



United States Department of the Interior

FISH AND WILDLIFE SERVICE

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Cons # 2-22-04-F-0537

Marcia R. Andre, Forest Supervisor
Gila National Forest
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Silver City, New Mexico 88061-7863

Dear Ms. Andre:

This document transmits the U.S. Fish and Wildlife Service's (Service) final biological opinion on the effects of actions associated with the "Biological Assessment for the Negrito/Yeguas Allotment" (BA) in the Reserve Ranger District, Gila National Forest (Forest), Catron County, New Mexico. The duration of this action is for 10 years from the date of issuance of the grazing permit. This 10-year assessment concerns the effects of the action on the threatened Chiricahua leopard frog (*Rana chiricahuensis*) (frog); the threatened Mexican spotted owl (*Strix occidentalis lucida*) (owl); the threatened loach minnow (*Tiaroga cobitis*) and bald eagle (*Haliaeetus leucocephalus*); and the endangered Mexican gray wolf (*Canis lupus baileyi*). Your request for formal consultation, in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*) was received on June 28, 2004.

This biological opinion is based on information submitted in the biological assessment dated June 24, 2004; a June 7, 2004, Interagency Range Consultation Team meeting; subsequent meetings and conference calls between the Service and Forest; the March 31, 2004, *Framework for Streamlining Informal Consultation for Livestock Grazing Activities, USDA Forest Service Southwestern Region*; attached grazing consultation forms; discussions with Forest staff; a site visit to the allotment attended by Service and Forest personnel, and the ranch manager; monitoring reports; an August 11, 2004 conference call; a May 31, 2005 conference call; a June 9, 2005, conference call; and other sources of information available to the Service. A complete administrative record of this consultation is on file at the Service's New Mexico Ecological Services Field Office (NMESFO).

The Forest requested concurrence with the determination of "may affect, is not likely to adversely affect" the owl and its critical habitat, loach minnow, and bald eagle. The Forest also requested concurrence with the determination of "not likely to jeopardize" the Mexican gray wolf. The Service concurs with the Forest's determination of "may affect, is not likely to adversely affect" the Mexican spotted owl and its critical habitat, the loach minnow and bald eagle for the following reasons:

A total of 23,401 acres (ac) of owl critical habitat are within the allotment. Thirteen owl

Protected Activity Centers (PACs) (5,935 ac) are contained or partially contained in the allotment and an additional 2,037 ac (1,245 ac mixed conifer and 792 ac of pine-oak) of protected habitat are outside PACs within the allotment. Mexican gray wolves and bald eagles may occur on the allotment. The loach minnow occupies the Tularosa and San Francisco Rivers that are located 7 miles and 10.5 miles, respectively, below the allotment.

The Forest will fence the South Fork of Negrito Creek to exclude livestock, and herding will be utilized to keep livestock use to less than 10 percent in the North and South Forks and mainstem of Negrito Creek. If utilization in the riparian areas reaches or exceeds 10 percent, corrective actions such as removing livestock from the pasture or fencing the riparian areas to completely exclude livestock will occur. No human disturbance or construction actions associated with livestock grazing will occur in PACs during the owl breeding season (March 1-August 31). Herbaceous vegetation within the PACs will be managed at levels that provide the woody and herbaceous vegetation needed by rodent prey species of the owl and that will support prescribed natural and ignited fires that would reduce the risk of catastrophic wildfire in the forest. Grazing will be managed to promote the regeneration of riparian trees. The maximum forage utilization will be 35 percent on stable soils and 25 percent on impaired and unstable soils. A 4.5-inch (in) cover height minimum in mountain meadows will be met in pastures that contain protected/restricted habitat. Livestock management activities will not occur within .25 miles of a bald eagle nest or roost site and the only activities that will occur when bald eagles are nesting or wintering will be livestock herding or horseback.

The Service concurs with the Forest's determination of "not likely to jeopardize" the Mexican gray wolf for the following reasons:

The Mexican gray wolf population has been designated as non-essential experimental, pursuant to section 10(j) of the ESA. Therefore, proposed livestock grazing and livestock management activities in the 10(j) area with Mexican gray wolves will not jeopardize the continued existence of the wolf.

The remainder of this biological opinion will deal with the effects of implementation of the proposed action on the frog. The Forest has determined that the proposed action "may affect, is likely to adversely affect" the frog.

Consultation History

On June 7, 2004, an Interagency Range Consultation Team, discussed the effects of the proposed action relative to compliance with the *Framework for Streamlining Informal Consultation for Livestock Grazing Activities, USDA Forest Service Southwestern Region (Consultation Framework)* dated March 31, 2004. Based on this meeting, the Forest submitted a BA for the Negrito/Yeguas Grazing Allotment dated June 24, 2004.

During an August 11, 2004, conference call, the Forest stated that survey results showed frogs occupied both the North and South Forks of Negrito Creek and that it was reasonable to assume that frogs also occupied the mainstem Negrito Creek. The proposed action only includes fencing

the South Fork Negrito Creek. The Forest proposed to exclude livestock from the North Fork and mainstem Negrito Creek by repairing existing pasture fences and regular riding and herding. It was agreed that the allotment would be closely monitored for compliance for the life of the 10-year Term Grazing Permit.

BIOLOGICAL OPINION

I. Description of the Proposed Action

Action Area

The action area for the proposed project includes all areas directly or indirectly affected by the Federal action. The action area for the proposed project is defined as the Negrito/Yeguas Allotment (Map 1) and the mainstem Negrito Creek downstream (approximately 5 miles [mi]) to the confluence of the Tularosa River.

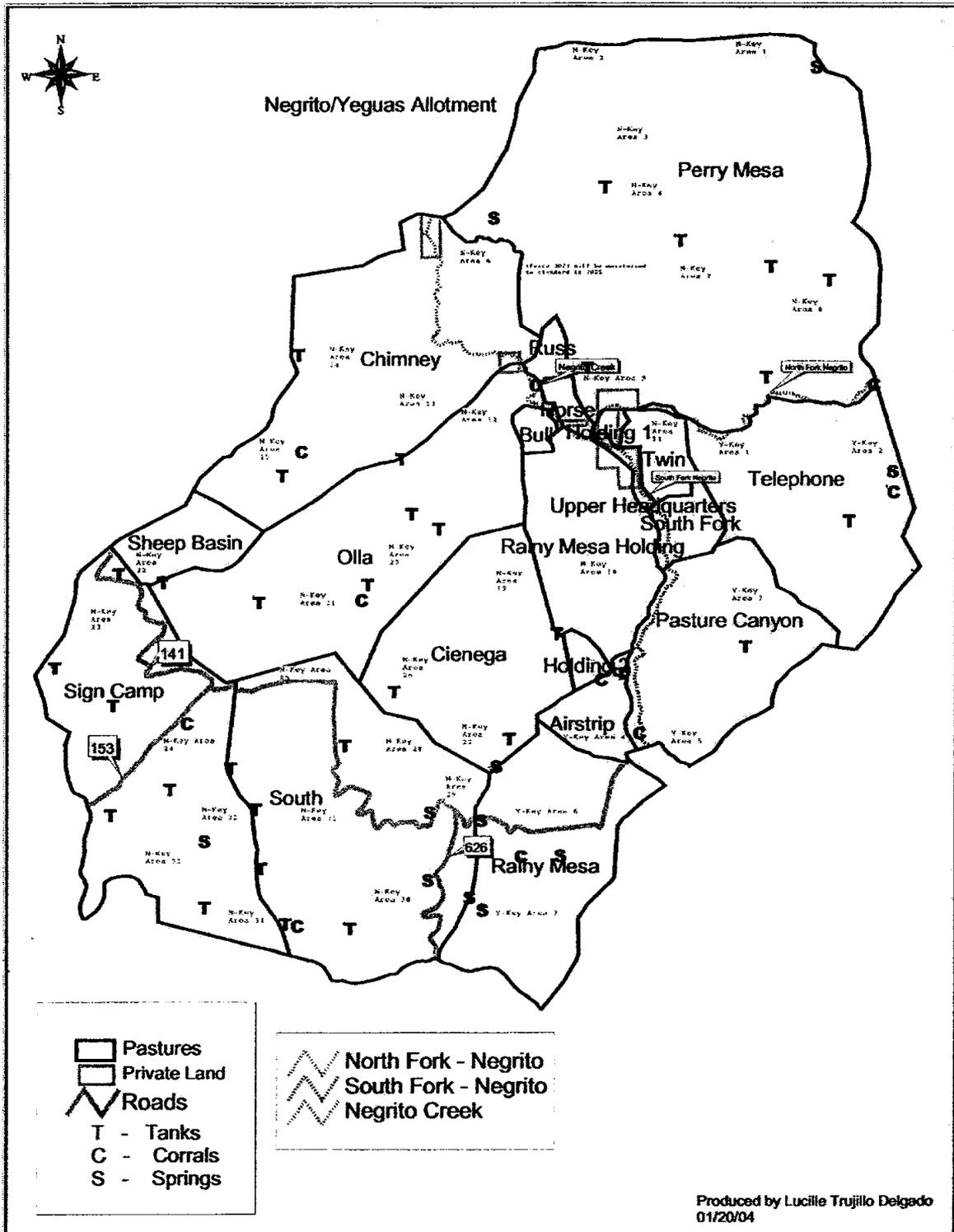
Proposed Action

The proposed action is the authorization of ongoing livestock grazing for the duration of the Term Grazing Permit. It would authorize a grazing permit, implemented under Annual Operating Instructions for the Negrito/Yeguas Allotment with a variable stocking rate of 3,960 head months (5,212 Animal Unit Months [AUMs]) to 5,928 head months (7,811 AUMs). This is equivalent to 320-484 cow/calf pairs and 10 horses for 12 months. Shorter periods of grazing with greater numbers that result in the same AUMs could be authorized in the Annual Operating Instructions. The overall management objective is to improve riparian areas to satisfactory condition.

The Term Grazing Permit would allow grazing by cow/calf pairs, replacement heifers, weaned or yearling holdovers, bulls, and horses, utilizing an 11-pasture rest rotation management system with 10 holding pastures. Scheduling of pasture use would vary from year to year and would be determined in the Annual Operating Instructions in response to resource conditions and management needs. Pasture rotation schedules would provide the basis for scheduled use, rest and recovery periods after use.

The current Term Grazing Permit for the Negrito/Yeguas Allotment, issued in March 1998, permits a combined total of 484 cattle (cow/calf) and 10 horses yearlong on the allotment for a total of 7,811 AUMs. Since the Term Grazing Permit was issued, the AUMs on the allotment have ranged from 69 percent to 84 percent of the permitted AUMs. Currently, 360 cattle (cow/calf) and 10 horses graze the allotment year-long for a total of 5,846 AUMs (75 percent of permitted AUMs). Average actual use from 1992-2002 has averaged 306 cattle (4,847 AUMs) and 10 horses (144 AUMs).

Map 1



The permittee would initially be authorized to stock 320-400 cow/calf pairs and 10 horses for twelve months, or any equivalent combination of shorter periods of grazing with greater numbers. The 484 cow/calf pairs could be authorized if vegetation management activities (i.e. thinning, grassland restoration, prescribed burning, etc.) result in increased forage and an increase in capacity. This would be measured by monitoring forage production in treated areas. Permitted numbers and season of use would vary within this range depending on conditions on the ground. Stocking levels would be determined annually through the Annual Operating Instructions. If utilization is less than 35 percent for two consecutive years in all measured key areas, the head months could be increased proportionate to the measured under-use. If upward trends do not continue with any increase in livestock numbers, stocking would be decreased. If the measured utilization is consistently greater than 35 percent, authorized livestock use would be reduced.

As part of the proposed action: (1) South Fork Negrito Creek would be fenced to exclude livestock; and (2) regular riding and herding would be implemented to ensure that grazing utilization in the mainstem Negrito Creek and North Fork Negrito Creek riparian areas would not occur. During the August 11, 2004, conference call the Forest agreed to ensure there would be no livestock use in the North Fork Negrito Creek and mainstem Negrito Creek by repairing existing fences in the Perry Mesa Pasture. If utilization in the riparian areas occurs, livestock would be removed from the pasture or riparian areas would be fenced to exclude livestock.

The proposed action does not include stock tank maintenance.

Table 1: Proposed Action Summary

Allotment size	Management: Year-long, 11 pasture rest rotation (7 summer, 4 winter, and 10 holding pastures)	Stocking Density	Utilization levels	Proposed monitoring would be conducted
54,088 ac 36,632 full capacity ac				approximately two weeks before to two weeks after the date cattle are scheduled to be removed from a pasture.
Currently permitted livestock use	484 cow/calf 10 horses	7,811 AUMs	Maximum observed: 2002: Rainy Mesa 60% (< 1 ac); Rainy Holding 38%; Rainy Mesa/Airstrip 45%; Airstrip 45-50%; Olla 50%; Rainy Mesa with three reports 65%. 2003: Perry Mesa 20-50%; > 10% mainstem Negrito Creek; South Fork Negrito Creek 20-30%	
Proposed livestock use	320 – 484 cow/calf 10 horses	5,846 AUMs variable depending on conditions but not to exceed 7,811 AUMs	Standard: 35% across entire pasture; < 10% in the North Fork, South Fork and mainstem of Negrito Creek	Pasture move methods are based on % utilization.

II. Status of the Species (Rangewide)

Species description

The frog was proposed for listing as a threatened species without critical habitat on June 14, 2000 (Service 2000). The final rule was published on June 13, 2002 (Service 2002).

Leopard frogs (*Rana pipiens* complex), long considered to consist of a few highly variable taxa, are now recognized as a diverse assemblage of about 29 species (Hillis *et al.* 1983, 2005; Frost 2004), many of which have been described in the last 30 years, and several more await description. Based on morphology, mating calls, and genetic analysis (electrophoretic comparisons of blood proteins), Platz and Platz (1973) demonstrated that at least three distinct forms of leopard frogs occurred in Arizona, including the southern form, which was subsequently described as the Chiricahua leopard frog (Platz and Mecham 1979).

The frog is distinguished from other members of the *Rana pipiens* complex by a combination of characteristics, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and, green coloration on the head and back (Platz and Mecham 1979). The species has a distinctive call consisting of a relatively long snore of 1 to 2 seconds in duration (Platz and Mecham 1979, Davidson 1996). Snout-vent lengths of adults range from 54 to 139 millimeters (mm) (2.1 to 5.4 in) (Platz and Mecham 1979).

Habitat

The frog is an inhabitant of cienegas (wetlands), pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 1,000 to 2,710 meters (m) (3,281 to 8,890 feet [ft]) in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico in northern Sonora, the Sierra Madre Occidental of Chihuahua, and northern Durango and northern Sinaloa (Platz and Mecham 1984, Degenhardt *et al.* 1996, Sredl *et al.* 1997). The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Rana montezumae*) in the southern part of the range of the frog. In New Mexico, of sites occupied by the frog from 1994 to 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 known historic localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl *et al.* 1997). Sixty-three percent of currently extant populations in Arizona occur in stock tanks (Sredl and Saylor 1998).

No formal studies of habitat use by frogs have been completed. However, important general characteristics include permanent or nearly permanent water that is devoid of non-native predators (such as bullfrogs, crayfish, and predatory fish). The role of habitat heterogeneity within the aquatic and terrestrial environment is unknown, but is likely to be important. Shallow water with emergent and perimeter vegetation provide tadpole and adult basking habitats, while deeper water, root masses, and undercut banks provide refuge from predators and potential sites

for hibernation (M. Sredl, Arizona Department of Game and Fish [ADGF], pers. comm., 2002). Most perennial water supporting frogs possess fractured rock substrata, emergent or submergent vegetation, deep water, root masses, undercut banks, or some combination of these features that frogs may use as refugia from predators and extreme climatic conditions (Jennings, Western New Mexico University [WNMU], pers. comm., 2002). Frogs are thought to over-winter at or near breeding sites, although these microsites have not been studied. Other leopard frogs typically over-winter at the bottom of ponds or lakes, and may bury themselves in the mud (Nussbaum et al. 1983, Cunjak 1986, Harding 1997).

Life History

Degenhardt et al. (1996) reported that frogs are shy, nocturnal, and quick to seek shelter when approached. During the day they usually rest hidden among the vegetation surrounding their aquatic habitat and are quick to enter the water. Degenhardt et al. (1996) also reported that this species is the most aquatic of the leopard frogs within New Mexico.

The juvenile habitat requirements of frogs are not well studied, but spatial and temporal separation of adults and juveniles may enhance survivorship. Seim and Sredl (1994) studied the association of juvenile-adult stages and pool size in the closely related lowland leopard frog (*Rana yavapaiensis*) and found that juveniles were more frequently associated with small pools and marshy areas while adults were associated with large pools. Fernandez (1996) speculated that lack of cover and cannibalism was the reason for low juvenile survival in a captive colony of frogs. Jennings (1988) found that juveniles were more active during the day, while adults were more active at night.

No comprehensive studies of the feeding behavior or diet of frog larvae or adults have been conducted. Larval frogs are herbivorous. Available food items at one site examined within the range of this species include bacteria, diatoms, phytoplankton, filamentous green algae, water milfoil (*Myriophyllum* sp.), duckweed (*Lemna minor*), and detritus (Marti and Fisher 1998). The diet of frog adults likely contains a wide variety of insects and other arthropods (Degenhardt et al. 1996). Stomach analyses of other members of the leopard frog complex from the western United States show a wide variety of prey items including many types of aquatic and terrestrial invertebrates (e.g., snails, spiders, and insects) and vertebrates (e.g., fish, and other anurans [including conspecifics] (Stebbins 1951).

Age and size at reproductive maturity are poorly known. In southeastern Arizona, juvenile frogs and late-stage tadpoles introduced to an outdoor enclosure in May and June 1994, reproduced in September 1994 (Rosen and Schwalbe 1998). The smallest males to exhibit secondary sexual characteristics measured 53.5 mm (2.1 in) and 56.2 mm (2.2 in) in snout-vent length (Randy Jennings, WNMU, unpublished data). Size at which females reach sexual maturity is not known. Although scoring of annuli (annual growth rings in bones) in frogs is more difficult than in lowland leopard frogs (Collins et al. 1996), preliminary determination of age based on annual growth rings indicates that they can live as long as six years (Durkin 1995).

Although frog juveniles and adults are generally inactive between November and February, a detailed study of wintertime activity or habitat use has not been done. Male home range sizes (dry season mean = 161.0 m²; wet season, mean = 375.7 m²) tended to be larger than those of females (dry season mean = 57.1 m²; wet season mean = 92.2 m²). The largest home range size documented for the species was that of a male who used approximately 23,390 m² (2,339 m by 10 m) of an intermittent, low elevation canyon (1,775 m) in New Mexico during July and August 1999. Another male moved 3.5 kilometers (km) (2.1 mi) in one direction during that same time period. The largest home range size documented for a female frog was about 9,500 m² (950 m by 10 m). Male frogs tended to expand home range size to a greater degree than females when dry season (early July) was compared to wet season (late July and August) (R. Jennings, WNMU, and C. Painter, New Mexico Department of Game and Fish [NMDGF], pers. comm., 2004).

Adult and juvenile frogs avoid terrestrial predators by jumping into the water (Frost and Bagnara 1977). Among members of the *Rana pipiens* complex, Chiricahua leopard frogs possess the unusual ability to profoundly darken their ventral skin under conditions of low albedo (reflectance) and low temperature (Fernandez and Bagnara 1991; Fernandez and Bagnara 1993). In clear, swiftly-moving streams (low albedo environments), this trait is thought to aid in escape of predators by reducing the amount of attention generated by bright flashes of white ventral skin. Other anti-predator mechanisms have not been identified, but deep water, vegetation, undercut banks, root masses, and other cover sites have been mentioned as being important retreats.

Population dynamics

Breeding habitat includes stock tanks, streams, cienegas, springs, and ponds. Sites with year-round flow, constant water temperature, a depauperate fish community, and thermal springs appear to be particularly important (Scott and Jennings 1985). Oviposition may take place year-round in thermal springs (Scott and Jennings 1985). Egg masses have been found in all months except November, December, and January, and reports of oviposition in June are also uncommon (Sredl and Jennings, *in press*). Frost and Platz (1983) found that Chiricahua leopard frogs at elevations below 1,800 m (5,900 ft) tended to oviposit from spring to late summer, while populations above 1,800 m (5,900 ft) bred during the summer months of June, July, and August. Females deposit egg masses on vegetation within 5 centimeters (cm) (2 in) of the water surface (Jennings and Scott 1991), probably in water temperatures between 12.6-29.5°C (54.7-85.1°F). Zweifel (1968) found that the temperature range for Chiricahua leopard frog embryo development is 12.0-31.5°C (53.6-88.7°F). They lay 300-1500 eggs in an egg mass (Jennings and Scott 1991) on aquatic vegetation including *Potamogeton* spp., *Rorippa* spp., *Echinochloa* spp., and *Leersia* spp. (Sredl and Jennings, *in press*). Hatching time may be as short as 8 days in geothermal influenced springs (Sredl and Jennings, *in press*). Tadpoles are known to overwinter (Frost and Platz 1983) with the larval period lasting as short as 3 months and as long as 9 months (Jennings 1988, 1990).

Populations of the frog occurring in thermally stable habitats (hot springs) may be reproductively active throughout the year. Jennings (1988, 1990) reported reproductive activity throughout the

year in Alamosa Warm Springs in Socorro County, New Mexico, where the water temperature remains above 61° F (16° C). He also found that in a nearby stock tank with varying water temperatures, reproduction occurred only during late April through May and mid-August through late September. In New Mexico, the frog may exhibit seasonal fluctuations in relative abundance. Overall abundance increases with the metamorphosis of tadpoles in August and September, and is lowest from December through March (Degenhardt et al. 1996). Throughout the year, frog activity generally increases as the nocturnal water temperature increases (Jennings 1990).

Metapopulation dynamics are an important component of stable, persistent frog populations (R. Jennings, WNMU, pers. comm., 2004). A metapopulation is a system of local populations connected by dispersing individuals (or a set of local populations which interact via individuals moving among local populations) (Hanski and Gilpin 1991). A local population is a set of individuals which interact with each other with a high degree of probability (Hanski and Gilpin 1991). Local populations are often disjunct, occupying relatively isolated suitable patches of habitat. Interactions among local populations establish a dynamic which can be characterized by the rates of local population extirpation and recolonization, and that in turn, create a phenomenon of local population turn over. Metapopulations persist until all local populations are extirpated (Hanski and Gilpin 1991).

An understanding of the dispersal abilities of frogs is essential for determining the likelihood that unoccupied habitat will be colonized from a nearby extant population of frogs. As a group, leopard frogs are surprisingly good at dispersal. In Michigan, young northern leopard frogs (*Rana pipiens*) commonly move up to 0.5 mile from their place of metamorphosis, and 3 young males established residency up to 8.4 miles from their place of metamorphosis (Dole 1971). Both adults and juveniles wander widely during wet weather (Dole 1971). In Cypress Hills, southern Alberta, young-of-the-year northern leopard frogs successfully dispersed to downstream ponds 3.4 miles from the source pond, upstream 0.6 mile, and overland 0.6 mile. At Cypress Hills, a young-of-the-year northern leopard frog moved 13 miles in one year (Seburn et al. 1997). The Rio Grande leopard frog (*Rana berlandieri*) in southwestern Arizona has been observed to disperse at least one mile from any known water source during the summer rainy season (Rorabaugh, *in press*). In New Mexico, Jennings (1987) noted collections of Rio Grande leopard frogs from intermittent water sources and suggested these were frogs that had dispersed from permanent water during wet periods.

Dispersal of leopard frogs away from water during the wet season may occur less commonly in the arid Southwest than in the mesic environments of Alberta, Michigan, or the Yucatan Peninsula. However, there is evidence of substantial movement of frogs away from water even in Arizona. Movement may occur with the active movement of adult frogs or the passive movement of tadpoles along stream courses. In 1974, Frost and Bagnara (1977) noted passive and active movement of Chiricahua and Plains (*Rana blairi*) leopard frogs for 5 miles or more along East Turkey Creek in the Chiricahua Mountains. In August, 1996, Rosen and Schwalbe (1998) found up to 25 young adult and subadult frogs at a roadside puddle in the San Bernardino Valley, Arizona. They believed that the only possible origin of these frogs was a stock tank located 3.4 miles away. Rosen et al. (1996) found small numbers of frogs at two locations in

Arizona that supported large populations of non-native predators. The authors suggested these frogs could not have originated at these locations because successful reproduction would have been precluded by predation. They found that the likely source of these animals were from populations 1.2 to 4.3 miles distance. In the Dragoon Mountains of Arizona, frogs breeding at Halfmoon Tank occasionally turn up at Cochise Spring (0.8 miles down canyon via an ephemeral drainage) and in Stronghold Canyon (1.1 miles down canyon via an ephemeral drainage). There is no breeding habitat for frogs at Cochise Spring or Stronghold Canyon, thus it appears that observations of frogs at these sites represent immigrants from Halfmoon Tank. In the Chiricahua Mountains, a population of frogs disappeared from Silver Creek stock tank after the tank dried up, but frogs then began to appear in Cave Creek, which is about 0.6 mile away, again suggesting immigration.

Movements away from water do not appear to be random. Streams are important dispersal corridors for young northern leopard frogs (Seburn et al. 1997). Displaced northern leopard frogs apparently use olfactory and auditory cues, and possibly celestial orientation, as guides (Dole 1968, 1972). Rainfall or humidity may be an important factor in dispersal because odors carry well in moist air, making it easier for frogs to find other wetland sites (Sinsch 1991).

Status and distribution

Recent articles in the scientific literature report the extirpation and extinction of amphibians in many parts of the world (Blaustein and Wake 1990; Pechmann et al. 1991; Vial and Saylor 1993; Laurence et al. 1996; Lips 1998; Berger et al. 1998; Houlahan et al. 2000). In the United States, the family Ranidae, which includes the Chiricahua leopard frog, is particularly affected (Corn and Fogleman 1984; Hayes and Jennings 1986; Clarkson and Rorabaugh 1989; Bradford 1991; Sredl 1993; Sredl et al. 1997). Currently, the frog is known to be absent from approximately 76 percent and 82 percent of historic localities in Arizona and New Mexico, respectively (Service 2000).

In Arizona, the frog still occurs in seven of eight major drainages of historical occurrence (Salt, Verde, Gila, San Pedro, Santa Cruz, Yaqui/Bavispe, and Magdalena river drainages), but appears to be extirpated from the Little Colorado River drainage on the northern edge of the species' range. Within the drainages where the species occurs, it was not found recently in some major tributaries and/or in river mainstems. For instance, the species has not been reported since 1995 from the following drainages or river mainstems where it historically occurred: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek mainstem. In southeastern Arizona, no recent records (1995 to the present) exist for the following mountain ranges or valleys: Pinaleno Mountains, Peloncillo Mountains, and Sulphur Springs Valley. Moreover, the species is now absent from all but one of the southeastern Arizona valley bottom cienega complexes. Large, valley bottom cienega complexes may have once supported the largest populations in southeastern Arizona, but non-native predators are now so abundant that the cienegas do not presently support the frog in viable numbers (Rosen et al. *in press*).

Northern populations of the frog along the Mogollon Rim and in the mountains of west-central New Mexico are disjunct from those in southeastern Arizona, southwestern New Mexico, and Mexico. Recent genetic analyses, including a 50-loci starch gel survey, morphometrics, and analyses of nuclear DNA supports describing the northern populations as a distinct species (Platz and Grudzien 1999). Multiple haplotypes within the frog were also identified using mitochondrial DNA analysis (Benedict and Quinn 1999), providing further evidence of genetically distinct population segments.

The frog occurs in west central and southwestern New Mexico in Catron, Grant, Hidalgo, Luna, Socorro, and Sierra Counties. In New Mexico, the frog has been collected or observed at 182 localities (Painter 2000, Service files). In 1995, Jennings reported that frogs still occurred at eleven sites in New Mexico. Based on additional work, Painter (2000) listed forty-one localities at which frogs were found from 1994-1999. Thirty-three of these are north of Interstate 10 and eight are in the southwestern corner of the State. Thirty-one of the forty-one populations were verified extant during 1998-1999 (Painter 2000). However, during May-August 2000, the frog was found at only 8 of 34 sites (C. Painter, NMDGF, pers. comm., 2000). Three populations east of Hurley in Grant County, declined or were extirpated during 1999-2000 (R. Jennings, WNMU, pers. comm., 2000), and preliminary data indicate populations on the Mimbres River and at Deep Creek Divide have experienced significant die-offs (C. Painter, NMDGF, and R. Jennings, WNMU, pers. comm., 2004). Preliminary results from 2004 field surveys indicate that in New Mexico, there are thirty-one locations where the frog can be considered as likely to occur (R. Jennings, WNMU, pers. comm., 2004). Jennings (1995) stated that the Gila Wilderness in the Gila National Forest has the greatest potential for supporting additional extant populations and for securing an intact metapopulation that would have a good chance of long-term persistence.

A number of factors have been identified as causes or possible causes of global amphibian decline and although the specific role of each factor in the declining status of the frog is poorly studied or unknown, in certain populations, each may be contributing causal factors. Furthermore, factors are likely working in synergy to exacerbate deleterious effects (Keisecker and Blaustein 1995; Vatnick et al. 1999; Middleton et al. 2001; Keisecker et al. 2001; Carey et al. 1999, 2001). Known threats to the frog include predation by non-native organisms, especially bullfrogs, fish, and crayfish; disease (chytridiomycosis); drought; climate change; floods; degradation and destruction of habitat as a result of dams, water diversions, and groundwater pumping; improper livestock management; altered fire regimes due to fire suppression and livestock grazing; disruption of metapopulation dynamics; mining; woodcutting; development and other human activities; increased possibility of extirpation due to low population numbers; and environmental contamination (Service 2002).

Numerous studies indicate that declines and extirpations of the frog is at least in part caused by predation and possibly by competition with non-native organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs (*Rana catesbeiana*), tiger salamanders (*Ambystoma tigrinum*), crayfish (*Oronectes* spp.), and several other fish species (Clarkson and Rorabaugh 1989, Sredl and Howland 1994, Rosen et al. 1994, Fernandez and Bagnara 1995, Fernandez and Rosen 1996, Rosen et al. 1996, Snyder et al. 1996). For example, in the Chiricahua region of southeastern Arizona, Rosen et al. (1996) found that almost all perennial

waters that lacked introduced vertebrate predators, contained frogs. In perennial waters with introduced predators, particularly fishes and bullfrogs, frogs were generally absent (Sredl and Howland 1994).

Disruption of metapopulation dynamics is an important factor in the regional loss of populations (Sredl and Howland 1994; Sredl et al. 1997). Frog populations are often small, with dynamic habitats (appearing and disappearing), resulting in a relatively low probability of long-term population persistence. Historically, populations were more numerous and closer together (Sredl and Howland 1994; Sredl et al. 1997). If populations disappeared due to drought, disease, or other causes, extirpated sites could be recolonized by immigration from nearby populations. However, as the numbers of populations decline and become more isolated, it is less likely the areas previously occupied will be recolonized. In addition, most of the larger source populations along rivers and streams (complex habitats) have disappeared.

Livestock grazing effects on ranid frog populations are not well studied, but probably depend on several factors such as grazing intensity (both numbers and duration), season, habitat type, climate, and rainfall. Analysis of the effects of livestock grazing on frogs requires examination of subtle, long-term, incremental changes in watershed functions, vegetation, and upland, riparian, and aquatic communities. Limited data on range condition, frog populations, and an agreeable definition of suitable frog habitat make an empirical analysis of the effects of livestock grazing and grazing management difficult, and often misleading, particularly with an allotment-by-allotment analysis. It is unlikely that any grazing scheme will improve a local hydrologic circumstance over that found under ungrazed conditions (Platts 1990, Belsky et al. 1999). Platts (1990) indicates that the two primary reasons why grazing strategies of any type have not protected riverine-riparian systems in the past is because streamside areas are generally incorporated into the larger pastures and not identified as distinct areas needing specialized management, and because the range is generally overstocked.

Livestock grazing may cause long-term changes to the watershed and its functions. The relationship between livestock grazing in a watershed and effects to river systems is widely recognized and documented (Leopold 1946, Blackburn 1984, Skovlin 1984, Chaney et al. 1990, Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994, Myers and Swanson 1995). Improper livestock grazing practices have been shown to increase soil compaction; decrease infiltration rates; increase runoff; change vegetative species composition; decrease riparian vegetation; increase erosion; increase stream sedimentation; increase stream water temperature; and change channel form (Meehan and Platts 1978, Kaufman and Kruger 1984, Schulz and Leininger 1990, Platts 1991, Fleischner 1994, Ohmart 1996). Livestock use of the riparian corridor causes changes in species composition and community structure of the aquatic and riparian fauna, in addition to flora changes already addressed (Neary and Medina 1995). The aquatic invertebrate community may be degraded because of altered stream channel characteristics, sediment deposition, or nutrient enrichment (Rinee 1988, Meehan 1991).

Although direct impacts to the riparian zone and stream can be the most obvious sign of improper livestock grazing, upland watershed condition is also important because changes in soil compaction, percent cover, and vegetation type influence the timing and amount of water

delivered to stream channels (Platts 1991). Increased soil compaction, decreased vegetative cover, and a decrease in grasslands lead to a faster delivery of water to stream channels, increased peak flows, and lower summer base flow (Platts 1991, Ohmart 1996, Belsky and Blumenthal 1997). As a consequence, streams are more likely to experience flood events during monsoons that negatively affect the riparian and aquatic habitats (water runs off quickly instead of soaking into the ground) and are more likely to become intermittent or dry in September and October (groundwater recharge is less when water runs off quickly). These flood flow changes interact with the stream channel and exacerbate flood damage to banks, channel bottoms, and riparian vegetation (Platts 1990, 1991; Meehan 1991; Johnson 1992; Ohmart 1996).

Adverse effects to the frog and its habitat as a result of livestock grazing and management actions include: Trampling of egg masses, tadpoles, and frogs; possible incidental ingestion of small larvae or eggs while drinking; deterioration of watersheds; degraded water quality and subsequent toxic effects on frogs; elimination of undercut banks that provide cover for frogs; loss of cover provided by wetland and riparian vegetation; loss of deep backwater pools; spread of disease; and facilitating dispersal of non-native predators (Gunderson 1968; Arizona State University 1979; Hendrickson and Minckley 1984; Chapman 1988; Ohmart 1995; Jancovich et al. 1997; Bartelt 1998; Belsky et al. 1999; Service 2002).

Cattle can remove bank-line vegetation that provides escape cover for frogs and a source of insect prey. Litter is reduced by trampling and churning into the soil, thus reducing cover for soil, plants, and wildlife (Schulz and Leininger 1990). Overuse of vegetation by livestock can cause changes to plant root structures, altering plant species composition and overall biomass (Martin 1975; Vallentine 1990; Popolizio et al. 1994). Reduced herbaceous vegetation leads to accelerated soil loss due to increased exposure of soils to downpour events and reduced sediment filtering capabilities of the vegetation (Erman et al. 1977; Mahoney and Erman 1981; Osborne and Kovacic 1993). Hoof action can cause loss of cryptobiotic soil crusts, soil compaction, erosion, and gulying (Klemmedson 1956; Ellison 1960; Gifford and Hawkins 1978; Webb and Stielstra 1979; Harper and Marble 1988; Orodho et al. 1990; Schlesinger et al. 1990; Bahre 1991; McClaran and Anable 1992). Bank configuration, soil type, and soil moisture content influence the amount of damage with moist soil being more vulnerable to damage (Marlow and Pogacnik 1985; Platts 1990).

Water-column alterations can be caused by changes in the magnitude and timing of organic and inorganic inputs into the stream; increases in fecal contamination; changes in water temperatures due to removal of vegetation; reduction of stream shore water depth; changes in timing and magnitude of stream flow events from changes in watershed vegetative cover; and an increase in stream temperature (Platts 1990; Fleischner 1994). These alterations in stream conditions can affect the entire food chain, including both the frog and their prey base.

Frogs can be adversely affected by degraded water quality caused by cattle urine and feces. At Headquarters Windmill Tank on the Coronado National Forest in the Chiricahua Mountains of southeastern Arizona, Sredl et al. (1997) documented heavy cattle use at a stock tank that resulted in degraded water quality, including elevated hydrogen sulfide concentrations. A die-off of frogs at the site was attributed to cattle-associated water quality problems, and the species has

been extirpated from the site since the die-off occurred (Service 2002). Larval frogs may be particularly susceptible to nitrogenous compounds that can be associated with grazing (Scheppers and Francis 1982, Boyer and Grue 1995). Toxicity could result from high concentrations of un-ionized ammonia (Schuytema and Nebeker 1999), particularly in combination with primary-production induced elevation in pH.

The creation of livestock waters in arid environments may provide the means for non-native predators such as bullfrogs and crayfish to move across landscapes that would otherwise serve as barriers to their movement. Maintenance of livestock tanks can result in death or injury of frogs. Eggs, tadpoles, juveniles, and possibly adult frogs are vulnerable to being trampled by cattle on the perimeter of stock tanks and in pools along streams (Bartlett 1998, Service 2002). Frogs, particularly eggs, tadpoles, and juveniles, are vulnerable to being trampled by cattle on the perimeter of stock tanks and in pools along streams (Bartlett 1998, Ross *et al.* 1999, U.S. Fish and Wildlife Service 2002). Juvenile and adult frogs can probably avoid trampling when they are active; however, leopard frogs are known to hibernate on the bottom of ponds (Harding 1997) where they may be subject to trampling during the winter months. Working in Nye County, Nevada, Ross *et al.* (1999) found a dead adult Columbia spotted frog (*Rana luteiventris*) in the hoof print of a cow along a heavily grazed stream. They observed numerous other dead frogs in awkward postures suggesting traumatic death likely due to trampling.

Grazing activities could result in the spread of infectious disease. Chytridiomycosis can survive in wet or muddy environments and could conceivably be spread by livestock carrying mud on their hooves and moving among frog habitats. Personnel working at an infected tank or aquatic site and then traveling to another site, thereby transferring mud or water from the first site, could also spread this disease (Daszak *et al.* 1999, Halliday 1998). Chytridiomycosis could be carried inadvertently in mud clinging to wheel wells or tires, or on shovels, nets, boots, or other equipment. Another transfer of chytridiomycosis could accidentally occur during intentional introductions of fish or other aquatic organisms; road maintenance; stock tank maintenance; by anglers, hunters, or other recreation users (Daszak *et al.* 1999, Halliday 1998).

The role of infectious diseases has recently been recognized as a key factor in amphibian declines in seemingly pristine areas (Daszak *et al.* 1999; Carey *et al.* 1999, 2001). A fungal skin disease, chytridiomycosis (*Batrachochytrium* sp.), has been linked to amphibian decline in many parts of the world (Berger *et al.* 1998; Speare and Berger 2000), including Arizona (Sredl 2000; Sredl and Caldwell 2000) and New Mexico (C. Painter, NMDGF, pers. comm., 2001). Chytridiomycosis is partly responsible for observed declines of frogs, toads, and salamanders in Panama, Costa Rica, Brazil, Ecuador, Uruguay, Australia, New Zealand, Spain, Germany, South Africa, Kenya, Mexico, and the United States (Berger *et al.* 1998, Longcore *et al.* 1999, Speare and Berger 2000). Although the cause of death is uncertain, a thickening of the skin on the feet, hind legs and ventral pelvic region is thought to interfere with water and gas exchange, leading to death of the host (Nichols *et al.* 2001). Die-offs occur during the cooler months from October-February. High temperatures during the summer may slow reproduction of chytrids to a point at which the organism cannot cause disease (Bradley *et al.* 2002). Rollins-Smith *et al.* (2002) also showed that chytrid spores are sensitive to antimicrobial peptides produced in ranid frog skin.

The effectiveness of these peptides is temperature dependent and other environmental factors probably affect their production and release (Matutte et al. 2000).

The origin of the disease is unknown, but epizootic disease data from Central America and Australia (high mortality rates, wave-like spread of declines, wide host range) (Berger et al. 1998), and analysis of genetic variability (Morehouse et al. 2003), suggest recent introduction of the disease into native populations and the disease subsequently becoming enzootic in some areas. Virulence of the pathogen or host susceptibility may be affected by environmental factors (Berger et al. 1998) including changes in climate or microclimate, contaminant loads, increased UV-B radiation, or other conditions that cause stress (Pounds and Crump 1994, Daszak 2000, Carey et al. 2001). The rapid spread of chytrids throughout the world is believed to have been facilitated by human activities. The fungus does not have an airborne spore, so it must spread via other means. Amphibians in the international pet trade (Europe and USA), outdoor pond supplies (USA), zoo trade (Europe and USA), laboratory supply houses (USA), and species recently introduced (*Bufo marinus* in Australia and bullfrogs in the USA) have been found infected with chytrids, suggesting human-induced spread of the disease (Daszak 2000, Mazzoni et al. 2003).

Free-ranging healthy bullfrogs with low-level chytridiomycosis infections have been found in southern Arizona (Bradley et al. 2002). Tiger salamanders and bullfrogs can carry the disease without exhibiting clinically significant or lethal infections. When these animals move, or are moved by people among aquatic sites, chytridiomycosis may be carried with them (Collins et al. 2003). Other native or non-native frogs may also serve as disease vectors or reservoirs of infection (Bradley et al. 2002). Chytridiomycosis could also 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, animals moving among aquatic sites (livestock or wild animals), or during scientific sampling of fish, amphibians, or other aquatic organisms. Preventive measures have been established by land management agencies to ensure that the disease is not spread by aquatic sampling.

Worldwide, 94 species of amphibians have been reported as infected with the chytrid fungus (Speare and Berger 2000). The proximal cause of extinctions of two species of Australian gastric brooding frogs (*Rheobatrachus spp.*) and the golden toad (*Bufo periglenes*) in Costa Rica were likely chytridiomycosis. In Arizona, chytrid infections have been reported from four populations of frogs (Sredl, ADGF, pers. comm., 2000), as well as populations of several other frogs and toads (Morell 1999, Davidson et al. 2000, Sredl and Caldwell 2000, Hale 2001, Bradley et al. 2002). In New Mexico, chytridiomycosis was identified in a declining population near Hurley, and patterns of decline at thirteen other populations are consistent with chytridiomycosis infections (Jennings, WNMU, pers. comm., 2005).

The role of chytridiomycosis in the population dynamics of the frog is as yet undefined; however, there is increasing evidence for amphibian population declines correlated with chytrid infections (Carey et al. 2003). The disease has now been documented to have been associated with Tarahumara frog die-offs since 1974 (Hale 2001). The earliest record for chytridiomycosis in Arizona (1972) roughly corresponds to the first observed mass die-offs of ranid frogs in

Arizona. Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and Chiricahua leopard frogs in Arizona and Sonora, but in both cases symptoms of moribund frogs matched those of chytridiomycosis. It is clear that some frog populations can exist with the disease for extended periods. The frog has coexisted with chytridiomycosis in Sycamore Canyon, Arizona, since at least 1972. However, at a minimum, it is an additional stressor, resulting in periodic die-offs that increase the likelihood of extirpation and extinction. It may well prove to be an important contributing factor in observed population declines.

The disease, Postmetamorphic Death Syndrome (PDS), was implicated in the extirpation of frog populations in Grant County, New Mexico, as well as in other frog and toad species (Declining Amphibian Populations Task Force 1993). All stock tank populations of the frog in the vicinity of Gillette and Cooney tanks in Grant County disappeared within a 3 year period, apparently as a result of PDS (Declining Amphibian Populations Task Force 1993). The syndrome is characterized by death of all or a majority of recently metamorphosed frogs in a short period of time. The syndrome appears to spread among adjacent populations, causing regional loss of populations or metapopulations.

Severe wildfires capable of extirpating or decimating amphibian populations are relatively recent phenomena resulting from the cumulative effects of historical or ongoing grazing (removes the fine fuels needed to carry low intensity fire; allows tree saplings to out compete herbaceous vegetation) and fire suppression (Madany and West 1983, Savage and Swetnam 1990, Swetnam 1990, Touchan et al. 1995, Swetnam and Baisan 1996, Belsky and Blumenthal 1997, Gresswell 1999). The absence of ground fires has allowed a buildup of woody fuels that precipitate infrequent yet intense crown fires (Swetnam and Baisan 1996, Danzer et al. 1997). In 2003 alone, over 80,937 ha (200,000 acs) burned in the Forest (Southwest Interagency Coordination Center fire occurrence records). In ponderosa pine ecosystems, historic wildfires were primarily cool-burning understory fires with return intervals of 3-7 years (Swetnam and Dieterich 1985). Cooper (1960) concluded that prior to the 1950s crown fires were extremely rare or nonexistent in the region. Increased canopy cover within forest and woodland types, increased relative abundance of small diameter ponderosa pine, and invasion of mesa-top grasslands by alligator junipers are the result of a reduction in the frequency of tree-thinning surface fires (Miller 1999).

A combination of factors probably was responsible for the postulated decrease in fire occurrence within the action area. Vigorous fire-suppression efforts by the U.S. Forest Service certainly minimized the spread of fires during the latter half of this century. However, some studies conducted in the southwest United States have found that abrupt decreases in fire frequencies preceded the initiation of effective fire suppression and coincided temporally with the introduction of large herds of domestic livestock (Swetnam and Dieterich, 1985; Savage and Swetnam, 1990; Savage, 1991). Changes in fire frequency, grazing intensity, and climate are inextricably linked as causes of observed increases in the distribution and density of piñon-juniper woodlands. However, it is generally accepted that intensive livestock grazing was the initial catalyst for the woody thickening seen in many conifer-dominated ecosystems in the southwestern United States (Leopold 1924; Swetnam and Baisan, 1996).

The effects of fire on amphibians are not known (Pilliod et al. 2003). It is expected that adults would retreat into the water if fire were present. Probably of greater consequence would be the effect of ash flows on eggs and tadpoles. Adults most likely could escape an ash flow but aquatic life stages would likely perish. Following the 1994 Rattlesnake Fire in the Chiricahua Mountains of Arizona, a debris flow filled Rucker Lake, extirpating a well established frog population. A documented 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 (T. Beatty, Miller Canyon, pers. comm., 2000). Leopard frogs were historically known from many localities in the Huachuca Mountains; however, natural pool and pond habitat is largely absent now and the only breeding leopard frog populations occur in man-made tanks and ponds. Bowers and McLaughlin (1994) listed six riparian plant species they believed might have been eliminated from the Huachuca Mountains as a result of floods and debris flow following destructive fires. Several high-severity wildfires and subsequent floods and ash flows have been documented on the Gila National Forest since 1989: Main Diamond (1989), South Diamond (1995), Burnt Canyon (1995), Trail Canyon (1996), Woodrow Canyon (1996), Sacaton Creek (1996), Upper Little Creek (2003) (Propst et al. 1992, Brown et al. 2001, J. Brooks, Service, pers. comm., 2003). Lesser impacts were experienced in 2002, when ash flows following the Cub Fire affected the lower reach of Whiskey Creek (Brooks 2002).

III. Environmental Baseline

Regulations implementing the Act (50 FR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress. 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 under consultation.

The Negrito/Yeguas Allotment encompasses approximately 21,889 hectares (ha) (54,088 ac) of Forest Service lands, primarily within the Negrito watershed (Map 1). Less than 130 ac of the allotment is in the Middle San Francisco River watershed. The Negrito/Yeguas Allotment is between 2,039 m and 2,789 m (6,690 ft and 9,151 ft) in elevation. The topography varies from gentle terrain in grasslands and along broad ridge tops, to steep broken terrain adjacent to drainages. There are approximately 3,020 ac of grasslands, 17,328 ac of piñon-juniper, 29,911 ac of ponderosa pine, 2,352 ac of mixed conifer, 580 ac of pine-oak stands, 55 ac of shrub mountain mahogany, 87 ac of riparian vegetation, and 741 ac of unknown cover type.

The BA states that approximately 57 percent of the range is in poor to very poor condition due to: (1) The proportion of cool season grasses relative to the overall available forage where blue grama is generally the dominant grass species, and (2) the dense canopy in piñon-juniper, ponderosa pine, and mixed conifer stands. There is limited diversity in plant composition throughout the allotment, specifically in riparian areas. General forage production is good to very good based on 2002 production measurements. Approximately 35 percent of the range is in

a downward trend due to decreased forage species diversity and density related to increased densities of piñon-juniper, ponderosa pine, and mixed conifer trees. Increased tree densities and tree encroachment into grasslands is likely related to the lack of a natural fire regime and historic and current grazing practices. Approximately 8,348 ac of the allotment are in good range condition, 14,082 ac are in fair condition, 23,778 ac are in poor condition, and 7,160 ac are in very poor condition.

The 1995 Terrestrial Ecosystem (TES) report concluded that the Negrito watershed is in overall satisfactory condition with 80 percent of soils being satisfactory, 5 percent unsatisfactory, and the remainder of the area was rated as unsuitable. The 1995 TES report concluded that although overall soil condition was satisfactory, soil movement could be reduced through better management. The BA states that soils are stable on approximately 35,593 ac (66 percent), stable/impaired on 3,177 ac (6 percent), impaired on 4,008 ac (7 percent), impaired/unstable on 3,150 ac (6 percent), and unstable on 7,932 ac (15 percent). There is no soils information on approximately 248 ac (0.005 percent).

Ephemeral drainages within the allotment include Bull Basin, Naranjo, Potato Patch, Shotgun, and Sign Camp Canyons. Drainages within the allotment with perennial stream miles include: 3.0 of North Fork Negrito Creek; 3.5 miles of South Fork Negrito Creek with less than 1.0 mile of perennial water; and, 3.5 miles of the mainstem of Negrito Creek that is perennial with short, interrupted reaches.

Riparian conditions within the allotment are in unsatisfactory condition with the exception of the canyon-confined reach of South Fork Negrito Creek, which is in satisfactory condition. North Fork Negrito Creek is rated as not achieving proper functioning condition due to past fire management practices, logging, road construction and maintenance, and upland grazing. One reach of North Fork Negrito Creek is rated as non-functional and one reach is rated as functional/at risk, with both reaches being in unsatisfactory condition. The BA indicated that past fire management practices, logging, road construction and maintenance, and upland grazing are affecting the condition rating in mainstem Negrito Creek. One reach of the mainstem Negrito Creek is described as non-functional and another is described as functional/at risk. Both reaches are in unsatisfactory condition and in a downward trend.

Recent monitoring efforts by the New Mexico Surface Water Quality Bureau have documented exceedance of New Mexico Water Quality Standards for temperature in South Fork Negrito Creek from the confluence with the North Fork Negrito Creek to its headwaters. This determination is based on data obtained from a temperature monitoring station located approximately .5 mile below the confluence with North Fork Negrito Creek. The probable source(s) of nonsupport was identified as being the removal of riparian vegetation (New Mexico Environmental Department 2002).

District monitoring records indicate a history of permittee non-compliance (see Table 2) for over utilization, mineral blocks in a riparian area, and cattle in pastures scheduled for rest/rotation.

Table 2: Documented non-compliance

November 11, 2001	Non-compliance documented, but not explained
November 27, 2001	Mineral blocks and molasses tub in the riparian area and vegetation was heavily grazed
May 8, 2002	Rainy Pasture: Cattle sign observed in riparian and 60% utilization observed. Rainy Mesa Holding: 38% utilization observed. Rainy Mesa/Airstrip Pastures: 45% utilization observed
July 15, 2002	Airport Strip Pasture: 45 – 50% utilization observed. Rainy Pasture: 65% utilization observed. Rainy Pasture: 65% utilization observed
July 16, 2002	Rainy Mesa Pasture: 65% utilization observed
July 23, 2002	Olla Pasture: Key area 6 had 60% utilization observed
August 27, 2002	Olla Pasture: 50% utilization observed
January 22, 2003	Riparian use > 10%
January 23, 2003	Notice of Non-Compliance issued to permittee indicating average use on key species > 60% along Negrito Creek
February 24, 2003	Riparian use > 10%
March 26, 2003	Cows in riparian area; fences down
March 17, 2004	3 cow/calf pairs in Negrito Creek. Forage had been utilized in the creek bottom, but it is difficult to determine how much is due to livestock and how much can be attributed to wildlife. Trespass livestock seen in Corner Allotment.
May 27, 2004	3 cow/calf pairs in Negrito Creek. The amount and appearance of cow sign indicated that cattle have been utilizing the creek for some time.

With only approximately 33 documented extant frog populations remaining in New Mexico, the Negrito/Yeguas Allotment frog metapopulation is of critical importance for the recovery of the frog on the Gila National Forest (C. Painter, NMDGF, and R. Jennings, WNMU, pers. comm., 2004).

A. Status of the species within the action area

The recent historic range of the frog within the Negrito/Yeguas Allotment included all of Negrito Creek and as many as ten stock tanks. Recent Forest surveys and information from field data collected by Charlie Painter (NMDGF) and Randy Jennings (WNMU) indicates that during the summer of 2004, the frog was known to occur in four stock tanks (Sheep Basin Tank, Long Mesa Tank, Cullum Tank, and Cienega Tank), South Fork Negrito Creek, and North Fork Negrito Creek. Randy Jennings (WNMU, pers. comm., 2004) reported that the North Fork population consisted of tadpoles, juveniles, and adult frogs. Based on this information, the close proximity of this population to the mainstem Negrito Creek, and frog dispersal behavior, it is reasonable to assume that the mainstem Negrito Creek is also occupied habitat. Since 2002, frog populations in Sixshooter stock tank and three nearby smaller stock tanks were extirpated (R. Jennings, pers. comm., 2004). These extirpations within the allotment, when combined with the

extirpation of frog populations in both Devils Creek and Deep Creek, resulted in a loss of population connectivity between Negrito Creek and the lower San Francisco River across the allotment.

The remaining populations within the allotment represent approximately 15 percent of the documented extant frog populations in New Mexico and approximately 5.25 percent of the documented extant frog populations range wide.

Chytridiomycosis has been implicated in the extirpation of at least four stock tank frog populations in the adjacent Deep Creek Allotment and is anticipated to spread across the Negrito/Yeguas Allotment during the life of this grazing permit (R. Jennings, WNMU, and C. Painter, NMDGF, pers. comm., 2004).

B. Factors affecting species environment within the action area

Factors within the project area that affect the frog include the introduction of non-native fish, bullfrogs, and crayfish, disease, timber harvesting, fire suppression and prescribed fire management, elk, drought, recreation, roads, off-highway vehicle (OHV) use, in-stream ponds, and irrigation.

Timber harvest

Before European settlement, ponderosa pine forests were generally open stands with well-developed herbaceous understories (Cooper 1960). Logging activities since the early to mid-1900s have likely caused major changes in watershed characteristics and stream morphology, altered water temperature regimes, sediment loading, and bank stability (Chamberlin et al. 1991). Timber harvesting has been linked to changes in water quality, water quantity, and timing of streamflow with a wide degree of variation in hydrologic responses that can be related to the method and extent of harvesting within a particular basin. The effects of forest practices can influence snow accumulation and melt rate, evapotranspiration and soil water, as well as water infiltration into, and transmission rate through, forest soils (Chamberlin et al. 1991). With a higher accumulation of snow and faster rate of melt contributing to a higher run-off from logged areas (Toews and Gluns 1986), the degree of groundwater recharge has been shown to increase or decrease depending upon the amount of solid compaction associated with harvesting activities that affect its infiltration capacity (Greacen and Sands 1980, Hetherington 1988, Hartman and Scrivener 1990). National Forest logging programs and associated road building dramatically increase erosion and sedimentation and alters natural hydrologic processes to the detriment of aquatic habitat (Burns 1971, Eaglin and Hubert 1993).

The Negrito Creek watershed was actively logged from the late nineteenth century until the mid-1990s when the local sawmill closed. The Gila National Forest has recently begun implementing the Sheep Basin Restoration Project, which will remove an additional 9 million board feet of ponderosa pine across approximately 4,000 ac of the Negrito Creek watershed. This project is being analyzed in a separate consultation.

Fire

Ecologically significant fire was nearly absent from the Negrito Creek watershed from 1949 until 1992 (Miller 1999). Approximately 381.5 ha (942.7 ac) burned during this 43-year span, and although there were frequent natural ignitions, most fires burned less than 0.1 ha and presumably had very little ecological impact on the landscape. From 1960 until 1993, 87 percent of the Negrito watershed had no fire activity greater than 0.1 ha (Miller 1999). The Eagle Peak Fire (1995) burned approximately 13,000 ac in the Negrito and Deep Creek watersheds with approximately 2,000 acres a stand replacement burn. Seventy thousand board feet of timber was salvage logged following the fire. The reduction of vegetation and forest litter following intense crown fires exposes soils to surface and rill erosion during storms, often causing high peak flows, sedimentation, and erosion in downstream drainages (DeBano and Neary 1996).

Recreation activities

The effects of recreation activities in the action area on the frog are unknown. It is possible that recreationists may try to catch frogs or tadpoles; however, the extent to which this occurs is not known. Recreationists (and possibly their dogs and horses) may inadvertently introduce chytridiomycosis from other locales, or may introduce non-native predators for angling or other purposes. All-terrain vehicle use by hunters, campers, permittees, and general recreationists is known to cause damage to soil, watershed, vegetation, other forest resources (Federal Register / Vol. 69, No. 135 / Thursday, July 15, 2004 / Proposed Rule / 42381-42394), and inadvertently spread chytrid and noxious weeds. Camping, in both managed and dispersed campgrounds, is likely to increase sedimentation, decrease riparian vegetation, and inadvertently spread chytridiomycosis or non-native predators.

Non-native predators

Bullfrogs and several species of non-native fish are found in two in-stream ponds on private land in South Fork Negrito Creek, creating a potential barrier to the movement of frogs within mainstem Negrito Creek. Bullfrogs are both a predator and a known vector for chytridiomycosis (Hanselmann et al 2004). This source population of bullfrogs within the allotment could reduce or eliminate frogs from the action area.

The presence of non-native predators in Negrito Creek, chytridiomycosis in the adjacent Deep Creek divide stock tanks, unsatisfactory riparian vegetation conditions, poor water quality, and a documented history of non-compliance by the permittee combine to create a difficult set of circumstances for the frog within the allotment

IV. Effects of the Action

Effects of the action refer to the direct and indirect effects of an action on the species that will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Effects

The effects to the frog from the proposed action will primarily occur in the riparian areas, wetland communities, and stock tanks. The riparian habitat in Negrito Creek is in unsatisfactory condition and generally in a downward trend. We anticipate an improvement in riparian areas as a result of livestock no longer accessing these areas. Of the factors identified as causes, or possible causes of global amphibian decline, several known threats are present on the allotment working in synergy to exacerbate deleterious effects. Known threats on the allotment include: (1) Chytridiomycosis; (2) the presence of bullfrogs; (3) altered fire regimes due to fire suppression and livestock grazing; (4) disruption of metapopulation dynamics; (5) stock tank maintenance; (6) trampling of frogs when livestock have access to occupied habitat; (7) reduction of bankline and emergent vegetation by livestock; (8) physical damage to stream banks by livestock; (9) timber harvest practices; (10) road building and maintenance; (11) recreational activities; and, (12) the presence of non-native fish. These effects are acknowledged in the BA.

Chytridiomycosis is rapidly spreading through frog populations in adjacent allotments and within the action area. During the past two years, chytridiomycosis was the cause of extirpation of 4 frog populations with > 40 adults in nearby stock tanks in the adjacent Deep Creek Allotment (R. Jennings, WNMU, pers. comm., 2004). The BA states that high frog mortality due to chytridiomycosis has been documented in some of the stock tanks within the allotment. Based on the presence of chytridiomycosis within the allotment, it is reasonably certain that the proposed action will contribute to the spread of chytridiomycosis across the allotment.

Frog populations within the allotment have experienced declines in both size and number during the past two years (C. Painter, NMDGF, and R. Jennings, WNMU, pers. comm., 2004). Disruption of metapopulation dynamics is likely an important factor in regional loss of amphibian populations (Sredl and Howland 1994, Sredl *et al.* 1997). Chiricahua leopard frog populations are often small and their habitats are dynamic, resulting in a relatively low probability of long-term population persistence. However, if populations are relatively close together and numerous, extirpated sites can be recolonized. Because of the fragmented nature of frog populations on this allotment, the threat of chytridiomycosis, predation by bullfrogs and non-native fish, and direct livestock access to occupied stock tanks, it is unlikely that frogs in this area will continue to function as a metapopulation.

Across the allotment, livestock have direct access to all stock tanks. During the life of the project, this could result in potential incidences of trampling of egg masses, tadpoles, and possibly adult frogs; ingestion of egg masses and tadpoles; and a further reduction in both bankline and emergent vegetation. A lack of riparian vegetation, specifically in and around stock tanks, leads to increased predation of juvenile frogs by adults (R. Jennings, WNMU, and C. Painter, NMDGF, pers. comm., 2004). During periods of below normal rainfall, frogs would be adversely affected by degraded water quality caused by livestock urine and feces when congregating at shrinking stock tanks. Larval frogs may be particularly susceptible to nitrogenous compounds associated with grazing (Schepers and Francis 1982, Boyer and Grue

1995). Maintenance of occupied stock tanks will require further consultation with the Service to minimize harm, injury, and mortality of frogs.

The current upland grazing regime reduces the amount of fine fuels that carry low intensity wildfires that reduce tree stand density. The Forest asserts that the amount of vegetation remaining after grazing will still support prescribed fires that reduce the risk of catastrophic crown fires that could result in ash and sediment flows, potentially destroy complex, perennial stream frog habitat, further reducing frog populations. Healthy and abundant grasses can also out-compete tree seedlings, resulting in reduced tree stand densities.

Because of the presence and potential spread of chytridiomycosis, disruption of metapopulation dynamics, non-native species that prey on frogs, and altered fire regimes due to livestock grazing, it is reasonably certain that the proposed action will contribute to the continued decline or extirpation of frog populations across the allotment.

V. 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 BO. 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 ESA.

Livestock grazing and associated activities on non-Federal lands, private land development and water use, and the presence of non-native fish and bullfrogs that prey on frogs in the watershed have a negative effect on the frog and its habitat. The development of ponds on private land owned by the permittee along South Fork Negrito Creek and the active cultivation of non-native fish and bullfrogs are a significant threat to the persistence of the frog in South Fork, North Fork, and mainstem Negrito Creek. Non-native species that prey on frogs have been identified as one of the primary causes for the decline of the species across its historic range. Bullfrogs are a known vector for the spread of chytridiomycosis (D. Green, United States Geologic Services, pers. comm., 2004). Livestock grazing and heavy equipment use, on the private lands in the South Fork Negrito Creek channel have reduced the quantity and diversity of riparian vegetation, increased stream-bank erosion, and contributed to sedimentation in mainstem Negrito Creek.

VI. Conclusion

After reviewing the current status of the frog, the environmental baseline for the action area, effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the effects of ongoing livestock grazing as proposed for the Negrito/Yeguas Allotment on the Gila National Forest will not jeopardize the continued existence of the species. No critical habitat has been designated, thus none would be affected. The Service's non-jeopardy conclusion for the frog is based on the following: (1) The frog occurs within the Negrito/Yeguas Allotment and the effects of livestock grazing, while adverse, are not severe enough (temporally or spatially) to imperil the continued existence of the species; (2) the proposed action affects a

small percentage of the frog's occupied range; and (3) the Forest Service will ensure livestock cannot access occupied stream habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined in the same regulation by the Service 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 that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take of a listed animal species that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, 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.

Amount and Extent of Take Anticipated

Given the many opportunities for take to occur, both temporally (10-year project life) and spatially, we believe take is reasonably certain to occur. Although we believe take will occur, precise levels of anticipated take are difficult to quantify because: (1) Dead or impaired individuals are difficult to find and losses may be masked by seasonal fluctuations in environmental conditions; and (2) the status of the species could change over time through immigration, emigration, and loss or creation of habitat. The levels provided below represent our assessment of take based on the best scientific and commercial data available to us. Livestock tank maintenance was not addressed in the BA, therefore mortality and injury to frogs due to livestock tank maintenance is not covered by this incidental take statement.

Because frogs occur in four stock tanks and the South Fork, North Fork, and mainstem Negrito Creek, the Service anticipates the following take for the life of the permit:

1. Frogs may be incidentally taken through trampling and destruction of egg masses, small tadpoles, and metamorphosing frogs, and ingestion of small larvae and eggs at occupied stock tanks at which livestock have access from March through October. They may also be incidentally taken by trampling and destruction of small tadpoles and overwintering frogs at occupied stock tanks where livestock have access from November through February. These life stages of frogs are very vulnerable to damage, egg masses are fragile, small tadpoles do not move rapidly to escape danger, and metamorphosing frogs are small and cannot swim or hop well to quickly escape from danger. During winter

months, frogs hibernate on the bottom of stock tanks, where they are vulnerable to trampling. Incidental take will be considered to be exceeded if trampling results in the direct mortality or injury of more than 2 adult frogs, 2 juveniles, 5 tadpoles, or any egg masses, at any one location, during the life of this permit.

2. Frogs may be incidentally taken by the transport of chytridiomycosis by livestock from infected sites to currently occupied habitat. Incidental take will be exceeded if more than one frog population is extirpated due to chytridiomycosis.

Reasonable and Prudent Measures and Terms and Conditions

The measures described below are non-discretionary, and must be undertaken by the Forest so that they become binding conditions of any grant or permit issued to any applicant, permittee, or contractor, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Forest has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest: (1) Fails to assume and implement the terms and conditions, or (2) fails to require any applicant, permittee, or contractor 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 Forest must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

The Service identified the following reasonable and prudent measures necessary and appropriate to minimize impacts of incidental take for the frog. In order to be exempt from the prohibitions of section 9 of the Endangered Species Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The Forest shall implement measures to minimize the incidental take from the trampling and ingestion of frogs, metamorphosing frogs, larvae, and eggs in occupied frog habitat.
 - 1.1 The Forest Service shall exclude livestock from 50 percent of Sheep Basin Tank, Long Mesa Tank, Cullum Tank, and Cienega Tank such that emergent and submergent vegetation is allowed to regenerate.
2. The Forest shall implement personnel education programs and well-defined operational procedures to minimize take from the introduction of non-native species and chytrid contamination.
 - 2.1 All Forest personnel conducting aquatic monitoring or research should follow the Declining Amphibian Populations Task Force Fieldwork Code of Practice protocol (<http://www.open.ac.uk/daptf/index.htm>) to prevent or reduce the spread of amphibian and other aquatic borne diseases.

- 2.2 For those actions within the Forest's discretion, live fish, crayfish, bullfrogs, leopard frogs, salamanders, or other aquatic organisms shall not be moved among livestock tanks or other aquatic sites.
 - 2.3 The Forest will ensure that all ranch hands, construction personnel, and others involved in implementing the proposed action are informed of the purpose and need to comply with those terms and conditions.
 - 2.4 Ensure that all Forest personnel conducting presence/absence surveys for both frogs and fish have successfully completed frog survey protocol training.
3. The Forest shall monitor grazing activities resulting in incidental take. The Forest shall provide a report of the findings to the Service no later than February 15 of each year of the proposed action.
 - 3.1 The Forest will build and maintain one grazing exclosure in North Fork Negrito Creek and one grazing exclosure in mainstem Negrito Creek. Each exclosure should be, at minimum, 200 square feet in size, and built to exclude livestock, elk, and deer. The exclosure should be designed to assist in determining the overall effects of grazing on riparian vegetation.
 - 3.2 The Forest will include photo points in their monitoring strategy and include, at minimum, bi-annual photo point data with the required annual monitoring report.
 - 3.3 All forage utilization monitoring and reporting of the effectiveness of the terms and conditions shall be submitted annually to the NMESFO. This report shall summarize for the previous calendar year: (1) Application and effectiveness of the terms and conditions; (2) utilization monitoring summary and analysis; and, (3) any suggestions for improving how terms and conditions are to be applied.

If during the course of the action, this level of incidental take is exceeded such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Forest must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

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. The term "conservation recommendations" has been defined as Service suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily

represent complete fulfillment of the agency's section 7(a)(1) responsibility. In order for the Service to be kept informed of activities that either minimize or avoid adverse effects or that benefit listed species or their habitats, the Service requests notification of the implementation of the conservation recommendations. The Service recommends the following:

1. We recommend the Forest develop and implement a program for long-term monitoring of both occupied and suitable frog habitat.
2. We recommend that the Forest work with the Service and NMDGF to begin an aggressive program to control non-native aquatic organisms on the Forest, particularly bullfrogs and non-native fish.
3. When stock tanks are newly constructed or reconstructed, the Forest should consider how that tank may serve as a stepping stone for non-native species to move across the landscape and negatively affect frog recovery. Careful placement of tanks and regulating public access may be necessary to ensure they do not become reservoirs of non-native predators. Also consider if these tanks can serve as habitat restoration/creation sites for future establishment or re-establishment of frog populations.
4. We recommend that the Forest convert stock tanks to troughs or elevated tanks in which water is supplied by a pipeline, windmill, or solar pump if the site is expected to be colonized by non-native predators, but should be discouraged if it could serve as habitat for frogs.
5. The Forest should convene a meeting of researchers and other appropriate staff from the New Mexico Department of Game and Fish, the Service, and the Forest Service by August 1, 2005, to develop survey strategies for population monitoring and monitoring the spread of chytridiomycosis. The group will develop a plan to fund and carry out this monitoring across the Forest.
6. We recommend that the Forest Service establish at least one elk/livestock enclosure around occupied livestock tanks and pipe the water to a trough.

REINITIATION - CLOSING STATEMENT

This concludes consultation on the action outlined in the consultation request. As provided in 50 CFR §402.16, reinitiation of formal consultation with the frog 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 that was not considered in this BO; and (4) a new species is listed or critical habitat designated that may be affected by the action. In

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instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending consultation with the Service.

We appreciate the Forest's efforts to identify and minimize effects to listed species. In future communications regarding this consultation please refer to consultation #2-22-04-F-0537. If you have any comments or questions regarding this BO, please contact Lyle Lewis or Melissa Kreutzian of the NMESFO if you have any comments or questions at the letterhead address or at (505) 346-2525.

Sincerely,



Susan MacMullin
Field Office Supervisor

cc:

Director, Arizona Department of Game and Fish, Phoenix, Arizona

Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico

Assistant Regional Director, U.S. Fish and Wildlife Service, Albuquerque, New Mexico

(Attn: Chief/ES)

Field Supervisor, U.S. Fish and Wildlife Service, Ecological Services Field Office, Phoenix, Arizona

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