

## United States Department of the Interior

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AESO/SE  
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April 20, 2001

Mr. John McGee, Forest Supervisor  
Coronado National Forest  
300 West Congress  
Tucson, Arizona 85701

Dear Mr. McGee:

This biological opinion responds to your request for initiation of formal consultation with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended. Your request was dated November 16, 2000, and received by the Service on November 20, 2000. At issue are impacts resulting from the proposed Baker prescribed fire in the Peloncillo Mountains on the Coronado National Forest that are likely to adversely affect the threatened New Mexico ridgenose rattlesnake (*Crotalus willardi obscurus*). Critical habitat has been designated for the rattlesnake in the Animas Mountains, to the east of the project area in Hidalgo County, New Mexico.

The Forest's request for initiation of consultation also found that the proposed prescribed fire may affect, but is not likely to adversely affect the endangered jaguar (*Panthera onca*), endangered Lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*), endangered Mexican long-nosed bat (*Leptonycteris nivalis*), threatened Mexican spotted owl (*Strix occidentalis lucida*), and the endangered Northern aplomado falcon (*Falco femoralis septentrionalis*). Our concurrences are provided in Appendix A.

This biological opinion was prepared using information from the following sources: the November 16, 2000, request for initiation of consultation (Coronado National Forest 2000), the biological assessment (BA) (Helbing 2000), follow-up letters addressing the proposed action, information in our files, and coordination among our staffs and other knowledgeable individuals; including field and office meetings. Literature cited in this biological opinion is not a complete bibliography of all literature available on the New Mexico ridgenose rattlesnake and the effects of prescribed fire, or other subjects addressed herein. A complete administrative record of this consultation is on file in this office.

### CONSULTATION HISTORY

On October 24, 2000, staff from the Forest presented the proposed action for the Peloncillo fire programmatic to the Service. This plan addressed both natural and prescribed ignitions for the entire Peloncillo mountain range for a ten year period of time. The Service expressed concerns over many issues, including the effects to the New Mexico ridgenose rattlesnake (NMRR) and its habitat.

A subsequent meeting occurred November 1, 2000. The purpose was to discuss in detail, the Service's concern with the proposed action.

This meeting resulted in the Forest's November 16, 2000, request for initiation of formal consultation which included modifications and clarifications of the proposed action.

The November 1, 2000, meeting also included a discussion of convening the NMRR advisory team to review the proposed action. The meeting was scheduled for February 13, 2001. That meeting resulted in further modifications to the proposed action that were sent to the Service in a letter dated March 12, 2001.

Further discussions between our staff indicated that there were still significant concerns regarding the effects to NMRRs and their habitat. On March 12, 2001, the Service met with the Forest to discuss how to proceed with formal consultation. It was agreed that the Forest would withdraw the proposed action for the Peloncillo programmatic fire plan and reduce the scope of the proposed action to one prescribed burn to be conducted in the near future, the Baker Canyon burn. This was documented in a letter from the Forest dated April 5, 2001.

In anticipation of the withdrawal of the Peloncillo programmatic fire plan, the Service requested an extension on March 22, 2001, to complete the formal consultation on the Baker burn. The Service has agreed to use the information provided in the November 2000, BA, all of the preceding correspondence and the results of a field visit conducted on April 10, 2001. The Forest agreed to conduct pre- and post-burn monitoring of snake habitat, concentrating on measurements of canopy cover. This work will be done in conjunction with NMRR experts. The Forest also agreed to visit areas delineated as high quality snake habitat (i.e. the blue areas on the NMRR habitat map, Holycross 1999) that experienced fire in the Maverick prescribed burn to determine its current status as snake habitat (R. Kvale, USFS, pers. comm). All of the information gathered before and after the Baker burn will be used to update the analysis for the Peloncillo programmatic. Formal consultation for that project will be initiated in the fall of 2001.

## **BIOLOGICAL OPINION**

### **DESCRIPTION OF PROPOSED ACTION**

The Coronado National Forest proposes the Baker prescribed burn, a prescribed fire on approximately 7,573 ha (18,700 acres) in the Baker Canyon and Guadalupe Canyon areas of the Peloncillo Mountains, Cochise County, Arizona, and Hidalgo County, New Mexico (Figure 1). A secondary fire line is identified on Figure 1 that indicates a backup line in case the fire escapes the primary line. Approximately 10,854 ha (26,800 acres) are included within the secondary fire line. The Forest has a target of 1,215 ha (3,000 acres) burned within the primary boundary (G. Helbing, USFS, pers. comm). The prescribed fire is part of an ecosystem/forest health initiative that the Forest is implementing within the Peloncillo Mountains in conjunction with the Malpai Borderlands Group (a coalition of local, private land owners), Natural Resources Conservation Service, and a number of other agencies and parties. The proposed action is part of a larger action known as the Peloncillo Fire Programmatic Plan, which will be revisited by the Service and Forest in the fall of 2001. All details pertaining to this specific prescribed burn are drawn from the Forest's November 2000, BA and are included here by reference.

The objectives of the prescribed fire are to: 1) create a mosaic of burned and unburned fuels within the range of allowable fire intensity thresholds (see Table 1); 2) within shrub invaded grasslands, kill 60-70 percent of the half shrubs; 3) within shrub invaded grasslands, top kill 25-40 percent of mesquites less than 10.2 cm (4 inches) in diameter; 4) within shrub invaded, coniferous or broadleaf woodlands, top kill 25-40 percent of mesquites less than 10.2 cm in diameter; 5) within shrub invaded, coniferous or broadleaf woodlands, top kill 40-50 percent of junipers less than 15.4 cm (6 inches) in diameter; and within pine, oak or pine-oak canyons reduce the 1-hour-time-lag fuels by 30-80 percent, the 10-hour-lag-fuels by 10-40 percent, the 100-hour-time-lag fuels by 1-10 percent and the 1,000-hour-time-lag fuels by 1-20 percent (see definitions in November 2000, BA).



The entire Peloncillo mountain range has been broken into eight Fire Management Areas (FMA) based on vegetation, fuel loading, and TES wildlife habitat considerations. The Baker fire is composed of FMAs VIII, VII, and the lower portion of VI. The fire is scheduled for May-June, 2001 or the following year. According to the BA, ignitions which occur from April 16 to July 14, will be considered summer season ignitions. Refer to Table 1 for the maximum thresholds associated with expected fire intensities for each FMA. For instance, in FMA VIII, a maximum of 75 percent of the area could burn at low intensity (ground fires), a maximum of 50 percent of the area could burn at moderate intensity (fire may reach into the canopy, but will not kill all trees in the area), and a maximum of 10 percent of the area could burn at high intensity (stand-replacing fires).

**TABLE 1**

Fire Management Area (FMA)	Low Fire Intensity (% Area)	Moderate Fire Intensity (% Area)	High Fire Intensity (% Area)
V	70	50	10
VI	90	60	20
VII	75	50	10
VIII	75	50	10

For Summer Season ignitions the following fire prescription parameters would apply:

**TABLE 2**

Vegetation Type	Relative Humidity	Wind Speed	Ambient Temperature	Intensity
Pine/oak canyon bottoms	25-50	5-15	60-85	moderate
Riparian	30-60	5-20	60-80	moderate
Woodland	20-40	3-30	65-90	moderate
Grassland	10-40	3-30	65-95	high

Using the information in Table 1 and 2, the Forest has established the maximum number of acres that would burn in low, moderate and high intensity for each FMA. If burning conditions change, either from weather, or changes in topography and fuels as the fire moves, such that the risk of high-intensity crown fire in sensitive habitat, such as NMRR habitat or riparian areas, increases to an unacceptable level, then a decision will be made to control or suppress the fire. The fire will be monitored to determine if suppression is necessary.

### **Proposed Minimization Measures**

The following measures are included as part of the original project description (Coronado National Forest 2000) or were agreed to by the Forest to be included as part of the project description at subsequent meetings. These measures are intended to minimize effects to all threatened and endangered species in the proposed project area.

1. Avoid high intensity crown fire on potential habitat for listed species, especially the NMRR.
2. In conducting prescribed fires, the Forest will utilize the NMRR potential habitat map developed by Holycross (1999) to provide information on areas of concern and special need.
3. All personnel on the fire will be informed and educated about the listed endangered, threatened and sensitive species present and the importance of protecting habitat and minimizing take.
4. A resource advisor will be designated to coordinate sensitive species and other resource concerns.
5. Off-road vehicle activity shall be kept to a minimum by parking on or near existing roads.
6. Crew camps and equipment staging areas will be located outside the habitats of listed species.
7. Use of dozers in habitats of listed species will be limited to improving roads or constructing short distances of line to minimize fires spread.
8. Fire lines constructed by hand crews and heavy equipment will be rehabilitated by water-barring and out-sloping.
9. NMRR habitat considerations will be incorporated into this prescribed burn, especially as it relates to the timing and pattern of firing that may impact snake habitat. Ignition techniques such as backing fires downslope, strip firing patterns, and evening ignitions are some of the methods that will be utilized to attain low intensity burning. Potential NMRR habitat is defined as those areas colored as blue on the NMRR Potential Habitat Map created by Holycross.
10. NMRR potential habitat mapped as yellow on the Holycross map that correspond with mapped riparian areas will be treated with reduced fire intensity.
11. Two growing seasons rest from livestock grazing will be provided where appropriate. Appropriate circumstances are defined as a fire event which burns a significant portion of a pasture or allotment. The Forest will work with permittees to develop alternatives that consider accommodating livestock grazing permittees and yet allow for adequate rest for vegetation recovery. Dormant season livestock grazing use will be allowed as appropriate.

12. Weather monitoring data will be collected within snake habitat areas to evaluate the likely fire effects within those sites prior to and during ignition phases of prescribed burning. These sites should be placed to evaluate conditions at sites with the most significant risks (fuel loading) and/or most important snake habitats (especially historic sites). Weather monitoring will occur on all sites to evaluate general burning conditions and potential fire effects.

13. Annual fire monitoring of the effects on snake habitat will be conducted by the Forest and will allow for the participation and review of members of the snake advisory team. The fire effects monitoring will consist of a map of fire perimeter, fire intensity (low, moderate, and high intensity), and canopy cover in selected blue and yellow NMRR habitat patches before and after the fire.

14. Due to the high activity of NMRR late into the month of October, the application of prescribed fire in NMRR habitat will not take place from July 15-October 31.

15. During fire management actions, the Forest will avoid withdrawing water from tanks known to be occupied by Chiricahua leopard frogs, and if such withdrawals are made, those tanks will not be refilled using water from tanks known to be occupied by aquatic predators such as bass, catfish and bullfrogs.

16. An unburned buffer of 100 m ( 328 feet) will be left around tanks known to be occupied by Chiricahua leopard frogs.

17. Prescribed fire ignitions will not be permitted within 0.42 km (0.25 mile) of known perennial wetland habitat.

18. During ignition of fire in the vicinity of Cowboy Flats, located near a known roost for lesser long-nosed bat, ignition will be done in such a way to minimize potential for smoke effects to the bat roost site.

19. Integrity of riparian areas and canyon bottoms will be maintained via cool season or low intensity fire.

20. Within broadleaf woodland communities, fire intensities will be maintained at such a level where agave mortality does not exceed 20%.

## **ANALYSES BY SPECIES:**

### **STATUS OF THE SPECIES**

#### **New Mexico Ridgenose Rattlesnake**

The NMRR is a small [maximum of 66 cm (2.19 ft) total length] montane species known only from the Animas Mountains, Hidalgo County, New Mexico; Peloncillo Mountains, Hidalgo County, and Cochise County, Arizona; and the Sierra San Luis, Sonora and Chihuahua, Mexico (Campbell et al. 1989, Painter 1995, Degenhardt *et al.* 1996, Keegan *et al.* 1999). *Crotalus willardi obscurus* is one of five subspecies of the ridgenose rattlesnake found from montane areas of southeastern Arizona and southwestern New Mexico, south through the Sierra Madre to Zacatecas, Mexico. The first specimen of *C. w. obscurus* was collected by ornithologist Joe Marshall in the Sierra San Luis in 1952 (Greene 1997, Marshall 1957). The first collection from

the Animas Mountains was in 1957 (Bogert and Degenhardt 1961). *C. w. obscurus* was first discovered in the Peloncillo Mountains in the form of an apparent hybrid *Crotalus willardi* X *lepidus* collected in 1987 (Campbell *et al.* 1989). The subspecies was first documented in the Arizona portion of the Peloncillo Mountains on October 24, 1996. *C. w. obscurus* may also occur in the Sierra Pulpita in Chihuahua (Barker 1991). Early collections were referred to as *C. w. silus*. Harris (1974) first used the name *C. w. obscurus* for specimens collected from the Animas Mountains. *C. w. obscurus* is closely related to *C. w. silus*, but the two can be distinguished based on a variety of scalation and coloration traits; the two are also distinct biochemically (Harris and Simmons 1976, Barker 1992).

*Crotalus willardi obscurus* is an inhabitant of insular woodlands that were more widespread and continuous during Pleistocene glaciation events (Maldonado-Koerdell 1964, Barker 1992, Van Devender 1995). A Pleistocene fossil *Crotalus willardi* from the San Pedro River Valley (Mead 1975) suggests ridgenose rattlesnakes tracked the distribution of the woodlands. When climates warmed and became drier, the ranges of this and other montane woodland reptiles, such as *Elgaria kingii*, *Eumeces callicephalus*, *Phrynosoma douglasii*, presumably contracted with that of the woodland communities and are now isolated on mountain tops in the Madrean region. Isolation and subsequent evolution have contributed to subspecific differences within *Crotalus willardi* (Barker 1992).

*Crotalus willardi obscurus* has been found in steep, rocky canyons with intermittent streams or on talus slopes at elevations ranging from approximately 1,576 to 2,576 m (5,200-8,500 ft) (Campbell *et al.* 1989, Barker 1991, Painter 1995, Degenhardt *et al.* 1996, A. Holycross, Arizona State University, pers. comm., 1997), and likely occurs as low as 1,525 m (5,000 ft) in the Peloncillo Mountains (Holycross 1999a). The subspecies is found primarily in areas of Madrean evergreen woodland and Petran montane coniferous forest (Brown 1982, Pase and Brown 1982). Dominant vegetation characterizing the habitat of this subspecies includes several species of oak (*Quercus* spp.), Douglas fir (*Pseudotsuga menziesii*), Apache pine (*Pinus engelmannii*), Chihuahua pine (*P. leiophylla* var. *chihuahuana*), Arizona madrone (*Arbutus arizonica*), manzanita (*Arctostaphylos pungens*), and grasses (Degenhardt 1972, Barker 1991, Degenhardt *et al.* 1996, Holycross 1999a). Access to rock shelters with moderate interstitial spaces is probably a key habitat component (Barker 1991); however, the subspecies also uses perennial bunch grasses for cover (Painter 1995). NMRRs apparently move less frequently, move relatively short distances, and show high fidelity to specific rock shelter sites as compared to other rattlesnake species (Barker 1991, Holycross 1995a and 1995b).

Holycross (1999b) prepared a map of *C. w. obscurus* habitat in the Peloncillo Mountains. Habitats were mapped as: 1) habitats 3 and 4 (probably or likely supports a deme of *C. w. obscurus*, 2) habitats 1 and 2 (very unlikely or unlikely that *C. w. obscurus* occurs there, 3) habitats identified as possible habitat, but which were not evaluated in the field, and 4) habitats identified as possible habitat but which burned destructively in the Maverick Prescribed Fire and no longer contain habitat characteristics. Habitats 3 and 4 were found in canyons and woodland patches from Skeleton Canyon on the north to the headwaters of Baker Canyon, near Little Bunk Robinson Spring, on the south. Few habitats rated as 1 and 2 were noted; these were limited to four patches between Geronimo Trail and Skeleton Canyon. Eighteen patches were identified that burned in the Maverick prescribed fire, including numerous woodland patches within a mile of Geronimo Trail, an area about a mile east of Cedar Spring, and woodland patches near Bunk Robinson Peak. Patches identified as possible habitat, but which were not evaluated in the field were mostly at lower elevation south and east of Bunk Robinson Peak and east and west of the higher elevation areas of the Peloncillos between Skeleton Canyon and Bunk Robinson Peak.

In the recovery plan for the species (US Fish and Wildlife Service 1985), 250-500 adult snakes were estimated to inhabit the Animas Mountains. However, based on eight years of mark and recapture data in West Fork Canyon, Animas Mountains, Holycross (1999a) suggests this is an underestimate. Encounter rates by experienced herpetologists suggest the densest populations may occur in the portions of the Sierra San Luis, with comparatively moderate and low densities in the Animas and Peloncillo mountains, respectively (Holycross 1998). However, densities probably vary greatly within mountain ranges, and encounter rates may not be indicative of population densities.

Young snakes are live born probably in late June through August (Holycross 1995b, Painter 1995). Mean litter size for 12 broods was 5.5 (Applegarth 1980). Fecal samples from 246 NMRRs and a literature record identified 95 identifiable prey. Juvenile snakes fed primarily on spiny lizards (*Sceloporus* sp.) and centipedes (*Scolopendra* spp.); adults preyed mostly on small mammals, spiny lizards, and passerine birds (Holycross *et al.* in prep.). Based on more limited samples, other workers have come to similar conclusions regarding the diet of *C. w. obscurus* (Applegarth 1980, Barker 1991).

The NMRR was listed as a threatened species by the Service in an August 4, 1978, Federal Register notice (43 FR 34479). Critical habitat was also designated in Bear, Spring, and Indian canyons of the Animas Mountains from 1,833 to 2,521 m (6,048-8,320 ft) elevation. At the time of listing the subspecies was not known to occur in the Peloncillo Mountains. The subspecies occurs in three (or more), small disjunct populations. As a result, its viability is sensitive to habitat destruction or modification, and collection. After publication of the Animas locality in 1961 (Bogert and Degenhardt 1961), the area was reportedly heavily collected. Harris and Simmons (1976) reported encountering 15 collectors from six states during August 1974 in the Animas Mountains. The US Fish and Wildlife Service (1985) estimated that as many as 130 NMRRs may have been collected in the Animas Mountains between 1961 and 1974. Collection during this period may have significantly affected the Animas population (Harris and Simmons 1976, US Fish and Wildlife Service 1985).

The Animas Mountains are privately owned, access to habitat areas is now strictly controlled, and the *C. w. obscurus* population there is now protected from collection. However, most of the habitat of the ridgenose rattlesnake in the Peloncillo Mountains is managed by the Coronado National Forest and the Bureau of Land Management, and is open to public use; thus providing more of an opportunity for illegal collecting.

Fire is a serious threat to the subspecies and its woodland habitat (Smith *et al.* 2001, Barker 1991). Catastrophic, stand-replacing fire occurred in the snake's habitat in the Animas Mountains in 1989 (Swetnam and Baisan 1996) and in the Sierra San Luis in 1989 (Barker 1991) and before 1952 (Marshall 1957). The 1997 Maverick prescribed fire in the Peloncillo Mountains destroyed woodlands at two of the 12 areas where *C. w. obscurus* had been observed in that mountain range. Overgrazing can adversely affect the subspecies (US Fish and Wildlife Service 1985), and mining, development, and logging are potential threats (US Fish and Wildlife Service 1985). Jim Jarchow (pers. comm. in Johnson [1983]) found that *C. w. willardi* suffers from a variety of diseases and pathogenic organisms; however, there is no evidence that ridgenose rattlesnake populations are threatened by disease (US Fish and Wildlife Service 1985).

Further information on the taxonomy, range, distribution, biology, and threats to the NMRR can be found in Applegarth (1980), Barker (1992, 1991), Campbell *et al.* (1989), Degenhardt (1972), Degenhardt *et al.* (1996), Johnson (1983), Painter (1995), Holycross (2000, 1999a, 1998, 1996, 1995a & b), Holycross and Douglas (1997), Holycross 2000, and Smith *et al.* 2001.

## ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, and the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation. It also includes 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 under consultation.

Within the project area (defined as the primary and secondary boundaries of the prescribed fire), the NMRR occurs at elevations above 5,000 feet primarily in canyons and mature woodlands in the Peloncillo Mountains in extreme southeastern Cochise County and southwestern Hidalgo County (Holycross 1999a). Holycross believes (pers. comm.) that at lower elevations the species probably occurs primarily in the bottoms of steep, heavily-wooded canyons. At higher elevations the species is found in woodlands, open woodlands, and chaparral on exposed slopes and plateaus. However, mature woodlands are apparently the essential core habitats for *C. w. obscurus* (Holycross 1999a). There are eight patches of high quality (blue areas) NMRR habitat within the primary burn zone and an additional 3 in the secondary zone. The majority of the blue areas lie to the north of the project area. An approximate analysis would be that 94% of high quality habitat lies outside of the proposed project area. There are numerous patches of habitat delineated as possible high quality habitat within the action area (approximately 20 patches). Holycross (pers. comm) indicated that approximately 50% of the areas mapped as yellow could be high quality habitat once it had been analyzed in the field.

The Peloncillo Mountains are relatively dry and low compared to the Chiricahua Mountains to the west and the Animas Mountains to the east. Hilly and mountainous terrain dissected by a few drainages characterize the area; only a portion of one major drainage is included within the primary zone, Sycamore. Cottonwood Canyon and Cloverdale Creek are included within the secondary (contingency) zone. The vegetation of the lower slopes is characterized by shrubs and grasses, with velvet mesquite (*Prosopis velutina*), juniper (*Juniperus* spp.), whitethorn acacia (*Acacia constricta*), and various perennial grasses predominating. In the higher elevations, pinyon pine (*Pinus edulis*), Apache pine, Chihuahua pine, and oaks are more abundant. Riparian vegetation is found in Sycamore, Cottonwood Canyon, Cloverdale Creek, and at several other sites, and includes Arizona ash (*Fraxinus velutina*), Arizona sycamore (*Platanus racemosa* var. *wrightii*), cottonwood (*Populus fremontii*), mesquite, and netleaf hackberry (*Celtis reticulata*).

A total of 25 ridgenose rattlesnakes and the one hybrid snake have been found in the Peloncillo Mountains in 12 general areas from upper Miller Canyon on the south to South Skeleton Canyon on the north (Holycross 1999a). Three of the 25 localities are in Arizona, all from South Skeleton Canyon. There are no known NMRR locations in the project area.

Areas in which ridgenose rattlesnakes have been found in the Peloncillo Mountains are characteristically more arid, lower, and less vegetated than typical habitats in the Animas Mountains of New Mexico. The snakes are often found on talus slopes in the Animas Mountains, but talus is apparently absent from the Peloncillo Mountains. The species is also much more difficult to find in the Peloncillo Mountains. An average of 33 person-days is needed to find one ridgenose rattlesnake in the Peloncillo Mountains. In the Animas Mountains the encounter rate is about one snake per four person-days of search time (Holycross, pers. comm., 1998.)

A listing of threats to the NMRR that contribute to its status as a threatened species is found in the section "Status of the Species" above and in US Fish and Wildlife Service (1985). Activities

that may affect the rattlesnake in the Peloncillo Mountains include prescribed fire, wildfire, poaching, cattle grazing, commercial beargrass (*Nolina microcarpa*) harvesting, and low to moderate levels of recreational activities such as birding, driving on or off roads, backpacking, camping, hunting, and nature study. The Peloncillo Mountains are much more accessible than the Animas or San Luis ranges, which makes illegal collection and other human activities potentially more important threats than elsewhere in the range of the snake. Also, the likely small size and possible disjunct nature of snake populations in the Peloncillo Mountains make these populations especially vulnerable to habitat degradation and collection.

A long history of cattle grazing coupled with active fire suppression, changing climate, and possibly other factors have favored a decline in fire frequency and subsequent conversion of grasslands to shrub lands in much of the Southwest (Bahre 1995, McPherson 1995, Van Devender 1995, Villanueva-Diaz and McPherson 1996, Curtin and Brown undated). Data are lacking to quantify recent patterns of vegetation community change in the Peloncillo Mountains, but anecdotal accounts suggest some areas, such as Cottonwood Basin, once supported more open communities, and fire, which probably was a regular occurrence in the range, is now a rare event. As a result, woody fuel loads have built up in the woodland habitats of the snake. These fuels, if ignited, could cause a crown fire and loss of woodland habitat. The 1997 Maverick prescribed fire burned 2,800 to 3,200 ha (7,000-8,000 ac) from approximately Sycamore Canyon on the south to just north of Geronimo Trail. Eighteen woodland patches thought to be habitat of *C. w. obscurus* were consumed by stand-replacing fire, including two of the twelve general areas in which the species has been found in the Peloncillo Mountains. These two sites, Cottonwood and Whitmire canyons, had not burned recently and exhibited fuels buildup. As fire entered these areas, it became intense and stand-replacing. Miller Canyon, a site where several *C. w. obscurus* have been found, has burned at least once (1994) at low intensity in the 10 years prior to the Maverick fire, and during the Maverick fire, low intensity fire swept through the canyon removing ground fuels but not the woodland component. Of the nine snakes that were marked and followed before and after the fire, eight survived the Maverick fire. One snake (not a NMRR) died in an area exposed to high intensity fire. The other snakes were exposed to low intensity ground fire and survived, including three NMRRs. It can be inferred from this study that since the ridgenose rattlesnake is a woodland species, hot fires that destroy woodlands are a serious threat to the ridgenose rattlesnake (Smith *et al.* 2001). However, the species historically existed in fire-adapted montane community types that experienced frequent low-intensity fire. The species also must have coexisted with infrequent stand-replacing fires, which occurred in the Madrean sky islands on occasion (Swetnam and Baisan 1996). Most fires occurred historically between late April and late June (Danzer *et al.* 1997, Swetnam and Baisan 1996).

Although other factors likely played some role in the elimination of frequent ground fires, most authors agree that livestock grazing was probably the most important, at least before effective fire suppression began in the 1930's (Bahre 1991, 1995, Swetnam and Baisan 1996, Danzer *et al.* 1997). Livestock grazing removes herbaceous fine fuels that normally carry fire. Without fire, ladder fuels and woody material build up in woodlands, promoting stand-replacing fire. The effects of livestock grazing on fire spread in the Peloncillo Mountains could be seen after the Maverick prescribed fire. The fire burned through Cottonwood Basin on the Geronimo allotment but stopped at the boundary of the Maverick allotment, because grazing had removed enough of the grasses and other fine fuels to halt the fire. Fire suppression efforts have been few in the Peloncillo Mountains; thus livestock grazing may be the most important factor in apparent altered fire regimes in this mountain range.

Prior to this opinion, the Service had issued four biological opinions on the NMRR. On May 3, 1997, the Service issued a biological opinion to the Coronado National Forest for the proposed Maverick prescribed fire. On September 26, 1997, a biological opinion was issued to the Bureau

of Land Management on the Safford and Tucson Field Offices' grazing program. A biological opinion dated December 19, 1997, was issued to the Southwest Region of the Forest Service on the land and resource management plans for eleven national forests and grasslands. On July 29, 1999, the Service issued a biological opinion to the Coronado National Forest on its grazing program, including 12 allotments in the Peloncillo Mountains. The Service determined in each of these four cases that the proposed action was not likely to jeopardize the continued existence of the rattlesnake or result in destruction or adverse modification of critical habitat.

### **Effects of the Action**

Absence of fire in Madrean regions over the last 100 or more years has resulted in an accumulation of woody fuels. Forest structure in many of the Madrean ranges in Arizona now favors the occurrence of infrequent high-intensity, stand-replacing fires, in contrast to the frequent low-intensity ground fires that characterized these communities historically (Grissino-Mayer *et al.* 1994, Danzer *et al.* 1997, Swetnam and Baisan 1996). Reintroduction of fire is an option for restoring natural fire regimes that, in the long term, will enhance ecosystem stability and resilience, and protect mature trees from catastrophic fire. However, the benefits of reintroducing fire must be weighed against the chance of prescribed fire escaping or burning out of prescription, and possibly destroying the woodlands that a fire management program aims to protect (Zwolinsky 1996). Kaib *et al.* (1996) recommended that before natural fire conditions can be restored, various fuel management options should be implemented to break the forest homogeneity, reduce catastrophic fire risk, and ultimately to restore montane systems to a more productive and sustainable state.

Although low-intensity surface fires were frequent in the sky islands, occasional high-intensity, sometimes stand-replacing fires occurred, as well. For instance a large stand-replacing fire occurred in the Pinaleno Mountains in 1685 (Grissino-Mayer *et al.* 1994). The Animas Mountains has experienced a mixed fire history, with more frequent high intensity fires than most sky island mountain ranges. In the Animas Mountains, surface fires occurred at about a 3 to 15 year interval and higher intensity fires, including some stand-replacing fires, occurred at about 20 to 50 year intervals. High intensity fire occurred in the Animas Mountains in 1753, 1805, 1825, 1857, 1879, 1879, and 1989. Some of the historic fires appeared to be on the order of about 500-1,230 acres in size. The 1989 fire was large; it burned more than 25,000 acres before suppression activities began (Swetnam and Baisan 1996). Swetnam and Baisan (1996) hypothesize that widespread, high-intensity fire occurred after fuel connectivity between woodland stands built up to threshold levels and that such fires typically occurred during moderate to severe drought periods. The 110-year hiatus in the occurrence of widespread fire from 1879 to 1989 was probably due to the combination of livestock grazing slowing fuels buildup and some (although limited) fire suppression efforts. *C. w. obscurus* has persisted in this mountain range despite the relatively high frequency of high intensity fire. One of Holycross' and Painter's study sites in the Animas Mountains (West Fork) is a relatively open site in which a stand-replacing fire occurred recently (probably in 1989).

Smith *et al.* (2001) reviewed fire effects in regard to reptiles. These effects can be complex, and may be beneficial, detrimental, or benign, including direct mortality of individuals, and either improvement or degradation of habitat. Effects are often dependent on fire frequency and intensity. Direct effects to individual snakes are likely during fire. For instance, Jeff Howland (US Fish and Wildlife Service, Alamo, TX, pers. comm.) found a dead western diamondback rattlesnake that was apparently killed by a wildfire in the McDowell Mountains near Phoenix. Todd Esque (USGS, Biological Resources Division, St. George, Utah, pers. comm.) reported finding a gopher snake (*Pituophis melanoleucus*) killed in a wildfire on Pusch Ridge, Santa Catalina Mountains, Pima County, and a tiger rattlesnake (*Crotalus tigris*) killed in the Rock

Peak fire in the San Tan Mountains, Pinal County, Arizona. Mortality of snakes also occurred during a fire in Arizona chaparral (Simons 1989) and tall grass prairie in Nebraska (Erwin and Stasiak 1979). Barker (1991) observed a *C. w. obscurus* with minor burn marks on its dorsum after the 1989 fire in the Sierra San Luis. *C. w. obscurus* could be similarly killed or injured by burning or overheating during a prescribed fire in the Peloncillo Mountains.

Smith *et al.* (2001) examined direct effects to rattlesnakes during the Maverick prescribed fire in 1997. Three ridgenose rattlesnakes, one black-tailed rattlesnake (*Crotalus molossus*), and five rock rattlesnakes (*Crotalus lepidus*) were radio-telemetered and located before and after the fire. Fire passed directly over eight of the snakes and within 10 feet of the ninth. None were injured or killed with the exception of one rock rattlesnake (*Crotalus lepidus*), an apparent victim of the fire. The eight snakes that survived were exposed to low-intensity fire and heat, while the snake that died was in an area that burned very hot. A Sonoran whipsnake (*Masticophis bilineatus*) was also found dead, a possible victim of the fire (Smith *et al.* 2001).

Barker (1991) described an intense, stand-replacing wildfire in June-July 1989 in *C. w. obscurus* habitat in Study Canyon and its tributaries in the Sierra San Luis that incinerated woodlands and was hot enough to break rocks apart. Three *C. w. obscurus* were telemetered before the fire. One individual was not relocated after the fire. A second was found unharmed shortly after the fire (July 25), but was not found on a subsequent visit. The third telemetered snake was in Hibbitts Canyon that burned especially intense. The snake was found after the fire on July 25, but not on a subsequent visit in September. As noted above, another snake found in Hibbitts Canyon after the fire had minor burns on its dorsum. Barker (1991) reported that the fire was extremely hot and intense, possibly of a similar intensity to the escaped Maverick Prescribed Fire in Whitmire Canyon. Almost all vegetation was consumed, rock piles were broken apart or covered with silt deposited from eroding hillsides, and boulders were split open from the intense heat. The encounter rate of ridgenose rattlesnakes decreased after the fire, a routinely monitored snake equipped with a transmitter vanished after the fire, and one of six individuals captured after the fire exhibited burns on its dorsum. However, at least two telemetered ridgenose rattlesnakes survived the fire, including one in an area that apparently burned especially hot. Barker (1991) suggested snakes that survived the fire may have been more subject to predation as a result of reduced cover. In a burned area he observed a zone-tailed hawk (*Buteo albonotatus*) flying with a small snake in its talons that may have been a ridgenose rattlesnake.

*C. w. obscurus* are probably most likely to be directly affected if they are active on the surface or in a shelter of flammable materials during the fire. Retreats in rock piles and talus slopes probably protect snakes to some degree; however, intense fire may still result in mortality, as witnessed with the rock rattlesnake in the Maverick fire, which was found dead in a rock shelter (Smith *et al.* 2001). A woody debris pile in Miller Canyon has yielded three records of *C. w. obscurus* in the Peloncillo Mountains. This debris pile burned in the Maverick fire; any snakes using that debris pile probably perished. *C. w. obscurus* will also occasionally use large bunch grasses, such as mountain muhly (*Muhlenbergia montana*), and leaf litter for cover (Holycross 1996). Snakes in these cover types would be susceptible to injury or mortality due to fire. Snakes are less likely to be affected during periods of inactivity, when they are more likely to be in rock shelters protected from intense fire. *C. w. obscurus* is relatively inactive from the end of November to the beginning of the monsoon season in late June or July (Holycross 1996).

*C. w. obscurus* may also be affected by fire indirectly through habitat degradation. As discussed in the Environmental Baseline, the Maverick fire destroyed woodland habitat where *C. w. obscurus* had been observed in Cottonwood and Whitmire canyons and in 16 other woodland patches thought to be habitat of the snake (Smith *et al.* 2001). In contrast, fire was low- intensity

in Miller Canyon, a *C. w. obscurus* locality that had burned in the recent past. After the 1989 Sierra San Luis fire, Barker (1991) observed severe erosion that included incisement of canyon bottoms and covering of rock outcrops used by snakes with sediment. Two new specimens of *C. w. obscurus* captured in July in Hibbitts Canyon after the fire retreated to tunnels at the base of boulders after release. In September 1989 the boulders were buried in three feet of sand, mud and rock that had eroded from nearby slopes. The prey base of the rattlesnake would also likely be affected by fire. Small mammal densities and diversities are typically depressed for 1 to 3 years after a fire (Wright and Bailey 1982).

Marshall (1957) collected a *C. w. obscurus* in “Turkey” or Diablo Canyon of the Sierra San Luis (Barker 1991) in 1952, and described the canyon at that time as dominated by brush that had apparently colonized the canyon after a stand-replacing wildfire. When Barker visited the site in 1986, he described Diablo Canyon as “a large deep drainage with a broad flat bottom densely forested with mixed-coniferous forest dominated by large Arizona cypress, typical of riparian upper encinal.” Despite more than 80 person days of effort, Barker and his colleagues were unable to locate any *C. w. obscurus* in Diablo Canyon. The vegetation community apparently had recovered between 1952 and 1986; however, based on Barker’s collection effort, *C. w. obscurus* was likely scarce, if not absent, in Diablo Canyon. Due to this inability to find *C. w. obscurus* in Diablo Canyon, Barker moved his research location to nearby Study Canyon where *C. w. obscurus* encounter rates were much greater. Barker (1991) found that snakes were generally absent from rock piles in which interstitial spaces were filled with sediment. He noted that all potential rock piles examined in Diablo Canyon contained sediment. Whether or not a canyon has rock piles capable of supporting *C. w. obscurus* may depend in part, according to Barker (1991), on the length of time since the last fire and the erosion that took place at that time. This anecdotal construct of events by no means constitutes firm evidence that stand-replacing fire causes long-term changes in *C. w. obscurus* habitat and populations. However, together with the information collected by Smith *et al.* (2001) and Barker (1991), it suggests caution is warranted in the application of fire across landscapes inhabited by this subspecies.

In the short term, livestock grazing can protect the woodland habitats of the rattlesnake from fire by removing fine fuels. However, by doing so, grazing promotes infrequent crown fires that destroy woodland habitats of the rattlesnake. A long history of grazing and the absence of fire from the Peloncillo Mountains has resulted in a situation where if fire does occur during warm seasons when fuels are dry, many woodland patches are likely to burn hot and rattlesnake habitat is likely to be lost. Current fire planning by the Coronado National Forest, Natural Resource Conservation Service, Bureau of Land Management, the Malpai Borderlands Group, and others is targeting mid- to high-elevation areas of the Peloncillo Mountains, including habitats of the ridgenose rattlesnake. To change fire regimes back to a more natural pattern of frequent ground fires without destroying woodland habitats will require careful application of cool season or low-intensity fire in woodlands in a way that consumes ladder fuels and understory vegetation without creating a crown fire. However, any attempt to reestablish a natural fire regime in the Peloncillo Mountains will depend upon properly managed livestock grazing so that sufficient fine fuels remain on the landscape to carry a fire.

The proposed action, as described, does not allow for high intensity fires in potential habitat (blue areas on the Holycross map, 1999b). The Forest has described methods to reduce fine fuels within the pine-oak component without compromising the canopy cover in those areas. The Forest also has a provision in the proposed action to protect riparian areas. Potential NMRR habitat (yellow areas on the Holycross map) that overlaps with mapped riparian habitat will also receive fuel treatment to minimize crown fire. Some of the area within the action area burned in the 1994 Baker burn and in the 1997 Maverick burn. On our April 10, 2001 field visit, the Service observed pine-oak areas that had burned in previous years. Those areas have had the

ladder fuels removed, the canopy is still intact, and are less likely to burn at high intensities in this proposed burn. The Forest cannot guarantee that all snake habitat will be protected from stand replacing fire, but is taking many precautions to reduce the risk of high intensity fire in these sensitive areas. The proposed action does not allow burning at the time that the snakes are active, July 15-October 31. In addition, some of the yellow areas within the project area will be protected from high intensity burns because they overlap with riparian areas, which will be treated with reduced fire intensity. In the end, protection of habitat without reduction of fuels, may prove to be more detrimental to the NMRR, as the effects from high intensity natural fires will remove habitat, possibly in the long-term, for the snake.

### **Cumulative Effects**

Cumulative effects are those adverse effects of future non-Federal (state, local government, and private) actions that are reasonably certain to occur in the project area. Future Federal actions would be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed project. Effects of past Federal, and private actions are considered in the "Environmental Baseline".

The majority of potential habitat for the ridgenose rattlesnake in the Peloncillo Mountains is administered by the Forest. Smaller areas are privately owned or administered by the Bureau of Land Management. Thus, most activities anticipated in the project area would be Federal actions subject to consultation and are not considered cumulative. Livestock grazing and other ranching activities occur on the limited private lands in the Peloncillo Mountains above 2,525 m (5,000 ft). These activities may result in localized habitat degradation. Regardless of land ownership, the threat of illegal collection and unauthorized off-road vehicle use may occur.

### **Conclusion**

After reviewing the current status of the NMRR, the environmental baseline for the action area, and the anticipated effects of the proposed Baker Prescribed burn, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the NMRR. No critical habitat has been designated for this species in the Peloncillo Mountains, thus none will be affected. We present our conclusion regarding jeopardy/no jeopardy for the following reasons:

1. There are no known locations for the NMRR within the proposed project area.
2. Most NMRRs will be in rock shelters at the time of the fire (November 1-July 15). These shelters will protect most animals from direct death or injury.
3. The Baker prescribed fire will facilitate resumption of a more natural fire regime wherein intense, destructive fires occur relatively infrequently.
4. Pastures, in which a significant portion burned, will be rested from livestock grazing for a minimum of two growing seasons following the prescribed fire. This action will facilitate vegetation recovery.
5. The fire is not expected to burn hot (i.e. stand replacing) in known high quality snake habitat. The Forest will use several techniques (back-burning) to reduce the likelihood of stand-replacing fire in pine-oak vegetation type. These are the areas that are most likely to support NMRR.
6. No critical habitat has been designated in the Peloncillo Mountains.

7. The Forest will implement the 20 measures outlined in the proposed action.

### **INCIDENTAL TAKE STATEMENT**

Section 9 of the Act prohibits the take of listed species without special exemption. Taking is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct. Harm is further defined 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 as 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 any take of a listed animal species that results from, but is not the purpose of, carrying out 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 under the Act provided that such taking is in compliance with this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, 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 require any applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

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

The Service anticipates the following forms of take as a result of the proposed action:

#### **New Mexico Ridgenose Rattlesnake**

- 1) Two NMRRs in the form of direct mortality resulting from snakes killed or injured by fire, smoke, or heat.
- 2) Two NMRRs in the form of harm resulting from habitat alteration and destruction (decreased cover, initial declines in prey populations, and increased predation)
- 3) An unlimited number of NMRRs in the form of harassment, to capture and move animals out of harm's way in case snakes are found during the fire. The Service anticipates that this form of take would be most likely to occur if the fire escaped the secondary fire line and fire crews were dispatched to suppress the fire.

### **EFFECT OF THE TAKE**

In this biological opinion, the Service finds that this level of anticipated take is not likely to jeopardize the continued existence of the NMRR.

### **REASONABLE AND PRUDENT MEASURES**

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the incidental take authorized by this biological opinion:

### **New Mexico Ridgenose Rattlesnake**

1. Personnel education/information programs and well-defined operational procedures shall be implemented.
2. Except as necessary during emergency fire suppression, no new roads or fire breaks shall be bladed.
3. The fire shall not be ignited if NMRRs are expected to be active on the surface.
4. If fire suppression is initiated, suppression activities shall be carried out in a manner to reduce potential adverse effects to the NMRR and its habitat; including moving individual snakes out of harm's way if they are encountered by fire crews.
5. Actions shall be taken to facilitate recovery of vegetation.
6. The Forest shall monitor incidental take resulting from the proposed action and report to the Service the findings of that monitoring.

### **TERMS AND CONDITIONS**

In order to be exempt from the prohibitions of section 9 of the Act, The Forest must comply with the following terms and conditions. These terms and conditions implement the reasonable and prudent measures described above and are nondiscretionary with the following exceptions. In the case of fire suppression activities, the Incident Commander or Incident Management Team, in consultation with the Resource Advisor, may elect not to implement specific terms and conditions if their implementation would place personnel or property in immediate danger, or delays caused by implementation would compromise efforts to protect habitat of a listed species. These specific terms and conditions are: 1a, 2a, 4a, 4c, 4d, and 4f. All other terms and conditions are nondiscretionary.

### **New Mexico Ridgenose Rattlesnake**

1. The following term and condition implements reasonable and prudent measure number 1:
  - a. All field personnel who implement any portion of the proposed action shall be informed of regulations and protective measures as described herein for the NMRR. All field personnel shall be informed that intentional killing, disturbance, or harassment of threatened or endangered species is a violation of the Act and could result in prosecution. All personnel shall be advised that care should be exercised when operating vehicles in the project area to avoid killing or injuring snakes on roads.
2. The following term and condition implements reasonable and prudent measure number 2:
  - a. No new roads or fire breaks shall be bladed.
3. The following term and condition implement reasonable and prudent measure number 3:
  - a. Before July 15, a decision to ignite the fire shall not occur within seven days of a rainfall event in either the primary or secondary burn areas (Figure 1). If rainfall occurs

after a decision to mobilize the fire, ignition will occur only if the effort cannot be halted without incurring significant expense.

4. The following terms and conditions implement reasonable and prudent measure number 4. Terms and conditions 4a. through 4h. only apply to suppression activities and personnel working in areas above 1,525 meters (5,000 feet) elevation (the presumed habitat of the rattlesnake).

a. All personnel on the fire shall be informed and educated about the NMRR and the importance of protecting habitat and minimizing take. All personnel shall be instructed to contact the Resource Advisor (defined in the next term and condition) if a NMRR is encountered. Personnel other than the Resource Advisor shall not handle, move, capture or interfere with the movements of any ridgenose rattlesnake unless the snake is in immediate danger from the fire. Any equipment operation or other activities that may result in harm to a NMRR shall cease pending action by the Resource Advisor.

b. A Resource Advisor(s) shall be on the fire during all suppression activities. Resource Advisors shall be qualified biologists designated to coordinate NMRR concerns and serve as an advisor to the Incident Commander/Incident Management Team. They shall also serve as field contact representatives responsible for coordination with the Service. They shall monitor fire suppression activities to ensure protective measures endorsed by the Incident Commander/Incident Management Team are implemented. Resource Advisors shall be on call 24 hours in case the prescribed fire escapes the secondary fire line.

c. If a ridgenose rattlesnake is encountered during the fire, a Resource Advisor shall be called to the scene as soon as possible. The Resource Advisor shall assess potential harm to the individual snake. If the snake is in harm's way and project activities cannot be modified so as to avoid disturbance to it, the snake shall be moved by the Resource Advisor, or personnel briefed by the Resource Advisor on how to move snakes, no more than 60 meters (200 feet) to a nearby rock shelter or other site where it will be reasonably safe from fire or suppression activities. The Resource Advisor shall be allowed some discretion to ensure that survival of ridgenose rattlesnakes is likely. If, in the judgement of the Resource Advisor, no reasonably safe site exists within 60 meters of the encounter site, the snake shall be captured and held for later release. Animals shall be transported off-site as soon as possible in an air-conditioned vehicle. The Service shall be contacted as soon as possible concerning disposition of the snake. No handling or capture of snakes shall occur without an appropriate State permit.

d. The Resource Advisor shall maintain a record of any NMRRs encountered during project activities. This information shall include for each snake:

- The location, date, and time of observation;
- General condition and health, including injuries and state of healing;
- Location moved from and location moved to.

e. Off-road vehicle activity shall be kept to a minimum. Vehicles shall be parked as close to roads as possible, and vehicles shall use wide spots in roads or disturbed areas to turn around. If off-road travel is necessary, local fire-fighting units should go off-road first because of their prior knowledge of the area.

f. Use of tracked vehicles shall be restricted to improving roads or constructing lines where a short distance of line might save a large area from fire.

- g. The Forest shall, to the extent possible, obliterate vehicle tracks made during the fire, especially those of tracked vehicles.
  - h. Areas disturbed for crew camps, landing strips, staging areas, and any other new areas of disturbance created during the fire shall be kept to the minimum area possible and shall be located in previously disturbed sites whenever possible.
  - i. One of the objectives of fire suppression will be protection of NMRR habitat.
5. The following terms and conditions implement reasonable and prudent measure number 5, and apply only to areas above 1,525 meters (5,000 feet):
- a. Areas disturbed during fire suppression or other activities, such as access routes, fire lines, crew camps, landing strips, and staging areas shall be rehabilitated, including prohibiting vehicular access to newly disturbed sites and facilitating vegetation restoration through seeding or other means.
6. The following terms and conditions implement reasonable and prudent measure number 6:
- a. A qualified biologist shall monitor and assess fire effects in the Baker fire. A survey of burned areas in suitable snake habitat shall be conducted as soon as possible after the fire to look for live, injured, or dead rattlesnakes. Disposition of any injured or dead rattlesnakes found shall be in accordance with the section "DISPOSITION OF DEAD, INJURED, OR SICK NEW MEXICO RIDGENOSE RATTLESNAKES"
  - b. By September 30 (or by the date that formal consultation is requested on the Peloncillo fire programmatic) following the fire, the Forest shall submit a monitoring report to the Arizona Ecological Services Office. The report shall document the areas and acreage burned, number of acres associated with low, moderate and high intensity fire, extent of any suppression activities, the effectiveness of these terms and conditions, information about ridgenose rattlesnakes encountered, as indicated in term and condition 4d., and any post-fire rehabilitation or monitoring activities conducted or planned. The report shall make recommendations for modifying or refining these terms and conditions to enhance protection of the NMRR.

**DISPOSITION OF DEAD, INJURED, OR SICK  
NEW MEXICO RIDGENOSE RATTLESNAKE**

Upon locating a dead, injured, or sick New Mexico ridgenose rattlesnake, initial notification must be made to the Service's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona, (Telephone: 602/261-6443) 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, 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 biological material in the best possible state. If possible, the remains of intact ridgenose rattlesnakes, shall be placed with educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information noted above shall be obtained and the carcass left in place.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution prior to implementation of the action. Injured animals should be transported to a

qualified veterinarian by an authorized biologist. Should any treated rattlesnake survive, the Service should be contacted regarding the final disposition of the animal.

### CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of the agency's section 2(c) or 7(a)(1) responsibilities for the New Mexico ridgenose rattlesnake or Lesser long-nosed bat. In furtherance of the purposes of the Act, we recommend implementing the following actions:

1. The Forest should evaluate, on the ground, all of the yellow areas on the Holycross map to determine their actual status as potential habitat. This information will be invaluable for the analysis of the effects to New Mexico ridgenose rattlesnake for the Peloncillo programmatic fire plan. Areas that move to blue (high quality potential habitat) should receive the same level of protection as in this proposed action.
2. The Forest should initiate studies to determine the effects of chemical fire retardants on the New Mexico ridge-nosed rattlesnake and its habitat.
3. Because of the potential for destructive crown fire and loss of shrub and woodland habitat valuable to the New Mexico ridge-nosed rattlesnake, the Forest should burn higher elevation vegetation communities during the fall. A fall fire would burn cool, clearing out fuels but not threatening woodlands that are very scarce in the Peloncillo Mountains.
4. The Forest has stated that cool season fires may have greater soil erosion associated with them as compared to spring fires. The Forest should investigate the relationship of soil erosion and timing of fires to quantify this observation.
5. The Forest should continue to coordinate and support, to the greatest extent possible, the monitoring of the status of the *Leptoncycteris* roost that is known to exist in the Peloncillo Mountains. Please provide the Service with any information received about that roost.
6. The Forest should participate on the preparation and implementation of a revised recovery plan for the New Mexico ridgenose rattlesnake.
7. The Forest should investigate the possibility of visiting or funding NMRR snake experts to revisit Barker's study site in the Sierra San Luis to determine if snakes still occur in the catastrophically burned areas.
8. The Forest should invite the participation of the New Mexico Game and Fish Department, Arizona Game and Fish Department, the Service, and appropriate experts to evaluate the effects of pretreatment of sensitive areas (NMRR habitat and riparian areas) before the introduction of fire into the action area.

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

### CLOSING STATEMENT

This concludes formal consultation on the Baker prescribed fire in the Peloncillo Mountains, Arizona/New Mexico. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may adversely 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 a listed species or critical habitat that was not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by this action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

The Service appreciates the cooperation and commitment of the Forest and the Malpais Borderlands Group on their continued conservation efforts on behalf of endangered species. Any questions or comments should be directed to Mima Falk, Jim Rorabaugh or Sherry Barrett of my staff.

Sincerely,

/s/ David L. Harlow  
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM  
Field Supervisor, Fish and Wildlife Service, Albuquerque, NM  
Doug Hardy, District Ranger, Douglas Ranger District, Douglas, AZ

State Director, Bureau of Land Management, Phoenix, AZ  
State Conservationist, Natural Resource Conservation Service, Phoenix, AZ  
(Attn:Ron Bemis)  
Director, Arizona Game and Fish Department, Phoenix, AZ (Attn: J. Scott)  
Director, New Mexico Fish and Game Department, Santa Fe, NM (Attn: C.  
Painter)  
Peter Warren, Field Representative, The Nature Conservancy, Tucson, Arizona.  
Bill MacDonald, Executive Director, Malpais Borderlands Group  
Andy Holycross, Arizona State University, Tempe, AZ

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## Appendix A

### CONCURRENCES

In the November 16, 2000, request for formal consultation, the Forest concluded that the proposed Baker prescribed fire is not likely to adversely affect the jaguar, Lesser long-nosed bat, Mexican long-nosed bat, Northern aplomado falcon, and Mexican spotted owl. The Service concurs with these finding based on the following reasons:

Jaguar (*Panthera onca*):

- the proposed action calls for low intensity fires in riparian areas, which serve as movement corridors for the jaguar. The canopy cover will not be removed through the proposed action and the prescribed fire should have little effect on the use of these areas for jaguar;
- the proposed action does not involve habitat type conversion or the fragmentation or blocking of movement corridors that jaguars may use between Mexico and the United States;  
and
- the prey base for the jaguar ( white-tail and mule deer) may be enhanced, in the short term, by the prescribed fire. Long term changes in vegetation structure may also enhance the prey base.

Lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*):

- there are no known maternity roosts in the Peloncillos;
- the proposed action calls for low to moderate fire intensities in the FMAs that contain potential foraging habitat for the Lesser long-nosed bat;
- within broadleaf woodland communities, fire intensities will be maintained at such a level where agave mortality does not exceed 20%. Agave mortality on the Maverick fire did not exceed 6% (Helbing 2000);
- ignition patterns of the prescribed burn will avoid excessive concentrations of smoke or human activities adjacent to occupied bat roosts;
- research in areas that burned in the Maverick fire concluded that nectar production in agaves was not affected by fire (Slauson 1998); and
- the proposed action will not significantly affect the food resource for the bat.

Mexican long-nosed bat (*Leptonycteris nivalis*):

- there are no reported individuals of this species known from the Peloncillo Mountains;

- individuals have been found in the Animas Mountains, within 40 km (25 air miles) of the Peloncillos. This is within foraging range for the species. The food resource, agaves, is the same as for Lesser long-nosed bat;
- the proposed action calls for low to moderate fire intensities in the FMAs that contain potential foraging habitat for the Lesser long-nosed bat;
- within broadleaf woodland communities, fire intensities will be maintained at such a level where agave mortality does not exceed 20%. Agave mortality on the Maverick fire did not exceed 6% (Helbing 2000);
- ignition patterns of the prescribed burn will avoid excessive concentrations of smoke or human activities adjacent to occupied bat roosts;
- research in areas that burned in the Maverick fire concluded that nectar production in agaves was not affected by fire (Slauson 1998); and
- the proposed action will not significantly affect the food resource for the bat

Northern aplomado falcon (*Falco femoralis septentrionalis*):

- there have been no reported sightings of this species in the Peloncillos (surveys done in 1993-2000);
- the majority of potential habitat in the proposed project area is currently not suitable due to increased density of mesquite trees; and
- the proposed action targets these areas for reduced densities of mesquite and should improve habitat that is currently unsuitable.

Mexican spotted owl (*Strix occidentalis lucida*):

- surveys have been conducted in suitable habitat and no owls have been located;
- the proposed action is not expected to significantly alter what suitable habitat is present in the action area because of the provisions to not burn pine-oak vegetation with high intensity fire;
- the proposed action will reduce the threat of catastrophic wildfire in suitable habitat by removing accumulated ground fuels that can create ladder fuels that could lead to the destruction of large trees, which provide suitable habitat for the owl; and
- fire may increase the prey base for the owl by increasing grass cover in areas that burn.

Chiricahua leopard frog (*Rana chiricahuensis*):

The Chiricahua leopard frog is currently proposed for listing as a threatened species ( Fed. Reg. Vol. 65;115). The Forest determined that the proposed action is not likely to jeopardize the continued existence of the frog. In addition, in their November 16, 2000, letter, the Forest

concluded that the proposed action may affect, but is not likely to adversely affect the Chiricahua leopard frog. The Service concurs with this determination for the following reasons:

- surveys for frogs and potential habitat have been conducted in the project area. No frogs have been located and only one site, Maverick Spring, was identified as potentially suitable habitat (G. Helbing, pers. comm, 2001);
- the proposed action includes protective measures for Maverick Spring (which is within the contingency zone);
- stock tanks have also been surveyed within the project area and no frogs have been found; and;
- off-forest sites in Guadalupe Canyon should not be affected by the fire because of the provisions in the proposed action to protect riparian areas from high intensity fire, reducing ash flow into this area.