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In Reply Refer To:

September 11, 2008

AESO/SE
22410-2006-F-0724

Memorandum

To: Regional Director, U.S. Fish and Wildlife Service, Albuquerque, New Mexico (Attn: Susan Jacobson)

From: Field Supervisor

Subject: Biological Opinion on the Leslie Canyon Watershed Safe Harbor Agreement

This memorandum represents our intra-service Biological Opinion (BO), furnished under Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act), on the issuance of a permit authorizing incidental take of the threatened Chiricahua leopard frog (*Lithobates* [=*Rana*] *chiricahuensis*), threatened beautiful shiner (*Cyprinella formosa*), threatened Yaqui catfish (*Ictalurus pricei*), endangered Yaqui chub (*Gila purpurea*), and endangered Yaqui topminnow (*Poeciliopsis occidentalis sonoriensis*). The permit is to be issued under the authority of Section 10(a)(1)(A) enhancement of survival permit (TE-160629-0) to Alysa F. Bennett, 99 Bar Ranch Limited Liability Limited Partnership, and Mr. Josiah and Mrs. Valer Austin, owners of the Bar Boot Ranch (Participants).

This biological opinion evaluates the effects of permit issuance on the permit species and on critical habitat for the beautiful shiner, Yaqui catfish, Yaqui chub, and Yaqui topminnow; and on the Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*) and its critical habitat. We determined further that this action may affect, but is not likely to adversely affect, the endangered southwestern willow flycatcher (*Empidonax trailli extimus*) with critical habitat, the endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), and the endangered jaguar (*Panthera onca*). Rationales for these determinations are in Appendix A.

Consultation History

This BO is based on information provided in the draft Leslie Canyon Watershed Safe Harbor Agreement (Agreement), dated June 22, 2008; the draft Environmental Assessment (EA) dated March 28, 2008; telephone conversations; field investigations; U.S. Fish and Wildlife Service (FWS) files; and other sources of information. Literature cited in this BO is not a complete bibliography of all literature available on the species of concern, the activities covered in the Agreement and their effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file in the Arizona Ecological Services Office (AESO).

- July 13, 2007: Draft Leslie Canyon Watershed Safe Harbor Agreement and permit application submitted to the Regional Office.

- April 11, 2008: 60-day public review and comment period for the draft Leslie Canyon Watershed Safe Harbor Agreement and associated draft Environmental Assessment opened (73 FR 19868).

- June 10, 2008: Public review and comment period closed with no comments received.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is the approval of the Agreement and the issuance of a section 10(a)(1)(A) enhancement of survival permit. The Agreement was written for the suite of aquatic listed species within the Leslie Canyon Watershed. The covered species in the Agreement are the Chiricahua leopard frog, Huachuca water umbel, beautiful shiner, Yaqui catfish, Yaqui chub, and Yaqui topminnow. The enhancement of survival permit is intended to cover the activities of non-Federal landowners upstream from Leslie Canyon NWR and downstream from the Coronado National Forest if the covered species move onto the non-Federal lands as a result of their activities to improve the watershed and/or the covered species are actively reestablished on their private property through the efforts of Arizona Game and Fish Department and our office. The Agreement covers the non-Federal lands upstream of Leslie Canyon National Wildlife Refuge (NWR) within the Leslie Canyon Watershed that the Participants either own or that they lease from the Arizona State Land Department, and non-Federal activities that may affect the covered species within the covered area, Cochise County, Arizona (See Figure 1).

The purpose of the Agreement is to implement recovery activities for the covered species, through the reestablishment of covered species and restoration and maintenance of their habitats by improving watershed conditions upstream from Leslie Canyon NWR and providing for the natural expansion of covered species into improving species habitats in the upper watershed. Active reestablishment of covered species will be pursued during the Agreement with in coordination with our office, Leslie Canyon NWR and the participants, with all necessary State and Federal permits.

Specific actions that are identified as part of the Agreement include:

- Promoting healthy grasslands, reducing invasive shrubs, protecting and enhancing riparian vegetation, reducing soil erosion, and improving water infiltration through watershed improvement projects (including fire management, erosion control, and mechanical and chemical brush control).

- Providing for recolonization or actively reestablishing populations of covered species within the permit area.

- Fencing off a portion of appropriate sites that will provide protection from trampling to covered species, thus allowing for better habitat,

- Constructing double tank systems,

- Creating additional small refuges, such as steel or concrete tanks to allow the site itself to be maintained, while providing alternate habitat for covered species,

- Constructing pipelines to provide a permanent water source to primary sites or refugia,

- Maintaining or improving existing habitat conditions at primary or secondary sites whenever opportunities and funding allow, and

- Notifying us of any activity planned to allow salvage of individuals to reduce potential harm, harassment, and mortality associated with conservation measures and on going land-use activities.

Conservation Measures

Fire Management

- Low-intensity prescribed fire that minimizes the threat of uncontrolled high-intensity wildland fires will be employed within the covered area.

- In cases of wildfires, suppression and management plans shall include low-intensity back-burning around sites occupied by covered species, when possible.

Herbicide Use

- Synthetic herbicides will be used only when other vegetation management methods are too costly or less effective.

- All synthetic herbicides will be applied by a certified applicator and will be used consistent with the approved labeling.

- Participants will contact LCNWR staff to ensure that use of synthetic herbicide in areas that may impact covered species will use all appropriate protection measures in White (2004), or newer revisions.

Mechanical Vegetation Control

- Mechanical vegetation control activities shall employ a 164 ft (50 m) buffer around drainages above occupied sites and around occupied sites.

- As necessary, silt and erosion control techniques (e.g., straw bales) will be used in drainages downstream of the mechanical treatments to avoid accidental soil loss and siltation in occupied aquatic sites.

Control of Invasive Non-native Species:

- The Participants will not knowingly engage in the release, nor allow the release, of non-native fish, amphibian, or invertebrate species within the covered area.

- The Participants agree to notify the FWS of any observations of suspected introduced species, as well as any die-offs of covered species.

- The Participants agree to allow temporary access by the FWS, or their designees, to execute measures aimed at controlling or eliminating non-native species and diseases, with 14-day advanced notice.

General Best Management Practices

- All vehicles and tools will be properly cleaned and/or dried before moving to new locations to minimize the potential spread of amphibian diseases.

- Leslie Canyon NWR staff will be notified of any activities that may result in incidental take 30 days prior to the activity. Refuge staff will be given the opportunity to salvage covered species and return them after the project.

Monitoring and Reporting

- This Agreement will grant to the FWS, after reasonable prior notice, the right to enter the Participant's property for the purpose of ascertaining compliance with the Agreement and for monitoring, surveying, sampling, marking, and in certain circumstances, relocating species, as well as other measures that may be necessary.

- The Participants will complete and submit an annual report of activities related to species management to the FWS, and other reports as required by the Agreement.

A complete description of proposed covered land uses is included in the Agreement (U.S. Fish and Wildlife Service 2008).

STATUS OF THE SPECIES AND CRITICAL HABITAT

Chiricahua leopard frog

The Chiricahua leopard frog was listed as threatened without critical habitat on June 13, 2002 (67 FR 40790), at which time a special rule, under section 4(d) of the Act, was also promulgated exempting the prohibition against the incidental take of Chiricahua leopard frogs for operations and maintenance of stock tanks on non-Federal lands. Primary factors cited as the basis for listing include significant population declines as a result of destruction, alteration, and fragmentation of the species' aquatic habitats; disease; and predation by introduced aquatic predators, especially bullfrogs, crayfish, and predatory fish (67 FR 40790). Chiricahua leopard frogs are considered a Wildlife Species of Concern (WSC) in Arizona and a Species of Concern (SOC) in New Mexico. The Chiricahua leopard frog is listed as threatened in Mexico (Secretaria de Medio Ambiente y Recursos Naturales 2002).

The Chiricahua leopard frog is an inhabitant of ciénegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 feet (ft) (1,000 to 2,710 meters [m]) in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northeastern Sonora and the Sierra Madre Occidental of northern and central Chihuahua (Platz and Mecham 1984, Degenhardt *et al.* 1996, Sredl *et al.* 1997, Sredl and Jennings 2005). Reports of the species from the State of Aguascalientes (Diaz and Diaz 1997) are questionable. The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Lithobates lemosespinali*) in

the southern part of the range of the Chiricahua leopard frog. In New Mexico, of sites occupied by Chiricahua leopard frogs from 1994-1999, 67 percent were creeks or rivers, 17 percent were springs or spring runs, and 12 percent were stock tanks (Painter 2000). In Arizona, slightly more than half of all known historical localities are natural lotic systems, a little less than half are stock tanks, and the remainder is comprised of lakes and reservoirs (Sredl *et al.* 1997). Sixty-three percent of populations extant in Arizona from 1993-1996 were found in stock tanks (Sredl and Saylor 1998).

Based on the latest information in our files, the species is still extant in most major drainages in Arizona and New Mexico where it occurred historically; with the exception of the Little Colorado River drainage in Arizona and possibly the Yaqui drainage in New Mexico. It has also not been found recently in many rivers, valleys, and mountains ranges, including the following in Arizona: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek mainstem. In southeastern Arizona, evidence suggests the species may be extirpated from the following mountain ranges or valleys: Baboquivari Mountains, Pinaleno Mountains, Chiricahua Mountains, Canelo Hills, Patagonia Mountains, and Sulphur Springs Valley. Moreover, the species is now absent from all but one of the southeastern Arizona valley bottom ciénega complexes. In many of these regions Chiricahua leopard frogs were not found for a decade or more despite repeated surveys. Recent surveys suggest the species may have recently disappeared from some major drainages in New Mexico (C. Painter and R. Jennings, pers. comm. 2004). Approximately 55 and 35-38 populations are likely extant in Arizona and New Mexico, respectively. The status of the species in Mexico is poorly known, but several populations have been documented in Chihuahua in the last two years.

Threats to this species include predation by non-native organisms; disease; drought; floods; degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, altered fire regimes due to fire suppression and livestock grazing, mining, development, and other human activities; disruption of metapopulation dynamics; increased chance of extirpation or extinction resulting from small numbers of populations and individuals; and environmental contamination. Predation by non-native species and the effects of the apparently introduced fungal skin disease, chytridiomycosis, are the primary limiting factors for recovery. The Chiricahua Leopard Frog Recovery Plan (U.S. Fish and Wildlife Service 2007) contains a complete discussion of these threats and is included herein by reference. The goal of the recovery plan is to improve the status of the species to the point that it no longer needs the protection of the Endangered Species Act. The recovery strategy calls for reducing threats to existing populations; maintaining, restoring, and creating habitat that will be managed in the long term; translocating frogs to establish, reestablish, or augment populations; building support for the recovery effort through outreach and education; monitoring; research needed to provide effective conservation and recovery; and application of research and monitoring through adaptive management. Recovery actions are recommended in each of eight recovery units throughout the range of the species. Management areas are also identified within recovery units where the potential for successful recovery actions is greatest.

Disruption of metapopulation dynamics is likely an important factor in regional loss of populations (Sredl *et al.* 1997, Sredl and Howland 1994). Chiricahua leopard frog populations are often small and habitats are dynamic, resulting in a relatively low probability of long-term population persistence. Historically, populations were more numerous and

closer together. If populations were lost due to drought, disease, or other causes, extirpated sites could be recolonized via immigration from nearby populations. As numbers of populations declined, populations became more isolated and were less likely to be recolonized if extirpation occurred. Also, most of the larger source populations along major rivers and in cienega complexes have disappeared.

The dispersal abilities of Chiricahua leopard frogs are key to determining the likelihood that suitable habitats will be colonized from a nearby extant population. Evidence exists to show substantial movements of leopard frogs and passive movement of tadpoles along stream courses. Current guidance, supported by scientific literature, suggests reasonable dispersal distances of Chiricahua leopard frogs of one mile overland, three miles within intermittent drainages, and five miles within perennial drainages. Dispersal of this species is largely thought to occur during the summer monsoon.

Additional information about the Chiricahua leopard frog can be found in Platz and Mecham (1984, 1979), Sredl and Howland (1994), Jennings (1995), Degenhardt *et al.* (1996), Rosen *et al.* (1996, 1995), Sredl *et al.* (1997), Painter (2000), Sredl and Jennings (2005), Lemos-Espinal and Smith (2007), and U.S. Fish and Wildlife Service (2007).

Given the range of this species, several Federal actions affect this species every year. A complete list of consultations affecting this species in Arizona can be found on our website (http://www.fws.gov/southwest/es/arizona/) by clicking on the "Document Library" tab and then on the "Section 7 Biological Opinions" tab. Information about the activities of the recovery team and the implementation of the recovery plan can be found in the recovery website for the species at http://www.fws.gov/southwest/es/arizona/CLF_Recovery_Home.html.

Huachuca water umbel with critical habitat

On January 6, 1997, we listed the Huachuca water umbel as an endangered species under the Act without critical habitat (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 on July 12, 1999 (64 FR 37441). The Arizona Department of Agriculture has designated Huachuca water umbel as a Highly Safe Guarded (HS) plant in Arizona; it is not known to occur in New Mexico, but has been documented at several sites in Sonora, Mexico. The Huachuca water umbel is not listed in Mexico.

The Huachuca water umbel is an herbaceous, semiaquatic perennial plant with slender, erect leaves that grow from creeping rhizomes. The species reproduces sexually through flowering and asexually from rhizomes; the latter is probably the primary reproductive mode. An additional dispersal opportunity occurs as a result of the dislodging of clumps of plants, which then may reroot in a different site along aquatic systems.

The Huachuca water umbel has been documented from sites in Santa Cruz, Cochise, and Pima counties, Arizona, and in adjacent Sonora, Mexico, west of the continental divide (Haas and Frye 1997, Saucedo Monarque 1990, Warren *et al.* 1989, Warren *et al.* 1991, Warren and Reichenbacher 1991, FWS files). 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 ciénegas 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). Wetland degradation and loss continue today. Human activities such as groundwater overdrafts, surface water diversions, impoundments, channelization, improper livestock grazing, chaining, agriculture, mining, sand and gravel operations, road building, non-native species introductions, urbanization, wood cutting, and recreation all contribute to riparian and ciénega habitat loss and degradation in southern Arizona. The local and regional effects of these activities are expected to increase with the increasing human population.

Our June 10, 2005, Programmatic Biological and Conference Opinion for the Continued Implementation of the Land and Resource Management Plans for the Eleven National Forests and National Grasslands of the Southwestern Region (U.S. Fish and Wildlife Service 2005) included a detailed Status of the Species for the Huachuca water umbel. This biological opinion (BO) is available on our website at http://www.fws.gov/arizonaes, under Document Library; Section 7 Biological Opinions. Herein, we incorporate that status discussion by reference.

Critical habitat for Huachuca water umbel includes seven critical habitat units in portions of: 1) Sonoita Creek, 2) upper Santa Cruz River, 3) Scotia Canyon, 4) Sunnyside Canyon, 5) Garden Canyon, 6) Bear Canyon, Lone Mountain Canyon, Rattlesnake Canyon, and an upper unnamed tributary, and 7) the upper San Pedro River (64 FR 37441).

The critical habitat primary constituent elements are:

- Sufficient perennial base flows to provide a permanently or nearly permanently wetted substrate for growth and reproduction of Huachuca water umbel;

- A stream channel that is relatively stable, but subject to periodic flooding that provides for rejuvenation of the riparian plant community and produces open microsites for Huachuca water umbel expansion;

- A riparian plant community that is relatively stable over time and in which non-native species do not exist or are at a density that has little or no adverse effect on resources available for Huachuca water umbel growth and reproduction; and

- In streams and rivers, refugial sites in each watershed and in each reach, including, but not limited to, springs or backwaters of mainstem rivers, that allow each population to survive catastrophic floods and recolonize larger areas.

Activities that may result in the destruction or adverse modification of critical habitat include those that alter the ability of the primary constituent elements to function properly and serve the intended conservation role for the species. These types of activities are discussed in the final rule designating critical habitat (70 FR 75546 and 71 FR 32496).

The Huachuca water umbel occurs in ciénegas and along streams and rivers at mid elevations from 3,500 to 6,500 ft (1,067 to 1,982 m). These aquatic environments are extremely rare in the desert southwest and much reduced from their historical abundance (about 10 percent remaining); the Huachuca water umbel is correspondingly rare.

A complete list of all consultations affecting this species can be found on our website

(http://www.fws.gov/southwest/es/arizona/) by clicking on the "Document Library" tab and then on the "Section 7 Biological Opinions" tab. Survey work and recovery projects also occur periodically, and are summarized in the appropriate land-management agency documents.

Yaqui Fish

The Yaqui fish listed under the Act include the beautiful shiner, Yaqui catfish, Yaqui chub, and Yaqui topminnow. On August 31, 1984, the beautiful shiner was listed as a threatened species, and the Yaqui catfish and Yaqui chub were listed as endangered species (49 FR 34490). Yaqui topminnow, originally listed as Sonoran topminnow (*Poeciliopsis occidentalis*), was listed as endangered only in the U.S. portion of its range on March 11, 1967 (32 FR 4001). Descriptions of these species and life history accounts are included in the Fishes of the Río Yaqui Recovery Plan (U.S. Fish and Wildlife Service 1995), and are included herein by reference.

Critical habitat was designated for these three species at the time of their listing (49 FR 34490). Critical habitat for the beautiful shiner, Yaqui catfish, and Yaqui chub includes all aquatic habitats of San Bernardino National Wildlife Refuge (San Bernardino NWR), Cochise County, Arizona. These areas provide habitat for one of the two existing known populations of beautiful shiner. Additionally, the aquatic habitats on San Bernardino NWR may provide expansion habitat for these three species. The critical habitat primary constituent elements for the beautiful shiner, Yaqui catfish, and Yaqui chub are:

- clean, small, permanent streams with riffles, or intermittent creeks with pools and riffles in the Río Yaqui drainage (beautiful shiner),
- permanent streams of medium current with clear pools (Yaqui catfish),
- permanent water with deep pool and intermediate areas with riffles (Yaqui chub),
- areas of detritus or heavy overgrown cut banks (Yaqui chub),
- clean and unpolluted water, and
- water free of introduced non-native fish.

Our June 10, 2005, Programmatic Biological and Conference Opinion for the Continued Implementation of the Land and Resource Management Plans for the Eleven National Forests and National Grasslands of the Southwestern Region (U.S. Fish and Wildlife Service 2005) included a detailed Status of the Species for the Yaqui catfish and Yaqui chub. A detailed Status of the Species for Yaqui topminnow is included in the September 3, 2004 Biological and Conference Opinion for the Bureau of Land Management (BLM) Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management (U.S. Fish and Wildlife Service 2004). The status of the beautiful shiner was documented in the January 23, 2006, Biological Opinion for the Implementation of the Fire Management Plan at the San Bernardino and Leslie Canyon National Wildlife Refuges (U.S. Fish and Wildlife Service 2006a). These BOs are available on our website at http://www.fws.gov/southwest/es/arizona/, under Document Library; Section 7 Biological Opinions. Herein, we incorporate those status discussions by reference. A brief update to the status of these four species referenced here is included below.

A complete list of all consultations affecting these species can be found on our website (http://www.fws.gov/southwest/es/arizona/) by clicking on the "Document Library" tab and then on the "Section 7 Biological Opinions" tab. Survey work and recovery projects also occur periodically, and are summarized in the appropriate land-management agency or AGFD documents.

Beautiful shiner

The beautiful shiner is found in a variety of habitats, but the largest populations appear to occur in the riffles of small streams (49 FR 34490). In Mexico, the beautiful shiner has been reported in both riffles and pools within moderate-sized, clear streams, creeks, spring-fed pools, and artesian-fed ditches, and exceptionally, in ephemeral lakes; occurring in habitats subject to environmental extremes (Miller *et al.* 2005). It is a mid-water-column species, remaining near, but rarely within aquatic vegetation or other cover along pond margins. This shiner likely spawns from February to June and perhaps over a longer period in warm springs (Miller *et al.* 2005). Little else is known about the life history and ecology of this fish, although it is thought to be similar to that of the red shiner (49 FR 34490).

The beautiful shiner historically occurred in the U.S. only in San Bernardino Valley in Arizona (now designated as the Yaqui form) and the Mimbres River in New Mexico (now designated as the Guzman form). In Mexico, its range includes the Río Yaqui system, Guzman basin, and Bavicora and Sauz basins. The Guzman form was extirpated in the U.S. by about 1951 and the Yaqui form by 1970. The species is continuing to suffer reductions in Mexico as a result of changes in land and water use along with impacts of non-indigenous species such as the red shiner. Few individuals were found in Sonora's Cajon Bonito during 2005 fish surveys, and none were documented during 2006 surveys in the same stream (W. Radke, pers. comm.).

About 900 beautiful shiner were collected under permit in Mexico from Arroyo Moctezuma on the Bavispe drainage during October 1989. These fish were held and propagated at Dexter National Fish Hatchery (Dexter NFH), and 300 fish were ultimately reestablished into Twin Pond on San Bernardino NWR on May15, 1990. The species is currently reproducing and thriving in the two adjacent Twin Ponds, and has adapted well to these off-channel ponds established as refugia for this and other fish species. Beautiful shiner from the Twin Ponds are able to pioneer into lotic habitats within Black Draw, but the species is not typically found in Black Draw during annual fish surveys (W. Radke, pers. comm.). In addition to being federally listed as threatened in the U.S., beautiful shiner is considered WSC in Arizona. The species is listed as threatened in Mexico (Secretaria de Medio Ambiente y Recursos Naturales 2002).

Yaqui catfish

The Yaqui catfish is a medium to large fish of the family Ictaluridae (Minckley 1973). The species is most commonly caught in larger rivers in areas of medium to slow current over gravel and sand substrates. These catfish are found in deeper pools in the canyon-bound reaches of the Río Yaqui and its tributaries among Mexican roundtail chubs (*Gila minaceae*) and Yaqui suckers. Yaqui catfish will frequent riffles and runs at night during feeding activity. Diet includes aquatic invertebrates, other fishes, and organic debris. Adults spawn in a depression or hole in the bank, and males will defend the nest and young for a period of time. Juveniles eventually move to riffles where they occupy shallow water between heavier substrates (Rinne and Minckley 1991).

Juvenile Yaqui catfish are profusely speckled, while adults are a fairly uniform dark gray to black dorsally and white to grayish beneath. The species is usually found in large streams in areas of medium to slow current over gravel and sand substrates. Besides this information on basic habitat preference, little is known about the life history and ecology of this fish (49 FR 34490).

Yaqui catfish are the only native catfish west of the Continental Divide. The historical range of the species most likely included the northernmost part of the Río Yaqui/Bavispe basin in Arizona and the Río Yaqui and Río Casas Grandes basins in Sonora and Chihuahua, Mexico. However, with the exception of a population of Yaqui catfish stocked in the upper Santa Cruz River in Arizona in 1899 (which persisted until the 1950's), no specimens documenting its historical presence in the U.S. are known. Yaqui catfish were probably extirpated from the wild in the U.S. prior to the 1960s when flows in Black Draw ceased. Threats to the species include habitat modification and actual and potential hybridization with introduced, non-native catfishes (e.g., channel catfish and blue catfish).

The species has been reestablished in Arizona at two sites. Initial collections of wild Yaqui catfish were made in 1987 and 1990 from the Rió Aros sub-basin. Additional collections totaling 100 catfish were made with electro-fishing equipment from three sites within the Rió Bavispe sub-basin (Tres Riós, La Taranga, and Cobora) during June 1995 and October 1995 and from Cajon Bonito during March 1996. These fish were transported to Dexter NFH to develop culture techniques, and fish were ultimately induced to spawn at Uvalde National Fish Hatchery during 1995, 1996, 1997 and 1999. On November 13, 1997, a total of 60 12-in catfish and 100 6-in catfish were stocked into Twin Pond on San Bernardino NWR, and a total of 100 12-in catfish and 100 6-in catfish were stocked into House Pond at Slaughter Ranch. All of the larger fish were implanted with Passive Integrated Transponder tags for future identification.

A total of 1,464 Yaqui catfish were released on October 26, 1999 at El Coronado Ranch on the western slopes of the Chiricahua Mountains, Cochise County. Limited population monitoring of this species occurred at Twin Pond and House Pond during 2001, 2003, 2005, and 2006. Yaqui catfish are currently present, in unknown numbers, in Twin Pond on San Bernardino NWR, in House Pond on the Slaughter Ranch, and in "Big Tank" on El Coronado Ranch. While natural spawning in these three locations has yet to be documented, multiple age class catfish were first documented in House Pond by refuge staff during October 2005 monitoring efforts, indicating the possibility of natural reproduction. Numerous Yaqui catfish representing multiple age classes were present in Sonora's Cajon

Bonito during fish surveys conducted in November 2006. It is present in the Río San Bernardino, but its distribution there and how close to Arizona it occurs is unclear (W. Radke, pers. comm.). It is anticipated that with current management activities and watershed improvements, aquatic sites within Black Draw will continue to improve and Yaqui catfish will reestablish in Black Draw on San Bernardino NWR. Yaqui catfish are considered WSC in Arizona and are not found in New Mexico. The species is listed as a species of special protection in Mexico (Secretaria de Medio Ambiente y Recursos Naturales 2002).

Yaqui chub

The Yaqui chub is a medium sized fish of the family Cyprinidae (Minckley 1973) growing to a total of about five in (13 cm) long. Until recently, *Gila purpurea* was thought to occur in the basins of the Ríos Sonora, Matape, and Yaqui in Arizona and Sonora, México (Hendrickson *et al.* 1980). In 1991, it was recognized that the chub in the Ríos Sonora and Matape and the Río Yaqui system downstream from San Bernardino Creek are a different species, *Gila eremica* (DeMarais 1991). *Gila purpurea* is endemic to San Bernardino Creek in Arizona and México and also the Willcox Playa basin in Arizona (Varela-Romero *et al.* 1990, DeMarais 1991). In addition to their status under the Act, Yaqui chub are considered WSC in Arizona and are not known from New Mexico. The species is listed as endangered in Mexico (Secretaria de Medio Ambiente y Recursos Naturales 2002).

Yaqui chub live in deep pools in creeks, ciénegas, and other stream-associated quiet waters. Habitat preferences vary by life stage, with young fish preferring marginal habitats and lower ends of riffles and adults preferring deep, permanent pools, undercut banks next to large boulders, debris piles, and roots of large trees (Hendrickson *et al.* 1980). Breeding males are a bluish-grey color while females are straw-yellow to light brown color (Minckley 1973). Spawning is protracted throughout the warmer months with the greatest activity in spring. Under the right conditions, spawning can also occur during the autumn (W. Radke, pers. comm.). Growth to maturity is rapid, often within the first summer of life; reproductive potential is therefore high and large populations can develop quickly from a few adults (DeMarais and Minckley 1993). Diet consists mostly of algae, insects, and detrital material (Galat and Gerhardt 1987).

The Yaqui chub has a very limited geographical range, occurring only at the headwaters of the Río Yaqui basin in Arizona and for a short distance, (about two miles or three km), into Mexico (Miller *et al.* 2005). Decline of the species probably began with regional arroyo cutting in the late 1800s when poor grazing practices helped destroy ciénegas and wetlands and contributed to watershed deterioration. The Río San Bernardino became incised by more than 25 ft in some areas, and streamside marshlands (ciénegas) were drained, except where locally maintained by springs or artesian wells. The fish approached extinction in the late 1960's due to habitat loss, but survived largely due to human intervention, including transplantation, hatchery production, and reestablishment; and habitat acquisition, renovation, and creation. Catastrophic drought in the mid-1970s further depleted populations (DeMarais and Minckley 1993).

Managed populations of this species are currently reproducing and thriving on San Bernardino NWR in Bathhouse Spring, Black Draw, Double PhD Pond, the Hay Hollow Ponds, House Pond, the Minckley Ponds, North Fork, Oasis Pond, and the Twin Ponds. They have also been reestablished in up to seven different ponds on El Coronado Ranch and throughout portions of West Turkey Creek, Chiricahua Mountains (W. Radke, pers. comm.). Virtually all of those populations have been stocked into enhanced or artificially created habitats as part of the recovery program and have adapted well to the off-channel ponds established as refugia for this and other fish species. The population in Leslie Creek was stocked in 1969 with individuals taken from Astin Spring (Minckley and Brooks 1985). The population in West Turkey Creek in the Chiricahua Mountains was stocked in 1986 and 1991 from Astin Spring (via Leslie Creek) raised at Dexter NFH. They are also found in most wetlands just south of San Bernardino NWR in Mexico and can pioneer upstream during flood events. Current populations have responded well to intensive management and have established large, viable populations in diverse habitats. Yaqui chub have not been documented in Astin Spring for several years, but could easily re-occupy the site during flood conditions. Most Yaqui chub populations continue to be threatened due to infestations by the non-native Asian tapeworm

Yaqui topminnow

The Yaqui topminnow is a small, live-bearing fish of the family Poeciliidae (Minckley 1973) occurring throughout shallow, warmer waters within the Río Yaqui Basin. Originally, the Yaqui topminnow was described as a full species by Girard (1859), but Minckley (1969) recognized the Gila and the Yaqui topminnow forms as subspecies of *Poeciliopsis occidentalis*. A subsequent publication considered the Gila topminnow and the Yaqui topminnow to be separate species; *P. occidentalis and P. sonoriensis*, respectively (Minckley 1999, Hedrick *et al.* 2001).

The Yaqui topminnow was federally listed as endangered without critical habitat on March 11, 1967 (32 FR 4001), although it remains fairly abundant and widespread in parts of Mexico. Yaqui topminnow are considered WSC in Arizona, and do not occur in New Mexico. The species is listed as threatened in Mexico (Secretaria de Medio Ambiente y Recursos Naturales 2002).

The species typically lives in shallow, warm, quiet waters (e.g., springheads, stream edges, ciénegas, and marshes), but can disperse through any flowing water during the warm summer months. Preferred habitats consist of dense mats of algae and debris along stream margins or in eddies below riffles. Topminnow are most abundant in marshes, especially those fed by thermal springs or artesian outflows. Females may have 20 or more young per brood and can breed at intervals of just 20 days. Reproduction occurs year round where winter temperatures are moderated by spring inflows, but may begin in early April and end in October under conditions of fluctuating temperatures. Yaqui topminnow eat vegetation and aquatic insects, including mosquito larvae.

Yaqui topminnow were once found throughout the Rió Yaqui drainage in southeastern Arizona and in Sonora and Chihuahua, Mexico. Their populations were dramatically reduced in the U.S. because of habitat alteration and destruction. Threats to the species include competition with western mosquitofish, a widely introduced exotic, and plant community succession (i.e., to cattail marshes) within their limited aquatic habitats. The mosquitofish is a voracious predator that has already reduced formerly large and widespread

populations of the native Gila topminnow (*Poeciliopsis occidentalis occidentalis*) in Arizona through both direct predation and through competition for food resources.

Yaqui topminnow are currently found in every permanent wetland on San Bernardino NWR, Slaughter Ranch, Rancho San Bernardino in Sonora, Leslie Creek, and in Astin Spring on the Malpai Ranch, where populations are relatively secure from mosquitofish introductions and habitat alteration (W. Radke, pers. comm.). The species has adapted well to numerous off-channel ponds established as refugia for this and other fish species on the refuge, it is thriving and reproducing, and it readily disperses into Río San Bernardino (Black Draw). Due to their dispersal capability, the species can be found anywhere in Black Draw, Hay Hollow Wash, and their tributaries during flood seasons, and can also disappear from particular wetland sites only to reappear years later. Wetland plant community succession, especially the proliferation and spread of cattail, continues to take over wetlands upon which topminnow depend.

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.

Description of the Action Area

The action area includes the portion of the Leslie Creek watershed downstream from the Coronado National Forest Boundary through the Leslie Canyon NWR. This includes the private and state trust lands covered by the Agreement and the Leslie Canyon NWR. Effects of the action are not likely to move upslope onto the Coronado National Forest. Therefore, it is not considered part of the action area. The Leslie Creek watershed contains ash, willow, and oak riparian communities, Chihuahuan Desert scrub, grasslands, and juniper/scrub shrublands.

The covered area of the Agreement includes the Bar Boot and the 99 Bar ranches. They are within the upper watershed of Leslie Creek, which is about 17 miles northeast of the City of Douglas, and about 15 miles east of McNeal, Arizona (see Figure 1). The Bar Boot and the 99 Bar Ranch control activities on the watershed between the LCNWR and the Coronado National Forest, which are the headwaters of Leslie Creek. The 99 Bar Ranch is an approximately 11,585-acre parcel, and is upstream and adjacent to the LCNWR. The 99 Bar Ranch is an active cattle production ranch on which FWS purchased a conservation easement in December 2001 for the purpose of providing critical watershed protection for Leslie Creek to maintain the integrity of aquatic habitat for endangered and threatened species, and desert riparian habitat for other wildlife species. The Bar Boot Ranch, approximately 13,000 acres, is also located upstream from the Leslie Canyon NWR; the FWS is in the process of acquiring a conservation easement on this ranch for the same purposes as those described for the 99 Bar Ranch. Currently, on both ranches, a total of approximately 16,852 acres has been placed under conservation easements with approximately 3,966 additional acres in the process of being completed. These conservation easements, held by FWS, will protect the watershed from development of residential land

uses. The remaining acreage includes an area adjacent to ranch houses, which will not be under a conservation easement; and a parcel of State Trust Land that is included in the Agreement.

Chiricahua leopard frog

A. Status of the species within the action area

While the Agreement covered area is within the historical range of the Chiricahua leopard frog, there are no currently known populations in the area covered by the Agreement. A small, but persistent population of Chiricahua leopard frogs exists downstream on Leslie Canyon NWR in the action area. No critical habitat has been designated for this species.

B. Factors affecting species environment within the action area

Threats to this species are from invasion of exotic predators, chytridiomycosis (an introduced fungal skin disease), livestock grazing, wildfire, environmental contamination, loss of aquatic habitats to drought, and human disturbance.

Numerous studies indicate that declines and extirpations of Chiricahua leopard frogs are at least in part caused by predation and possibly competition by non-native organisms, including fish in the family Centrarchidae, bullfrogs, tiger salamanders (*Ambystoma tigrinum mavortium*), crayfish, and several other species of fish (Clarkson and Rorabaugh 1989, Rosen *et al.* 1994, Sredl and Howland 1994, Fernandez and Bagnara 1995, Fernandez and Rosen 1996, Rosen *et al.* 1996, Snyder *et al.* 1996, Fernandez and Rosen 1998). Bullfrogs have not been documented in this watershed, but are known to occur in the Turkey Creek watershed to the north of the covered area. Barred tiger salamander (*Ambystoma mavortium mavortium*) has been documented within the action area in the Chalk Tank Complex. Barred tiger salamanders are not a huge predator of Chiricahua leopard frogs, but they can carry amphibian chytrid.

Chytridiomycosis was first noted in the San Bernardino Valley in 1996 at Belency Tank on the Magoffin Ranch, where the frog population declined abruptly and is now extirpated. At the same time, the population at Leslie Canyon declined probably as a result of chytridiomycosis, but frogs at this site have persisted with the disease at a low density. Chytridiomycosis was also associated with the decline and loss of Chiricahua leopard frog populations at a “ranarium” and frog enclosure at San Bernardino NWR and was also detected in frogs at Douglas High School ponds (Bradley *et al.* 2002, Rosen 2002). Humans probably distribute the pathogen in many ways (Carey *et al.* 2003). For example, chytrids could be spread by tourists or fieldworkers sampling aquatic habitats (Halliday 1998). The fungus can exist in water or mud and thus could be spread by wet or muddy boots, vehicles, cattle, and other animals moving among aquatic sites, or during scientific sampling of fish, amphibians, or other aquatic organisms. Once introduced to a site, it is also likely spread around the landscape by bullfrogs, tiger salamanders, and other organisms that can carry the disease (Carey *et al.* 2003, Collins *et al.* 2003). Many environmental factors or stressors may interact with chytridiomycosis synergistically to either increase the virulence of the disease or compromise the immune systems of amphibians (Lips 1999). These factors or stressors may include increased levels of contaminants (such as cadmium, arsenic, pesticides and others), but also acidic rainfall, climate or microclimate (e.g. temperature, moisture) change, cold winters, increased UV-B radiation, or other changes in habitats that cause stress and immunosuppression (Carey *et al.* 1999, 2001; Parris and Baud 2004; Hale *et al.* 2005).

Cattle grazing in the upper watershed has likely affected Chiricahua leopard frogs in many ways. Intense livestock grazing during the late 1800's and early 1900's was likely a key cause of change in the structure and composition of montane forests, arroyo cutting and loss of ciénegas and riparian systems, replacement of grasslands by shrublands, and altered fire regimes (Hendrickson and Minckley 1984, Swetnam and Baisan 1996), although other factors such as logging, mining, loss of beaver populations, and climate change also likely contributed (Hereford 1993, Bahre 1995a and 1995b, Geraghty and Miller, Inc. 1995). Some adverse effects to the species and its habitat may still occur under certain circumstances, but have been reduced as a result of improved managed livestock grazing activities (Sredl and Jennings 2005). These effects might include deterioration of watersheds; erosion and/or siltation of stream courses; elimination of undercut banks that provide cover for frogs; loss of wetland and riparian vegetation and backwater pools; and spread of disease and non-native predators (Arizona State University 1979, Hendrickson and Minckley 1984, Ohmart 1995, Jancovich *et al.* 1997, Belsky *et al.* 1999, Ross *et al.* 1999, Sredl and Jennings 2005, USFWS 2007). Increased watershed erosion caused by over grazing can accelerate sedimentation of deep pools used by frogs (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). There are three livestock grazing allotments on the Coronado National Forest that are located within the watershed. Recent consultations with the Coronado National Forest concerning the effects of ongoing grazing and reissuance of the grazing permits have documented improving or stable range condition. Big Bend and Barboot allotments are in fair and fair to excellent range condition, respectively. The Big Bend Allotment shows soil impairment over nearly 40% of the allotment, but the range condition trend is static. Several water developments are proposed to help redistribute livestock on the Big Bend Allotment to improve soil and range conditions. The Barboot Allotment shows 100% satisfactory soil conditions, and riparian conditions are fair to good. The third allotment that is in this watershed is a small portion of the Hunt Canyon Allotment. The Hunt Allotment shows 100% satisfactory soil conditions, with range conditions meeting forest plan standard and improving. In general, livestock grazing on these allotments is not resulting in significant downstream effects on Chiricahua leopard frogs. (U.S. Forest Service 2008a and 2008b)

Fire and subsequent degradation of watershed condition immediately after fires can result in dramatically increased runoff, sedimentation, and debris flow that can scour aquatic habitats in canyon bottoms or bury them, and ash flow that can create toxic conditions. Amphibian communities, including frog populations, can be significantly altered following prescribed fires. Post fire recovery may take 12 or more years for southern leopard frog (*Lithobates sphenocephalus*) populations (Schurbon and Fauth 2003). In Romero Canyon, Catalina Mountains, Pima County, Arizona, lowland leopard frogs and their habitat were severely reduced due to runoff and sedimentation following the Aspen Fire in 2003. Loss of occupied habitat also occurred in Buehman Canyon and probably other localities in the Catalina Mountains due to recent large scale, high-severity fires (Wallace 2003). At Saguaro National Park East, similar loss of lowland leopard frog habitat has also occurred due to post-fire sedimentation and ash flow (Don Swann, pers. comm. 2002). A population of leopard frogs (either Chiricahua or Ramsey Canyon leopard frogs) disappeared from Miller Canyon in the Huachuca Mountains of Arizona, after a 1977 crown fire in the upper canyon and subsequent erosion and scouring of the canyon during storm events (Tom Beatty, Miller Canyon, pers. comm. 2000). Additionally, smoke diffusion into water and ash flow can result in high levels of phosphorus and nitrogen (Spencer and Hauer 1991) with potentially toxic effects to frogs.

During fire suppression, dipping of water from stock tanks or other leopard frog habitats can reduce habitats and make them more susceptible to drying. In some cases, stock tanks are refilled after fires. Unless the water comes from a well or domestic water source, such action may facilitate the spread of non-native predators and disease. Fire retardants and suppressants, used regularly during fire suppression, are ammonia-based, which in itself can be potentially toxic; however, many formulations also contain yellow prussiate of soda (sodium ferrocyanide), which is added as an anticorrosive agent. Such formulations are toxic to a variety of aquatic and other organisms, including leopard frogs. Toxicity of these formulations is typically found to be low in the laboratory, but in the field toxicity to the southern leopard frog and rainbow trout has been found to be photoenhanced by ambient UV radiation (Calfee and Little 2003). Fire suppression activities can also affect leopard frogs and their habitat through improper placement of crew camps or staging areas. Suppression and prescribed fire can adversely affect frogs and frog habitat by directing fire into sensitive riparian areas or where habitats could be damaged by post-fire erosion or sedimentation.

Wildfire, prescribed fire, and fire suppression have not significantly affected Chiricahua leopard frog in the action area in the last 15 years. The last sizable wildland fire was in the early 1980's on Packsaddle Mountain and was approximately 700 acres in size. Since this time there have been no prescribed fires on the Coronado National Forest in this watershed and the only suppression activities have been small spot fires less than 15 acres in size. (Rubin Morales, Douglas Ranger District, pers. comm. 2008)

Hale and Jarchow (1988) suggested arsenic and or cadmium poisoning might be contributing factors in die-offs of leopard frogs and Tarahumara frogs in southeastern Arizona. Cadmium originating from airborne emissions from copper smelters in southeastern Arizona and northern Sonora was identified as a possible source of the contaminants. Precipitation collected in 1984-5 in southeastern Arizona had a depth-weighted mean pH of 4.63 and carried high levels of sulfate, arsenic, cadmium, copper, lead, and zinc. High acidity and sulfate concentration occurred when upper-level winds were from the directions of copper smelters, particularly those at Douglas, Arizona and Cananea, Sonora (Blanchard and Stromberg 1987). Little and Calfee (2008) found that the combination of moderate levels of cadmium (0.056 mg/L), copper (0.013 mg/L), and zinc (0.025mg/L) resulted in significant mortality in Chircahua leopard frogs in 60-day chronic exposure experiments. These concentrations are lower than the levels where effects were seen under similar test with each metal independently; 0.33 mg/L of cadmium and 0.013 mg/L of copper. Zinc was not found to have effect at chronic exposures up 0.165 mg/l over 60 days. These smelters are now closed, and another at Nacozari, Sonora is equipped with pollution control scrubbers; hence any associated contaminant problems should be in decline. How long it might take for residual elevated levels of cadmium, arsenic, and other smelter-related contaminants in the environment to disperse is unknown.

Chiricahua leopard frogs in the action area have been restricted to the perennial reach of Leslie Creek on the Leslie Canyon NWR. Drought and the lack of perennial water accessible to frogs in the action area have isolated this population. Drought and loss of ground water from ground water withdrawal have had a large impact in restricting Chiricahua leopard frog distribution and conductivity. In 2000, the species was also documented for the first time in the Baboquivari Mountains, Pima County, Arizona (USFWS files, Phoenix, AZ), extending the range of the species approximately 12 miles to the west. However, during a drought in 2002, populations in the Baboquivari Mountains and most populations in the Buckskin Hills were extirpated due to drying of stock tanks inhabited by the frogs. However, Southwestern

leopard frogs, including the Chiricahua leopard frog, have been observed to survive drought by burrowing into muddy cracks and holes around drying water sources (Howland *et al.* 1997, personal observations of J. Rorabaugh, 2002). Some habitat types may be particularly important. Year-round flow and constant water temperature that permit year-round adult activity and winter breeding, and the depauperate fish communities of thermal springs, make these sites particularly important breeding sites for Chiricahua leopard frogs in New Mexico (Scott and Jennings 1985). Factors that alter the suitability of dispersal habitat will affect the functioning of metapopulations, as well. For instance, drought may eliminate ephemeral pools and streams upon which frogs rely during their dispersal through otherwise arid landscapes. However, wet periods may facilitate dispersal and connections among local populations. Alterations of the habitat, such as highways and urban or agricultural development reduce the ability of frogs to travel among local populations, and thus are capable of disrupting metapopulation dynamics.

The effects of increased immigration and Border Patrol activities likely have little impact on Chiricahua leopard frogs in the action area, as the occupied sites are small and heavily vegetated. The potential for impacts from immigrants (undocumented aliens) drinking or walking in the water are insignificant. The use of these ponds for bathing and personal hygiene may result in some decrease in water quality, but effects of this type have not been studied or documented.

Prior section 7 consultations with Federal agencies have influenced the environmental baseline within and in close proximity to the action area. There have been 37 formal consultations involving Chiricahua leopard frog since its listing in 2002, with five in this watershed, see document library on the Arizona Ecological Services Office website: http://www.fws.gov/southwest/es/arizona/reading.htm. These consultations included spring livestock grazing, fire management planning, two overlapping safe harbor agreements, land and resource management plans, and habitat renovation and reestablishment of Chiricahua leopard frogs and Yaqui topminnow through state-wide safe harbor agreements. The consultations involving fire management each included measures to reduce adverse effects and minimize take of Chiricahua leopard frogs and resulted in non-jeopardy determinations. In particular, the Fire Management Plan at the San Bernardino and Leslie Canyon National Wildlife Refuges (02-21-05-F-0495) is aimed at return fire as an integral, natural process in the maintenance of the Refuges' ecosystems, and, ultimately, to provide an overall benefit to each of the Federally-listed threatened and endangered species undergoing population recovery.

Huachuca water umbel

A. Status of the species and critical habitat within the action area

Within the action area, Huachuca water umbel occurs in one location (12 separate patches) in Leslie Canyon NWR. While the covered area is within the historical range of the Huachuca water umbel, there are no currently known populations in the area covered by the Agreement. Critical habitat has not been designated within the action area of the Agreement.

B. Factors affecting species environment and critical habitat within the action area

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

catastrophe, such as a severe tropical storm or drought, could eliminate populations or cause extinction. In addition, populations are almost always isolated, which makes the chance of natural recolonization after extirpation less likely. Small populations are also subject to demographic and genetic stochasticity, which increases the probability of population extirpation (Wilcox and Murphy 1985, Shafer 1990).

A suite of non-native plant species has invaded wetland habitats in southern Arizona (Stromberg and Chew 1997), including those occupied by the Huachuca water umbel (Arizona Department of Water Resources 1994). In some cases their effect on the umbel is unclear. There are no naturally occurring water umbel patches in managed wetland ponds at San Bernardino NWR (although it is persisting in Black Draw), and the patches transplanted to ponds were all quickly outcompeted and essentially eliminated by other wetland species. Bermuda grass (*Cynodon dactylon*) grows at San Bernardino NWR but does not appear to be a problem at Leslie Canyon NWR. Watercress is another non-native plant now abundant along perennial streams in Arizona. Water umbel grows together with watercress at Leslie Canyon, but watercress does not appear to stress the umbel. Water umbel seems to do best along the stream courses where flooding and scouring periodically remove competing vegetation while the umbel persists due to its rhizomes.

Prior section 7 consultations with Federal agencies have influenced the environmental baseline within and in close proximity to the action area. There have been 32 formal consultations involving Huachuca water umbel in this watershed since 1997, with 12 that include this watershed, see document library on the Arizona Ecological Services Office website: http://www.fws.gov/southwest/es/arizona/reading.htm. These consultations included livestock grazing, fire management planning, watershed and grassland management, research and management of this species, and changes to the Arizona Water Quality Standards. The consultations involving livestock grazing and fire management each included measures to reduce adverse effects on Huachuca water umbel and resulted in non-jeopardy determinations. The Fire Management Plan at the San Bernardino and Leslie Canyon National Wildlife Refuges (02-21-05-F-0495) is aimed at return fire as an integral, natural process in the maintenance of the Refuges' ecosystems, and, ultimately, to provide an overall benefit to each of the Federally listed threatened and endangered species undergoing population recovery. The Huachuca Water Umbel Research and Management plan (02-21-04-F-0484) on the San Bernardino and Leslie Canyon NWRs has developed propagation techniques and has successfully reestablished patches on these two refuges meeting this species needs to reduce threats that lead to its listing.

Yaqui Fish

A. Status of the species and critical habitat within the action area

While the area is within the historical range of all the Yaqui fish, beautiful shiner and Yaqui catfish are not present in the action area. In 2007 and 2008, Yaqui chub was discovered on the Bar Boot Ranch at the Chalk Tank Complex. In 2007, a viable population of Yaqui chub with multiple age classes was found in Lower Chalk Tank, but none were found in Upper Chalk Tank. In 2008, multiple age classes were found during monitoring in Upper Chalk Tank, but none were located in Lower Chalk Tank. Since Lower Chalk Tank is formed from the overflow and seepage from Upper Chalk Tank, these two tanks make up one population site and are considered part of the baseline condition of this ranch in the Agreement. Yaqui chub are also present downstream on Leslie Canyon NWR and are the likely source population for the Chalk Tank Complex. Yaqui topminnow are not known from the covered area of the Agreement; however, Yaqui topminnow are found in low numbers downstream on the Leslie Canyon NWR. The small population size on Leslie Canyon NWR is presumed due to low water temperatures and shaded conditions. Critical habitat for beautiful shiner, Yaqui catfish, and Yaqui chub has not been designated within the action area of the Agreement. Critical habitat has not been designated for Yaqui topminnow.

B. Factors affecting species environment and critical habitat within the action area

The populations of Río Yaqui fish are very small and isolated, making them vulnerable to stochastic environmental events such as drought and floods. The lack of perennial aquatic sites in the action area limits the distribution of Yaqui fish. A significant potential threat to the populations is illegal introduction of non-native predators and competitors to these ponds. Introduced predators and competitors have not been documented within the action area. A factor affecting most Yaqui chub populations is the introduced Asian tapeworm (*Bothriocephalus acheilognathus*), an intestinal parasite (Granath and Esch 1983). Current research has shown the Asian tapeworm impacts growth of Yaqui chub, but does not increase mortality. The Asian tapeworm also infects beautiful shiner and beautiful shiners reestablished in the action area may be infected with Asian tapeworm from the Yaqui chub already present in the watershed. Treatment of all fish used in reestablishments with Praziquantel should prevent spreading Asian tapeworm into new ponds (Kline 2007). Ongoing livestock grazing in the upper watershed and in the action area can result in accelerated erosion and increased sedimentation as described above for Chiricahua leopard frogs. This could result in similar effects, as discussed above, on primary production, invertebrate populations, and the Yaqui fish species as well. Debris and ash flow, chemical changes, and the diffusion of toxic components of smoke from wildland fires are also factors that would affect the Yaqui fish species. Activities on surrounding lands that lower the ground water level and decrease water flow would adversely impact this species, but most of the land on which ground water levels could be impacted are included in the covered area of the Agreement. Because of the conservation easements on or being placed on the private lands within the covered area that limit residential development, the potential for ground water pumping is limited to existing ranch and ranch house uses. The Yaqui topminnow population on Leslie Canyon NWR persists at low levels. This may be a result of recent increases in riparian vegetation cover and a resulting drop in water temperature. However, Leslie Creek is subjected to high flow events after major monsoon storms in the watershed. Since topminnow habitat is generally found in low velocity, shallow pools and stream edges, high flows may preclude high densities.

Prior section 7 consultations with Federal agencies have influenced the environmental baseline within and in close proximity to the action area. There have been six formal consultations involving beautiful shiner, 14 formal consultations involving Yaqui chub, four involving Yaqui catfish, and 10 involving Yaqui topminnow since 1997, with five formal consultation involving Yaqui chub and Yaqui topminnow that included the action area of this Agreement, see document library on the Arizona Ecological Services Office website: http://www.fws.gov/southwest/es/arizona/reading.htm. The consultations in the action area of this Agreement have primarily addressed fire management planning and have resulted in non-jeopardy determinations.

EFFECTS OF THE ACTION

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

Permit issuance

Issuance of the permit and approval of the Agreement will have no direct effects on the listed species within the action area. Indirect effects from the interrelated watershed improvement, ongoing land use, and covered species management actions in the implementation of the Agreement will include both short-term and long-term effects on the listed species. A description of these indirect effects follows.

Watershed Improvements

Fire Management

Wildland fire suppression or wildland fire use for resource benefit are not decisions the Participants in the Agreement will be making, as these are decisions of incident command teams and not part of this Agreement. Therefore, fire management under the Agreement is focused on prescribed fires in grassland and shrub-invaded grassland, to maintain the grassland component of the watershed. This limits the type of fuels that will be burned, the area to be burned, and the effects of these burns. While some ash, debris, and erosion is possible, the large debris and ash flows, described in the baseline section above, are not expected from the type of fuels found the action area. These fuels are primarily fine herbaceous fuels (light, short grasses) that have cured or are nearly cured (Fuel Model 1, as classified by National Forest Fire Laboratory). Fires are anticipated to be surface fires with short flame lengths that move rapidly through cured grass and associated material. A prescribed fire in this fuel model should not produce severe fire behavior that will result in dramatic post-fire effects causing significant sediment and ash flows into potential Chiricahua leopard frog habitat. Fires in this fuel model rarely consume 100 percent of the fuels, leaving a mosaic of unburned patches of grass. Even burned grasses should retain their root crown, stabilizing soils and further decreasing the potential for erosion. Although it is possible that a major rain event following a prescribed fire can cause increased erosion, the

mosaic burn pattern typical of fires in this fuel model and the retention of root crowns should decrease the likelihood of significant erosion events affecting Chiricahua leopard frogs.

Frogs would primarily be affected at breeding sites, but they have been known to move overland or along intermittent drainages and may be found at temporary pools that are sometimes miles from breeding habitats. Frogs could be affected in these areas as well. An inflow of ash and sediment into a water body is capable of smothering eggs and tadpoles, resulting in mortality. A reduction in the amount of prey can ultimately affect leopard frog numbers and reproduction. Sediment and ash flow can also inhibit respiration in macroinvertebrates, resulting in reduced density and composition of macroinvertebrates (a primary food source for the frogs). Conversely, Chiricahua leopard frogs may experience positive indirect effects from aggressive fire suppression actions within riparian or upland habitats. Fire suppression activities may minimize the amount of vegetation lost from catastrophic wildfires, which would contribute to the soil and ash flow into occupied sites. Long-term positive effects are also expected as a result of prescribed fire helping to restore natural vegetation communities and natural fire regimes.

There may be a variety of adverse effects to Chiricahua leopard frogs, and conservation measures are unlikely to eliminate the adverse effects of prescribed fire at or near the occupied sites. Over time, implementing fire management activities would reduce the risk of catastrophic fires in riparian or upland habitats that would result in large-scale losses of vegetation. Because small, disjunct populations, such as with the Chiricahua leopard frog, are at higher risk of local extirpation from catastrophic events, this long-term improvement would assist in protecting their aquatic habitats and potentially stabilizing frog populations, thereby providing an overall positive effect to the species. Although adverse effects cannot be completely avoided, the proposed conservation measures are designed to minimize the effects of prescribed fire in the action area. The conservation measures will help reduce adverse effects by minimizing the amount of vegetation impacted, the amount of sedimentation, and direct effects to the Chiricahua leopard frog and its habitat. If Leslie Canyon NWR implements the fire management program for the Participants or conducts suppression activities or makes Wildland Fire Use decision on the covered properties, FWS will consult on these actions separately.

Immediate effects of fire management activities can occur to Chiricahua leopard frogs dispersing through grassland vegetation communities or if fire escapes into occupied riparian or wetland communities. These effects could include mortality and injury from flames, heat, and fire management activities, including mortality by vehicles and retardant drops. The likelihood of these effects is not high, as the frogs disperse primarily during humid or wet periods when fires are not likely to spread or escape. In the case of fire escaping into occupied wetland communities, the effects on Chiricahua leopard frogs and the Yaqui fish species may include mortality or injury from heat along the shoreline, infusion of the toxic component of smoke into the water, and local depletion of oxygen. Huachuca water umbel may be burned or killed through heat pulses from severe fires, however, because of the high humidity in areas this species is found these effects are likely to occur rarely.

Post-fire effects on the covered species are also likely to occur through short-term watershed degradation caused by increases in run-off carrying sediment, debris, and ash downstream into occupied habitats. Fire can lead to elevated soil particle transport due to short-term loss of soil-shielding vegetation and natural litter. Until re-growth occurs, sediment, debris, and ash resulting from fuel combustion may enter wetlands. The actual amount of erosion and resultant potential silt and ash discharge into drainages and perennial waters is highly variable, depending almost entirely on the intensity and duration of precipitation events. Studies have shown that large, post-fire hydrologic events can kill fish and frogs and extirpate local populations (Novak and White 1990; Propst *et al.* 1992; Bozek and Young 1994; Rinne 1975, 1996; Rieman *et al.* 1997, Wallace 2003). Recolonization rates for fish depend on the proximity and relative location of refuges, access from refuges to disturbed areas (i.e. no fish barriers), and the occurrence of complex life history traits and overlapping generations (Gresswell 1999; Dunham *et al.* 2003).

Accelerated runoff from upland areas can contribute to bank erosion in stream channels and siltation of riparian and aquatic plants. Accelerated soil erosion also leads to increased sediment-loading in streams. Post-fire erosional processes that deliver sediment to streams over long periods of time due to roads, fire lines, or the lack of re-vegetation can have long-term negative effects on aquatic ecosystems (Lotspeich *et al.* 1970; DeByle and Packer 1972). Fires generate ash, and incomplete combustion of materials creates charcoal. Elevated peak flow volumes and velocities are associated with increased transport of ash and nutrients (Ffolliott *et al.* 2004). Heavy ash and soot loads in water clog the gills of fish and lead to acute and chronic chemical effects, including death. The runoff of ash contributes phosphoric nutrients to aquatic ecosystems, and the presence of charcoal in water is associated with reduced dissolved oxygen concentrations. Both ammonia and phosphorus levels have been documented to be above lethal limits to fish during fires (Spencer and Hauer 1991). Changes in the pH and dissolved oxygen can render habitat unsuitable for fish and amphibian larvae. As nutrient-filled ash flows into streams, it changes the pH and nutrient level of the water (Karle 2000).

Fires can alter aquatic food webs to the detriment of native fishes. Periphyton biomass has been documented to decrease initially after a fire, but then increase due to increased light availability and increased temperature (Minshall *et al.* 1990). Periphyton biomass would hypothetically decrease gradually to pre-fire levels as riparian vegetation reestablishes itself and increases stream shading (Minshall *et al.* 1989), although no studies have been conducted on the long-term effects of fire on periphyton communities.

The effects of fire on macroinvertebrates have been well studied since the early 1980s (La Point *et al.* 1983; Minshall *et al.* 1989, 1990, 1995, 1997; Roby 1989; Richards and Minshall 1992; Jones *et al.* 1993; Lawrence and Minshall 1994; Robinson *et al.* 1994; Roby and Azuma 1995; Mihuc *et al.* 1996; Minshall 2003; Spencer *et al.* 2003). Macroinvertebrate communities are strongly influenced by substrate instability associated with post-fire erosional processes. Effects include changes in functional feeding groups (La Point *et al.* 1983), more annual variation (Richards and Minshall 1992), abundance, diversity, and species richness (Roby 1989; Lawrence and Minshall 1994; Minshall *et al.* 1995; Mihuc *et al.* 1996; Minshall 2003). Changes can persist for many years. Roby (1989) found that diversity was lower in burned streams compared to reference streams nine years after a fire. Species best adapted to post-fire stream conditions can be characterized as those that prefer a broad range of physical habitat (Mihuc *et al.* 1996). Taxa that require specialized habitats respond much slower to disturbances such as fire (Mihuc *et al.* 1996).

In addition to temporary effects on fish habitat, post-fire fluvial adjustments can remove native fish habitat. Post-fire, sediment- and debris-bulked peak flows can result in downcutting of channels. Once downcut, subsequent floodflows may be contained entirely within the channel and unable to inundate now-perched floodplains (Rosgen 1996). Native fishes and tadpoles that require access to low-velocity floodplains to avoid being transported downstream and/or to colonize upstream areas will be adversely affected. Lateral erosion of stream channels will increase width to depth ratios, resulting in decreased unit velocities in the cross section. These decreased unit velocities will result in the deposition of larger particle sizes, often cobbles, in systems formerly dominated by gravels, and boulders in systems formerly dominated by cobbles. This aggregation of sediment can fill pools and other persistent features, reducing or eliminating habitat for native fishes.

The potential increase in sediment, combined with ash and debris, could result in mortality and injury from physical trauma with debris, covering of respiratory surfaces of gills, and burying of individuals. These effects could occur to all life history stages of the fish species, Huachuca water umbel, and Chiricahua leopard frogs (particularly egg masses and small tadpoles) in the stream channel. Beyond the physical effects of debris and sediment in runoff flows, ash from the fire is likely to result in temporary changes in water pH, dissolved oxygen, temperature, and other water quality parameters. This can result in loss of individuals of all life stages of fish and aquatic stages of Chiricahua leopard frogs. Many adult Chiricahua leopard frogs would likely avoid these effects by leaving the water and waiting until the debris and ash flows pass, although the forage base of the frog, including fish and aquatic invertebrates, may be reduced temporarily affecting the frogs.

Prescribed fires can include the use of hand tools, heavy equipment, use of surface water, and the transfer of water from one source to another. These activities may result in the introduction of non-native invasive species that could result in changes in post fire plant communities. Amphibian chytrid and non-native aquatic predators may also be spread this way, especially through the transfer of water from one source to another. Amphibian chytrid has resulted in the loss of a number of population sites throughout Arizona and New Mexico. The effects of chytrid on leopard frog populations are discussed in the Chiricahua Leopard Frog Recovery Plan (U.S. Fish and Wildlife Service 2007). The drying and cleaning of all equipment moving among aquatic sites should reduce the likelihood of spreading amphibian chytrid in this manner.

Bullfrog and non-native fish species may also be introduced into new waters through such water transfers. The minimization measures to clean, dry, and or sterilize all equipment should reduce the possibility of such effects. The information provided to burn crews and incident command teams concerning the location of aquatic covered species should also reduce these potential effects.

Little precipitation occurs in this area during spring and fall, and while substantial rainfall can occur during winter, this precipitation rarely results in major runoff events. Heavy precipitation is most likely to occur with intense summer thunderstorms. The effects of these precipitation events may be felt in the channel of Leslie Canyon Creek, but not as much in the constructed livestock ponds and tanks. Fish in the channel are at risk from post-fire effects within the watershed; however, with improvements to the riparian vegetation and management of low to medium intensity fires, these effects on aquatic species may be minimized.

Huachuca water umbel is also likely to be affected by the increase in sedimentation and fire related debris and ash flow. Plants growing in the stream channel may be buried or physically stripped out of the substrate, and they may be affected by chemical changes in the water and substrate. These changes may stunt growth and remove plants, but they also add nutrients and may result in dispersal of this species downstream to potential new locations.

Erosion Control

Immediate impacts to covered species are not anticipated from the proposed erosion control activities. These activities are typically not implemented in drainages when water is present, and the covered species are not likely to occur within any project areas.

If heavy equipment and vehicles are used, dispersing Chiricahua leopard frogs could be killed under the tires or treads of vehicles. Amphibian chytrid can be spread through moving wet or muddy equipment from one aquatic site to another. The effects of amphibian chytrid on leopard frogs are discussed in the Chiricahua Leopard Frog Recovery Plan (U.S. Fish and Wildlife Service 2007). These effects will be minimized through proper cleaning and/or drying of all vehicle and tools before moving to new locations.

Post-project effects of Erosion Control activities on covered species could include a temporary increase in sediment transport into downstream habitats from the disturbed area around the erosion control structures. The effects would be similar, but to a lesser degree, as that described above under fire management activities. Any increase that does occur would be temporary and not likely to be perceivable above background levels of sediment transport due to erosion. The long-term effects of these activities on covered aquatic species should be a reduction in sediment transported in run-off, a reduction in water run-off, better water infiltration and retention, and increases in perennial water availability (Zeedyk and Jansens 2006).

Mechanical Brush Control

Mechanical brush control activities would have effects similar to those described for erosion control activities, except that the possibility for immediate impacts would be less, as these activities would not occur within aquatic sites or in drainages. So, even though heavy equipment would be used in the implementation of mechanical brush control, the potential for crushing adult Chiricahua leopard frogs would be less due to the unlikelihood that this species would be found in the upland habitat. Post-project impacts on the covered species would be similar to the effects of accelerated erosion and sedimentation described above under fire management. It is likely the intensity of these effects would fall between those of fire and of erosion control projects. The long-term beneficial impact of these activities would be an overall increase in grass and forb cover, which reduces erosion and sediment transport. It is unlikely that mechanical brush control activities would introduce amphibian chytrid into an aquatic site and would be further minimized through proper cleaning and/or drying of all vehicle and tools before moving to new locations.

Herbicide Brush Control

A number of generalizations can be made about herbicides. First, effective herbicides are designed to be selective in their effects: they are extremely toxic to some forms of life and

relatively harmless to others. Few are absolutely specific to their target organisms, so other related and unrelated species may be affected. Second, the mode of application of herbicides varies according to the circumstances. Third, in stagnant lentic (i.e., non-flowing) aquatic systems, certain pesticides are more likely to be persistent at low levels (Rand *et al*. 1995).

Aquatic habitats are often the ultimate sinks for herbicides, insecticides, fertilizers, sewage, and other contaminants. These chemicals have a variety of direct and indirect effects on amphibians (Sparling 2003). Airborne movement and deposition of acidic compounds, pesticides, and potentially other chemicals over long distances can affect otherwise pristine areas that do not receive direct applications (Blanchard and Stromberg 1987, Davidson *et al*. 2002), and some pesticides may cause sublethal effects at very low dosages (Hayes *et al*. 2002, Relyea 2005). No studies have been conducted on the effects of contaminants on the Chiricahua leopard frog; however, they are likely affected by a number of contaminants; effects are probably similar to other ranid frogs and amphibians (Sparling 2003).

Herbicide may result in lethal and sub-lethal effects to the covered fish species. The covered fish may be killed by some herbicides that are particularly toxic to fish, but these are typically not permitted by their labeled use to be applied near water. Generally, herbicides that are approved for use in or near aquatic systems are relatively non-toxic to aquatic species. However, runoff containing herbicides could affect hormone regulation, reproduction, and embryonic development in the covered fish species, which may result in mortality. Herbicide use may also affect immune systems, rendering organisms more susceptible to disease. This could result in fewer healthy adults in the breeding population, lower fecundity, and abnormalities in young fishes. Some herbicides may also affect prey species, both plant and animal species, reducing foraging opportunities and creating additional stressors on fish populations.

Herbicides, by design, kill green plants and therefore, if not used properly, could result in loss of Huachuca water umbel that may be within the application area, downwind of the application area, or where water transports and deposits herbicides downstream of the application area. Growth and reproduction of Huachuca water umbel may be affected in these areas.

Indirect effects of herbicide use may also include reduction in riparian vegetation. Riparian areas are important in providing quality habitat for fish and frogs. Increased riparian vegetation has been documented to increase instream and overhanging cover, buffer streams from incoming sediment and other pollutants, build a sod of herbaceous plants that form undercut banks, buffer temperature extremes, increase habitat complexity, and increase terrestrial invertebrate prey (Platts 1991). Accidental removal of riparian trees can temporarily reduce canopy cover over the stream. In most of the riparian areas within the covered area, riparian trees are relatively small and unlikely to contribute a substantial amount to the overall canopy. Removal of the smaller trees is therefore unlikely to have an adverse effect on water temperature. In the areas with larger trees, their removal could result in a slight, localized increase in water temperature, if surface water is present. However, these areas would be isolated. These potential direct and indirect effects would be minimized, if not eliminated, through the implementation of conservation measures included in the Agreement.

Ongoing Land Use

Livestock Management

Livestock management is the primary land use within the permit area. Changes in livestock management are not necessarily required under the Agreement, but may include such actions as reducing the number of livestock or the number of days they would be present in an occupied site. Livestock management within the covered area is likely to affect occupied sites of the covered species. If Chiricahua leopard frogs, Huachuca water umbel, or Yaqui fishes become established in any aquatic sites in the covered area, effects to these species could include: trampling-related mortality or harm of Chiricahua leopard frogs, eggs, and tadpoles; Huachuca water umbel; and Yaqui fish, eggs, and larvae. Degraded water quality due to trampling (increased turbidity) and defecation may also impact Chiricahua leopard frogs and Yaqui fish either directly or through indirect effects to prey and forage species population reductions.

In general, the removal of grass, forbs, and other vegetation can expose more soil to erosion and destabilize the vegetation communities in a watershed. This could result in increases in invasive plants and an increase in erosion. Effects on the covered species would be similar to those described above for fire, erosion control, and mechanical shrub control related to accelerated erosion and sediment transport. These potential effects would not be expected to be as severe as immediate post-fire effects, but are more likely to affect the covered species at a lower and prolonged level. These effects are typical of livestock operations where no active management is applied to the movement of livestock. That type of passive livestock operations historically have resulted in the erosion and shrub invasions that the Participants are trying to correct through their ongoing watershed improvement activities and livestock management.

The Participants' ranches have been managed under NRCS ranch management plans and are currently being updated (Don Decker, NRCS, pers. comm.). The trends observed on the Forest Service allotments held by the Participants have been moving towards improved watershed conditions or are stable (USFWS files). In addition, downstream effects of grazing have not been observed at Leslie Canyon NWR (Bill Radke, USFWS, pers. comm.). Therefore, through the watershed improvement activities described above and active management of livestock these effects will be minimized and where impacts occur, corrective actions would be taken to reduce erosion and sediment transport.

Construction and Maintenance of Ranch Infrastructure

The effects of construction and maintenance of ranch infrastructure to the Chiricahua leopard frogs, Yaqui fish, and Huachuca water umbel would be similar to that of erosion control and mechanical brush control activities if these species are found in the project area during construction or maintenance. Linear facility construction, maintenance and use can result in road mortality of dispersing Chiricahua leopard frogs; trapping of dispersing Chiricahua leopard frogs in pipeline trenches; and increased water run-off, erosion, and sediment transport into aquatic species' habitats. The downstream effects on Chiricahua leopard frog, Yaqui fish, and Huachuca water umbel are similar to those described above for fire management, erosion control, and mechanical brush control. Fence line and pipeline construction usually will result in only temporary increases in sediment transport, but roads may result in long-term increases in sedimentation, depending on design and erosion control

implemented with construction and maintenance of ranch roads. Amphibian chytrid can be spread through moving wet or muddy equipment among aquatic sites. These effects will be minimized through proper cleaning and/or drying of all vehicles and tools before moving to new locations.

Livestock Tank Use and Maintenance

Livestock use of stock tanks and other water covered by this Agreement is a common condition, and most interactions should have minimal impact on the covered species. The primary possible negative interaction is trampling. Chiricahua leopard frogs (especially egg masses, small tadpoles, and metamorphosing frogs), Yaqui fish (especially eggs and larvae), and water umbel are subject to direct impacts of trampling (67 FR 40790, Malcom and Radke 2008). The potential effects of these activities on leopard frogs, Huachuca water umbel, and Yaqui fish could include: direct mortality or harm as a result of trampling effects; harm through water quality degradation as a result of trampling (increased turbidity) and defecation (eutrophication) from livestock use. In addition, there is the possibility that livestock could transport amphibian chytrid from one aquatic site to another. For this to occur there would need to be an aquatic microclimate that could sustain the fungus for the trip from one water to another, such as in the hair, mud on the animal, or in the hoof keratin. This is also true of all wildlife species that may travel from one aquatic site to another, such as white-tailed deer, javelina, waterfowl, and aquatic insects. The Participants shall strive to minimize any negative impacts resulting from normal livestock operations through partial fencing, stocking rates, and/or timing of occupied stock tanks and other waters as funding and alternative waters are available.

Livestock tank maintenance is a commonly employed practice that typically focuses on removing silt from tank bottoms on a 5 to 20 year cycle, usually with bulldozers or other heavy equipment when a tank is dry (Lehman 2004). The potential effects on the covered species of maintenance include mortality, harm and harassment from emptying/drying stock tanks for maintenance, and mortality or harm as a result of heavy equipment use in the course of stock tank maintenance. The drying of a livestock tank will result in the death of all or most of the Yaqui fish, aquatic life stages of the Chiricahua leopard frog, and may result in the death of adult Chiricahua leopard frog if left dry for an extended period. Chiricahua leopard frogs may still be present in cracks in the mud or rodent burrows on the edge of a stock tank. Chiricahua leopard frogs could be killed or injured when heavy equipment is used in and around the stock tank. The provisions in the Agreement to notify the FWS and allow access for salvage of individuals will reduce the extent of the effects of these species. This conservation measure does have an emergency maintenance exception when natural events, such as floods, may threaten a livestock tank, but the Participants are encouraged to provide what notice they can for potential salvage activities. Regardless, livestock tank maintenance activities, while potentially resulting in some mortality of covered species, provide a benefit in maintaining aquatic sites on the landscape. Huachuca water umbel has not been documented around livestock tanks and is not likely to be impacted by these activities.

In addition, under drought conditions it may be necessary to fill livestock tanks with water to sustain livestock until the rainy season when the tanks fill naturally. If the water source is from another body of surface water, there is the potential to spread amphibian chytrid in the same manner discussed under fire management above. The effects of chytrid on leopard frog populations are discussed in the Chiricahua Leopard Frog Recovery Plan (U.S. Fish and Wildlife Service 2007).

Recreation

Recreation use of the covered area is limited and characterized by relatively few impacts. There is one county road that runs through the Leslie Canyon NWR, the covered properties, and into Turkey Creek Watershed. The road is a primitive dirt road that does not directly impact any of the potential occupied habitats in the action area. Any recreation that occurs in the area is of a dispersed nature and has been from the families and friend of the Participants. This may include hiking, hunting, and other similar outdoor activities. The effects of these activities would be relatively minor and localized compared to ongoing land management activities. The potential effects of these activities on Chiricahua leopard frogs, Yaqui fish, and Huachuca water umbel could include mortality and harm if vehicles are used in or adjacent to occupied sites, but is very unlikely. Erosion from road use may accelerate runoff and sediment transport into aquatic sites, but these would be relatively minor compared to those of land management and conservation activities. If this resulted in larger-level effects, chronic erosion or head cutting could result. In this case, corrective measures would be taken (see descriptions of erosion control projects above).

Covered Species Management

Habitat Enhancement and Protection

In addition to the watershed improvements discussed above, several localized habitat enhancement and protection activities will also be implemented. These may include, but are not limited to, fencing all or portions of occupied sites, construction of double tank systems, creation of small refuges, pipelines, and maintaining or improving occupied sites. All these may be accomplished using heavy equipment and motor vehicles. The effects of construction and maintenance of these structures are similar to those described for heavy equipment use above. These effects will be greatest at sites occupied by Chiricahua leopard frogs, Yaqui fish, and Huachuca water umbel. These activities may result in a short-term increase in incidental take through harm, harass, and direct mortality, but such take will decline in the long-term through exclusion of livestock from portions of occupied habitat, providing protection for riparian vegetation development, and development of perennial water sources with pipelines and wells.

Non-native Species Control: Invasive species, including diseases that compromise native species, are a distinct threat to the covered species (U.S. Fish and Wildlife Service 1995, 67 FR 40790). Asian tapeworm and chytridiomycosis are invasive diseases that currently threaten native species (Yaqui chub and beautiful shiner [Asian tapeworm], and Chiricahua leopard frog [chytridiomycosis]). Species such as bullfrogs, crayfish, mosquitofish, sunfish, and non-native catfish species present predation, competition, and/or hybridization threats to the covered species, and may carry diseases. Introduction of these species, and other invasive species not listed above, may not be intentional by the Participants, but inadvertent introduction may occur during typical ranching operations.

The presence of non-native predators and competitors often exclude Chiricahua leopard frogs and the Yaqui fish from otherwise suitable aquatic sites. The process of removing these non-native species can result in short-term unavailability of aquatic sites for use by the covered species through fencing (Chiricahua leopard frog), draining, or the use of EPA-approved piscicides. These activities are typically done during the drier portions of the year when dispersal is less likely to occur. Covered species occupying a site to be renovated will be salvaged under this Agreement and reestablished into the same site once the piscicide is neutralized or the tank is refilled. These renovations may result in the direct mortality of all life stages of Chiricahua leopard frogs, Yaqui fish, and Huachuca water umbel that may be incidentally killed in the process. However, the long-term effects of these actions will be to enhance habitats for covered species.

Reestablishment and Monitoring

The effects reestablishing and monitoring the covered species may result in incidental take in the form of mortality, harm and harass during capture, transport, release, and disease assessments and treatment. The effects of these interdependent actions are mentioned here, but these effects are analyzed and authorized separately under the issuance of section 10(a)(1)(A) research and recovery permits to qualified individuals and agencies conducting such work.

Reestablishing covered species populations within the Leslie Canyon watershed increases the number of populations within this watershed, which will help improve the stability and persistence of these species. Due to the sporadic nature of precipitation in the desert southwest, the more population sites within this watershed the more likely some will be persistent through drought and other extreme conditions. In this way, there is an increased chance of recolonization of population sites that become extirpated due to drought or other reasons. This increases the probability that the metapopulation will persist through time and meet recovery objectives for these species in Arizona (U.S. Fish and Wildlife Service 2007).

Return to Baseline Condition

The proposed action provides for the Participants to return enrolled properties to baseline condition. This provision has the potential to impact all reestablished populations and any habitat created through this Agreement.

The Agreement provides for the salvage of the covered species from all sites being returned to baseline condition, so while individuals will be lost, not all gains from the conservation activities will be lost with the return to baseline. It is anticipated that the permit is likely to be renewed, especially considering the enrolled properties are either under conservation easements already acquired by FWS or FWS is in the process of acquiring conservation easements on the properties. However, potentially all populations established through the Agreement may be lost as the landowner assurances are exercised. Salvaged Chiricahua leopard frogs, Huachuca water umbel, and the Yaqui fish species can be translocated to new sites as appropriate.

The Yaqui chub population at the Chalk Tank Complex is part of the baseline condition of the Bar Boot Ranch and is not subject to this provision of the Agreement. Effects of the watershed improvement activities, ongoing land uses, and species management may result in

mortality, harm and harassment of individuals as described above, but the effects are not expected to result in the loss of this population's viability as defined in the Agreement.

Recovery Potential

Populations that are established under a Safe Harbor Agreement may contribute towards a species' recovery, but may not be the sole means of meeting recovery criteria. This is due to the provision to bring a property back to baseline condition and the potential to lose all populations reestablished through a Safe Harbor Agreement. Regardless, the Agreement should contribute to recovery of Chiricahua leopard frog, Huachuca water umbel, and all the Yaqui fishes for up to 50-years or more.

This Agreement will assist in maintaining the isolated population of Chiricahua leopard frogs at Leslie Canyon NWR and providing enough alternative sites in the watershed to ensure long-term persistence and stability within the Swisshelm Mountains Management Area of Recovery Unit 3. This may further facilitate natural recolonization of Chiricahua leopard frogs in the Southern Chiricahua Mountains Management Area and on the national forest. This combined with the metapopulations being reestablished in the Peloncillo Mountains may accomplish recovery criterion 1 for this species in Recovery Unit 3 (U.S. Fish and Wildlife Service 2007). Recovery criteria 2, 3, and 4 would be partially met in Recovery Unit 3 through the implementation of this Agreement (U.S. Fish and Wildlife Service 2007).

The Huachuca water umbel has no recovery plan or recovery criteria in place. However, several activities proposed under this Agreement would assist in reducing the threats identified in the final rule listing Huachuca water umbel (62 FR 665). This Agreement would be with cooperating landowners who would through their actions assist in the reestablishment of Huachuca water umbel populations in suitable habitats on their lands as well as enhance and protect Huachuca water umbel populations downstream on Leslie Canyon NWR. This Agreement also includes provisions for annual monitoring of any suitable habitats and establishment sites, the results of which will be reported annually.

The Fishes of the Rio Yaqui Recovery Plan (U.S. Fish and Wildlife Service 1995) identifies three general conditions for delisting the beautiful shiner and Yaqui catfish and downlisting the Yaqui chub and Yaqui topminnow. The Agreement will contribute to general condition a, through the watershed improvement actions that will occur and their contribution to securing and protecting adequate, perennial flow in Leslie Creek. The watershed improvements and reestablishments in the Agreement should provide enhanced and improved suitable habitats on Leslie Canyon NWR to increase security and stability of existing and future reestablished Yaqui fish populations on the Refuge. This would also assist in meeting delisting condition 1 for the beautiful shiner, and downlisting criterion 1 for both the Yaqui chub and Yaqui topminnow.

The implementation of the Agreement is expected to result in long-term benefits to the species, through:

- Increased numbers of populations and greater population sizes of Chiricahua leopard frogs, Yaqui topminnow, Yaqui chub, Yaqui catfish, beautiful shiner, and Huachuca water umbel both locally and in the general area.

- Elimination of the need to use mosquito fish (*Gambusia* spp.) for mosquito control in all ranch waters and allow for greater control of non-native predators and competitors that threaten the covered species in the watershed.

- Insurance against the loss of the covered species in the general area because of the extirpation of localized populations.

- Increased connectivity of populations in the general area.

- Restoration of the water table, allowing for more stable discharge rates in Leslie Canyon NWR.

- Increased overall quality and quantity of water, by lessening the potential for erosive scouring of wetlands during extreme floods.

- Increased overall volume of perennial wetland habitats for the covered species downstream from the ranches on the LCNWR.

- Improved watershed stability and hydrologic function as a result of implementing prescribed burns to improve grass and herbaceous plant cover.

CUMULATIVE EFFECTS

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

Because most activities expected to occur on the private lands within the action area are addressed herein, and the lands upstream and downstream of the covered area are managed by Federal agencies; most activities that could potentially affect these species are covered in this consultation or are Federal activities subject to additional section 7 consultation.

Residential development in and around McNeal and Douglas, Arizona, has recently slowed, but it is likely to increase as the local and national economy recovers during the 50-year duration of the permit. Development in these areas is likely to result in a higher probability of State Trust Lands being sold by auction and developed. Such development will result in more water use and a need for road improvements, which in turn will affect the perennial waters. Prior to that occurring, recreational use of Leslie Canyon Road is more likely to occur. This may increase illegal entry into Leslie Canyon NWR and the private and state trust lands within the action area. While this use is not likely to have a large impact on the covered species, some effects from accelerated run-off and sedimentation may occur from the road, and illegal collection will become more likely.

The 2007 Intergovernmental Panel on Climate Change (IPCC) report outlines several scenarios that are virtually certain or very likely to occur in the 21st century; these are that 1) over most land, there will be warmer and fewer cold days and nights, and warmer and more frequent hot days and nights, 2) areas affected by drought will increase, and 3) the frequency of warm spells/heat waves over most land areas will likely increase. The IPCC makes equally sobering predictions for ecosystems; the resilience of many ecosystems is likely to be

exceeded this century by an unprecedented combination of climate change, associated disturbances (e.g. flooding, drought, wildfire, insects), and other global drivers, and with medium confidence predicts that approximately 20-30% of plant and animal species assessed so far are likely to be at an increased risk of extinction if increases in global average temperature exceed 1.5 – 2.5ºC (IPCC 2007).

Periods of drought in the southwest are not uncommon. However, the frequency and duration of dry periods may be altered by climate change. Anthropogenic climate change, and associated effects on regional climatic regimes, is not well understood, but the predictions for the Southwest indicate less overall precipitation and longer periods of drought. Seager *et al*. (2007) predict, based on broad consensus among 19 climate models, that the southwest will dry in the 21st century and that the transition to this drier state has already occurred. The increased aridity associated with the current on-going drought, and the 1950's drought will become the norm for the American southwest within a timeframe of years to decades, if the models are correct. These species, along with their habitat, will almost certainly be affected in some manner by climate change; the magnitude and extent of the change cannot be quantified at this time.

CONCLUSION

After reviewing the current status of Chiricahua leopard frog, Huachuca water umbel with critical habitat, Beautiful shiner with critical habitat, Yaqui catfish with critical habitat, Yaqui chub with critical habitat, and Yaqui topminnow, the environmental baseline for the action area, the effects of the proposed Agreement and the cumulative effects, it is the FWS's biological opinion that issuance of a section 10(a)(1)(A) permit for the Agreement, as proposed, is neither likely to jeopardize the continued existence of the Chiricahua leopard frog, Huachuca water umbel, Beautiful shiner, Yaqui catfish, Yaqui chub, or Yaqui topminnow; nor likely to destroy or adversely modify the critical habitat of the Huachuca water umbel, Beautiful shiner, Yaqui catfish, and Yaqui chub. Our rationale for these conclusions is as follows:

Chiricahua leopard frog

- In the action area, Chiricahua leopard frogs are currently found only in Leslie Canyon NWR.

- Reestablishment efforts, natural dispersal, and improved conductivity will increase the number of populations of Chiricahua leopard frogs in the action area and improve connectivity among population sites.

- The long-term effects of the on-going land management, watershed improvements, and conservation activities taken as a whole will reduce sediment load in the run-off water and improve water retention in the watershed in the action area, resulting in less sediment deposition in aquatic habitats.

- The watershed improvements should result in slowing run-off, improving infiltration, and increasing water retention. This should result in reducing the effects of floods, increasing the amount of perennial aquatic sites, and increasing the persistence of ephemeral sites, which should result in an increase in available habitat.

- The conservation measures, including salvage and temporary holding of frogs prior to activities that may result in incidental take, and other measures identified in the Agreement should reduce the potential and extent of incidental take of this species.

- The return to baseline condition should not impact existing populations of Chiricahua leopard frogs.

Huachuca water umbel

- In the action area, Huachuca water umbel is currently found only in Leslie Canyon NWR.

- Reestablishment efforts and subsequent natural dispersal will increase the number of Huachuca water umbel populations in the action area.

- The watershed improvements should result in slowing run-off, improving infiltration, and increasing water retention. This should result in reducing the effects of floods, increasing the amount of perennial aquatic sites, and increasing the persistence of ephemeral sites, which should result in an increase in available habitat.

- The long-term effects of the on-going land management and conservation activities taken as a whole will reduce sediment load in the run-off water and improve water retention in the watershed in the action area, resulting in less sediment deposition in aquatic habitats.

- The populations of Huachuca water umbel established under this Agreement may be lost, but covered activities should not impact existing populations of Huachuca water umbel.

Beautiful shiner

- Beautiful shiner are currently not found within the action area.

- Reestablishment efforts will increase the number of populations of Beautiful shiner in the action area.

- The long-term effects of the on-going land management and conservation activities taken as a whole will reduce sediment load in the run-off water and improve water retention in the watershed in the action area, resulting in less sediment deposition in aquatic habitats.

- The watershed improvements should result in slowing run-off, improving infiltration, and increasing water retention. This should result in reducing the effects of floods, increasing the amount of perennial aquatic sites, and increasing the persistence of ephemeral sites, which should result in an increase in available habitat.

- The conservation measures, including salvage and temporary holding of beautiful shiner prior to activities that may result in incidental take, and other measures

identified in the Agreement should reduce the potential and extent of incidental take of this species.

- The return to baseline condition should not impact existing populations of beautiful shiner.

Yaqui catfish

- Yaqui catfish are currently not found within the action area.

- Reestablishment efforts will increase numbers of populations of Yaqui catfish in the action area.

- The long-term effects of the on-going land management and conservation activities taken as a whole will reduce sediment load in the run-off water and improve water retention in the watershed in the action area, resulting in less sediment deposition in aquatic habitats.

- The watershed improvements should result in slowing run-off, improving infiltration, and increasing water retention. This should result in reducing the effects of floods, increasing the amount of perennial aquatic sites, and increasing the persistence of ephemeral sites, which should result in an increase in available habitat.

- The conservation measures, including salvage and temporary holding of Yaqui catfish prior to activities that may result in incidental take, and other measures identified in the Agreement should reduce the potential and extent of incidental take of this species.

- The return to baseline condition should not impact existing populations of Yaqui catfish.

Yaqui chub

- Yaqui chub are currently found only at one site within the action area, and the effects of implementing the Agreement should not result in the loss of this Yaqui chub population.

- Reestablishment efforts will increase number of Yaqui chub populations in the action area.

- The long-term effects of the on-going land management and conservation activities taken as a whole will reduce sediment load in the run-off water and improve water retention in the watershed in the action area, resulting in less sediment deposition in aquatic habitats.

- The watershed improvements should result in slowing run-off, improving infiltration, and increasing water retention. This should result in reducing the effects of floods, increasing the amount of perennial aquatic sites, and increasing the persistence of ephemeral sites, which should result in an increase in available habitat.

- The conservation measures, including salvage and temporary holding of Yaqui chub prior to activities that may result in incidental take, and other measures identified in the Agreement should reduce the potential and extent of incidental take of this species.

- The return to baseline condition should not impact existing populations of Yaqui chub.

Yaqui topminnow

- Yaqui topminnow are currently found only on the Leslie Canyon NWR, and the effects of implementing the Agreement should not adversely affect this population of Yaqui topminnow.

- Reestablishment efforts will increase number of Yaqui topminnow populations in the action area.

- The long-term effects of the on-going land management and conservation activities taken as a whole will reduce sediment load in the run-off water and improve water retention in the watershed in the action area, resulting in less sediment deposition in aquatic habitats.

- The watershed improvements should result in slowing run-off, improving infiltration, and increasing water retention. This should result in reducing the effects of floods, increasing the amount of perennial aquatic sites, and increasing the persistence of ephemeral sites, which should result in an increase in available habitat.

- The conservation measures, including salvage and temporary holding of Yaqui topminnow prior to activities that may result in incidental take, and other measures identified in the Agreement should reduce the potential and extent of incidental take of this species.

- The return to baseline condition should not impact existing populations of Yaqui topminnow.

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.

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 further 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 Fish and Wildlife Service so that they become binding conditions of any grant or permit issued to the Participants, as appropriate, for the exemption in section 7(o)(2) to apply. The Fish and Wildlife Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Fish and Wildlife Service (1) fails to assume and implement the terms and conditions or (2) fails to require the Participants 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. In order to monitor the impact of incidental take, the Fish and Wildlife Service 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 INCIDENTAL TAKE

The FWS anticipates incidental take of Chiricahua leopard frogs, beautiful shiner, Yaqui catfish, Yaqui chub, and Yaqui topminnow will be difficult to detect for the following reasons:

- these species have small body sizes,
- losses may be masked by seasonal fluctuations in numbers or other causes (e.g., oxygen depletions for aquatic species),
- the species occur in habitat that makes detection difficult, and
- run-off events that could result in incidental take are likely to carry off any dead or injured individuals.

It is also not possible to determine how many of the reestablished or colonized populations will be brought back down to the baseline condition for the covered area. Therefore, the level of incidental take anticipated is:

- Up to all individuals at all population sites reestablished or colonized under the Agreement that are above the baseline condition for the covered area.

The baseline condition of Bar Boot Ranch contains one population of Yaqui chub at the Chalk Tank Complex. The effects of implementing the Agreement are likely to result in the incidental take of individuals within this population, but the level of incidental take anticipated is not expected to result in the loss of this baseline population. Therefore, the baseline condition will be maintained.

As described above the incidental take of individual Yaqui chub will be difficult to detect. For this reason, incidental take will be measured by population level effects. Therefore, the level of incidental take anticipated is:

- up to the loss of the multiple age/size classes structure in the annual monitoring samples of the Yaqui chub population in the Chalk Tank Complex for a single year;

Incidental take shall be exceeded if the baseline population of Yaqui chub is found to no longer contain multiple age/size class structure in the annual monitoring samples during the annual monitoring for two consecutive years, as a result of Agreement implementation.

Take authorizations are contingent on adequate implementation of all commitments in the Agreement. While this consultation anticipates incidental take of individuals in the baseline population of Yaqui chub, neither the Agreement nor this consultation authorize incidental take of the entire baseline population of Yaqui chub on the Bar Boot Ranch. Additional incidental take authority of the baseline population of Yaqui chub would need to be obtained through another permitting process such as a permit and habitat conservation plan under section 10(a)(1)(B) of the Act.

EFFECT OF THE TAKE

In this biological opinion, the FWS determines that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat for the reasons stated in the Conclusions section.

REASONABLE AND PRUDENT MEASURES and TERMS AND CONDITIONS

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize or avoid impacts of incidental take to Chiricahua leopard frog, Huachuca water umbel, beautiful shiner, Yaqui catfish, Yaqui chub, and Yaqui topminnow.

1. The FWS, through the Leslie Canyon NWR staff, shall continue annual monitoring of the baseline population of Yaqui chub on the Bar Boot Ranch to assess the level of incidental take of this population.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Participant must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. If the loss of multiple age/size class structure is observed during the annual monitoring of Yaqui chub at the Chalk Tank Complex, evaluations of the actions that may have lead to the level of incidental take observed must occur.

    a. If the actions were related to the implementation of the Agreement, conservation measures associated with the Agreement should be re-evaluated. FWS will work with the Permittee to implement modifications to the conservation measures that will further reduce the potential of incidental take of Yaqui chub in the Chalk Tank Complex population.

2. If the loss of the multiple age/size class structure is observed during the annual monitoring of Yaqui chub at the Chalk Tank Complex for two consecutive years, the level of anticipated incidental take will have been exceeded, and reinitiation of this consultation shall be requested.

Review requirement: 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 FWS must immediately provide an explanation of the causes of the taking and review the need for possible modification of the reasonable and prudent measures with the AESO.

Disposition of Dead or Injured Listed Species

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, telephone: 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.

1. No additional conservation measures are recommended.

In order 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 on the proposed issuance of a Section 10(a)(1)(A) permit to allow incidental take of Chiricahua leopard frog, beautiful shiner, Yaqui catfish, Yaqui chub, and Yaqui topminnow for management activities outlined in the Agreement on property owned and managed by the Participants within the Leslie Canyon Watershed. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

For further information please contact Marty Tuegel (520) 670-6150 (x232) or Sherry Barrett at (x223), at the Arizona Ecological Services Office in Tucson. Please refer to the consultation number, 22410-2006-F-0724, in future correspondence concerning this project.

/s/

_____	_____
Field Supervisor	Date

Concurrence

_____	_____
Deputy Regional Director	Date

cc: Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ
Refuge Manager, Leslie Canyon National Wildlife Refuge, Douglas, AZ

Alysa F. Bennett, 99 Bar Ranch Limited Liability Limited Partnership, Douglas, AZ
Josiah and Valer Austin, Bar Boot Ranch, Pearce, AZ
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ

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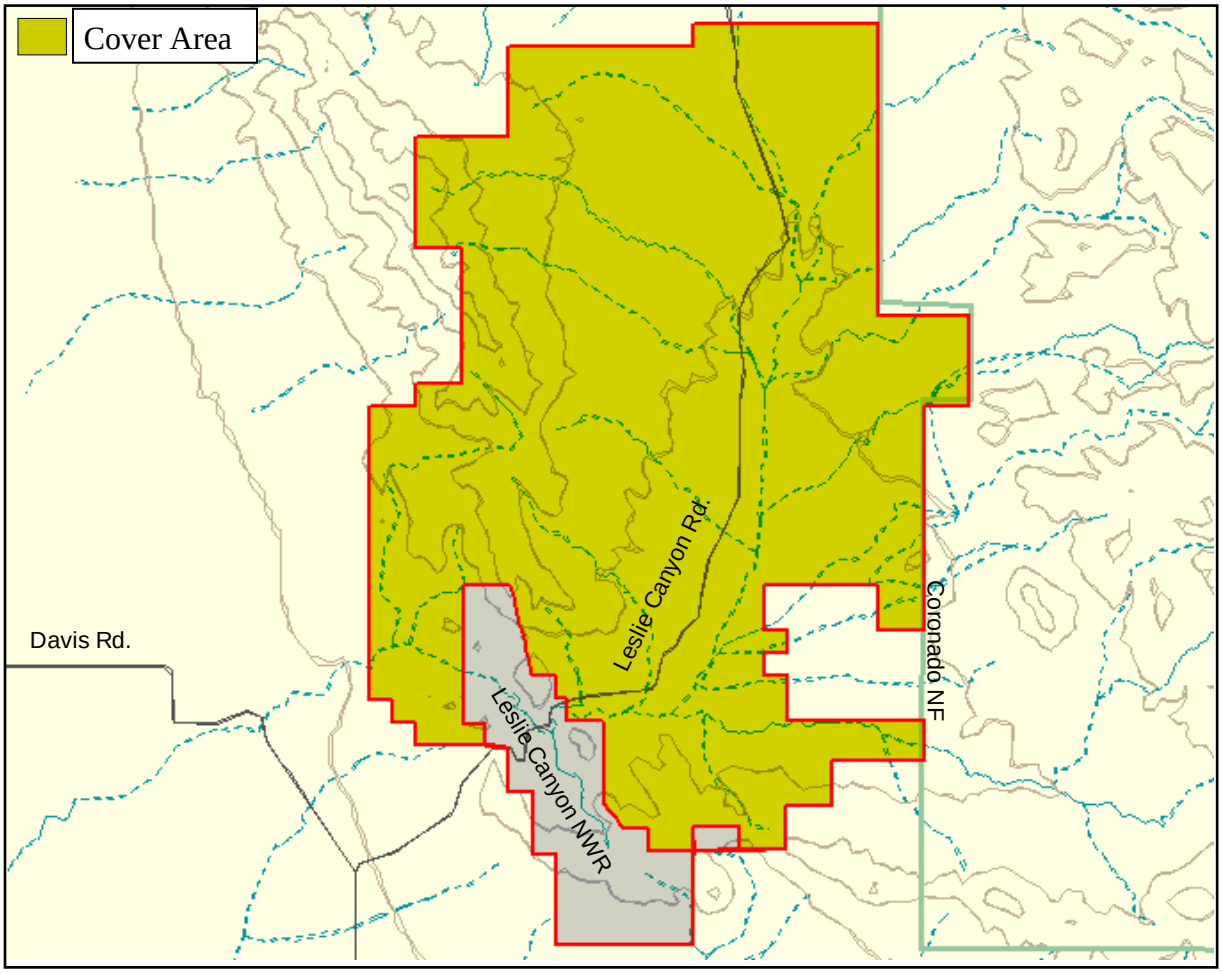
TABLES AND FIGURES

Figure 1. The action area is the combination of the covered area and the Leslie Canyon NWR.



Appendix A: Determinations

Jaguar

The non-U.S. population was listed as endangered in March 1972 (37 FR 6476). The geographical extent of the listing was expanded to include jaguars in the U.S. on July 22, 1997 (62 FR 39147). It is the largest species of cat native to the Western Hemisphere. Individuals in Arizona have been found in Sonoran desertscrub up through subalpine conifer forest. Loss and modification of habitat, shooting of the species and its prey, and predator control have contributed to its decline.

After reviewing the status of the jaguar, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, we concur that the proposed action may affect, but is not likely to adversely affect, the jaguar based upon the following:

- Confirmed sightings have been reported from adjacent mountain ranges that are connected by corridors of suitable habitat to the analysis area, but not from the project area. There is some likelihood that jaguars could occur in the project area during the term of the permit.

- Indirect effects of permit issuance will not reduce cover in riparian areas or uplands. Herbaceous cover is projected to increase over existing conditions.

- Watershed improvement activities will promote upland and riparian vegetation, which should enhance connectivity corridors within the U.S.

- No critical habitat has been designated for this species, thus none will be affected.

Lesser long-nosed bat

Our June 10, 2005, Programmatic BO for the Continued Implementation of the Land and Resource Management Plans for the Eleven National Forests and National Grasslands of the Southwestern Region (U.S. Fish and Wildlife Service 2005) included a detailed Status of the Species for the Lesser Long-nosed Bat. This BO is available on our website at http://www.fws.gov/arizonaes, under Document Library; Section 7 Biological Opinions. Herein, we incorporate that status discussion by reference.

This species is known from grasslands and arid scrublands below 5,500 ft in elevation. In Arizona, most lesser long-nosed bats arrive in mid-April, roosting in caves, abandoned mine shafts and tunnels. Young are typically born in maternity colonies in mid-May. Females and young remain in maternity roosts and forage below about 3,500 ft until approximately mid-July. At this time the range expands and bats are found up to about 5,500 ft in areas of semi-desert grassland and lower oak woodland. Most bats leave southern Arizona by late September to early October.

After reviewing the status of the lesser long-nosed bat, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, we concur that the proposed action may affect, but is not likely to adversely affect, the lesser long-nosed bat, based upon the following:

- There are no roosts within the action area, therefore no direct effects are likely to occur.

- Indirect effects of permit issuance, including ongoing land uses and watershed improvement activities, are not likely to result in a reduction of bat food plants.

- No critical habitat has been designated for this species, thus none will be affected.

Southwestern willow flycatcher

The southwestern willow flycatcher was listed as endangered, without critical habitat on February 27, 1995 (60 FR 10694). On October 19, 2005, we designated critical habitat for the southwestern willow flycatcher (70 FR 60886). A total of 737 river miles across southern California, Arizona, New Mexico, southern Nevada, and southern Utah were included in the final designation. In Arizona designated critical habitat includes portions of the Virgin River Gorge, Verde River, Gila River, Salt River, Tonto Creek, San Pedro River, Little Colorado River, and Big Sandy River, but is not designated within or adjacent to the action area.

The southwestern willow flycatcher recovery plan (U.S. Fish and Wildlife Service 2002) describes the reasons for endangerment and the current status of the species, addresses important recovery actions, includes detailed issue papers on management issues, and provides recovery goals and criteria. Recovery is based on reaching numerical and habitat-related goals for each specific Management Unit established throughout the subspecies' range and establishing long-term conservation plans (U.S. Fish and Wildlife Service 2002).

Our June 27, 2006, BO on the effects of the proposed construction of the Florence-Kelvin Bridge over the Gila River (U.S. Fish and Wildlife Service 2006b [22410-2006-F-0429]) included a detailed Status of the Species for the Southwestern Willow Flycatcher. This BO is available on our website at http://www.fws.gov/arizonaes, under Document Library; Section 7 Biological Opinions. Herein, we incorporate that status discussion by reference.

Rangewide, the population is comprised of small, widely separated breeding groups, including unmated individuals. Rangewide, 83 percent of all sites from 1993 to 2004 had 0 to five flycatcher territories present (Durst *et al.* 2006). Removing the extirpated sites, the percentages are similar; 69 percent of all sites have between one and five territories. Conversely, across the southwestern willow flycatcher's range, there are only three percent of all sites with greater than 50 territories (Durst *et al.* 2006).

We concur with the determination that the action may affect, but is not likely to adversely affect, the southwest willow flycatcher and designated critical habitat, based upon the following:

- No critical habitat is designated within or adjacent to the action area.

- No southwestern willow flycatcher breeding sites or suitable breeding habitat are currently known from within the action area.

- The only known sightings of southwestern willow flycatchers in the action area are of migrating individuals, which are not likely to be affected by the proposed action.