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In Reply Refer To:

April 1, 2010

AESO/SE  
22410-F-2009-0217

Mr. Gene Blankenbaker, Forest Supervisor  
Tonto National Forest  
2324 East McDowell Road  
Phoenix, Arizona 85006

RE: On-going Livestock Grazing on the Crouch Mesa Allotment, Pleasant Valley Ranger District,  
Tonto National Forest

Dear Mr. Blankenbaker:

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was dated July 30, 2008, and received by us on July 31, 2008. At issue are impacts to the threatened Chiricahua leopard frog (*Lithobates chiricahuensis*) (CLF) that may result from on-going livestock grazing on the Crouch Mesa Allotment, located in the Pleasant Valley Ranger District on the Tonto National Forest (TNF) in Gila County, Arizona. You have determined that the proposed action "may affect, and is likely to adversely affect" the CLF. You also requested our concurrence with your determination that the proposed action "may affect, but is not likely to adversely affect" the endangered southwestern willow flycatcher (*Empidonax traillii extimus*) and its critical habitat. We concurred with your determination and provided our response in our January 15, 2008, letter for on-going livestock grazing for 33 allotments on the TNF (22410-2007-I-0221). Therefore, this species is not addressed further. You also determined that the proposed action would have "no effect" on the Mexican spotted owl (*Strix occidentalis lucida*) and its critical habitat, and the threatened Sonoran Desert population of the bald eagle (*Haliaeetus leucocephalus*). Species with no effect determinations do not require review from the FWS, and are not addressed further.

This biological opinion (BO) is based on information provided in the July 2008 biological assessment (BA), an April 23, 2008 site visit to Pine Spring and Crouch Creek by representatives of the TNF, FWS, and the Arizona Game and Fish Department (AGFD), electronic correspondence between our staffs, and other sources of information. Literature cited in this BO is not a complete bibliography of all literature available on the CLF, livestock grazing, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at our office.

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### **Consultation History**

- February 8, 2007: We received your request for informal consultation for on-going livestock grazing for 33 allotments in the Tonto Basin, Globe, Payson, Pleasant Valley, and Mesa Ranger Districts on the TNF.
- January 15, 2008: We provided our concurrence for twenty-six allotments and a non-concurrence for seven allotments, including the Crouch Mesa Allotment with the CLF.
- July 31, 2008: We received your request to initiate formal consultation and the July 2008 BA.
- August 27, 2008: We requested a 60-day extension.
- September 18, 2008: We received your acceptance transmittal for our 60-day extension.
- February 19, 2009: We requested a second 60-day extension.
- April 21, 2009: We transmitted a draft BO, and requested an additional 30-day extension of the consultation period to review your comments and finalize the BO.
- September 17-24, 2009: Our staffs discussed by email the proposed conservation measures and reasonable and prudent measures.
- September 29, 2009: We received your comments electronically on the draft BO.
- November 12, 2009: We responded to your comments and transmitted a second draft BO.
- December 10, 2009 through January 8, 2010: Our staffs discussed the proposed conservation measures and we provided technical assistance on CLF surveys and monitoring for incidental take.
- January 12, 2010: We received electronic notification from you that the permittee was granted applicant status.
- March 8, 2010: We received your comments by email on the second draft BO.

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## **BIOLOGICAL OPINION**

### **DESCRIPTION OF THE PROPOSED ACTION**

The proposed action is to continue to provide grazing opportunities and improve or maintain range and watershed conditions on the Crouch Mesa Allotment by employing conservative-use and rest or deferred-rotation strategies. This consultation covers a period of four years. In September 2005, the TNF adopted a policy of rangeland adaptive management which is detailed in Chapter 90 of the Forest Service Handbook (FSH) 2209.13 (USFS 2005). Under this policy, limits on timing, intensity, frequency, and duration of livestock grazing are set in the Environmental Assessments which reflect Allotment Management Plans (AMP). The TNF will utilize the Tonto Restocking Guidelines, the Tonto Drought Policy, and the Region 3 Drought Policy. These documents recognize the need for recovery following drought and as a general rule, recommend a minimum of one growing season's rest following a drought.

Grazing will be conducted at conservative-use levels. The objective of conservative-use is to manage grazed vegetation for the maintenance of good to excellent conditions, and enhancement of poor to fair watersheds and wildlife habitat. Wildlife habitat and range, and watershed conditions, may be gauged by monitoring seasonal utilization on key forage species during the grazing period. Forage utilization would be managed at a level that corresponds to light to moderate grazing intensity, in order to provide for grazed plant recovery, increases in herbage production, and retention of herbaceous litter to protect soils. Conservative-use equates to 30% to 40% on herbaceous species and less than 50% use on browse (current year's leaders). Consistent patterns of utilization in excess of 40% of key herbaceous species and 50% of browse species in key areas would be used as a basis to modify management practices or take administrative actions necessary to reduce utilization in subsequent grazing seasons. The TNF will utilize the document entitled "Principles of Obtaining and Interpreting Utilization Data on Southwestern Rangelands" for guidance and direction on utilization monitoring. If utilization levels exceed desired levels over multiple years, the TNF may implement changes to management practices, such as adjustments of timing, intensity, frequency and duration of grazing (Smith et al. 2005; USFS 2005). Grazing intensity can be measured before and during the growing season to manage livestock so that expectations of end of growing season utilization measurements will not be exceeded.

Control features such as fences and cattle guards are designed to hold permitted livestock within the appropriate pastures. Occasionally, livestock may access areas that are outside the area of planned use. In such cases, the TNF will work with the permittee to assist in correcting the situation through inspections and regular visits to occupied pastures and their adjacent areas.

### **Monitoring**

Monitoring in the Crouch Mesa Allotment will consist of implementation and effectiveness monitoring. Implementation monitoring will be conducted using a variety of methods. It is designed to provide information that will enable decision makers to practice adaptive management and make necessary changes needed for plant development and recovery, and assess physical improvements to the allotment. Effectiveness monitoring documents whether

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management actions are having the expected progress towards achieving resource management objectives and is used to track upland vegetative and soil conditions over the long-term.

Monitoring will occur at key areas in a grazing unit as appropriate. Key area monitoring examines upland range sites and assesses changes in ground cover and relative composition of perennial forage plants, which indicates range condition and trend. Data will be collected by the TNF range conservationists, biologists, other TNF personnel as well as, the permittee, in upland areas using a variety of methods. In addition, the TNF and the permittee will conduct planned inspections. The data will then be presented and analyzed by the District rangers to assist in making adaptive management decisions.

Critical areas are those which must be treated with special consideration because of inherent site factors, size, location, condition, values, or significant potential conflicts among uses. In general, riparian habitats and locations where listed species occur are examples of critical areas. The critical areas identified in the Crouch Mesa Allotment include Crouch Creek and an unnamed drainage that flows between Upper Tank and Crouch Creek. These areas will be monitored during the grazing season to ensure that sufficient residual vegetation and streambank integrity are maintained to mitigate flood disturbance throughout the year. Grazing will be adjusted if conservative-use levels are exceeded.

Livestock-use standards for riparian areas will include the following:

- For obligate woody riparian species, limit use to less than 50% of terminal leaders on the top one-third of plants that are accessible to livestock (i.e., limit grazing use for tree heights that are equal to or less than 6 feet tall). Use of 50% of terminal leaders on the top one-third of plants is equivalent to approximately 20% of annual growth by volume.
- For herbaceous riparian species, limit use to less than 40% of annual plant biomass on deergrass (*Muhlenbergia rigens*).
- For emergent species, maintain an average of six to eight inches of stubble height during the grazing period.
- Livestock will be moved from critical areas or pastures based on monitoring to maintain utilization levels.

In upland areas that are outside of critical areas, adaptive management will be conducted if utilization is exceeded or analyses indicate that range conditions are not improving under the current management strategy. Changes in the management strategy will be accomplished by adjusting one or more aspects of intensity, timing, frequency, or duration of grazing. Re-initiation of section 7 consultation with the FWS will be conducted if utilization levels are “consistently exceeded in critical areas.”

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### **Conservation Measures**

- The TNF will conduct annual surveys within the dispersal areas of known CLF populations that lack non-native predators (e.g., bullfrogs, crayfish, green sunfish, etc.) in order to identify any new CLF populations in the Crouch Mesa Allotment. These areas include the perennial reaches of Crouch Creek, Pine Spring drainage and two unnamed drainages. The TNF shall survey once during the monsoon season. If CLF individuals are encountered at a new site, the TNF will follow the 1-3-5 guidance and conduct two surveys per year to capture the spring and monsoon seasons when the species is most likely to disperse.
- As time and budget allows, other suitable habitats within the Crouch Mesa Allotment will be surveyed for species presence.
- If future surveys detect CLF individuals, the TNF, in cooperation with the permittee, FWS, and AGFD, will collaborate and decide the appropriate action for long-term persistence of the species.
- If an egg mass is discovered within the allotment, the TNF would ensure its protection to prevent any adverse impacts from livestock grazing.

### **Action Area**

The action area includes all areas to be affected directly or indirectly by the Federal action. Since impacts from livestock grazing may be carried downstream (sedimentation), the action area is larger than the allotment boundaries. Thus, we have defined the action area as all areas within the Crouch Mesa Allotment as well as, one mile downstream of all perennial, intermittent, or ephemeral streams that flow out of the allotment. Some of the named streams in the action area include: Cherry Creek, Crouch Creek, Brewer Spring, Scarlet Springs, and the Divided Spring drainage.

The Crouch Mesa Allotment is located within the Pleasant Valley Ranger District on the TNF near Young, Arizona (Figure 1). The allotment is managed in conjunction with the Pleasant Valley Allotment and consists of 7,510 acres with a maximum permitted number of 955 animal unit months (AUMs). The number of livestock listed is the current maximum permitted numbers in AUMs, however, the actual number on the ground may be lower. The Crouch Mesa Allotment has three summer pastures, the Mesa, Deadman, and Scarlet pastures. These pastures will be grazed under a rest, deferred-rotation system, where two pastures are grazed each summer while the other is rested. Grazed pastures will be used during a different time period in alternate years, in which, each summer pasture is rested for an entire year for every three years of use. One winter pasture, the Brewer Pasture, will be used each year from November 1st through May 15th.

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## STATUS OF THE SPECIES

### *Rangewide*

The CLF was listed as a threatened species without critical habitat on June 13, 2002 (67 FR 40790, USFWS 2002b). Included in the listing was a special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. A recovery plan was completed in April 2007 (USFWS 2007). The CLF is distinguished from other members of the *Lithobates pipiens* complex by a combination of distinctive morphological and genetic characters, and a distinctive call (Platz and Mecham 1979; Davidson 1996; Stebbins 2003).

The CLF is an inhabitant of cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 feet in central, east-central, and southeastern Arizona; west-central and southwestern New Mexico; and in northern Sonora and the Sierra Madre Occidental of Chihuahua, Mexico (Platz and Mecham 1984; Degenhardt et al. 1996; Sredl et al. 1997; Sredl and Jennings 2005). In New Mexico, of sites occupied by CLF from 1994 to 1999, 67% were creeks or rivers, 17% were springs or spring runs, and 12% 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 remaining locations are lakes and reservoirs (Sredl et al. 1997). Sixty-three percent of populations extant in Arizona from 1993 to 1996 were found in stock tanks (Sredl and Saylor 1998).

Northern populations of the CLF 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 support describing the northern populations as a distinct species (Benedict and Quinn 1999; Platz and Grudzien 1999; Goldberg et al. 2004). The Ramsey Canyon leopard frog (*Lithobates "subaquavocalis"*), found on the southeastern slope of the Huachuca Mountains in Cochise County, Arizona, has recently been subsumed into *Lithobates chiricahuensis* (Frost et al. 2008). However, until such time that the listing for *chiricahuensis* is revised; the Ramsey Canyon leopard frog is not considered listed under the Act.

Disruption of metapopulation dynamics is likely an important factor in the regional loss of populations (Sredl and Howland 1994; Sredl et al. 1997). CLF populations are often small and habitats are dynamic, resulting in a relatively low probability of long-term population persistence. The dispersal abilities of CLF are key to determining the likelihood that suitable habitats will be colonized from a nearby extant population. In general, individual frogs may shift their home ranges via dispersal for a variety of reasons, including competition, predation, or unfavorable environmental conditions (Stebbins and Cohen 1995). Where such dispersal results in movement of frogs among local populations and discrete aquatic habitats, such movement facilitates the creation of metapopulations. Existing evidence shows substantial movements of leopard frogs and passive movements of tadpoles along stream courses. Current guidance, supported by scientific literature, suggests reasonable dispersal distances of CLF 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 CLF can be found in Platz and Mecham (1979,1984), Rosen et al. (1994),

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Rosen et al. (1996), Sredl and Howland (1994), Jennings (1995), Degenhardt et al. (1996), Sredl et al. (1997), Painter (2000), Sredl and Jennings (2005), and USFWS (2007).

Numerous studies indicate that declines and extirpations of CLF are at least in part caused by predation and possibly competition with non-native organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs (*Rana catesbeiana*), tiger salamanders (*Ambystoma tigrinum mavortium*), crayfish (*Orconectes virilis*), and several other species of exotic fish. Additional threats to CLF include: an introduced fungal skin disease, chytridomycosis or *Batrachochytrium dendrobatidis* (*Bd*); drought; floods; degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, altered fire regimes from 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. The loss of CLF populations also fits into the global pattern of amphibian decline, suggesting that other regional or global factors, such as ultra-violet radiation, pesticides or contamination, and climate change may be contributing causal factors.

Within the last decade, *Bd* has been recognized as an important contributor to the global decline of frogs, toads, and salamander species (Berger et al. 1998; Longcore et al. 1999; Daszak 2000; Speare and Berger 2000; Hale 2001). *Bd* does not have an airborne spore and spreads by other means, such as by people (and animals) moving among various tanks and/or by personnel sampling aquatic habitats (Halliday 1998). The fungus can exist in water or mud and may be spread by wet or muddy boots, vehicles, and/or in the hoofs of livestock. *Bd* infections have been reported from several populations of CLF in southeastern Arizona, as well as, in populations of several other frogs and toads (Davidson et al. 2000; Sredl and Caldwell 2000; Hale 2001; Bradley et al. 2002; USFWS 2007). The role of the fungi in the population dynamics of the CLF is of yet undefined.

#### *Recovery Unit 5*

The final Recovery Plan for CLF (USFWS 2007) delineated eight recovery units in key areas that were targeted as being valuable in the recovery of this species. The action area lies within Recovery Unit (RU) 5, which is delineated to the west by the Verde River southeast of Camp Verde, to the north along the interface between the mountains, grasslands, and pinyon-juniper woodlands of the Colorado Plateau, to the east where elevations rise into the White Mountains, and to the south where elevations drop below 4,000 feet, corresponding to the presumed lower limit of the frog's distribution within the recovery unit.

Historically, there are records of CLF scattered across the western and southern portions of RU5. Today, the species is currently known from two to three areas: (1) the Buckskin Hills area of the Coconino National Forest (Fossil Creek drainage); (2) the upper Ellison Creek drainage within the Payson Ranger District of the TNF; and (3) the Cherry and Crouch Creek areas within the Pleasant Valley Ranger District, also referred to as the Gentry Creek Management Area (MA). Reintroduction efforts in the Gentry Creek MA have produced a functioning CLF metapopulation. In 2005, this metapopulation was comprised of four distinct subpopulations; however, as of 2008, there are now seven extant sites. The FWS, in cooperation with the TNF, the AGFD, and the Phoenix Zoo, have started a captive breeding program in order to establish,

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among several goals, a new population in Pine Spring, a designated TNF wildlife area that is located approximately one mile east of the Crouch Mesa Allotment. During the summer of 2006, 400 CLF tadpoles and metamorphs were released within and just below Pine Spring in the drainage, which flows into Crouch Creek within the Brewer Pasture. Additional releases of 361 tadpoles, metamorphs, and adult frogs occurred in July 2007 and October 2008. The CLF have persisted at this site since their initial release in 2006, but reproduction has not yet been documented. Follow-up efforts since 2006, observed tadpoles 0.2 mile downstream from Pine Spring in the drainage and adults found within less than 0.5 mile of the Brewer Pasture. The CLF Recovery Plan (USFWS 2007) cites that drought, invasion of non-native predators, and the potential spread of *Bd* are the three primary threats to the Gentry Creek MA.

Given the wide range of this species, several Federal actions affect this species every year. A complete list of formal consultations conducted for 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. Survey work and recovery projects are also occurring regularly, and are summarized in the appropriate land-management agency, FWS, or AGFD documents; the CLF Recovery website ([http://www.fws.gov/southwest/es/arizona/CLF\\_Recovery\\_Home.htm](http://www.fws.gov/southwest/es/arizona/CLF_Recovery_Home.htm)); as well as, in the BA associated with this project. The TNF biologists and private partners have contributed greatly to the ongoing conservation efforts for the species.

## **ENVIRONMENTAL BASELINE**

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions 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 Crouch Mesa Allotment occurs below the Mogollon Rim with elevations ranging from 5,400 to 6,000 feet above sea level. The vegetation community is dominated by interior chaparral, pinyon-juniper, and ponderosa pine species. The major waterways in the allotment are Cherry and Crouch Creeks. Cherry Creek is a perennial stream with a small reach in the Deadman Pasture. Crouch Creek is largely intermittent and flows through the Brewer Pasture. Upstream of Crouch Creek from its confluence with the Pine Spring drainage, semi-permanent water occurs in a series of small pools, marshy areas, and areas of low flow (B. Burger, AGFD, pers. comm. 2009) that are potentially suitable habitat for the CLF. All of the Brewer Pasture and a portion of the Mesa Pasture are located within the Gentry Creek MA (USFWS 2007).

From 2003 to present, the Crouch Mesa Allotment has not been stocked. In years prior to 2003, the allotment was typically stocked within 85% of maximum permitted levels. No current rangeland or watershed trend data are available. Range condition and trend data have been gathered sporadically over the past forty-two years. A 1994 rangeland trend study showed 63% of the range vegetation in the allotment was in fair to good condition and 36% in poor condition,

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with 27% in an upward trend and 73% in a stable trend. Watershed conditions from this study showed 54% of the acreage was rated in good to excellent condition with the remaining 45% rated in fair condition. Trends for watershed conditions showed that 27% were in an upward trend, 64% in a stable trend, and 9% in a downward trend. Soil conditions assessed in the allotment are 61%, 21%, and 17% in satisfactory, impaired, and unsatisfactory condition, respectively. During the April 2008 site visit, there were evidence of heavy cattle trailing along Crouch Creek in the Brewer Pasture, one incident of an unauthorized cow in the allotment, and a livestock fence situated between the boundary of Pine Spring and Crouch Mesa that excludes cattle from the wildlife area, in disrepair. However, no impacts to potential suitable habitat for CLF was recorded. Deer and elk also occur in the action area and contribute to these baseline conditions. We are not aware of any significant recreational activities occurring in the Crouch Mesa Allotment.

### **Status of the species within the action area**

No extant populations of CLF are currently known to occur within the action area. However, given the proximity of individuals in Pine Spring and the dispersal abilities of CLF (within 3 miles along an ephemeral or intermittent drainage from occupied habitat), we anticipate that the species will occur on the allotment during the life of this project. During the April 2008 site visit, approximately eighteen metamorphs were observed within the drainage downstream from Pine Spring. It was estimated that these individuals would reach sexual maturity within a year and disperse into suitable CLF habitat in the action area and contribute to the overall status of RU5.

Additional populations of CLF occur in upper Crouch Creek and in the Cherry Creek drainage (e.g., Bottle Spring and upper Cherry Creek) but are located upstream from the allotment and outside the action area. The occupied sites within upper Crouch Creek are located 1.5 to 2 miles upstream from waters in the Crouch Mesa Allotment. Although this is within dispersal distance for CLF, the reach is intermittent and includes a waterfall with a 100-foot drop and steep cliffs on both sides of the creek. The dispersal distance from Bottle Spring and/or upper Cherry Creek into the action area is well beyond the known dispersal range recorded for the species. In the lower reaches of Cherry Creek, below the town of Young, crayfish and several exotic fish species have been recorded. A small reach of Cherry Creek flows within the Deadman Pasture, but given the presence of non-native species, this habitat is considered unsuitable for CLF.

All known waters in the allotment were surveyed to protocol from 2003 to 2007. These surveyed areas included: Cherry Creek, Crouch Creek, Brewer Spring, Scarlet Springs, Big Tank, Double Tank, Magnet Tank, McKinney Tank, Ridge Tank, Deadman Canyon, Fourmile Canyon, Hog Canyon, Lower Hog Canyon, Divided Spring drainage, McKinney Tank drainage, and Pine Spring drainage. No CLF were documented. Historically, populations of CLF occurred at Upper Tank in 1982, 1991, and 1993 and an unnamed tank southwest of Upper Tank in 1982, 1991, and 1993. Additionally, one adult was observed in Upper Tank in 1998. In 1993 and 1994, bullfrogs were found in both of these tanks and again in the unnamed tank in 2001, 2003, and 2007. Tiger salamanders, which can prey upon CLF, were also found in these tanks in 2003, 2005, and 2007. In 2007, bullfrogs were found in Hog Canyon. Thus, surveys conducted within the last six years in the action area have been negative, with no CLF documented in these waters presumably as a result of non-native predators.

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The CLF was addressed in the Programmatic Biological Opinion on the Continued Implementation of the Land and Resource Management Plans for 11 National Forests and National grasslands of the Southwest region. This opinion concluded “no jeopardy” to the species for eight management programs, including grazing of domestic livestock under rangeland management. Three reasonable and prudent measures directed the TNF to protect CLF and its habitat and to monitor populations on National Forest Systems lands (USFWS 2005).

## **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.

Grazing effects on CLF habitat include both the creation of habitat and the loss and degradation of habitat (Sredl and Jennings 2005). Construction of stock tanks for livestock water has created leopard frog habitat, and in some cases has replaced destroyed or altered natural wetland habitats (Sredl and Saylor 1998). In some areas of Arizona, stock tanks provide the only suitable habitat available for the frog; however, these habitats are often temporary and can be intermediary “stepping stones” in the dispersal of non-native species (Rosen et al. 2001) that result in CLF decline (Rosen et al. 1994; Rosen et al. 1996). Livestock grazing can cause a decline in diversity, abundance, and species composition of riparian herpetofauna communities from direct or indirect threats. These can include: (1) declines in the structural richness of the vegetative community; (2) losses or reductions of the prey base; (3) increased aridity of habitat; (4) loss of thermal cover and protection from predators; and (5) a rise in water temperatures to levels lethal to larval stages of amphibian and fish development (Szaro et al. 1985; Schulz and Leininger 1990; Belsky et al. 1999).

Adverse effects to the CLF and its habitat as a result of livestock grazing and its management actions may occur under certain circumstances. These effects include: facilitating dispersal of non-native predators, as previously mentioned; trampling of egg masses, tadpoles, and frogs; possible incidental ingestion (of small larvae or eggs while drinking); deterioration of watersheds; erosion and/or siltation of stream courses; elimination of undercut banks that provide cover for frogs; loss of cover provided by wetland and riparian vegetation, and resulting increased predation; loss of backwater pools; and spread of disease (ASU 1979; Hendrickson and Minckley 1984; Ohmart 1995; Jancovich et al. 1997; Bartelt 1998; Belsky et al. 1999; Adams et al. 2009). The CLF Recovery Plan (USFWS 2007) provides a lengthy discussion of potential effects to CLF from livestock grazing activities with emphasis on affects to CLF during the warmer periods of the year when the species is assumed to be surface-active and/or reproductive. Since Crouch Creek is where frogs are reasonably likely to occur and the stream is identified as a critical area, planned monitoring to assess ground cover, range conditions, and trends, should identify and minimize many of these possible adverse effects to CLF and its habitat. Additionally, these effects are expected to be attenuated through implementation of conservative-

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use and adaptive management as proposed by the TNF in their management plan for the Crouch Mesa Allotment.

Indirect adverse effects may occur through a variety of means during the year when CLF are inactive (e.g., between November and February). Increased erosion in the watershed caused by livestock 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). CLF may also be adversely affected by degraded water quality and subsequent toxic effects caused by cattle urine and feces. For example, at Headquarters Windmill Tank on the Coronado National Forest in the Chiricahua Mountains in 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 CLFs at the site was attributed to cattle-associated water quality problems and as a result, the species has been extirpated from the site (USFWS 2002). Larval frogs may be particularly susceptible to nitrogenous compounds that can be associated with grazing (Schepers and Francis 1982; Boyer and Grue 1995). Toxicity could result from high concentrations of unionized ammonia (Schuytema and Nebeker 1999), particularly in combination with primary-production induced elevation in pH. In the Crouch Mesa Allotment, we believe that degraded water quality and the possible spread of *Bd* may occur and impact CLF or its habitat. Heavy cattle trailing was observed in April 2008, and the possibility exists for this to occur again. In addition, with the varying availability of water in Crouch Creek, we believe that seasonal pools where CLF will likely inhabit will also be shared by cattle in which, cattle may potentially impact CLF individuals directly or indirectly.

Trampling of CLF by cattle has not been documented, however, it likely occurs. Juvenile and adult frogs can probably often avoid trampling when they are active; however, leopard frogs are known to hibernate on the bottom of ponds (Harding 1997) from November to February and may be subject to disturbance during these winter months. Winter grazing will occur (November 1<sup>st</sup> through May 15<sup>th</sup>) where the CLF is expected to be present during their non-active and active seasons (March through May), including the egg laying period. Egg masses could be laid within the Brewer Pasture during winter use and may be impacted by cattle moving through the pasture. We are reasonably certain that increased risk to hibernating or surface active frogs, carry-over tadpoles from last year which have not yet metamorphosed, or egg masses, may occur at sites that become occupied by CLF as a result of dispersal from Pine Spring during the life of the project. The ability of the frogs to disperse is largely dependent on suitable environmental conditions, such as adequate snow pack and subsequent spring runoff, coupled with spring showers to sustain pools and prevent the entire drainage from drying out. Under these conditions, we are relatively certain that a proportion of CLF individuals, from the eighteen metamorphs observed in April 2008 will disperse to suitable sites and be present in the action area concurrent with livestock grazing. Thus, the closer CLF individuals are to source populations, such as Pine Spring, there is a higher likelihood that CLF individuals will actively move among suitable habitat using overland areas or aquatic habitats (e.g., Pine Spring drainage) for travel and occur in the same areas with cattle. The TNF has committed to establishing new fence lines on a case by case basis that, together with planned monitoring, is expected to minimize possible adverse effects to frogs at newly occupied sites.

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In review of the potential effects of livestock grazing discussed above, we are reasonably certain that loss or disturbance of egg masses, early-stage tadpoles, or dormant-season metamorphosed frogs will occur at some rate over the life of the project. Additionally, we are reasonably certain that adverse effects to bankside and aquatic vegetation in likely to be occupied habitat, causing loss of cover for frogs, will also occur at some level during the duration of the proposed action. We anticipate these direct and indirect effects could occur on one or any of the future habitat areas within the Crouch Mesa Allotment. Trespass cattle may also occur again in the future; however, inspections and regular visits to occupied pasture by the TNF, in cooperation with the permittee, should identify and remedy these situations. The continued success of the Gentry Creek MA and the expected progress towards achieving resource management objectives on the ground, should allow for species persistence on the Crouch Mesa Allotment.

### **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.

Since the land within the action area is managed by a Federal agency; most activities that could potentially affect these species are Federal activities and subject to additional section 7 consultation. Most of the land within the Brewer Pasture is under private ownership. Access to this pasture is restricted. We are not aware of any private or non-Federal activity occurring within the Brewer Pasture or with the action area that is likely to affect CLF, with the exception of livestock grazing activities.

### **CONCLUSION**

After reviewing the current status of the CLF, the environmental baseline for the action area, the effects of the proposed livestock grazing and the cumulative effects, it is the FWS's biological opinion that on-going livestock grazing on the Crouch Mesa Allotment, as proposed, is not likely to jeopardize the continued existence of the CLF. No critical habitat has been designated for this species, therefore none will be affected. We present this conclusion for the CLF for the following reasons:

- The proposed action will employ livestock grazing management strategies that will maintain or improve the existing range and watershed conditions during the life of the AMP to support suitable habitat for the species in the allotment;
- Implementation of the proposed conservation measures are expected to reduce direct effects on CLF by the proposed action by identifying and protecting newly established populations;
- The continued success of the Gentry Creek MA and the expected progress towards achieving resource management objectives on the ground, should allow for the establishment and persistence of the species on the Crouch Mesa Allotment.

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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 proposed action.

### **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 TNF so that they become binding conditions of any grant or permit issued to the permittee, as appropriate, for the exemption in section 7(o)(2) to apply. The TNF has a continuing duty to regulate the activity covered by this incidental take statement. If the TNF (1) fails to assume and implement the terms and conditions or (2) fails to require the permittee 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 TNF 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)].

### **AMOUNT OR EXTENT OF TAKE**

We anticipate that the proposed action is reasonably certain to result in incidental take of CLF. However, it is difficult to quantify the number of individual frogs taken because: (1) dead or impaired individuals are difficult to find and losses may be masked by seasonal fluctuations in environmental conditions; (2) the status of the species could change over time through immigration, emigration, and loss or creation of habitat; and (3) the species is small-bodied, well camouflaged, and occurs under water of varying clarity. For these reasons, we will attribute take at the sub-population level (hereinafter referred to as "populations"; also known as occupied sites) as addressed in the Programmatic Biological and Conference Opinion on the Continued Implementation of the Land and Resource Implementation Plans for the Eleven National Forests and National Grasslands of the Southwest Region (LRMP BO, USFWS 2005). We anticipate one of the following forms of take over the life of the project:

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1. Direct mortality or injury through trampling of a proportion of CLF adults, metamorphs, tadpoles, or egg masses at one occupied site in the winter pasture where cattle have authorized access, or gain unauthorized access from November through May; or
2. Harm, as a result of lost productivity of CLF due to the loss of bankline and emergent vegetation, increased sedimentation of pools or other forms of habitat degradation at one occupied site where cattle contribute to erosion within or upstream of these sites.

Occupancy of suitable habitat within a CLF metapopulation is dynamic. Discovery of new populations, recolonizations of extirpated sites, and extirpation of occupied sites are common occurrences with this species. In addition, the Gentry MA is an area of active recovery projects in which frogs could be reestablished at suitable sites within the action area. Therefore, we expect that over the life of this proposed action, sites where take may occur (sites that are likely to be occupied by CLF) will change across the allotment. The above anticipated take considers the dynamic nature of frog occupancy; thus, we do not believe reinitiating is needed whenever a new population of CLF is found.

We reviewed the prescriptions for take outlined on pages 270 and 271 of the LRMP BO to identify when take has been exceeded. In the LRMP BO and as of June 10, 2005, the Pleasant Valley Ranger District was identified as possessing four extant populations of CLF. As of 2008, there were seven occupied sites. A new population in the Crouch Mesa Allotment would be considered an eighth or additional occupied site. As provided for in the LRMP BO, the authorized level of incidental take of CLF from the proposed action will be exceeded if, after a period of two consecutive years, the total number of occupied CLF sites totals less than four in the Pleasant Valley Ranger District as a result of livestock management.

### **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 for the reasons stated in the Conclusions section.

### **REASONABLE AND PRUDENT MEASURES and TERMS AND CONDITIONS**

The following reasonable and prudent measure(s) are necessary and appropriate to minimize take of CLF:

1. Ensure the continued integrity of all current or future pasture boundary or livestock enclosure fence lines.
  - a. The TNF shall ensure that any pasture boundary and any appropriate livestock enclosure fence lines in the Crouch Mesa Allotment are inspected once at the beginning of pasture use.
  - b. If breaches are found, the TNF shall ensure the fence line is immediately repaired or repaired as soon as feasibly possible. In addition, the TNF shall ensure that any unauthorized livestock that are observed in the allotment are removed.

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- c. After removal of livestock from unauthorized areas, the TNF shall ensure that the route of entry used by the unauthorized livestock is determined and will evaluate the need for corrective action to avoid future breaches.
2. Reporting monitoring findings to our office.
    - a. The TNF shall report annually the results of frog surveys conducted to identify new dispersal locations and breeding locations.
    - b. The TNF shall report the documented results of fence line assessments annually. In the event that a fence line is observed in disrepair, the TNF shall notify our office when the situation was discovered and how it was remedied. Initial notification to our office can be accomplished via telephone or e-mail.

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

### **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. We provide the following recommendations prescribed in the final CLF Recovery Plan (USFWS 2007) for your consideration:

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1. Continue to collaborate with other stakeholders to eliminate non-native predators at or near CLF populations that pose a threat to those populations, and/or prevent existing sites with suitable CLF habitat from becoming occupied by non-native species, most notably at sites including, but not limited to, lower Cherry Creek in the Deadman Pasture, Upper Tank, and the unnamed tank southwest of Upper Tank within the Gentry Creek MA.
2. Continue to collaborate in identifying, restoring, or creating as needed, and protecting currently unoccupied recovery sites in the Gentry Creek MA necessary to support viable populations and metapopulations of CLF.
3. Continue to collaborate in establishing new, or re-establishing former, populations of CLF at selected recovery sites.
4. Continue to collaborate in augmenting populations in the Gentry Creek MA, as needed, to increase persistence.
5. Continue to collaborate in monitoring extant CLF populations and habitats, and implementation of the recovery plan.
6. Continue to support research needed to support recovery actions and adaptive management.
7. Continue to encourage and develop support for the recovery efforts for the CLF in the Gentry Creek MA through collaborative public and private partnerships.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

### **REINITIATION NOTICE**

This concludes formal consultation on the action outlined in this biological opinion. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect CLF 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 CLF 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.

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The FWS appreciates the TNF efforts to identify and minimize effects to listed species from this project. For further information please contact Kathy Robertson (x232) or Debra Bills (x239). The consultation number has been revised. Please refer to this number, 22410-F-2009-0217 in future correspondence concerning this project.

Sincerely,

/s/Debra Bills for

Steven L. Spangle  
Field Supervisor

cc: (hard copy)

Julia Camp, Wildlife Biologist, Pleasant Valley Ranger District, Young, AZ  
Michael Lechter, Tilting H. LLC, Paradise Valley, AZ

Habitat Branch Chief, Arizona Game and Fish Department, Phoenix, AZ  
Mike Sredl, Nongame Branch, Arizona Game and Fish Department, Phoenix, AZ  
Bill Burger, Arizona Game and Fish Department, Region 6, Mesa, AZ

(electronic copy)

Jim Rorabaugh, Fish and Wildlife Service, Tucson, AZ

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### LITERATURE CITED

- Adams, M.J., C.A. Pearl, B. McCreary, S.K. Galvan, S.J. Wessell, W.H. Wente, C.W. Anderson, and A.B. Kuehl. 2009. Short-term effect of cattle exclosures on Columbia spotted frog (*Rana luteiventris*) populations and habitat in northeastern Oregon. *Journal of Herpetology* 43(1):132-138.
- Arizona State University (ASU). 1979. Resource inventory for the Gila River complex, Eastern Arizona. Report to the Bureau of Land Management, Safford District, Safford, Arizona. Contract No. YA-512-CT6-216.
- Bartelt, P.E. 1998. Natural history notes: *Bufo boreas*. Mortality. *Herpetological Review* 29(2):96.
- Belsky, A.J., A. Matzke, and S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the Western United States. *Journal of Soil and Water Conservation* 54:419-431.
- Benedict, N., and T.W. Quinn. 1999. Identification of Rio Grande leopard frogs by mitochondrial DNA analysis: a tool for monitoring the spread of a non-native species. Department of Biological Sciences, University of Denver, CO.
- Berger L., R. Speare, P. Daszak, D.E. Green, A.A. Cunningham, C.L. Goggins, R. Slocombe, M.A. Ragan, A.D. Hyatt, K.R. McDonald, H.B. Hines, K.R. Lips, G. Marantelli, and H. Parkes. 1998. Chytridiomycosis causes amphibian mortality associated with population declines in the rain forests of Australia and Central America. *Proceedings of the National Academy of Science, USA* 95:9031-9036.
- Boyer, R., and C.E. Grue. 1995. The need for water quality criteria for frogs. *Environmental Health Perspectives* 103(4):352-357.
- Bradley, G.A., P.C. Rosen, M.J. Sredl, T.R. Jones, and J.E. Longcore. 2002. Chytridomycosis in native Arizona frogs. *Journal of Wildlife Diseases* 38(1):206-212.
- Chapman, D.W. 1988. Critical review of variables used to define effects of fines in redds of large salmonids. *Transactions of the American Fisheries Society* 117:1-21.
- Daszak, P. 2000. Frog decline and epidemic disease. *International Society for Infectious Diseases*. Accessed online from: <http://www.promedmail.org>.
- Davidson, C. 1996. Frog and toad calls of the Rocky Mountains. Library of Natural Sounds, Cornell Laboratory of Ornithology, Ithaca, NY.
- Davidson, D., A.P. Pessier, J.E. Longcore, M. Parris, J. Jancovich, J. Brunner, D. Schock, and J.P. Collins. 2000. Chytridiomycosis in Arizona (USA) tiger salamanders. Page 23 in *Conference and Workshop Compendium: Getting the jump! On amphibian disease*. Cairns, Australia, August 2000.

Mr. Gene Blankenbaker

- Degenhardt, W.G., C.W. Painter, and A.H. Price. 1996. Amphibians and reptiles of New Mexico. University of New Mexico Press, Albuquerque, NM.
- Fleischner, T. L. 1994. Ecological costs of livestock grazing in western North America. *Conservation Biology* 8(3):629-644.
- Frost, D.R., R.W. McDiarmid, and J.R. Mendelson III. 2008. Anura: Frogs. *In*: B. I. Crother (ed.), *Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico*, pp. 24–45. SSAR Herpetological Circular 37. Accessed online from: [http://www.ssarherps.org/pdf/HC\\_37\\_6thEd.pdf](http://www.ssarherps.org/pdf/HC_37_6thEd.pdf).
- Goldberg, C.S., K.J. Field, and M.J. Sredl. 2004. Mitochondrial DNA sequences do not support species status of the Ramsey Canyon leopard frog (*Rana subaquavocalis*). *Journal of Herpetology* 38(3):313-319.
- Gunderson, D.R. 1968. Floodplain use related to stream morphology and fish populations. *Journal of Wildlife Management* 32(3):507-514.
- Hale, S.F. 2001. The status of the Tarahumara frog in Sonora, Mexico based on a re-survey of selected localities, and search for additional populations. Report to the U.S. Fish and Wildlife Service, Phoenix, Arizona.
- Halliday, T.R. 1998. A declining amphibian conundrum. *Nature* 394:418-419.
- Harding, J.H. 1997. *Amphibians and Reptiles of the Great Lakes Region*. The University of Michigan Press, Ann Arbor, MI.
- Hendrickson, D.A., and W.L. Minckley. 1984. Cienegas-vanishing climax communities of the American Southwest. *Desert Plants* 6(3):131-175.
- Jancovich, J.K., E.W. Davidson, J.F. Morado, B.L. Jacobs, and J.P. Collins. 1997. Isolation of a lethal virus from the endangered tiger salamander *Ambystoma tigrinum stebbinsi*. *Diseases of Aquatic Organisms* 31:161-167.
- Jennings, R.D. 1995. Investigations of recently viable leopard frog populations in New Mexico: *Rana chiricahuensis* and *Rana yavapaiensis*. New Mexico Game and Fish Department, Santa Fe, NM.
- Longcore, J.E., A.P. Pessier, and D.K. Nichols. 1999. *Batrachyrium dendrobatidis* gen. Et sp. Nov., a chytrid pathogenic to amphibians. *Mycologia* 91(2):219-227.
- Ohmart, R.D. 1995. Ecological condition of the East Fork of the Gila River and selected tributaries: Gila National Forest, New Mexico. Pages 312-317 *In*: D.W. Shaw and D.M. Finch (tech. coords.). *Desired future conditions for Southwestern riparian ecosystems: bringing interests and concerns together*. USDA Forest Service, General Technical Report RM-GTR-272.

Mr. Gene Blankenbaker

- Painter, C.W. 2000. Status of listed and category herpetofauna. Report to U.S. Fish and Wildlife Service, Albuquerque, NM. Completion report for E-31/1-5.
- Platz, J.E., and T. Grudzien. 1999. The taxonomic status of leopard frogs from the Mogollon Rim country of central Arizona: evidence for recognition of a new species. *Proceedings of Nebraska Academy of Sciences* 109:51.
- Platz, J.E., and J.S. Mecham. 1979. *Rana chiricahuensis*, a new species of leopard frog (*Rana pipiens* Complex) from Arizona. *Copeia* 1979(3):383-390.
- \_\_\_\_\_. 1984. *Rana chiricahuensis*. *Catalogue of American Amphibians and Reptiles* 347.1.
- Rosen, P.C., and C.R. Schwalbe. 1998. Using managed waters for conservation of threatened frogs. Pages 180-202 in *Proceedings of Symposium on Environmental, Economic, and Legal Issues Related to Rangeland Water Developments*. November 13-15, 1997, Tempe, Arizona.
- Rosen, P.C., C.R. Schwalbe, D.A. Parizek, P.A. Holm, and C.H. Lowe. 1994. Introduced aquatic vertebrates in the Chiricahua region: Effects on declining native ranid frogs. Pages 251-261 in L.F. DeBano, G.J. Gottfried, R.H. Hamre, C.B. Edminster, P.F. Ffolliott, and A. Ortega-Rubio (tech. coords.). *Biodiversity and management of the Madrean Archipelago: the sky islands of southwestern United States and Northwestern Mexico*. USDA Forest Service, General Technical Report RM-GTR-264. September 19-23, 1994. Tucson, Arizona.
- Rosen, P.C., C.R. Schwalbe, and S.S. Sartorius. 1996. Decline of the Chiricahua leopard frog in Arizona mediated by introduced species. Report to Heritage program, Arizona Game and Fish Department, Phoenix, AZ. IIPAM Project No. I92052.
- Rosen, P. C., E. J. Wallace, and C. R. Schwalbe. 2001. Resurvey of the Mexican Garter Snake (*Thamnophis eques*) in Southeastern Arizona Pp. 70-94 in P. C. Rosen and C. R. Schwalbe. 2002. Conservation of wetland herpetofauna in southeastern Arizona. Final Report to the Arizona Game and Fish Department (Heritage Grant #I99016) and U.S. Fish and Wildlife Service. 160 pp.
- Schepers, J.S., and D.D. Francis. 1982. Chemical water quality of runoff from grazing land in Nebraska: influence of grazing livestock. *Journal of Environmental Quality* 11(3):351-354.
- Schulz, T. T., and W.C. Leininger. 1990. Differences in riparian vegetation structure between grazed areas and exclosures. *Journal of Range Management* 43(4):295- 299.
- Schuytema, G.S., and A.V. Nebeker. 1999. Comparative toxicity of ammonium and nitrate compounds to Pacific treefrog and African clawed frog tadpoles. *Environmental Toxicology and Chemistry* 18(10):2251-2257.

Mr. Gene Blankenbaker

Smith, L., G. Ruyle, J. Maynard, S. Barker, W. Meyer, D. Stewart, B. Coulloudon, S. Williams, J. Dyess. 2005. Principles of obtaining and interpreting utilization data on Southwest rangelands. University of Arizona Cooperative Extension. Tucson, AZ. 11 pp.

Speare, R., and L. Berger. 2000. Global distribution of chytridiomycosis in amphibians. Accessed online from: <http://www.jcu.edu.au/school/phtm/PHTM/frogs/chyglob.htm>, November 2000.

Sredl, M.J., and D. Caldwell. 2000. Wintertime population surveys-call for volunteers. *Sonoran Herpetologist* 13:1.

Sredl, M.J., and J.M. Howland. 1994. Conservation and management of madrean populations of the Chiricahua leopard frog, *Rana chiricahuensis*. Arizona Game and Fish Department, Nongame Branch, Phoenix, AZ.

Sredl, M.J., J.M. Howland, J.E. Wallace, and L.S. Saylor. 1997. Status and distribution of Arizona's native ranid frogs. Pages 45-101 in M.J. Sredl (ed). Ranid frog conservation and management. Arizona Game and Fish Department, Nongame and Endangered Wildlife Program, Technical Report 121.

Sredl, M.J., and L.S. Saylor. 1998. Conservation and management zones and the role of earthen cattle tanks in conserving Arizona leopard frogs on large landscapes. Pages 211-225 in Proceedings of Symposium on Environmental, Economic, and Legal Issues Related to Rangeland Water Developments. November 13-15, 1997, Tempe, AZ.

Sredl, M.J., and R.D. Jennings. 2005. *Rana chiricahuensis*: Platz and Mecham, 1979, Chiricahua leopard frogs. In: M.J. Lanoo (ed), Status and Conservation of U.S. Amphibians. University of California Press, Berkeley, CA.

Stebbins, R.C. 2003. A field guide to western reptiles and amphibians, Third Edition. Houghton Mifflin Company, Boston, MA.

Stebbins, R.C., and N.W. Cohen. 1995. A Natural History of Amphibians. Princeton University Press, Princeton, New Jersey. 316 pp.

Szaro, R. C., S. C. Belfit, J. K. Aitkin, and J. N. Rinne. 1985. Impact of grazing on a riparian garter snake. In: Riparian ecosystems and their management: Reconciling conflicting uses. First American Riparian conference, April 16-18, 1985, Tucson, Arizona, USDA Forest Service General Tech. Report RM-120.

U.S. Fish and Wildlife Service (USFWS). 2002a. Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon. viii plus 173 pp.

\_\_\_\_\_. 2002b. Endangered and threatened wildlife and plants; listing of the Chiricahua leopard frog (*Rana chiricahuensis*); final rule. Federal Register 67(114):40790-40811.

Mr. Gene Blankenbaker

\_\_\_\_\_. 2005. Programmatic biological and conference opinion on the continued implementation of the land and resource implementation plans for the eleven national forests and national grasslands of the Southwest Region. 830 pp. plus Appendices A-D.

\_\_\_\_\_. 2007. Chiricahua Leopard Frog (*Rana chiricahuensis*) Recovery Plan. U. S. Fish and Wildlife Service, Southwest Region, Albuquerque, NM. 149 pp. plus Appendices A-M.

U.S. Forest Service (USFS). 2005. Rangeland management decisionmaking. Chapter 90 *in*: Forest Service Handbook (FSH) 2209.13, Grazing permit administration handbook. Accessed online from: [http://www.fs.fed.us/cgi-bin/Directives/get\\_dirs/fsh?2209.13!](http://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?2209.13!).

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**Figure 1.** Map of the Crouch Mesa Allotment on the Tonto National Forest in the Pleasant Valley Ranger District, near the town of Young, Arizona. The four pastures of the Crouch Mesa Allotment are outlined in red. The Pine Spring Wildlife Area, east of the Brewer Pasture, is outlined in green. Shaded areas represent non-Federal lands. Map courtesy of the Tonto National Forest.

