounding the town of Sonoita, which is itself growing. This growth is based on groundwater use, which could threaten the surface water of Cienega Creek. Several wineries and vineyards occur along the groundwater divide between the Cienega Creek and Babocomari River basins. The vineyards are entirely supported by groundwater.

The environmental baseline of the Las Cienegas NCA is thoroughly discussed in the 2002 Las Cienegas NCA Resource Management Plan BO (22410-2002-F-0162)(USFWS 2002).

The environmental baseline of the upper San Pedro River is thoroughly discussed in the 2007 Ft. Huachuca BO (22410-2007-F-0132)(USFWS 2007).

Status of the species within the action area

Gila chub

The Santa Cruz River has five tributaries with extant populations of Gila chub: Sabino Canyon, Bear Canyon, Romero Canyon (Pima County), and Sheehy Spring (Santa Cruz County) have unstable-threatened populations, and Cienega Creek (Pima and Santa Cruz counties) has the only known stable-secure population of Gila chub in existence. Cienega Creek has a second, small population north of Interstate 10 on Pima County’s Cienega Creek Preserve. On the Las Cienegas NCA, the chub is found throughout Cienega Creek and Mattie Canyon but is absent from Empire Gulch. All three creeks on the Las Cienegas NCA have designated critical habitat.

Extensive surveys in 2005 and 2007 produced results that suggest that Gila chub are abundant in Cienega Creek. Surveys in 2007 demonstrate that chub are recolonizing Mattie Canyon following heavy flooding and extreme sedimentation resulting from the collapse of a grade control structure in 2001. No chub have ever been observed in Empire Gulch since BLM acquisition in 1988.

The regional drought has impacted stream flows in both Empire Gulch and Cienega Creek, reducing the amount of perennial aquatic habitat (Bodner et al. 2007, Bodner and Simms 2008). Primary constituent elements one and three defining critical habitat have been negatively impacted by the drought.

No Gila chub occur on the SPRNCA. In the adjacent portions of the San Pedro River basin, the Babocomari River population is considered unstable-threatened, as is the tributary population in O'Donnell Creek. Three populations in tributaries lower in the San Pedro River basin are considered stable-threatened: Redfield, Hot Springs, and Bass Canyon.

Gila topminnow

The Las Cienegas Gila topminnow natural population is one of only two on public lands and it is by far the largest of all remaining natural populations (Simms and Simms 1991) in the U.S. Gila topminnow was first documented from Cienega Creek in the 1970s. In addition to Gila topminnow, Cienega Creek supports two other native fishes (Bagley et al. 1991, Simms and Simms 1991), the longfin dace and the endangered Gila chub. Cienega Creek is one of the last places in Arizona supporting an intact native fish fauna uncontaminated by nonindigenous fish and is one of only three natural Gila topminnow populations not contaminated by mosquitofish (Weedman 1999, Voeltz and Bettaso 2003). No nonindigenous fish and few nonindigenous species of other taxa are found in Cienega Creek. With increasing access and recreational use, the vulnerability of the stream and its Gila topminnow population to nonindigenous invasion is intensifying. The Cienega Creek basin has been closed to fishing by the Arizona Game and Fish Commission to lessen the potential for release of illegal fish and live bait.

In October 2001, a repatriation of Gila topminnow was made into the Cienega Creek drainage at Empire Gulch. Additional releases of topminnow have been made. Empire Gulch is a tributary of Cienega Creek within the NCA. Gila topminnow did not establish a robust population at Empire Gulch, probably because of high levels of aquatic vegetation and aquatic invertebrate predators.

Management changes to improve riparian and aquatic habitat on Cienega Creek, coupled with drought, have actually caused topminnow to become significantly rarer in the upper perennial reach. The lower reach appears to have a stable Gila topminnow population, but because of how data were collected, even that is uncertain (G. Bodner, TNC, pers. comm., 2007; J. Simms, BLM, pers. comm., 2007; Bodner et al. 2007).

No topminnows currently occur in the upper San Pedro River basin of SPRNCA.

Huachuca water umbel

The SPRNCA and Las Cienegas NCA are the primary locations for this plant on BLM land. The species appears to be naturally recolonizing the San Pedro River and Cienega Creek at several locations.

Fort Huachuca has committed to conservation actions that will benefit Huachuca water umbel. On the San Pedro RNCA, Fort Huachuca will inventory all potential umbel habitats every three years with frequency transects conducted every year in between the inventory years. The Fort may also fund water umbel habitat management or restoration where habitat has been degraded or lost, or where potential exists for creating water umbel habitat. Assistance can take the form of funding or technical assistance. Projects funded can include both off-post and on-post projects. Off-post, the Fort could collect, propagate, and plant water umbel in suitable habitat along the SPRNCA, as well as assist BLM, the Coronado National Forest, or other land owners and managers of water umbel habitat potentially affected by the proposed action. Off-post projects that the Fort can consider funding include cienega restoration or protection of cienega conditions on the SPRNCA, if approved by and coordinated with the BLM. All plans and agreements for funded projects will be coordinated with and approved by the FWS.

The Huachuca water umbel was found in the SPRNCA in 1994. Mark Fredlake (BLM), Peter Warren, and Dave Gori (TNC) located 43 patches of Huachuca water umbel during 1995 and 1996. Haas and Frye (1997) identified eight additional patches in 1997. These patches were found in six disjunct areas, including about two miles downstream of Fairbank, near Brunchow Hill upstream of Charleston, in the river at Lewis Springs, about one mile north and south of Highway 90, about 2.5 miles downstream of Highway 90, and from Hereford Bridge north for about one mile. Haas and Frye (1997) also documented the species on the San Pedro River about 0.5 miles south of the international boundary. Joanne Kirchner and Karen Blumenthal (EEC 2001), under contract to Fort Huachuca, inventoried 51.0 km (31.7 miles) of the 53.9 km (33.7 miles) of the designated critical habitat within the SPRNCA. Kirchner and Blumenthal identified 43 populations during the inventory. Of these 43 populations, 17 appeared to be new locations when compared with BLM records dated 1995 to 1999. Fort Huachuca contracted EEC to conduct the inventory again in 2004. During the inventory efforts, 30 populations were documented within the SPRNCA. Fourteen of the 30 populations appear to be at sites documented in 2001 (EEC 2004). Surveys in the San Pedro basin in Mexico found nine sites with umbel (Anderson 2006). Three mainstem San Pedro River sites were surveyed; the northernmost site was dry and had no umbel (see above). Two upstream sites did have water umbel (Anderson 2006).

Critical habitat was designated in 1999 for 33.7 miles of the San Pedro River. This unit includes the stream courses identified from Fairbank to 200m south of the Hereford Bridge. The critical habitat includes areas adjacent to the stream course out to the beginning of upland vegetation. The White House Wetland portion of the proposed action occurs in the upper portion of the San Pedro River floodplain but is about 650 m (2145') south of designated critical habitat. Thus, no affects to Huachuca water umbel critical habitat are expected. Refer to the Fort Huachuca BO for the most recent discussion of the status of the upper San Pedro River basin (USFWS 2007).

Chiricahua leopard frog

Many of the mountain ranges in southern Arizona no longer have a known occupied site or now only have a single site, including the Chiricahua, Santa Rita, Patagonia, Peloncillo, Galiuro, and Dragoon mountains. This does not include the seven populations of the closely related Ramsey Canyon leopard frogs, five of which are on private lands.

The last remaining population in the Cienega Creek basin is located in upper Empire gulch on the Las Cienegas NCA with a few individuals observed in the upper portion of Cienega Creek (Rosen 2006). The Ramsey Canyon leopard frog occurs in Carr, Ramsey, and other canyons on the eastern slope of the Huachuca Mountains. No leopard frogs occur on the SPRNCA.

Desert pupfish

No natural populations of desert pupfish remain in Arizona, although several wild, reestablished populations exist in southern Arizona outside of the Las Cienegas NCA and SPRNCA. Captive and reestablished populations are on the Nature Conservancy's Dudleyville Preserve, Aravaipa Wilderness, and Muleshoe Cooperative Management Area. No designated critical habitat occurs in or near the project area.

EFFECTS OF THE PROPOSED 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 (50 CFR § 402.02). “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 (50 CFR § 402.02).

General considerations

The aggregate effects of land management activities are likely to be additive to or magnify the effects of any one activity to the watershed and the stream channels. These activities include livestock grazing, recreation, road placement and extent, past watershed degradation, historical loss of beaver activity, mining, pollution from abandoned mines, water diversions, past and present introductions of nonindigenous fishes, off-road vehicle travel, riparian roads, groundwater pumping, surface water diversion, and construction of diversion structures that act as barriers to fish movement.

Many watershed impacts (including livestock grazing) are cumulative, slow acting, and show effects on a time scale not usually considered by managers. Over 200 hundred years of human activity in the action area has resulted in an altered hydrograph and generally lowered water tables, disrupting the original flow conditions in many areas (Rabini 1992). This is especially true in the San Pedro watershed (Hendrickson and Minckley 1984, Jackson et al. 1987, Bahre 1991).

Establishment of new populations

The reestablishment of these species at 11 locations would have the potential to significantly improve the conservation status of all species. However, the transfer of Gila topminnow and Gila chub from the wild population in Cienega Creek would diminish that population and would likely result in some level of injury and mortality depending on stress level at time of release and prevailing habitat conditions (covered by 10(a)(1)(A) permit).

The establishment of new, self-sustaining populations on two national conservation areas would benefit the aquatic species by meeting conservation and recovery goals. However, the reestablishment of predators into those populations (Gila chub, Mexican gartersnake, Chiricahua and Ramsey Canyon leopard frogs, and Sonora mud turtle) would result in some loss of individuals through predation. Some level of habitat displacement of topminnow by desert pupfish may occur when they occur in the same site.

Livestock grazing

Activities related to grazing could result in some limited direct effects to all listed aquatic species. Maintenance of viable populations of Chiricahua leopard frog, Gila chub, Gila topminnow, desert pupfish, and Huachuca water umbel are compatible with well-managed livestock grazing. However, adverse effects to aquatic species from grazing may occur under certain circumstances. These effects include facilitating dispersal of non-native predators; trampling of eggs, juvenile fish, egg masses, tadpoles, and frogs; deterioration of watersheds; erosion or siltation of stream courses; elimination of undercut banks that provide cover; loss of wetland and riparian vegetation and backwater pools; and spread of disease (Hendrickson and Minckley 1984, Ohmart 1995, Jancovich et al. 1997, Belsky et al. 1999, U.S. Fish and Wildlife Service 2000). Livestock grazing and trampling can indirectly affect fish by altering the shape and form of the aquatic habitat, riparian soils and vegetation composition, density, and structure; water quality, quantity, and flow patterns (Kauffman and Krueger 1984, Fleischner 1994, and Belsky et al. 1999). Even though most release sites will be excluded from livestock, they will periodically gain access to the enclosure. Livestock periodically go through, under, or over fences; fences go down from tree fall, fires, and floods; and gates may be left open. Therefore, periodic, light impacts are expected within some enclosures. The pipe-rail fencing fails less often and is penetrated by livestock much less frequently when compared to barb-wire fences.

Livestock can injure or kill young fish by stepping on them (Roberts and White, 1992), or through ingestion, however, most livestock effects are related to changes in habitat. Increased erosion in the watershed caused by grazing can accelerate sedimentation that can negatively affect aquatic habitat (Gunderson 1968). Sediment can alter primary productivity and fill interstitial spaces in streambed materials with fine particulates that impede water flow, reduce oxygen levels, and restrict waste removal (Chapman 1988). Eggs, tadpoles, and metamorphosing Chiricahua leopard frogs are probably trampled by cattle on the perimeter of stock tanks and in pools along streams (Bartelt 1998, USFWS 2000). Many fish and frogs can probably avoid trampling when they are active. However, leopard frogs are known to hibernate on the bottom of ponds (Harding 1997), where they may be subject to trampling during the winter months. Cattle can remove bank vegetation that provides escape cover for frogs and a source of insect prey. However, dense shoreline or emergent vegetation in the absence of

grazing may favor some predators, such as garter snakes, and the frogs may benefit from some open ground for basking and foraging. At a tank in the Chiricahua Mountains, Sredl et al. (1997) documented heavy cattle use at a stock tank that resulted in degraded water quality, including elevated hydrogen sulfide concentrations. A die off of Chiricahua leopard frogs at the site was attributed to cattle-associated water quality problems, and the species has been extirpated from the site since the die off.

Livestock watering at the eastern pond at Road Canyon Tank could result in the loss of fish or frogs from trampling and ingestion through consumption of water. Livestock watering there could result in the reduction of frogs and fish growth and reduced survival from increased turbidity levels leading to decreased primary productivity, or water quality degradation from heavy accumulation of livestock waste. Adult frogs or fish are more likely to avoid direct injury from livestock than newly born fish. However, fish or frogs in the adjacent pond would be protected by pipe-rail fencing, protecting habitat and animals from direct and indirect effects of livestock watering.

A negligible amount of fish and frog injury and mortality from trampling and water consumption can also be anticipated at some sites from trespass livestock at Horse Thief Spring, Frog Spring, Murray Spring, Ben Spring, and Road Canyon Tank. In contrast, Little Joe Spring, White House Well, Cieneguita Wetland, and Spring Water Wetland would be protected by fencing while Nogales and Little Nogales springs are currently protected by deferred use related to rough terrain in the pasture. Trespass livestock that are not permitted by BLM are not part of the proposed action.

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 (FR 62:665-689). Though, 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. Water umbel plants are likely to be trampled by cattle on the perimeter of stock tanks and in pools along streams. Cattle can remove bank vegetation that competes with the water umbel. However, grazing and trampling that reduces competition among plants will also result in the mortality of water umbel plants.

Vegetation management

Lentic habitats do not maintain open habitats over time through scouring as do lotic habitats. Ponds and restored wetlands will begin to fill with large statured aquatic plants such as cattail and bulrush (*Schoenoplectus = Scirpus* sp.). Vegetation management will likely be required to maintain some of the sites. Vegetation management may temporarily degrade water quality by increasing turbidity and hydrogen sulfide and decreasing dissolved oxygen levels. This may lead to stress or mortality of reestablished animals present in the habitat.

Management of aquatic vegetation may occur periodically at many of the sites. Vegetation management could include pulling plants by hand, using a backhoe, or cutting. Any activities in water could adversely affect fish. Activities in shallow water or on saturated soil could be in

habitat occupied by Huachuca water umbel, thus affecting the umbel. Chiricahua leopard frogs could occur both on land and in the water, so could be affected by any vegetation management near any sites containing frogs.

Road Canyon Tank, Little Joe Spring, Cieneguita Wetland, Spring Water Wetland, and White House Wetland would require periodic dredging to remove silt (every 10-15 years). Dredging is usually conducted when the tank is dry or nearly dry. However, dredging would require mechanized equipment and would disturb both riparian and aquatic habitats that could be occupied by all the listed species. Umbel could be run over or crushed, or dug up or crushed during dredging. Listed animals could incur the same fate as umbel, and temporary changes to water quality after dredging could impair their reproduction and foraging.

Recreation

Recreation was once considered a non-consumptive use in regard to its effects on wildlife and ecosystems, but that is no longer true (Knight and Cole 1995). Recreation has potential for adverse effects including stress to animals from continual disturbance, vandalism of frog fences, and the introduction of nonindigenous species into habitats occupied by listed species. It is possible, but unlikely, that aquatic animals could experience stress from excessive disturbance from people that wade or try to capture them. Recreational activity such as wading or observation from water's edge can displace fish from normal activity patterns. There is likely to be a low level of recreational activity of the type that may harm, harass, or injure fish or frogs at most of the reestablishment sites. Many of the habitats are remote and would have almost no recreational activity. However, Murray Springs and Whitehouse Wetland are anticipated to have large numbers of people visit. Educational signs at locations with high visitation should discourage activity that disrupts conservation efforts at these sites and promote a sense of stewardship. An adverse effect of recreation may occur through the surreptitious introduction of non-native aquatic species that reduce or eliminate aquatic species populations. Renovating habitats is expensive and time consuming, but would be done when necessary to remove invasive aquatic species.

Severe, unmanaged recreational impacts 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 off-highway vehicles. Recreational activity would likely result in incidental trampling of water umbel plants, as they are relatively inconspicuous. Mortality and injury may occur from wading or wildlife observation from water's edge. There is likely to be a low level of recreational activity of the type that may harm or injure water umbel at most of the reestablishment sites. Many of the habitats are remote and would have almost no recreational activity. However, Murray Springs and Whitehouse Wetland are anticipated to have large numbers of people visit. Educational signs at locations with high visitation would discourage the use of areas with newly established patches of water umbel and promote a sense of stewardship.

Flooding

All of the species to be stocked in the proposed action area have the ability to disperse. Their ability to move into and persist in an area is limited by flow and suitable habitat characteristics. While it is possible that individuals could be washed to downstream areas during high flow events, we believe that existing literature and site characteristics indicates this is unlikely. For example, Minckley and Meffe (1987) determined that, while nonnative fish species are unable to resist flooding events and so are washed downstream, native fishes show little if any response to flooding events. In comparing discharge patterns of Arizona streams versus streams in Florida and Georgia, they concluded that, in Arizona, native fishes resist floods by maintaining position in or adjacent to channel habitats, persisting in microrefugia, or rapidly recolonizing if displaced. By comparison, nonindigenous fishes were displaced or destroyed. Similarly, routine sampling at the confluence of Bonita Creek and the Gila River does not yield any Gila chub, Sonora sucker, desert sucker, or speckled dace, even though these fish occur in Bonita Creek, periodic flooding occurs, and there are connected flows between the two systems. We believe fish would not persist in downstream areas because habitat conditions there are unsuitable.

Flooding can move nonindigenous fish and frogs from upstream impoundments to downstream habitats occupied by native fishes, especially on the SPRNCA. However, several of the sites are not in drainages. This contamination of native fish habitat with nonindigenous fish and frogs often results in the loss of individual native fish and frogs or, possibly, entire populations through predation or competition (Miller 1961, Minckley and Deacon 1968, and Minckley and Deacon 1991). Flooding can also extirpate the reestablished populations, or displace individuals to downstream sites (e.g., the San Pedro River).

On the SPRNCA, Frog Spring, Ben Spring, Murray Springs, and Horse Thief Spring are in drainages, and are thus subjected to flooding. Animals and plants that are reestablished at these sites could be moved downstream into the San Pedro River. Huachuca water umbel is already established on the river, therefore any additional plants flooded downstream from the proposed sites would only add to the existing population. Also, animals released at these sites could be moved downstream and into the San Pedro River.

Many of the sites will have no out flows or be subject to flooding. Because flows do not regularly continue downstream of the other release sites, and because habitat at the lower portions is generally not suitable for several reasons for the species to be released, we believe fish or frogs will not move to or persist in these areas. One exception is Nogales Spring and Little Nogales Spring. In wet years, flow may continue downstream onto state land. In addition, Wakefield Canyon is downstream on state land, and contains perennial water with longfin dace. Additional coordination and compliance will be necessary before releases can occur at Nogales and Little Nogales.

Non-native species

The proposed action would create several lentic habitats that are conducive to the establishment of bullfrogs and other non-native aquatic species that can spread to other habitats. Should

bullfrogs gain access to wetlands protected by a double layer of frog fencing, they are likely to prey on topminnow, chub, and pupfish to a limited extent.

Chytrid fungus can survive in wet or muddy environments, and could conceivably be spread by cattle carrying mud on their hooves and moving among frog habitats. The disease could also be spread by ranch hands working at an infected tank or aquatic site and then traveling to another site with mud or water from the first site. Chytrids could be carried inadvertently in mud clinging to wheel wells or tires, or on shovels, boots, or other equipment. Chytrids cannot survive complete drying, thus, if equipment is allowed to thoroughly dry, the likelihood of disease transmission is much reduced. Bleach or other disinfectants can also be used to kill chytrids (Loncore 2000).

Chytrids could also be moved among aquatic sites during intentional introductions of fish or other aquatic organisms. Anglers move fish, tiger salamanders, and crayfish among tanks and other aquatic sites to establish a fishery or a source of bait, or in some cases bait is released at an aquatic site during angling. Water, frogs, salamanders, or perhaps fish and crayfish, could all be carriers of chytrids. In addition to possibly introducing chytrids, such activities would also facilitate introduction of nonindigenous predators with which the Chiricahua leopard frog cannot coexist.

Critical Habitat

Designated critical habitat for the Huachuca water umbel on the San Pedro River should not be destroyed or adversely modified by the proposed action. The proposed sites on the SPRNCA are outside of critical habitat and there will be no effects downstream of the sites on critical habitat.

Spring Water Wetland and Cieneguita Wetland are within Gila chub designated critical habitat. The proposed action occurs in the floodplains of Cienega Creek and Empire Gulch, but not in areas that are presently habitat for Gila chub. It is possible, though very unlikely, that sediment from the restoration of these two wetlands could get into critical habitat. Because perennial water is several miles downstream of the sites, sediment from the proposed action is highly unlikely to affect the constituent elements. No other effects to critical habitat are expected.

Cumulative Effects

Cumulative effects are those impacts of future non-Federal (State, local government, and private) actions that are reasonably certain to occur in the project area. Future Federal actions will be subject to the consultation and conferencing requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed project.

In 1991, the American Fisheries Society adopted a position Statement regarding cumulative effects of small modifications to fish habitat (Burns 1991). Though the American Fisheries Society use of the term “cumulative” differs from the definition in the ESA, the statement concludes that accumulation of, and interaction between, localized or small impacts, often from unrelated human actions, pose a serious threat to fishes.

Unregulated activities on Federal and non-Federal lands, such as trespass livestock, inappropriate use of OHVs, illegal introduction of nonindigenous aquatic species, and residential and commercial development on lands within watersheds containing threatened and endangered native aquatic animals, are cumulative effects and can adversely affect the species through a variety of avenues.

Most introductions of nonindigenous fishes and bullfrogs have been done illegally for many reasons (Aquatic Nuisance Species Task Force 1994, Rosen et al. 1995). Illegal introductions of nonindigenous fishes and other aquatic invasive species are routinely made by the public (e.g., topminnow, red shiner, and guppies in the Safford Field Office). The release of nonindigenous fish, and likely bullfrogs, by the public has been a major factor in the spread of these species (Moyle 1976a, 1976b; Welcomme 1998). Nonindigenous fish are transported for bait and sporting purposes (Moyle 1976a, 1976b), for mosquito control (Meffe et al. 1983), and release of aquarium fishes (Deacon et al. 1964, Moore et al. 1976, Shelton and Smitherman 1984). The population of Gila topminnow at Watson Wash was extirpated as a result of transfers of nonindigenous fish into topminnow habitat (BLM and Service files). Refer to our May 15, 2008, BO on the Central Arizona Project for a discussion on the pathways and impacts of nonindigenous aquatic species to native fish, native frogs, and their habitats (file number 22410-2007-F-0081). We incorporate by reference that discussion (U.S. Fish and Wildlife Service 2008).

Cumulative effects to native aquatic animals include ongoing activities in the watersheds in which the species occurs such as livestock grazing and associated activities outside of Federal allotments, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization without a Federal nexus, and recreation. Some of these activities, such as irrigated agriculture, are declining and are not expected to contribute substantially to cumulative long-term adverse effects to native aquatic animals.

Other activities, such as recreation, are increasing. Increasing recreational, residential, or commercial use of the non-Federal lands near the riparian areas would likely result in increased cumulative adverse effects to occupied, as well as potentially-occupied native aquatic animal habitat through increased water use, increased pollution, and increased alteration of the stream banks through riparian vegetation suppression, bank trampling, changing flow regimes, and erosion.

Watershed effects from degraded conditions on surrounding ASLD land and dense thickets on Forest Service land that are primed for catastrophic fires are likely to occur at sites in both NCAs. Some of these effects would be ameliorated due to the location of the sites, riparian and aquatic vegetation buffers, and adequate ground cover; but effects will vary by site and over time. The San Pedro basin has been undergoing a long and sustained period of geologic renewal (Hereford 1993) and vegetation change (Kepner et al. 2002) from past watershed destabilization, where tributary stream channels undergo head cutting. This type of erosion has affected Murray Spring and may affect the others to various degrees in the future.

The over allocation of water resources in Arizona has already affected flows in the San Pedro River (Pool and Coes 1999, Thomas and Pool 2006) and some springs in the San Pedro RNCA

have dried. 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 unless measures are implemented to halt or mitigate groundwater pumping in the upper San Pedro basin (ASL 1998, USFWS 2007). Recharge projects have caused Murray Spring to increase flow in the basin. It is likely that some sites may not be viable in the future as a result of groundwater overdraft while other sites may improve in habitat quality and quantity. The current drought has compounded the effects of pumping on vulnerable spring sources.

There are many conservation actions being considered by the AGFD for native fish and frogs. Two important conservation actions are the approved Safe Harbor Agreements for the Chiricahua leopard frog and the topminnow and pupfish. While these two agreements and any other conservation actions taken by AGFD are likely to be federally funded or approved, it is likely some of them will have no Federal nexus.

That southeastern Arizona and much of the American southwest have experienced serious drought recently is well known. What is known with far less certainty is how long droughts last. State-of-the-art climate science does not yet support multi-year or decade-scale drought predictions. However, instrumental and paleoclimate records from the Southwest indicate that the region has a history of multi-year and multi-decade drought (Hereford et al. 2002, Sheppard et al. 2002, Jacobs et al. 2005). Multi-decade drought in the Southwest is controlled primarily by persistent Pacific Ocean-atmosphere interactions, which have a strong effect on winter precipitation (Brown and Comrie 2004, Schneider and Cornuelle 2005); persistent Atlantic Ocean circulation is theorized to have a role in multi-decadal drought in the Southwest, particularly with respect to summer precipitation (Gray et al. 2003, McCabe et al. 2004). Given these multi-decade “regimes” of ocean circulation, and the severity and persistence of the present multi-year drought, there is a fair likelihood that the current drought will persist for many more years (Stine 1994, Seager et al. 2007), albeit with periods of high year-to-year precipitation variability characteristic of Southwest climate.

The information on how climate change might impact southeastern Arizona is less certain than current drought predictions. However, virtually all climate change scenarios predict that the American southwest will get warmer during the 21st century (IPCC 2001, 2007). Precipitation predictions show a greater range of possibilities, depending on the model and emissions scenario, though precipitation is likely to be less (USGCRP 2001, Seager et al. 2007). To maintain the present water balance with warmer temperatures and all other biotic and abiotic factors constant, precipitation will need to increase to keep pace with the increased evaporation and transpiration caused by warmer temperatures. Key projections to keep in mind include:

- decreased snowpack — an increasing fraction of winter precipitation could fall as rain instead of snow, periods of snowpack accumulation could be shorter, and snowpacks could be smaller; ironically, due to changes in snow-precipitation characteristics, runoff may decrease even if total precipitation increases (Garfin 2005, Seager et al. 2007);

- earlier snowmelt — increased minimum winter and spring temperatures could melt snowpacks sooner, causing peak water flows to occur much sooner than the historical spring and summer peak flows (Stewart et al. 2004);
- enhanced hydrologic cycle—in a warmer world an enhanced hydrologic cycle is expected; flood extremes could be more common causing more large floods; droughts may be more intense, frequent, and longer-lasting (Seager et al. 2007).

Continuing drought and climate change, when added to the historical and continuing threats, will make native aquatic species conservation in the Gila River Basin even more difficult (Duncan and Garfin 2006). The impact of site desiccation to fish is obvious. Frogs may be able to move to another site. Many less obvious effects could occur with drought and a warmer climate. A site with reduced streamflow, or a pond or pool with low water levels could become uninhabitable to aquatic vertebrates due to low dissolved oxygen. We have seen this occur at three important natural Gila topminnow sites (i.e. Sharp Spring, Redrock Canyon, and Cienega Creek). Nonindigenous aquatic species may become more restricted in distribution as well; however, both native and nonindigenous species will be competing for remaining aquatic habitats, and extensive case history suggests that nonindigenous species will win (Moyle et al. 1986, Minckley and Deacon 1991).

Drought and climate change will also impact watersheds and subsequently the water bodies in those watersheds. Drought and especially long-term climate change will affect how ecosystems and watersheds function. These changes will cause a cascade of ecosystem changes, which may be hard to predict and are likely to occur non-linearly (Seager et al. 2007).

As an example, drought and climate change will cause changes in fire regimes in all southeastern Arizona vegetation communities (Kitzenberger et al. 2006). The timing, frequency, extent, and destructiveness of wildfires are likely to increase (Westerling et al. 2006) and may facilitate the invasion and increase of nonindigenous plants. These changed fire regimes will change vegetation communities, the hydrological cycle, and nutrient cycling in affected watersheds (Brown et al. 2004). Some regional analyses conservatively predict that acreage burned annually will double with climate change (MacKenzie et al. 2004). Such watershed impacts could cause enhanced scouring and sediment deposition, more extreme flooding (quicker and higher peak flows), and changes to water quality due to increases in ash and sediment within stream channels. Severe watershed impacts such as these, when added to reductions in extant aquatic habitats, will severely restrict sites available for the conservation of native fish and other aquatic vertebrates and make management of extant sites more difficult.

Many of the predictions about the impacts of climate change are based on modeling, but many predictions have already occurred. The tree die-offs and fires that have occurred in the southwest early in this century show the impacts of the current drought. Because of drought, climate change, and human population growth, negative effects to aquatic habitat in the Gila basin will continue to occur. In addition, the basin's rivers, streams, and springs continue to be degraded, or lost entirely.

CONCLUSION

After reviewing the current status of the Gila chub, Chiricahua leopard frog, Gila topminnow, Huachuca water umbel, and the desert pupfish, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the Gila chub, Chiricahua leopard frog, Gila topminnow, Huachuca water umbel, and the desert pupfish. Critical habitat has been designated within the action area for the Huachuca water umbel, but is outside the project area and thus will not be affected by the proposed action. Critical habitat for Gila chub is within the project area. However, the constituent elements are not present at the sites, and constituent elements downstream of the sites are unlikely to be affected. Our rationale for our conclusions is summarized here:

1. Most of the impacts from the project will be transitory;
2. Both the short- and long-term effects have a small footprint;
3. The conservation measures proposed by the BLM will reduce impacts, minimize the chance for nonnative species to invade and establish, and minimize loss of individuals;
4. The inter-specific impacts of multiple aquatic species being present at a site should not preclude the establishment of viable populations; and
5. The proposed conservation actions are designed to promote the conservation and recovery of the listed species.

This biological opinion does not rely on the regulatory definition of “destruction or adverse modification” of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

Critical habitat for the Gila chub will remain functional, as we expect no direct effects to occur. Indirect effects are unlikely to occur from sediment transport, and their effects to PCEs would be negligible.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is defined (50 CFR § 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly

impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined (50 CFR § 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. “Incidental take” is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the BLM so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The BLM has a continuing duty to regulate the activity covered by this incidental take statement. If the BLM (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the BLM must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

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.

AMOUNT OR EXTENT OF TAKE

We anticipate that the proposed action may result in incidental take of Gila topminnow, Chiricahua leopard frog, Gila chub, and desert pupfish. Incidental take will be difficult to detect for the following reasons: dead animals are difficult to find, cause of death may be difficult to determine, and losses may be masked by seasonal fluctuations in numbers or other causes. The incidental take is expected to be in the form of harm, harassment, kill, and pursuit from:

1. Management actions to remove nonnative aquatic species;
2. Vegetation management (including prescribed fire);
3. One released species preying on another (i.e., Gila chub on Gila topminnow);
4. Water diversion and management;
5. Livestock grazing (permitted and trespass); and
6. Recreation.

Because the actions proposed for Las Cienegas NCA implement the approved Resource Management Plan, the incidental take anticipated here is in addition to the incidental take anticipated in that BO. The actions on the SPRNCA are not covered under any prior section 7 consultation. We anticipate that the proposed action could result in up to 100% loss of any of the five species at each site. Therefore, we consider incidental take to have been exceeded if all 11 reestablishment sites fail due to one or more of the six causes of take.

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.

Effect of Take

In this biological opinion, we find the anticipated level of take is not likely to jeopardize the continued existence of the endangered Gila chub, Chiricahua leopard frog, desert pupfish, or Gila topminnow.

Reasonable and Prudent Measures and Terms and Conditions

The following reasonable and prudent measures are necessary and appropriate to minimize take of the Chiricahua leopard frog, Gila topminnow, Gila chub, and desert pupfish. To be exempt from the prohibitions of section 9 of the Act, the BLM must comply with the following terms and conditions, which implement the reasonable and prudent measures and outline required reporting and monitoring requirements. These terms and conditions are non-discretionary. The following reasonable and prudent measures and terms and conditions are necessary and appropriate to minimize take:

1. The BLM shall implement measures to reduce the impacts of management actions at the release sites:
 - a. To minimize impacts from recreation and as part of the proposed public education program, include information on the presence of listed species in the area, their status and importance, and prohibitions.
2. The BLM shall monitor implementation of the proposed action and any resulting incidental take and report to the FWS and AGFD the findings of that monitoring.
 - a. A brief written report shall be prepared by BLM summarizing project implementation, observed take, and monitoring results. This report shall be submitted annually to the FWS for five years after completion of the wetland restorations. The report shall also make recommendations, as needed, for modifying or refining these terms and conditions to enhance protection of the Gila

chub, Gila topminnow, Chiricahua leopard frog, and desert pupfish or reduce needless hardship on the BLM.

- b. The BLM shall provide us copies of any other reports regarding implementation of the proposed action.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The BLM must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 2450 W. Broadway Rd, Suite 113, Mesa, Arizona, 85202, 480-967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care and in handling dead specimens to preserve the biological material in the best possible state.

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 you implement the following conservation recommendations for the Gila chub:

- 1) Continue to assist us and the AGFD in conserving and recovering the Gila chub, Chiricahua leopard frog, desert pupfish, and Gila topminnow;
- 2) In the written report referred to in term and condition 3.a. above, include the Huachuca water umbel in the discussion; and
- 3) Continue to assist us in conserving and recovering the Huachuca water umbel.

For the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation for the proposed aquatic species conservation at the San Pedro Riparian and Las Cienegas National Conservation Areas. 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 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 conserve and recover the Chiricahua leopard frog, desert pupfish, Huachuca water umbel, Gila topminnow, and Gila chub. For further information please contact Doug Duncan (520) 670-6150 (x236) or Lesley Fitzpatrick (602) 242-0210 (x236). Please refer to consultation number, 22410-2008-F-0103, in future correspondence concerning this project.

/s/ Steven L. Spangle

cc: Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ
New Mexico Ecological Service Field Office, Albuquerque, NM

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

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Locations	UTM (NAD27)	Legal Description of Location	Acres	Elevation (feet)
Little Joe Spring	E-573221, N-3523064	T.18 S., R. 21 E., Sec. 29, SE, NW, SW - Land 7.5' USGS quadrangle.	0.1	3680
Horse Thief Draw Spring	E-579958, N-3491513	T.21 S., R. 21 E., Sec. 31, SE - Lewis Spring 7.5" USGS Quadrangle	NA	4100
Frog Spring	E-574255, N-3515336	T.19 S., R. 21 E., Sec. 20, SE, NE - Lewis Spring 7.5" USGS Quadrangle	NA	4100
Murray Spring	E-578517, N-3493264	T.21 S., R. 21 E., Sec. 29, SE -Lewis Spring 7.5" USGS Quadrangle	NA	4150
Ben Spring	E-575097, N-3509395	T.20 S., R. 20 E., Sec. 8, N1/2 - Fairbank 7.5" USGS Quadrangle	NA	3900
White House Well Wetland	E-584711, N-3477642	T.23 S., R. 22 E., Sec. 16, NW, SE - Hereford 7.5" USGS Quadrangle	0.25	4165

Locations	UTM (NAD27)	Legal Description of Location	Acres	Elevation (feet)
Nogales Spring	E-550186, N-3527600	T 18S, R. 18E, Sec. 11, NE, SE - Mescal 7.5' USGS quadrangle	NA	4720
Little Nogales Spring	E-549566, N-3527533	T 18S, R. 18E, Sec. 11, NE, SW - Mescal 7.5' USGS quadrangle	NA	4630
Road Canyon Tank (twin tanks)	E-540923, N-3511193	T19S, R. 17E, Sec. 36, NW, SW - Elgin 7.5' USGS quadrangle.	0.12	4650
Cieneguita Wetland	E-538200, N-3517626	T 19S, R. 17E, Sec. 10, N1/2, S1/2, SW - Spring Water 7.5' USGS quadrangle.	2.5	4360
Spring Water Wetland	E-539208, N-3518787	T 19S, R. 17E, Sec. 2, SW, SW - Spring Water 7.5' USGS quadrangle.	0.25	4360

Table 3. Species proposed for reestablishment at 11 sites on the San Pedro RNCA and Las Cienegas NCA, Arizona. Not all species listed for a site will necessarily be translocated there. One of three native leopard frogs will be chosen for each site in the San Pedro basin: Chiricahua, Ramsey Canyon, or lowland leopard frog, depending on site habitat characteristics and the biogeography of each species.	
Locations	Species Selected for Reestablishment
Little Joe Spring	pupfish, topminnow, native leopard frog, Mexican gartersnake, water umbel, Sonora mud turtle
Horse Thief Spring	pupfish, topminnow, native leopard frog, Mexican gartersnake, water umbel
Frog Spring	pupfish, topminnow, native leopard frog, Mexican gartersnake, water umbel
Murray Spring	pupfish, topminnow, native leopard frog, Mexican gartersnake, water umbel
Ben Spring	pupfish, topminnow, native leopard frog, Mexican gartersnake, water umbel
White House Well	pupfish, topminnow, native leopard frog, Mexican gartersnake, water umbel, Sonora mud turtle
Nogales Spring	chub, topminnow, water umbel
Little Nogales Spring	chub, topminnow, water umbel
Road Canyon Tank	pupfish, topminnow, native leopard frog, water umbel, Sonora mud turtle
Cieneguita Wetland	pupfish, topminnow, native leopard frog, mud turtle, gartersnake, water umbel
Spring Water Wetland	pupfish, topminnow, native leopard frog, mud turtle, gartersnake, water umbel

Figure 1. Map of proposed reestablishment sites on the San Pedro Riparian National Conservation Area north of Sierra Vista, Cochise County, Arizona.

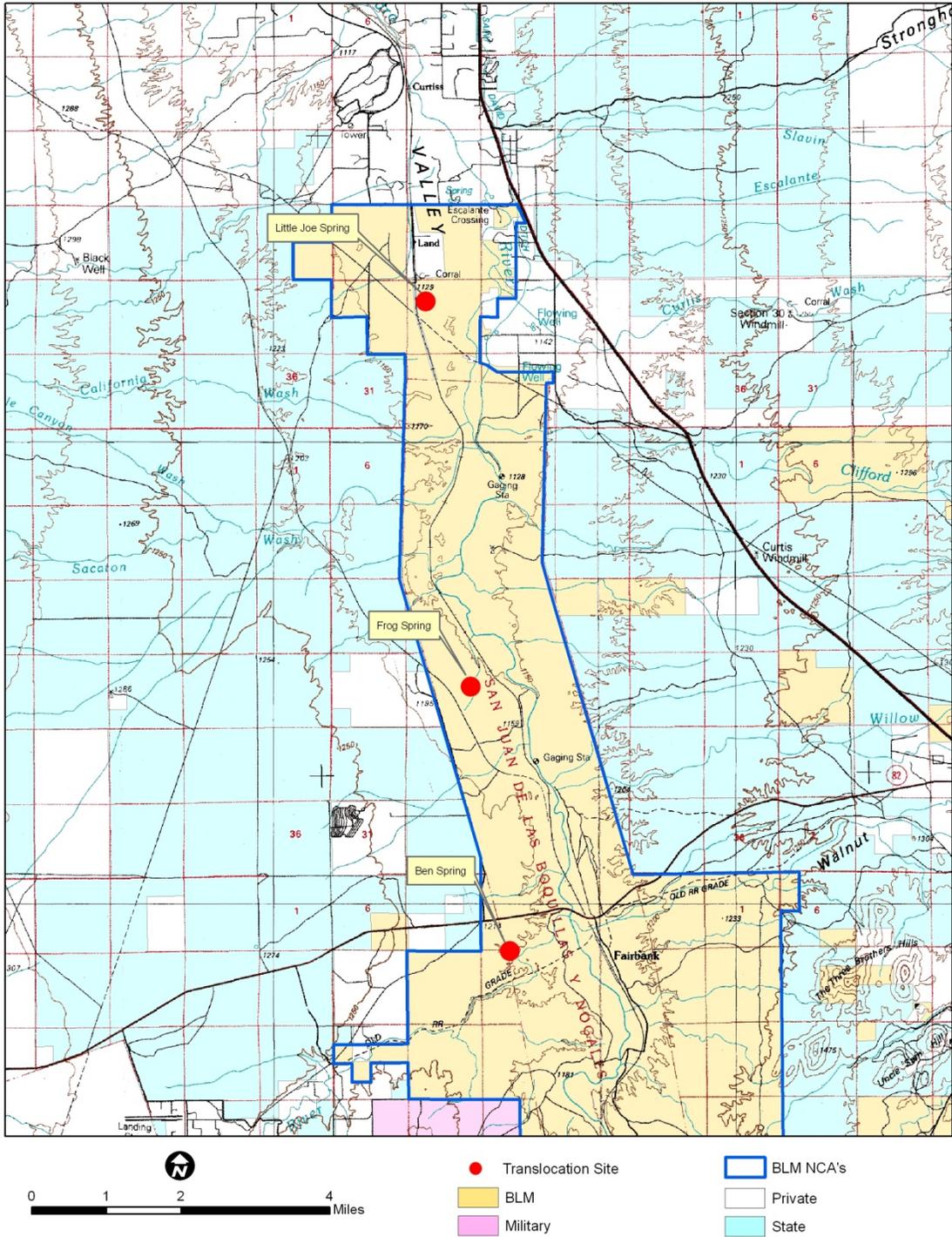


Figure 2. Map of proposed reestablishment sites on the San Pedro Riparian National Conservation Area south of Sierra Vista, Cochise County, Arizona.

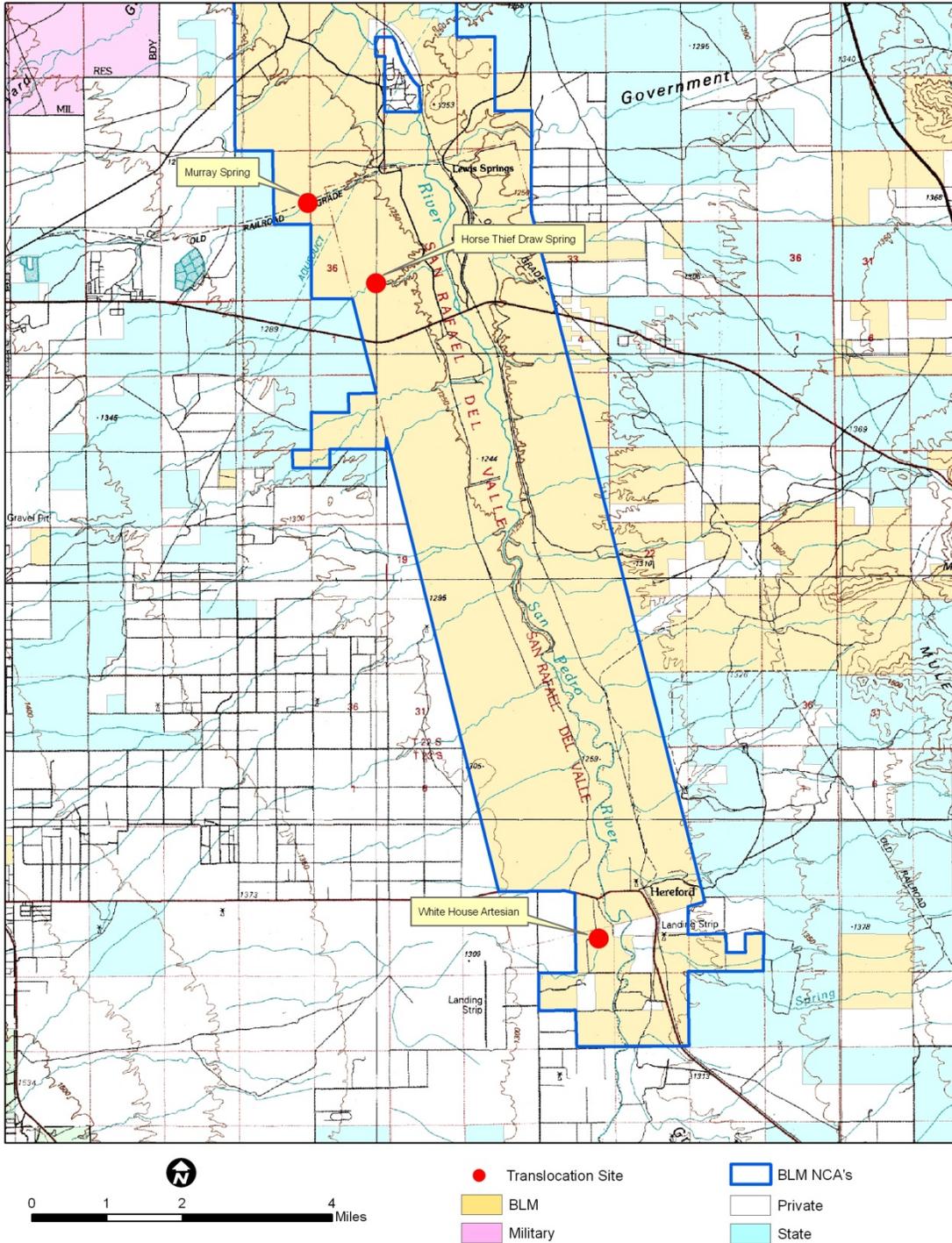


Figure 3. Map of proposed reestablishment sites on the Las Cienegas National Conservation Area, Pima County, Arizona.

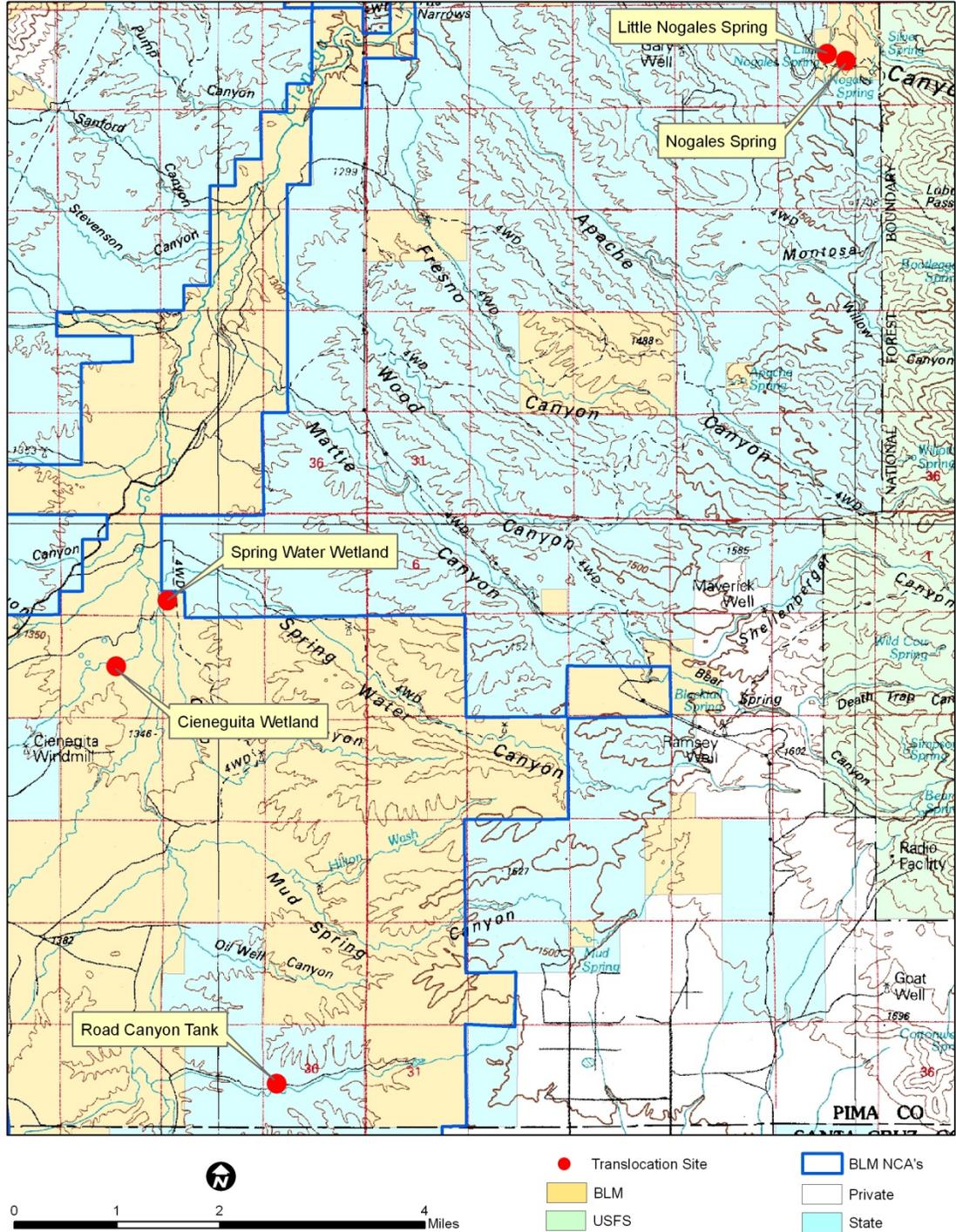
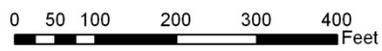


Figure 4. Map of Road Canyon Tank with proposed fence installation.



 **Proposed Pipe Fence**

Figure 5. Map of Cieneguita Wetland with proposed frog fence installation.

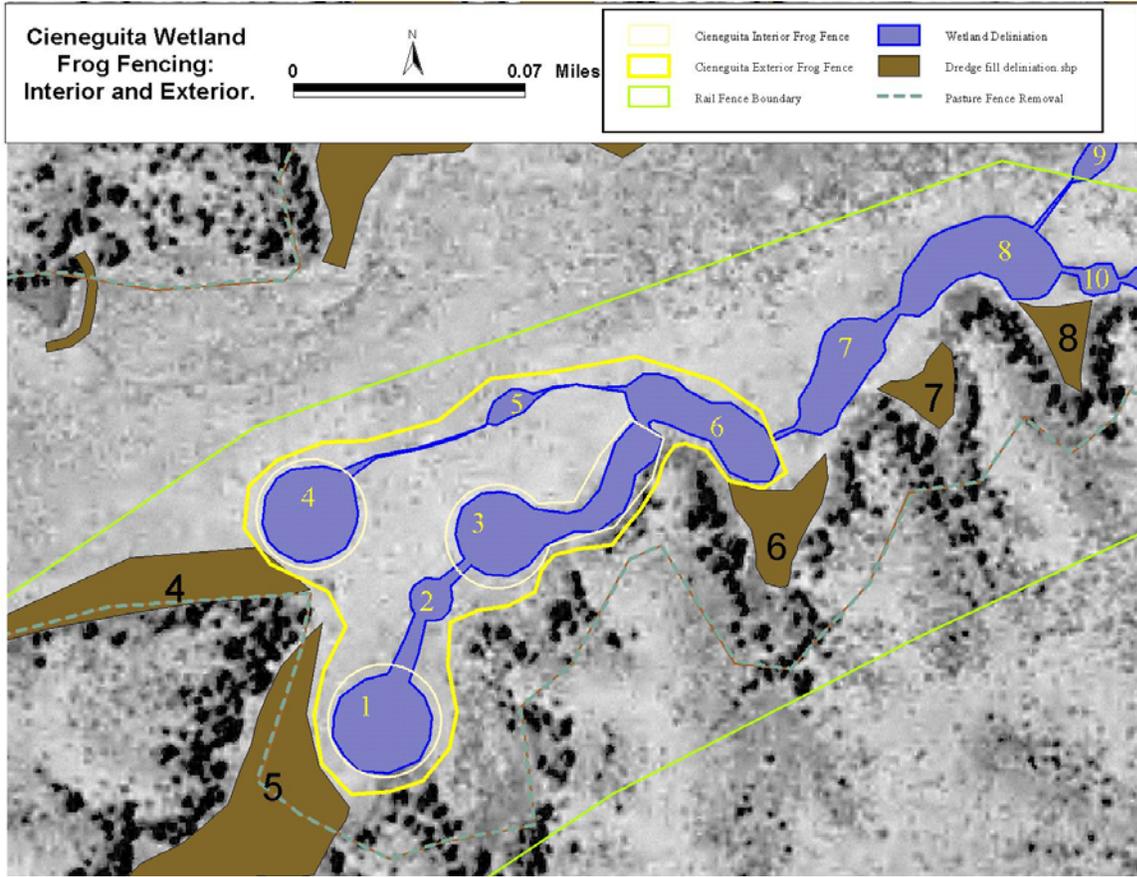


Figure 6. Map of Cieneguita Wetland with proposed construction routes and fill storage areas.

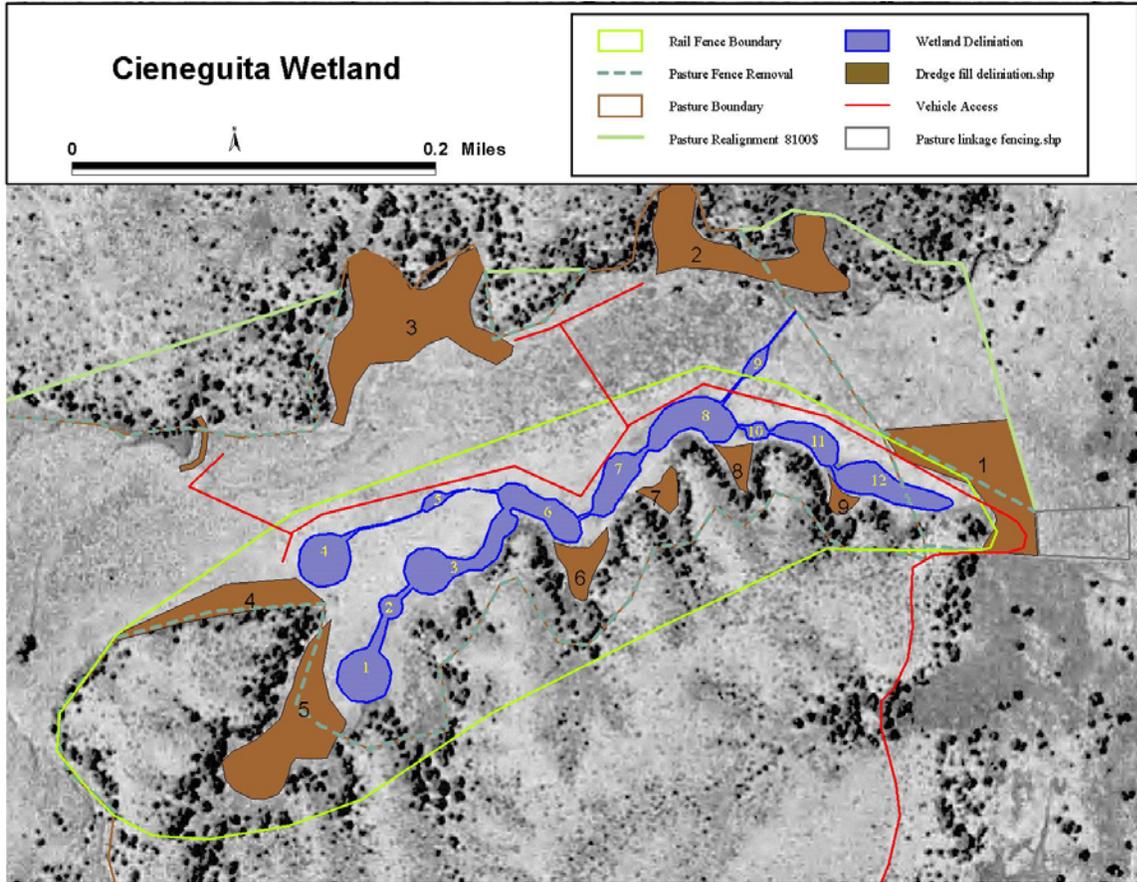


Figure 7. Map of Spring Water Wetland with proposed pipe-rail fence, frog fence, fill storage area, and equipment access routes.

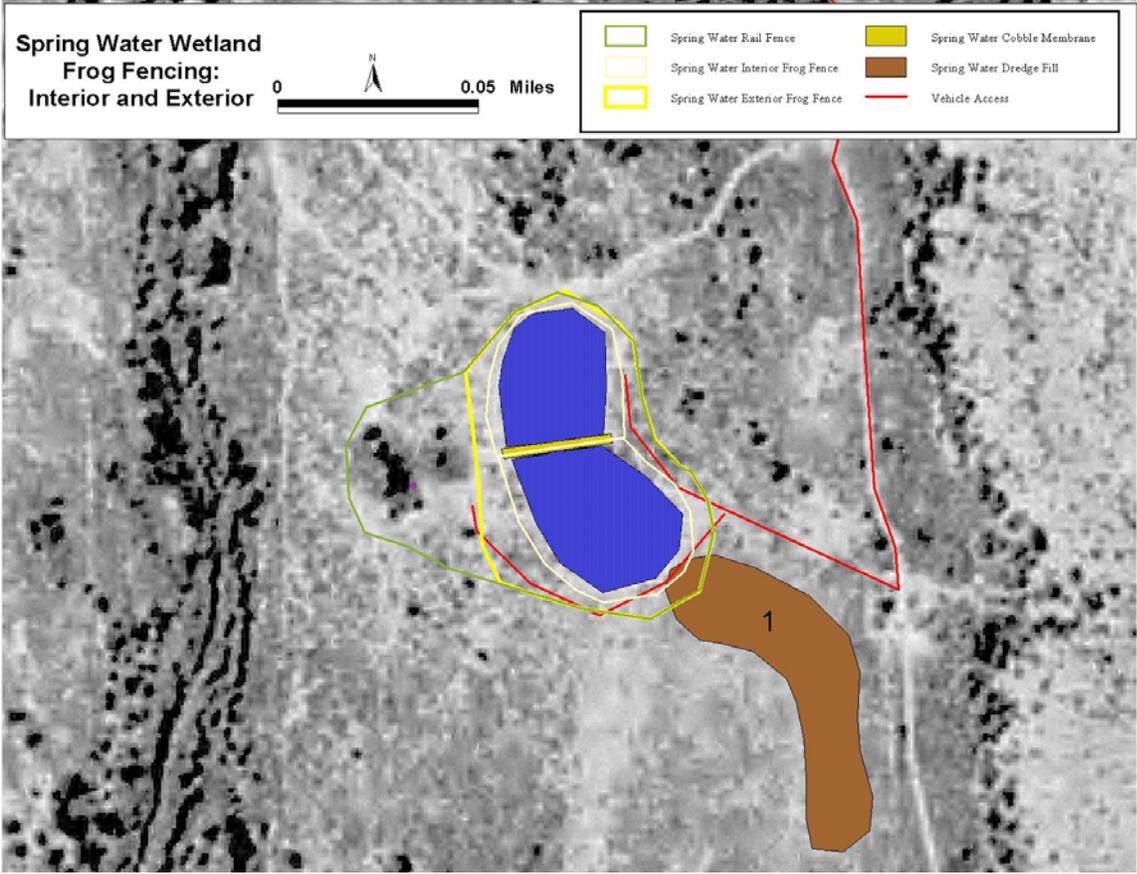


Table 4. Proposed species reestablishments in restored/constructed wetland habitats.		
Locations	Limiting Factors	Species
Cieneguita Wetland	Existing ponds too shallow (seasonal) - need to be deepened	Gila topminnow, Chiricahua leopard frog, Sonora mud turtle MX garter snake, Huachuca water umbel, desert pupfish
Spring Water Wetland	Existing ponds too shallow (seasonal) - need to be deepened	Gila topminnow, Chiricahua leopard frog, MX garter snake Sonora mud turtle, Huachuca water umbel, desert pupfish
White House Wetland	Existing wetland too shallow (seasonal) - need to be excavated	Gila topminnow, Ramsey Canyon leopard frog, MX garter snake, Sonora mud turtle Huachuca water umbel, desert pupfish

Table 5. Selected water quality parameters for reestablishment sites on the San Pedro RNCA, Cochise County, and Las Cienegas NCA, Pima County, Arizona.						
Location	Date & Time	Dissolved oxygen (mg/l)	pH	Alkalinity (mg/l)	Hardness (mg/l)	Carbon Dioxide (mg/l)
Little Joe Spring	06-21-05 10:00	6.0	7.9	215	340	N/A
Horse Thief Spring	06-03-05 10:30	3.8	7.1	365	410	N/A
Frog Spring	06-20-05 13:00	3.9	7.4	198	324	N/A
Murray Spring	06-01-05	5.4	7.4	238	226	N/A
Ben Spring	06-20-05 15:30	8.6	8.0	395	113	N/A
White House Well	No data	-	-	-	-	-
Nogales Spring	05-31-05 16:00	Equip Failure	7.2	302	275	54
L. Nogales Spring	05-31-05	6.5	7.1	262	185	56
Road Canyon Tank	05-31-05 12:00	11.2	9.3	41	83	N/A

Figure 8. Map of White House Wetland with proposed pond/wetland and pipe-rail fence and drain.



- +—+—+ Proposed Pipe Fence
- Proposed Drainage Pipe

APPENDIX A. CONCURRENCES

We concur with your determinations that this action may affect, but is not likely to adversely affect the endangered southwestern willow flycatcher (*Empidonax traillii extimus*) and endangered lesser long-nosed bat (*Leptonycteris yerbabuena curasoae*). Our rationales for concurring with your determinations follows.

SOUTHWESTERN WILLOW FLYCATCHER

The southwestern willow flycatcher was listed as endangered, without critical habitat in 1995 (60 FR 10694). Critical habitat was later designated in 1997 (62 FR 39129). A correction notice was published in the Federal Register in August 1997 to clarify the lateral extent of the designation (62 FR 44228). In 2001, the 10th Circuit Court of Appeals set aside designated critical habitat in those states under the 10th circuit's jurisdiction (New Mexico). The FWS decided to set aside critical habitat designated for the southwestern willow flycatcher in all other states (California and Arizona) until we reassessed the economic analysis. In 2005, we re-designated critical habitat for the southwestern willow flycatcher (70 FR 60866). A total of 737 river miles across southern California, Arizona, New Mexico, southern Nevada, and southern Utah were included in the final designation.

We concur with your determination that the proposed action may affect, but is not likely to adversely affect, the southwestern willow flycatcher. We base this determination on the following:

- The southwestern willow flycatcher appears to only use Cienega Creek for migration. Nesting has not been documented for several years, and the habitat no longer appears suitable for nesting;
- the southwestern willow flycatcher appears to use the SPRNCA mainly for migration, though nests are found periodically;
- most sites have no suitable habitat for flycatchers;
- suitable habitat is unlikely to develop at the sites;
- the proposed action and any additional treatments will occur outside the nesting periods; and
- the proposed project is unlikely to result in incidental take.

LESSER LONG-NOSED BAT

The lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*) was listed (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered in 1988 (U.S. Fish and Wildlife Service 1988). No critical habitat has been designated for this species. A recovery plan was completed in 1997 (U.S. Fish and Wildlife Service 1997). Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. The recovery plan states that the species will be considered for delisting when three major maternity roosts and two post-maternity roosts in the United States, and three maternity roosts in Mexico have remained stable or increased in size for at least five years, following the approval of the recovery plan.

We concur with your determination that the proposed action may affect, but is not likely to adversely affect, the lesser long-nosed bat. We base this determination on the following:

- The lesser long-nosed bat may use water at these sites at night while feeding in the area or traveling to other areas, but no activities are planned at night;
- No forage plants or potential roost sites will be impacted by project actions; and
- It is highly unlikely that there would be ecological interactions between the reestablished species and lesser long-nosed bats.