New Mexico

Ridgenose Rattlesnake

Recovery Plan

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New Mexico Ridgenose Rattlesnake

Recovery Plan

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This is the completed New Mexico Ridgenose Rattlesnake Recovery Plan. It has been approved by the U.S. Fish and Wildlife Service. It does not necessarily represent official positions or approvals of cooperating agencies and individuals who contributed to preparation of the plan. This plan is subject to modification as dictated by new findings and changes in species status and completion of tasks described in the plan. Goals and objectives will be attained and funds expended contingent upon appropriations, priorities, and other budgetary contraints.

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SUMMARY

Even though the very restricted range of *Crotalus willardi obscurus* as it is presently known may preclude eventual delisting, reclassification to non-threatened status, nonetheless, could be considered when:

1) all important areas of *C. w. obscurus* habitat in Mexico and New Mexico are identified;

2) *C. w. obscurus* habitat in New Mexico is protected from adverse modification; and

3) the continued existence of the taxon in its habitat is assured.

Steps to reach recovery include identification and protection of important habitat and gaining additional information, through research, concerning unknown aspects of the taxon's life history.

To keep the subspecies recovered, it will be necessary to provide adequate protection and management of important habitat. This must include entering into land management agreements with private landowners and monitoring *C. w. obscurus* populations to assure continued survival of viable populations.

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PART I - INTRODUCTION

Objectives

The objectives of this recovery plan are to identify the major threats to the continued existence of the New Mexico ridgenose rattlesnake (*Crotalus willardi obscurus*) populations in the Animas Mountains of southwestern New Mexico and Sierra San Luis, Chihuahua, Mexico, and to propose actions designed to ensure their survival in these mountain ranges. The plan is tailored specifically for recovery of the New Mexico population, but most of the proposed recovery actions also are applicable to populations in the Sierra San Luis. The plan draws upon information concerning the species throughout its range to better understand the evolution, systematics, distribution, and natural history of the taxon.

Taxonomy

The ridgenose rattlesnake is named in honor of Frank C. Willard, who collected the type specimen (*C. w. willardi*) at an elevation of 7,000 feet on the middle fork of Ramsey Canyon in the Huachuca Mountains of southeastern Arizona (Meek 1905, Swarth 1921, Klauber 1949). Two additional subspecies, *C. w. silus* and *C. w. meridionalis*, later were described by Klauber (1949). The type specimen of *C. w. silus* was collected on the Rio Gavilan, 7 miles southwest of Pacheco in Chihuahua, Mexico, at an elevation of 6,200 feet. The type specimen of *C. w. meridionalis* is one of two snakes collected at Coyotes in Durango, Mexico, at an elevation of 8,000 feet. A fourth subspecies, *C. w. amabilis*, from the Sierra del Nido of

central Chihuahua, Mexico, was described by Anderson (1962). The type locality for the Sierra del Nido subspecies is the Arroyo Mesteno at an elevation of 8,500 feet. Most recently, Harris (1974) and Harris and Simmons (1976) assigned the name C. w. obscurus to ridgenose populations in the Animas Mountains of southwestern New Mexico and the adjacent Sierra San Luis of Chihuahua.

The validity of C. w. obscurus as a subspecies distinct from C. w. silus is questioned by some herpetologists. Armstrong and Murphy (1979) omitted any mention of C. w. obscurus from their book and did not cite the publications of Harris and Simmons. Russell (1980) evidently rejected C. w. obscurus as a subspecies, because his range map shows C. w. silus entering southwestern New Mexico and he does not mention C. w. obscurus.

The lack of universal acceptance of C. w. obscurus as a valid subspecies stems, in part, from the fact that Harris (1974) and Harris and Simmons (1975, 1976) deviated from accepted nomenclatural procedures when describing C. w. obscurus. The lack of broader acceptance also may reflect opposing opinions as to the degree of difference necessary to justify the naming of a subspecies (Charles H. Lowe, pers. comm. to Johnson 1983). However, despite reservations by some herpetologists, C. w. obscurus is accepted as valid by such authors as Collins et al. (1982) and McCranie and Wilson (1978). In addition, the New Mexico Department of Game and Fish and the U.S. Fish and Wildlife Service recognize the taxon, e.g., Hubbard et al. (1978) and U.S. Fish and Wildlife Service (1977). Consequently, the name should be used for ridgenose rattlesnake populations in the Animas

and Sierra San Luis until a definitive taxonomic study on the validity of this subspecies is published.

All ridgenose rattlesnakes are distinguished by the tip of the snout and the anterior canthus rostrals raised into a sharp internasal ridge (Figure 1). The five C. willardi subspecies are distinguished by the following key (see Figures 2-5) derived from Klauber (1972) and Harris and Simmons (1976):

1a. No white vertical line on the rostral or mental.....see 2

1b. A white vertical line on the rostral and mental.....see 3

2a. Prominent white flash-mark present (Crotalus willardi silus).

2b. Prominent white flash-mark absent (Crotalus willardi obscurus).

3a. Body blotches 35 or more (Crotalus willardi amabilis).

3b. Body blotches 34 or fewer.....see 4

4a. Scale rows usually 25; subcaudals 29 or fewer in the male and 26 or fewer in the female; body blotches 26 or fewer (Crotalus willardi willardi).

4b. Scale rows usually more than 25; subcaudals 30 or more in the male and 27 or more in the female; body blotches more than 26 (Crotalus willardi meridionalis).

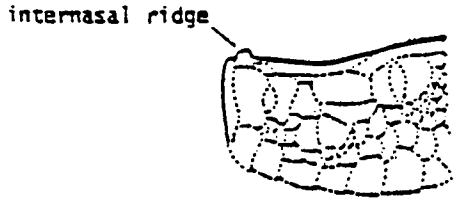


FIGURE 1. Cross section of head of Crotalus willardi showing internasal ridge (after Klauber 1972).

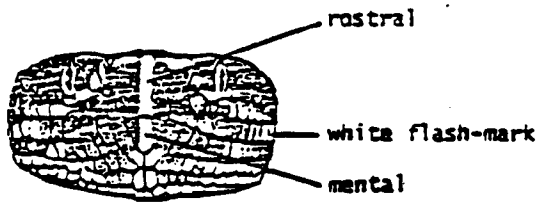


FIGURE 2. Frontal view of Crotalus willardi willardi showing verticle white line on rostral and mental, and anterior portion of white flash-mark (after Klauber 1972).

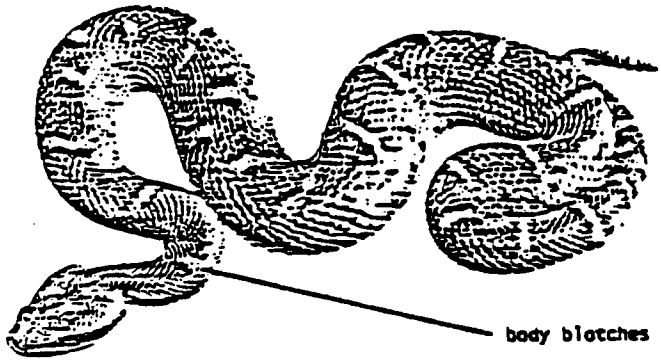


FIGURE 3. Crotalus willardi willardi showing body blotches (Specimen from Ramsey Canyon, Huachuca Mountains, Cochise County, Arizona; after Klauber 1972).

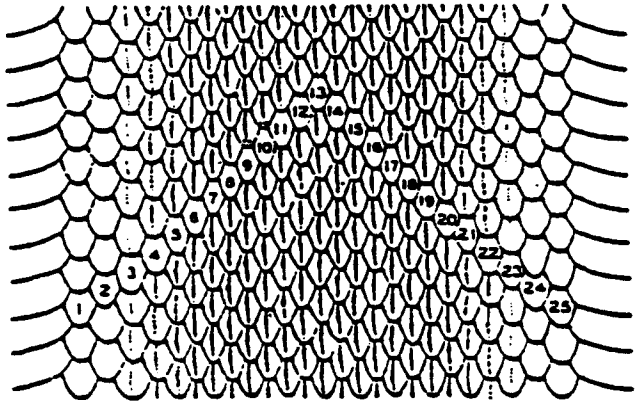


FIGURE 4. Method of counting dorsal scale rows (after Klauber 1972).

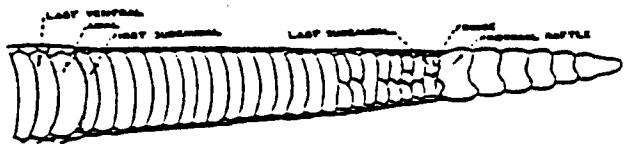


FIGURE 5. Ventral view of tail with nomenclature (after Klauber 1972).

Distribution

Ridgenose rattlesnakes occur from southeastern Arizona and southwestern New Mexico south through portions of Chihuahua and Sonora to southern Durango and southwestern Zacatecas (Figure 6). The nominate subspecies, C. w. willardi, is known from the Huachuca, Patagonia, and Santa Rita Mountains of Arizona, the Sierra de los Ajos, Cerro Sierra Azul (Klauber 1949, 1956; Bogert and Degenhardt 1961; Johnson 1983), and the Sierra de Cananea in Sonora, Mexico (Harris and Simmons 1976). The subspecies with the broadest distribution, C. w. silus, occurs in the Sierra Madre Occidental of western Chihuahua and eastern Sonora along the Continental Divide, including Sierra Huachinera, Sierra del Tigre, Sierra de Oposura, Sierra Aconchi, and an area near Yecora (Harris and Simmons 1976). The Sierra Madre Occidental of Durango and Zacatecas is inhabited by C. w. meridionalis, while C. w. amabilis is known only from the Sierra Del Nido of Chihuahua (Anderson 1962). Populations of C. w. obscurus are found in the Animas Mountains of New Mexico and the adjacent Sierra San Luis of Chihuahua (Harris and Simmons 1976), but they probably also occur in the Sonora portion of the Sierra San Luis.

The distribution of the ridgenose rattlesnake in the Animas Mountains of southwestern New Mexico consists of four areas of canyon bottom and adjacent slopes totaling approximately one to two square miles (Hubbard 1977, Applegarth et al. 1980, U.S. Fish and Wildlife Service 1980). Additional areas of potentially occupied habitat, i.e., areas of essential habitat (see Figure 7), total approximately 6.5 square miles in

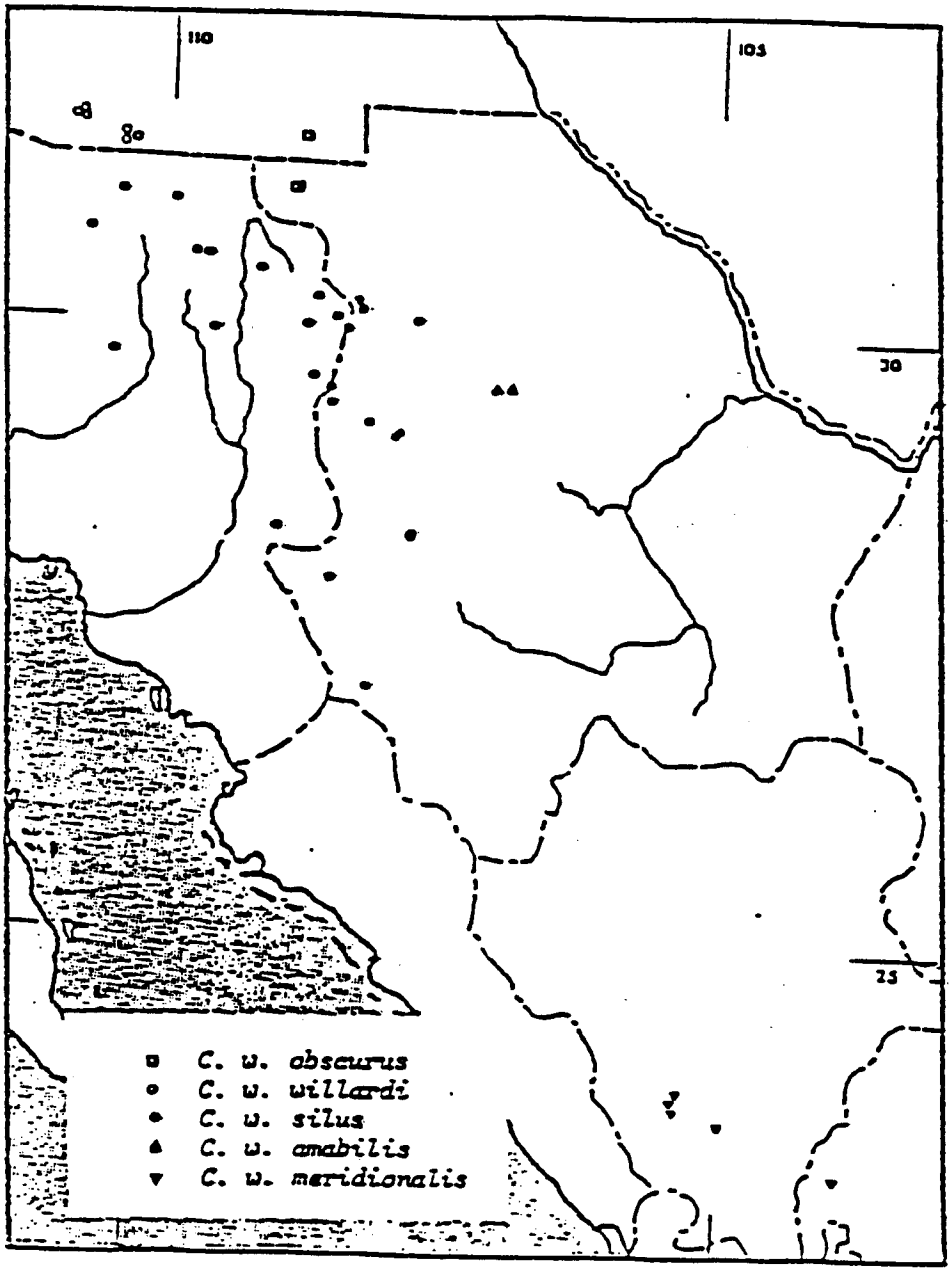
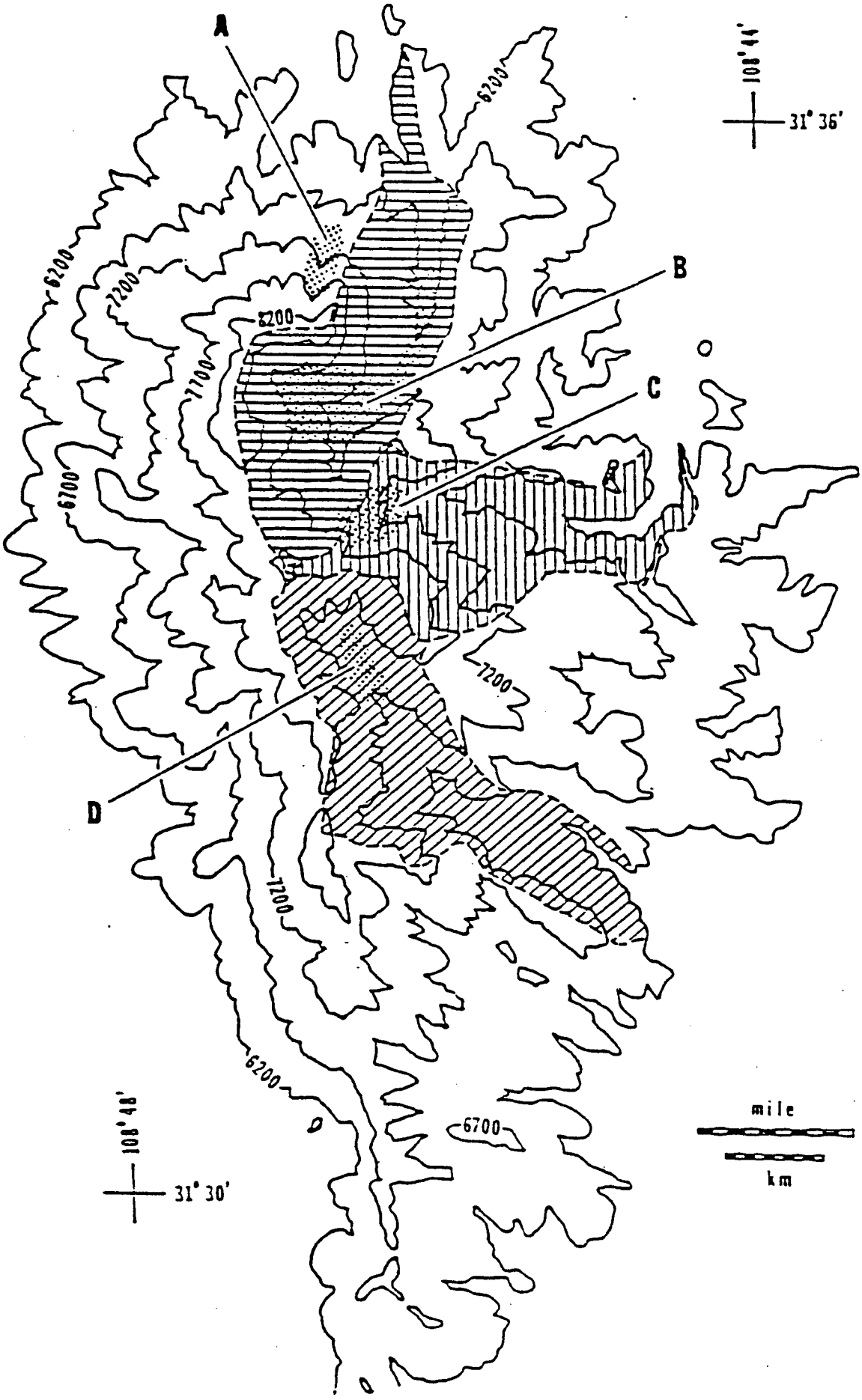


FIGURE 6. Geographic distribution of the subspecies of Crotalus willardi (after Harris and Simmons 1976).

FIGURE 7. Distribution of the New Mexico ridgenose rattlesnake, Crotalus willardi obscurus, in the Animas Mountains of southwestern New Mexico (after Applegarth et al. 1980). The four known areas of occurrence are shaded with dots (A is West Fork Canyon, B is in Indian Creek Canyon, C is in Bear and "Little Bear" canyons, and D is in Spring Canyon). Critical habitat, as defined by the U.S. Fish and Wildlife Service (1978), is shaded with lines (horizontal lines for Indian Creek drainage, vertical lines for the Bear Canyon drainage, and diagonal lines for the Spring Canyon drainage.) The contour lines indicate elevation in feet above mean sea level and are traced from U.S. Geological Survey topographic maps surveyed in 1917-1918: Animas Peak, Cienega Springs, and Walnut Wells (scale 1:62,500).


A
B
C
D
6200
6200
6200
7100
6700
7200
7200
6200
6700
108°44'
31°36'
108°48'
31°30'
mile
km

surrounding areas. However, occurrence of ridgenose rattlesnakes in these areas is unsubstantiated.

Habitat

The following synopsis of habitats occupied by ridgenose rattlesnakes is based on observations by various workers as compiled by Applegarth et al. (1980). Data for all subspecies are included in this summary because little information is available for New Mexico ridgenose rattlesnakes and because the habitat used by the species in other areas of its range may provide insight into the needs of the New Mexico subspecies.

Populations of Crotalus willardi are restricted to mountainous terrain at moderate elevations. The species is found on elevated plateaus in the central and southern parts of its range in Mexico. In New Mexico and Arizona, it lives in pine-oak vegetation in sheltered canyon bottoms. Combined elevational data for 39 records (Applegarth et al. 1980) showed a range of occurrence from 5,348 to 9,000 feet above sea level, with a mean of 7,304 feet. However, in any one mountain range the vertical range of occurrence is usually less than 2,000 feet; the exception to this is in the Santa Rita Mountains of Arizona where C. w. willardi has a vertical range of 2,800 feet in Madera Canyon (Klauber 1949, Fowlie 1965, Applegarth et al. 1980).

Rocks, leaf litter, and mesic conditions commonly are mentioned in descriptions of Crotalus willardi habitat (Applegarth et al. 1980 and citations.therein). Deep and narrow canyons that provide more mesic conditions than surrounding habitats apparently are especially important for

the survival of ridgenose populations in the northern and relatively arid parts of the species' range. Populations of C. w. obscurus from the Animas Mountains and Sierra San Luis exist in a drier climate than other C. willardi populations, including those of C. w. willardi in Arizona (Armstrong and Murphy 1979).

Only two records of C. w. obscurus are known from the Sierra San Luis of Chihuahua (Harris and Simmons 1976, McCranie and Wilson 1978), and most records of C. w. obscurus in New Mexico are from an area about two miles long and 20-200 yards wide along the bottom of Indian Creek Canyon (Table 1). Most records from other localities in the Animas Mountains are associated with similar habitats. The annual precipitation in the Animas Mountains is about 20 inches and the annual evaporation is about 65 inches (U.S. Soil Conservation Service 1974, 1975). The only known permanent water is Turkey (=Aspen) Spring, a very small flow in the upper portion of Indian Creek Canyon.

Habitats occupied by Crotalus willardi are classified into a number of vegetational zones, all roughly equivalent. Armstrong and Murphy (1979) characterized the habitat of C. w. meridionalis as belonging to the Montane Formation Series (Wagner 1964), which is essentially equivalent to Leopold's (1950) pine-oak woodland, i.e., open, scattered stands dominated by pines (Pinus spp.) in some places and by oaks (Quercus spp.) in others. The vegetation of the Sierra del Nido subspecies, C. w. amabilis, is described by Anderson (1962) as consisting of relatively moist montane forest. C. w. silus inhabits a variety of habitats, including rocky

TABLE 1. Localities of occurrence for Crotalus willardi obscurus in the Animas Mountains of southwestern New Mexico. *

Area Basis for record	Date	Collector and/or observer
Indian Creek Canyon		
Specimen (AMNH 79056)	09-15-1957	Zeller, R.A.
Specimen (AMNH 81796)	09-15-1957	Zeller, R.A.
Specimen (UNM 6737)	10-28-1960	Degenhardt, W.G.
Specimen (UNM 6738)	10-28-1960	Degenhardt, W.G.
Specimen (UNM 10083)	09-01-1961	Kauffeld, C.F. Degenhardt, W.G. Wright, J.W.
Specimen (UNM 10084)	" " "	"
Specimen (UNM 13715)	" " "	"
Specimen (UNM 13716)	" " "	"
Specimen (UNM 13717)	" " "	"
Specimen (LACM 67265)	05-23-1965	Harris, G. Johnson, R.
Specimen (USNM 195546)	09-10-1965	Kauffeld, C.F. Degenhardt, W.G. Hanson, C.
Specimen ?	" " "	"
Specimen ?	" " "	"
Specimen ?	09-17-1965	"
Specimen ?	08-30-1969	McVicker, G.A.
Specimen ?	" " "	"
Specimen (NHSM 954)	09-06-1971	Davis, J.

TABLE 1. Continued

Area Basis for record	Date	Collector and/or observer
Indian Creek Canyon (Cont.)		
Specimen (NHSM 955)	08- ?-1972	Davis, J.
Specimen (UAZ 40776)	04-17-1973	Martin, B.
Specimen (UAZ 43034)	08-13-1973	"
Captured and released	08-04-1974	Halley, R.
Captured and released	09-08-1974	Williams, M.A.
Captured and released	09-15-1974	Altenbach, J.S.
Photographed and released	07-11-1976	Conway, M.C. Schmitt, C.G.
Photographed and released	08-20/21-1976	"
Photographed and released	10-04/06-1976	"
Photographed and released	05-28/29-1977	Schmitt, C.G. Baltosser, W.H.
Photographed and released	07-01-1978	Dobrott, S.J. Conway, M.C.
West Fork of Indian Creek		
Captive specimen	09-01-1969	Altenbach, J.S.
Sight record	? ?-1970	McCrea, G. & R. (fide Altenbach)
Specimen ?	07-05-1970	Unknown (fide Williamson, M.A.)
Sight record	08-16-1970	McVicker, G.A.
Captive specimen ?	08-10-1973	"

TABLE 1. Continued

Area Basis for record	Date	Collector and/or observer
Upper Bear Canyon		
Captured and released	09-14-1974	Altenbach, J.S. McVicker, G.A.
Captured and released	" " "	"
Captured and released	09-28-1974	Mongold, R.
Captured and released	09-30-1974	Degenhardt, W.G. (student of)
Photographed and released	05-22-1975	Degenhardt, W.G. Williamson, M.A.
Captured and released	05-05-1976	Altenbach, J.S.
Photographed and released	07-12-1976	Conway, M.C. Schmitt, C.G.
Captured and released	09-11-1976	Altenbach, J.S.
Captured and released	09-19-1976	"
Sight record	" " "	"
Photographed and released	07-02-1978	Hubbard, J.P.
Upper Spring Canyon		
Sight record	06-04-1976	Hubbard, J.P.

* Source of data: Applegarth et al. (1980), New Mexico Department of Game and Fish files, and New Mexico Heritage Program computer files; Abbreviations: (AMNH) American Museum of Natural History; (UNM) University of New Mexico herpetological collection; (LACM) Los Angeles County Museum of Natural History; (USNM) U.S. National Museum; (NHSM) collection of the Natural History Society of Maryland; (UAZ) University of Arizona herpetological collection.

canyons with dense underbrush, mountain slopes with pines and oaks, and open parks and grasslands (Klauber 1972). Populations of C. w. willardi in Arizona and northern Sonora were assigned to the Transition Life-zone (pine forest) by Stebbins (1954) and Lowe (1964). Habitats of C. w. obscurus in the Animas Mountains typically are occupied by semi-evergeen oaks, but conifers and other tree and shrub species also may be present.

The canyons of the Animas Mountains between 6,200 feet and 6,900 feet elevation are characterized by oak species occasionally found as high as 8,200 feet elevation. The primary dominant of the lower reaches is Emory oak (Quercus emoryi), which is gradually replaced in middle reaches by Arizona white oak (Quercus arizonica). In the higher reaches of the canyons, the dominants are silverleaf oak (Quercus hypoleucoides) and neatleaf oak (Quercus rugosa). Alligator juniper (Juniperus deppeana) and Mexican pinyon (Pinus cembroides) are common in middle reaches and periodically occur in lower reaches along mesic canyon bottoms. Chihuahua pine (Pinus leiophylla) occurs in middle and locally in upper reaches, where it is joined by Apache pine (Pinus engelmannii) and locally by Arizona ponderosa pine (Pinus ponderosa var. arizoncia). Douglas fir (Pseudotsuga menziesii) also is found in the more elevated reaches of habitats occupied by ridgenose rattlesnakes in the Animas Mountains. Additional plant species associated with the dominant habitats of ridgenose rattlesnakes in these mountains include Gambel oak (Quercus gambelii), Arizona madrone (Arbutus arizonica), skunkbush (Rhus trilobata), manzanita (Arctostaphylos pungens), and birchleaf rhamnus (Rhamnus betulaefolia).

Activity Patterns

Most records of Crotalus willardi activity are from July through September, with isolated records as early as April and as late as October and November (Armstrong and Murphy 1979, Applegarth et al. 1980, Johnson 1983). In July and August, C. willardi typically is active in the morning (0800-1100 hours) and in the late afternoon (around 1700 hours); in September and October, C. willardi is active mainly between the hours of 1100-1600 (Applegarth et al. 1980). The few pre-July records suggest that C. willardi is active between 0900-1200 hours in May and inactive in June, unless it rains (Applegarth et al. 1980). However, a juvenile C. w. obscurus was encountered at 1430 hours at Turkey Spring in the Animas Mountains by Schmitt and Baltosser (ms.) on 28 May 1977.

Records of ridgenose rattlesnake activity are primarily diurnal (see Johnson 1983 for reports of nocturnal activity), and it seems unlikely that the species would be active much after sundown, except on warm summer nights. Even by day, individuals may sometimes have difficulty warming themselves, especially during the rainy season, because clouds and vegetation reduce the amount of sunlight reaching the canyon bottoms. However, small-bodied rattlesnakes like C. willardi have an advantage over larger species in being able to warm themselves more quickly during brief periods of sunshine.

Most rattlesnakes occasionally climb trees, but they do not do this on a regular basis (Klauber 1972). Arboreal behavior by C. w. obscurus

has been observed five times (Hubbard 1977 and Applegarth et al. 1980), and behavior of the other four subspecies of ridgenose rattlesnakes is perhaps similar. Climbing vegetation may have several benefits for C. w. obscurus, including a better view and thereby a greater chance of seeing potential prey, both on the ground and in the foliage.

Food and Feeding

Observations of captive and wild ridgenose rattlesnakes indicate that the species feeds on a broad range of prey, including small mammals, birds, lizards, other snakes, and arthropods (Applegarth et al. 1980). However, diets of small-bodied rattlesnakes such as Crotalus willardi generally consist more of lizards than small mammals (Vorhies 1948, Klauber 1972). Lizards may be an especially important food source for young snakes that require smaller prey than adults.

Fangs of the ridgenose are proportionately longer than other rattlesnakes, and the species may forage more actively than other rattlesnake species that apparently depend more on an ambush strategy (Klauber 1972). Young C. willardi may use caudal or facial luring to catch prey, but data supporting this possibility are limited (Applegarth et al. 1980). Rattlesnakes in captivity frequently will eat dead animals, so the natural feeding of C. willardi may include scavenging.

Reproduction

All rattlesnakes are ovoviviparous, retaining fertilized eggs in their oviducts until the eggs are ready to hatch, at which time, the female gives birth to live young (Klauber 1956, 1972). This adaptation enables the female to behaviorally regulate incubation of the eggs and perhaps enables species such as Crotalus willardi to live at relatively higher and cooler elevations (Fitch 1970, Applegarth et al. 1980, Shine 1983).

On the basis of gestation times for three captive-bred broods and the limited season available for activity in the wild, Tryon (1978) concluded that C. willardi is biennial (females mate in one summer and give birth in the next). Thus, in areas with relatively short summers, this strategy would give the embryos more time to develop. Tryon (1978) estimated that the gestation period for ridgenose rattlesnakes is approximately 13 months and speculated that a cool hibernation period is required for reproductive cycling.

Young of most species of rattlesnakes are born between August 1st and October 15th, with the majority of births occurring in mid-September (Klauber 1972). Armstrong and Murphy (1979) concluded that parturition in Mexican rattlesnakes coincides with the rainy season, possibly because of the greater abundance of prey at that time. Increased availablity of surface water possibly is important to the survival of the young, particularly in the case of C. willardi, because Kauffeld (1943) noted that

even captive adults frequently drink water. Limited data for C. willardi, based on a wild birth and six captive births, suggest that most ridgenose rattlesnakes are born in August (Applegarth et al. 1980).

Newborn rattlesnakes often are found sharing the same hiding place with their mother, but no evidence of maternal care exists for any species (Klauber 1956, 1972). Normally, young disperse from their birthplace within a few days. Newborn rattlesnakes are eaten by a wide variety of predators, many of which could not overpower adult snakes. Freezing temperatures and failure to secure food also contribute to mortality of newborn snakes (Klauber 1972).

Population Estimates and Threats to Continued Existence

Wild populations of Crotalus willardi obscurus have not been censused, thus what is known is based primarily on circumstantial information derived from museum holdings (15 specimens, see Table 1) and the amount of effort required to find ridgenose rattlesnakes. Studies conducted by the New Mexico Department of Game and Fish (Hubbard 1977) indicate that C. w. obscurus populations in the Animas Mountains are perhaps more abundant than originally thought. Members of the Endangered Species Program of the New Mexico Department of Game and Fish spent 48 man-days in the Animas during the summer of 1976 and encountered three ridgenose rattlesnakes (one snake per 16 man-days) with no special effort being devoted to finding these snakes. By contrast, Degenhardt (1975) and his colleagues, in an

earlier study (designed with the specific objective of finding these snakes), spent a total of 283 man-days in the Animas and found 11 ridgenose rattlesnakes (1 snake per 25.7 man-days).

The first documented record of the ridgenose rattlesnake in the Animas Mountains dates from 1957 (Bogert and Degenhardt 1961). Following that publication, collectors from all parts of the country came to the Animas Mountains to obtain specimens of C. w. obscurus (Applegarth et al. 1980). Collecting was relatively unabated until April 19, 1974, when an agreement restricting entry of collectors and protecting the habitat of the snakes was signed between the U.S. Fish and Wildlife Service and the owner of the Animas Mountains. In January 1975, the ridgenose population in New Mexico was given legal protection as an endangered species (New Mexico Department of Game and Fish 1975).

The effects of collecting on ridgenose populations in the Animas Mountains during the period between 1957 and 1974 are unknown because there are no estimates of the abundance of these snakes prior to collecting. However, arbitrarily assuming that ten snakes were taken each year between 1961 and 1974, as many as 130 individuals were removed from the Animas Mountains during the 13 year period. This is a seemingly significant number, given that the total area inhabited by C. w. obscurus in New Mexico is less than two square miles (Hubbard 1977). Arbitrarily assuming a density of one snake per hectare and an area of occupancy of less than two square miles, populations of ridgenose rattlesnakes in the Animas Mountains

may have totaled no more than 500 individuals before intense collecting began. Habitat disturbance also occurred in conjunction with collecting, thereby reducing the potential carrying capacity of the area for ridgenose rattlesnakes.

Alteration of habitat through other means also threatens ridgenose rattlesnake populations. Past and present factors, such as fire and excessive cattle grazing, could affect continued survival of C. w. obscurus populations in the Animas Mountains because of the limited habitat and restricted distribution of the subspecies. Future threats might include fire, mining, development, and harvest of wood or other renewable resources in the range. Mining is of particular concern because mineral rights in the area have been retained by Tenneco (the previous owner of the property), who has continued to explore for minerals in the area for several years.

Natural threats to the ridgenose rattlesnake include predation, starvation, and disease. Until recently, ridgenose rattlesnakes had not been examined for the occurrence of pathogens, but they were known to have succumbed to a variety of poorly understood diseases (Johnson 1983). A recent study of C. w. willardi by Jarchow (pers. comm. to Johnson 1983) indicates that this subspecies, and perhaps other subspecies of ridgenose rattlesnakes, suffers from a variety of diseases and pathogenic organisms that undoubtedly have been an integral part of the evolution of ridgenose populations.

The present disjunct ranges of the various populations would make recolonization after a major die-off virtually impossible.

Conservation Measures

In 1974, representatives from the U.S. Fish and Wildlife Service and the New Mexico Department of Game and Fish discussed the ridgenose rattlesnake populations of the Animas Mountains with Mr. Peter G. Wray, whose company at the time owned the Animas Mountains and other lands in the vicinity. Mr. Wray was sympathetic to these concerns and demonstrated his cooperation by signing a cooperative agreement with the U.S. Fish and Wildlife Service. As a result, areas occupied by ridgenose rattlesnakes were closed on April 19, 1974, to all unauthorized entry according to agreements between the Gray Ranch/Pruett-Wray Cattle Company and the U.S. Fish and Wildlife Service.

On January 24, 1975, Crotalus willardi obscurus (then listed as C. w. silus) was listed as endangered by the State of New Mexico. Since then, a permit is required in New Mexico to legally possess or to take any specimen of C. w. obscurus (New Mexico Department of Game and Fish 1975, 1979, 1980, 1983).

On May 26, 1977, the U.S. Fish and Wildlife Service (1977) proposed endangered status for C. w. obscurus populations in the Animas Mountains, with critical habitat on all lands above 6,200 feet elevation. After

reviewing comments from concerned individuals and agencies, the U.S. Fish and Wildlife Service (1978) published its final ruling on August 4, 1978, listing C. w. obscurus as threatened and designating the western part of the Animas Mountains in Bear, Spring, and Indian Canyons between 6,200 feet and 8,532 feet elevation as critical habitat.

In 1982, the Animas Mountains and other holdings of the Gray Ranch/Pruett-Wray Cattle Company were sold to American Breco, a California-based corporation. Contacts established between the New Mexico Department of Game and Fish and American Breco to ensure the future of C. w. obscurus and its habitat have not resulted in renewal of the cooperative agreement in effect under former ownership, even though the earlier management plan (Dobrott 1980) remains in effect for the more elevated areas of the Animas occupied by C. w. obscurus, which are treated as a nature preserve. Consequently, a renewed formal cooperative agreement with American Breco and appropriate agencies is desirable.

PART II

RECOVERY

The ultimate goal of the recovery plan is to improve the status of the New Mexico ridgenose rattlesnake to the point that survival is secured. However, because of its restricted distribution and limited habitat, the population of Crotalus willardi obscurus in the Animas and San Luis Mountains will probably always be threatened. In the absence of other suitable historical sites, there seems little chance to rear and to transplant individuals into other localities. Therefore, the best and most realistic plan of action is to maintain and enhance the present status. This goal should be reached from implementation of the recovery plan.

Step-down Outline

Goal: Maintain and enhance the status of the New Mexico ridgenose rattlesnake (Crotalus willardi obscurus) to the point that survival of the Animas Mountains and Sierra San Luis populations is assured.

1.0 Protect ridgenose rattlesnakes and their habitat.

- 1.1 Enforce State and Federal endangered species laws.
  - 1.11 New Mexico Wildlife Conservation Act and its Regulatons.
  - 1.12 Federal Endangered Species Act and its Regulations.
- 1.2 Ensure long term protection of critical or essential habitat.
  - 1.21 Establish cooperative agreements with landowners.

1.22 Develop a joint U.S./Mexico Agreement to protect and study the species in Mexico.

1.3 Other alternatives.

2.0 Investigate status and biology of ridgenose rattlesnakes.

2.1 Conduct surveys to obtain trend information concerning the distribution, number, and population structure of ridgenose rattlesnake populations in the Animas Mountains and Sierra San Luis.

2.11 Survey suitable habitats.

2.12 Capture, mark, photograph, sex, weigh, measure, and/or radio tag and release ridgenose rattlesnakes.

2.2 Determine habitat requirements, including vegetation and associated parameters.

2.3 Determine behavioral patterns.

2.31 Activity patterns.

2.32 Reproductive patterns.

2.33 Other patterns.

2.4 Determine prey relationships and the availability of potential prey.

2.5 Determine sources of mortality, including predation, disease, man's impacts, and related factors.

2.51 Predation.

2.52 Disease.

2.53 Man's impacts.

2.54 Related factors.

2.6 Based on the previous factors and other findings and information, develop and implement steps to reduce or eliminate threats to survival of the species.

3.0 Clarify the taxonomic status of ridgenose rattlesnake populations in the Animas Mountains and Sierra San Luis.

4.0 Establish two or three captive populations.

5.0 Disseminate information about New Mexico ridgenose rattlesnakes.

5.1 Public information.

5.11 Local and state.

5.12 National.

5.2 Professional information.

Step-down Narrative

Goal: Maintain and enhance the status of the New Mexico ridgenose rattlesnake (Crotalus willardi obscurus) to the point that survival of the Animas Mountains and Sierra San Luis populations is assured.

1.0 Protect ridgenose rattlesnakes and their habitat.

Any action that might jeopardize the continued existence or well being of ridgenose rattlesnakes or their habitat should be prohibited.

1.1 Enforce State and Federal endangered species laws.

Populations of ridgenose rattlesnakes in the Animas Mountains are protected by both the State of New Mexico and by the U.S. Fish and Wildlife Service. Current laws must continue to be enforced to ensure that illegal collecting, harassing, killing, or habitat destruction does not occur.

1.11 New Mexico Wildlife Conservation Act and its Regulations.

In 1974, the New Mexico Legislature passed the Wildlife Conservation Act, which provides for the protection and management of species endangered in New Mexico. The State of New Mexico has provided legal protection for ridgenose rattlesnake populations in the Animas Mountains since January 1975. New Mexico State Game Commission Regulation 624, as most recently amended (1983) must continue to be enforced.

1.12 Federal Endangered Species Act and its Regulations. The New Mexico ridgenose rattlesnake (C. w. obscurus) has been protected by the Endangered Species Act of 1973 (P.L 93-205 87 Stat. 884) since August 1978 when it was listed as threatened. Continued enforcement of the Endangered Species Act as it pertains to ridgenose rattlesnake populations is essential.

1.2 Ensure long term protection of critical or essential habitat. Every effort should be made to obtain written agreements with private, State, Federal, and international authorities to provide enforceable protection measures to guarantee that critical or essential habitats of C. w. obscurus are preserved.

1.21 Establish cooperative agreements with landowners. Although no written agreement with American Breco or Tenneco exists at the present time, terms of the previous cooperative agreement with the Gray Ranch/Pruett-Wray Cattle Company are being followed. However, a written agreement should be obtained.

1.22 Develop a joint U.S./Mexico Agreement to protect and study the species in Mexico. Because a portion of the range of C. w. obscurus extends into Mexico, the U.S. Fish and Wildlife Service (in conjuntion with other appropriate agencies) should work to obtain a cooperative agreement with the Republic of Mexico to

protect habitats occupied by C. w. obscurus. The agreement(s) should also provide protection for individuals of the population by carefully regulating collecting and any other factors that might serve to jeopardize populations of New Mexico ridgenose rattlesnakes.

1.3 Other alternatives.

In the event that a new cooperative agreement cannot be signed with the present owners of the Animas Mountains or with the Republic of Mexico, other alternatives should be sought to guarantee the protection of ridgenose rattlesnakes and their habitats; alternatives should include investigating the possibility of acquiring management rights through conservation easements, lease, or other legal agreements.

2.0 Investigate status and biology of ridgenose rattlesnakes.

As discussed in the introduction, much still remains to be learned about ridgenose rattlesnakes, especially for those populations in the Animas Mountains and Sierra San Luis. All that is really known about populations of the New Mexico subspecies is that they are confined to a very small area, are geographically isolated from other populations, and apparently are scarce. Thus, further study is essential to better understand the needs of ridgenose rattlesnakes in this area.

2.1 Conduct surveys to obtain trend information concerning the distribution, number, and population structure of ridgenose rattlesnake populations in the Animas Mountains and Sierra San Luis.

A program designed to monitor populations of ridgenose rattlesnakes in the Animas Mountains and Sierra San Luis on a regular basis should be established.

2.11 Survey suitable habitats.

Areas of suitable habitat should be surveyed on a regular basis during the months of April through October.

2.12 Capture, mark, photograph, sex, weigh, measure, and/or radio tag and release ridgenose rattlesnakes.

Individual snakes should be captured, marked, photographed, sexed, weighed, measured, and/or radio tagged and then released to gather data on their distribution, movements, numbers, and population structure.

2.2 Determine habitat requirements, including vegetation and associated parameters.

The habitat at each capture site should be studied. Parameters such as water availability and cover, density, and diversity of the vegetation (including lists of all plants found at capture site) at each site should be measured. In addition, the substrate, exposure, and elevation of each site should be recorded. Once individual habitat sites have been studied and measured, the data from all sites should be compared to determine habitat requirements of ridgenose rattlesnakes in the Animas Mountains and Sierra San Luis.

2.3 Determine behavior patterns.

Little is known of the ecology of ridgenose rattlesnake

populations in the Animas Mountains and Sierra San Luis. In order to better manage and protect these populations, data on their behavior and other pertinent factors governing their activity are needed.

2.31 Activity patterns. The time of capture and atmospheric conditions as well as any observations of ridgenose rattlesnake activity should be noted. Data on ambient and substrate temperature should be obtained each time a snake is observed.

2.32 Reproductive patterns. In addition to surveying for immature and juvenile snakes, female snakes should be examined to see if they are gravid.

2.33 Other patterns. When possible, individual snakes should be observed for as long as possible prior to capture to monitor their behavior. The behavior of snakes after they have been captured and released should be monitored, also. Other patterns shown by ridgenose rattlesnakes, which appear to be correlated with other biotic and/or abiotic components of the environment, should be investigated.

2.4 Determine prey relationships and the availability of potential prey.

Ridgenose rattlesnakes appear to be rather opportunistic in the types of prey consumed. Seasonally, however, ridgenose

rattlesnakes may have more specialized diets. Data on the types of prey consumed by young and adult snakes and the relative abundance of potential prey items should be monitored, without sacrificing individuals, during the months of April through October.

2.5 Determine sources of mortality, including predation, disease, man's impacts, and related factors.

Many of the factors contributing to ridgenose rattlesnake mortality may be extremely difficult to document, but every effort should be made to do so. We need to develop an understanding of the relative importance of the various sources of mortality.

2.51 Predation. Ridgenose rattlesnakes, especially young snakes, are known to be preyed upon by a variety of predators. However, there are no data on sources of predation or predation rates for ridgenose rattlesnakes in the Animas Mountains or Sierra San Luis.

2.52 Disease. Ridgenose rattlesnakes are known to suffer from a variety of diseases and pathogenic organisms. Little or no information is available, however, on the proportion of individuals in wild populations that are afflicted and the severity of affliction. Data should be gathered on field and captive occurrence of diseases in C. w. obscurus.

2.53 Man's impacts. The impacts of man on ridgenose rattlesnake populations in the Animas Mountains and Sierra San

Luis have been significant in the past. At present, the effects of man in the Animas Mountains have been minimized by restricting access to areas occupied by ridgenose rattlesnakes. However, the future of ridgenose rattlesnake populations in the area will be increasingly dependent on man; therefore, every effort should be made to document mortalities resulting from human intervention or disturbance.

2.54 Related factors. Anything causing, or suspected of causing, the death of ridgenose rattlesnakes in the Animas Mountains and Sierra San Luis should be investigated in order to minimize future mortality.

2.6 Based on the previous factors and other findings and information, develop and implement steps to reduce or eliminate threats to survival of the species.

All data should be integrated into a revised Plan of Action once sufficient data have been obtained as a result of initial investigations.

3.0 Clarify the taxonomic status of ridgenose rattlesnake populations in the Animas Mountains and Sierra San Luis.

The taxonomic status of Crotalus willardi populations throughout their range should be studied. Morphometric and meristic characters should be analyzed to determine if populations in the Animas Mountains and Sierra San Luis constitute a subspecies distinct from C. w. silus populalations of Chihuahua, Mexico. Because of the limited number of

specimens in museums, and rarity of the population, a traditional evaluation of the taxonomic relationships between the various subspecies based on preserved specimens will probably not be possible. Therefore, other alternatives, such as electrophoretic techniques, that will not harm the snake should be used.

4.0 Establish two or three captive populations.

No historic areas of occurrence are presently unoccupied that would be suitable for reintroduction of C. w. obscurus, thus broadening its limited range. Nonetheless, two or three "zoo" populations, one from Sierra San Luis stock and one or two from Animas Mountains stock, would be advantageous. Not only could more be learned about the basic biology of the species by studying such individuals, but surplus individuals could be released into both the Animas Mountains and Sierra San Luis to augment existing populations should the need arise.

5.0 Disseminate information about New Mexico ridgenose rattlesnakes.

Information concerning New Mexico ridgenose rattlesnakes should be disseminated to provide knowledge and understanding of these snakes and to promote support and confidence in the recovery effort.

5.1 Public Information.

Besides providing basic information on the species, a good information program can stimulate support for recovery efforts.

5.11 Local and state. Information on the New Mexico ridgenose rattlesnake should be disseminated to the public locally and statewide to reach as large and as varied an audience as possible. Media to be used include newspapers, state

conservation magazines, radio, and television. Programs should be prepared for broadcast on respective state television programs.

5.12 National. Information concerning New Mexico ridgenose rattlesnakes should also be supplied to media that have national coverage.

5.2 Professional Information.

Technical information will be made available through appropriate media, including scientific journals, agency reports, and regulations concerning New Mexico ridgenose rattlesnakes.

LITERATURE CITED

Anderson, J. D. 1962. A new subspecies of the ridge-nosed rattlesnake, Crotalus willardi, from Chihuahua, Mexico. Copeia 1962:160-163.

Applegarth, J. S., J. C. Bednarz, and M. A. Williamson. 1980. The ridge-nosed rattlesnake in New Mexico: a review of existing information and a search for suitable habitat on public lands. Unpubl. report to the Bureau of Land Management. Las Cruces, New Mexico. 140 pp.

Armstrong, B. L., and J. B. Murphy. 1979. The natural history of Mexican rattlesnakes. University of Kansas Museum of Natural History, Special Publication No. 5. viii + 88 pp.

Bogert, C. M., and W. G. Degenhardt. 1961. An addition to the fauna of the United States, the Chihuahua ridge-nosed rattlesnake in New Mexico. American Museum Novitates, No. 2064. 15 pp.

Collins, J. T., R. Conant, J. E. Huheey, J. L. Knight, E. M. Rundquist, and H. M. Smith. 1982. Standard common and current scientific names for North American amphibians and reptiles. Society for the Study of Amphibians and Reptiles Circular 12:1-28.

Degenhardt, W. G. 1975. A report submitted to the U.S. Fish and Wildlife Service: the first year of the study of the Animas ridge-nosed rattlesnake, Crotalus willardi. Albuquerque, NM. 4 pp.

Dobrott, S. J. 1980. A management plan for the Animas Mountains, Hidalgo County, New Mexico. Management plan submitted to the Victorio Company.

Fitch, H. S. 1970. Reproductive cycles in lizards and snakes. University of Kansas, Museum of Natural History Miscellaneous Publication No. 52. iv + 247 pp.

Fowlie, J. A. 1965. The snakes of Arizona. Published by the author (distributed by Azul Quinta Press. Fallbrook, California). iv + 164 pp.

Harris, H. S., Jr. 1974. The New Mexican ridge-nosed rattlesnake. National Parks and Conservation Magazine 48(3):22-24.

Harris, H. S., and R. S. Simmons. 1975. An endangered species, the New Mexican ridge-nosed rattlesnake. Bulletin of Maryland Herpetological Society 11:1-7.

_____. 1976. The paleogeography and evolution of Crotalus willardi, with a formal description of a new subspecies from New Mexico, United States. Bulletin of the Maryland Herpetological Society 12:1-22.

Hubbard, J. P. 1977. A biological inventory of the Animas Mountains, Hidalgo County, New Mexico. 56 pp.

_____., J. P., M. C. Conway, H. Campbell, G. Schmitt, and M. D. Hatch. 1978. Handbook of species endangered in New Mexico. vi + 187 pp.

Johnson, T. B. 1983. Status report: Crotalus willardi willardi (Meek 1905). Unpubl. report to the Office of Endangered Species, U.S. Fish and Wildlife Service. Albuquerque, New Mexico. ii + 70 pp.

Kauffeld, C. F. 1943. Field notes on some Arizona reptiles and amphibians. The American Midland Naturalist 29:342-359.

Klauber, L. M. 1949. The subspecies of the ridge-nosed rattlesnake, Crotalus willardi. Transactions of the San Diego Society of Natural History 11:121-140.

_____. 1956. Rattlesnakes: their habits, life histories, and influence on mankind. University of California Press, Berkeley. Two volumes. xxx + 708 pp and xviii + 709-1476 pp.

_____. 1972. Rattlesnakes: their habits, life histories, and influence on mankind. Second edition (with revisions). University of California Press, Berkeley. Two volumes. xxx + 740 pp. and xxviii + 741-1533 pp.

Leopold, A. S. 1950. Vegetation zones of Mexico. Ecology 31:507-518.

Lowe, C. H. 1964. Editor: The vertebrates of Arizona. The University of Arizona Press, Tucson. x + 270 pp.

McCranie, J. R., and L. D. Wilson. 1978. A second Mexican specimen of Crotalus willardi obscurus from the Sierra San Luis, Chihuahua, with comments on other members of the herpetofauna. Herpetological Review 9:108-109.

Meek, S. E. 1905. An annotated list of a collection of reptiles from southern California and northern Lower California. Field Columbian Museum, Zoological Series (Fieldiana: Zoology) 7:1-19.

New Mexico Department of Game and Fish. 1975. State Game Commission's Regultion No. 563: protection of endangered species and subspecies of New Mexico. Adopted 24 January 1975.

_____. 1979. State Game Commission's Regulation No. 599: listing of endangered species and subspecies of New Mexico. Adopted 25 May 1979.

_____. 1980. State Game Commission's Regulation No. 599, as amended 20 June 1980: listing of endangered species and subspecies of New Mexico. Adopted 20 June 1980.

_____. 1983. State Game Commission's Regulation No. 642: listing of endangered species and subspecies of New Mexico. Adopted 22 July 1983.

Russell, F. E. 1980. Snake venom poisoning. J. B. Lippincott Company, Philadelphia. xiv + 562 pp.

Shine, R. 1983. Reptilian viviparity in cold climates: testing the assumptions of an evolutionary hypothesis. Oecologia 57:397-405.

Stebbins, R. C. 1954. Amphibians and reptiles of western North America. McGraw-Hill Book Company, Inc., New York, xiv + 529 pp.

Swarth, H. S. 1921. The type locality of Crotalus willardi Meek. Copeia 1921:83.

Tryon, B. W. 1978. Reproduction in a pair of captive Arizona ridge-nosed rattlesnakes, Crotalus willardi willardi (Reptilia, Serpentes, Crotalidae). Bulletin of the Maryland Herpetological Society 14:83-88.

U.S. Fish and Wildlife Service. 1977. Proposed endangered status and critical habitat for the New Mexican ridge-nosed rattlesnake. Federal Register 42(102):27007-27009.

_____. 1978. Listing of the New Mexican ridge-nosed rattlesnake as a threatened species with critical habitat. Federal Register 43(151): 34476-34480.

_____. 1980. In jeopardy - America's endangered species: ridge-nosed rattlesnake. Leaflet, 4 pp.

U.S. Soil Conservation Service. 1974. Gross annual lake evaporation, New Mexico. Hydrologic map No. 4-R-33582.

_____. 1975. Normal annual precipitation, New Mexico. Hydrologic map No. 4-R-33714.

Vorhies, C. T. 1948. Food items of rattlesnakes. Copeia 1948:302-303.

Wagner, P. L. 1964. Natural vegetation of Middle America. Pages 216-264 in: R. Wauchope and R. C. West, editors. Handbook of Middle American Indians. Volume 1. Natural environment and early cultures. University of Texas Press, Austin. vii + 570 pp.

GENERAL CATEGORIES FOR IMPLEMENTATION SCHEDULE

Information Gathering - I or R (Research

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

Acquisition - A

1. Lease
2. Easement
3. Mangement agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depredation control
6. Disease control
7. Other Management

Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

Task Priority

Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly.

Priority 2 - An action that must be taken to prevent a significant decline in species population habitat quality or some other significant negative impact short of extinction.

Priority 3 - All other actions necessary to provide for full recovery of the species.

Abbreviations

NMDGF - New Mexico Department of Game and Fish
Mgmt. - Management
LE - Law Enforcement
RE - Realty
R&D - Research and Development
SEDUE - Secretaria de Desarrollo Urbano y Ecologia

PART III - IMPLEMENTATION SCHEDULE

NERAL TEGORY (1)	PLAN TASK (2)	TASK # (3)	PRIORITY # (4)	TASK DURATION (5)	RESPONSIBLE AGENCY FWS REGION (6)	RESPONSIBLE AGENCY FWS PROGRAM (6a)	RESPONSIBLE AGENCY OTHER (7)	FISCAL YEAR COSTS (EST.)* FY1 (8)	FY2	FY3	COMMENTS (9)
02	New Mexico Wildlife Conservation Act and its Regulations	1.11	2	Ongoing			NMDGF**				Exclusively a State activity
02	Federal Endangered Species Act and its Regulations	1.12	2	Ongoing	2	Mgmt. LE		5,000	5,000	5,000	Enforce Sections 7 & 9
A3	Establish cooperative agreement with landowners	1.21	2	Until accomplished	2	Mgmt. RE	NMDGF	5,000	5,000	5,000	
A3	Develop a joint U.S./ Mexico Agreement to protect and study the species in Mexico	1.22	3	Ongoing	2	Mgmt. IA		5,000	5,000	5,000	Should be included in present U.S./ Mexico agreement
A7	Other alternatives	1.3	3	Until accomplished, if necessary	2	Mgmt. RE	NMDGF				Any costs assigned would be speculative
I2	Survey suitable habitats	2.11	3	2	2	Mgmt. R&D	NMDGF SEDUE***		5,000	5,000	

PART III - IMPLEMENTATION SCHEDULE

GENERAL CATEGORY (1)	PLAN TASK (2)	TASK # (3)	PRIORITY # (4)	TASK DURATION (5)	RESPONSIBLE AGENCY FWS REGION (6)	RESPONSIBLE AGENCY FWS PROGRAM (6a)	RESPONSIBLE AGENCY OTHER (7)	FISCAL YEAR COSTS (EST.)* FY1 (8)	FY2	FY3	COMMENTS (9)
I2	Capture, mark, photograph, and/or radio tag and release ridgenosed rattlesnakes	2.12	3	2	2	Mgmt. R&D	NMDGF SEDUE		5,000	5,000	
I3	Determine habitat requirements, including vegetation and associated parameters	2.2	3	2	2	Mgmt. R&D	NMDGF SEDUE		2,000	2,000	Should be done concurrently with 2.11 & 2.12
I6	Activity patterns	2.31	3	2	2	Mgmt. R&D	NMDGF SEDUE		2,000	2,000	
I6	Reproductive patterns	2.32	3	2	2	Mgmt. R&D	NMDGF SEDUE		2,000	2,000	
I6	Other patterns	2.33	3	2	2	Mgmt. R&D	NMDGF SEDUE		4,000	4,000	
I3	Determine prey relationships & the availability of potential prey	2.4	3	2	2	Mgmt. R&D	NMDGF SEDUE				Should be done concurrently with 2.1, 2.2, & 2.3

PART III - IMPLEMENTATION SCHEDULE

GENERAL CATEGORY (1)	PLAN TASK (2)	TASK # (3)	PRIORITY # (4)	TASK DURATION (5)	RESPONSIBLE AGENCY FWS REGION (6)	RESPONSIBLE AGENCY FWS PROGRAM (6a)	RESPONSIBLE AGENCY OTHER (7)	FISCAL YEAR COSTS (EST.)* FY83 (8)	FISCAL YEAR COSTS (EST.)* FY84	FISCAL YEAR COSTS (EST.)* FY 85	COMMENTS (9)
I6	Predation	2.51	3	2	2	Mgmt. R&D	NMDGF SEDUE		2,000	2,000	
I6	Disease	2.52	3	2	2	Mgmt. R&D	NMDGF SEDUE		2,000	2,000	
I6	Man's impacts	2.53	3	2	2	Mgmt. R&D	NMDGF SEDUE		2,000	2,000	
I14	Related factors	2.54	3	2	2	Mgmt. R&D	NMDGF SEDUE		2,000	2,000	
M4	Develop action plan	2.6	3	1	2	Mgmt.	NMDGF SEDUE	3,000			
R5	Clarify the taxonomic status of ridgenosed rattlesnake populations in the Animas & San Luis Mountains	3.0	3	2	2	Mgmt. R&D	NMDGF SEDUE	5,000	5,000		C. w. obscurus cannot be sacrified; feasibility of using electrophoretic techniques should be considered.

PART III - IMPLEMENTATION SCHEDULE

GENERAL CATEGORY (1)	PLAN TASK (2)	TASK # (3)	PRIORITY # (4)	TASK DURATION (5)	RESPONSIBLE AGENCY FWS REGION (6)	RESPONSIBLE AGENCY FWS PROGRAM (6a)	RESPONSIBLE AGENCY OTHER (7)	FISCAL YEAR COSTS (EST.)* FY83 (8)	FISCAL YEAR COSTS (EST.)* FY84	FISCAL YEAR COSTS (EST.)* FY 85	COMMENTS (9)
M1	Establish two or three captive populations	4.0	3	2	2	Mgmt.	NMDGF SEDUE	3,000	3,000	3,000	Gladys Porter Zoo, Brownsville, TX, & Rio Grande Zoo, Albuquerque, NM, are suggested locations for captive populations
01	Local and State	5.11	3	Ongoing	2	Mgmt.	NMDGF	1,000	1,000	1,000	
01	National	5.12	3	Ongoing	2	Mgmt.	NMDGF	1,000	1,000	1,000	
01	Professional information	5.2	3	Ongoing	2	Mgmt.	NMDGF	1,000	1,000	1,000	

*refer only to U.S. Fish and Wildlife Service costs
**New Mexico Department of Game and Fish
***Secretaria de Desarrollo Urbano y Ecologia, Mexico

APPENDIX

COMMENTS AND RESPONSES

The following comments were received from reviewers of the technical and agency review drafts of the New Mexico Ridgenose Rattlesnake Recovery Plan and are arranged alphanumerically, e.g., A1, A2, etc. Responses to comments are similarly listed alphanumerically.

A-1 The authors correctly used the best available information, published and unpublished, in writing this recovery plan; appending Applegarth, et al. (1980) to the plan would not have increased the amount of pertinent information.

A-2 Many recovery plans are similar, because species are often threatened or endangered for similar reasons; some recovery actions have greater immediacy than others, as reflected in priorities assigned to them in Part III.

A-3 Agreed, except fall surveys would allow observation of young-of-the-year.

A-4 Task 1.0 and its subtasks discuss alternatives for protecting habitat.

B-1 See response A-1.

B-2 Crotalus willardi obscurus was listed in 1978 as threatened under the criteria of Section 4 of the Endangered Species Act of 1973, as amended; the best scientific and commercial data available at the time of listing were used to determine the status of the species.

B-3 Agreed.

B-4 The range of C. w. willardi is stated correctly.

B-5 The habitats of the southern, central, and northern subspecies are somewhat different, as reflected by wording in the recovery plan.

B-6 Even though Indian Creek is not easily traversed, it is less difficult than other areas in the Animas.

Habitat descriptions are accurate.

B-7 Discussion of arboreal behavior was appropriately reworded.

B-8 Nothing more was intended than the possibility that was stated.

B-9 The original statement was made by Klauber, not Applegarth.

B-10 Degenhardt and co-workers focused their efforts along Indian Creek, but their catch per effort was not greater. New Mexico Department of Game and Fish personnel worked all habitats for all species and their catch per effort was greater.

COMMENTS AND RESPONSES cont.

B-11 This paragraph is arbitrary, but it emphasizes the need for population data and the potentially detrimental effects on the population of removal of a few snakes.

B-12 Agreed.

C-1 Done.

C-2 Unfortunately, data on the taxon in Mexico is not available, and probably does not exist.

C-3 Appropriate parts of the plan were reworded to comply as much as possible with these suggestions.

C-4 See A-19 and page 23 of the plan.

C-5 These suggested objectives would be accomplished by implementation of tasks 1.21, 1.22, and 2.53.

C-6 The wording of 1.2, 1.21, 1.22, and 1.3 reflects the preferred sequence by which protection should proceed.

C-7 The Step-down narrative describes what actions should be undertaken for recovery of the species. The Implementation Schedule describes agency responsibilities and funding requirements for the tasks.

C-8 Corresponding editorial corrections were made.

D-1 Done.

D-2 Done.

D-3 Specific alternatives cannot be listed until the needs of the species are understood.

D-4 Agreed.

D-5 Agreed.

D-6 Agreed.

D-7 Wording changed.

D-8 Agreed.

D-9 The intent to study populations is clearly stated in the first sentence of 2.53. Habitat issues are addressed in 1.2, 1.3, 2.11, and 2.2.

COMMENTS AND RESPONSES cont.

D-10 Any techniques which might produce reliable, pertinent data would be considered for possible use. Actual techniques to be used cannot be identified until all are considered and evaluated.

E-1 All editorial corrections were made.

F-1 Comments treated appropriately.

F-2 Done.

F-3 Done.

F-4 Done.

F-5 Done.

F-6 Done.

G-1 Agreed.

G-2 Agreed.

G-3 Wording clarified.

G-4 Animas Mountains only.

UNITED STATES GOVERNMENT

memorandum

	Eng. Sp. R-2
✓	JOHNSON
✓	Bowman
	Carley
	Halverson
	Hoffman
	Kolowski
	Lankowski
	KAYSER
	Hoop
	Padilla
	SANCHEZ
FILE	NM ridge-nosed rattlesnake recovery plan (NMRR) RF

DATE: 21 February 1984

REPLY TO ATTN OF: Norman J. Scott, Jr., Denver Wildlife Research Center, Albuquerque

SUBJECT: New Mexico Ridge-nosed Rattlesnake Recovery Plan

TO: James E. Johnson, Endangered Species, Albuquerque

Thank you for the opportunity to comment on the technical review draft of the New Mexico Ridge-nosed Rattlesnake (NMRR) Recovery Plan.

A-1 The Plan is well put together although I would have preferred to see less reliance on unpublished and generally inaccessible reports. Perhaps Applegarth's at least should be included as an appendix.

A-2 My main concern is that the study plan (2.0) is sort of a shopping list that could apply to any species and is not generally practical for the NMRR. How much money did the USFWS spend for a four page report covering 11 snake sightings? I don't believe that we need to repeat these errors. The studies of activity, reproductive, and behavioral patterns are even tougher to study; furthermore, I don't think that they are essential to good conservation of the species.

A-3 I would suggest that the habitat be studied, instead. Annual surveys of NMRR range should be initiated and the habitat monitored using transects or other permanent sampling stations. At the same time, these people could study any snakes that they find, but, more importantly, they could note any habitat perturbations.

This design should take two people about two weeks each spring. I feel that this will adequately insure the well-being of the NMRR without putting an unnecessary burden on scarce species recovery funds.

A-4 I do believe that a mechanism for purchase of the Animas Range should be designed (perhaps through the Nature Conservancy?) so that it could be rapidly implemented in case negotiations for agreements with the landowners breakdown.

Norm

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FEB 24 '84

SE

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(REV. 1-80)
GSA FPMR (41 CFR) 101-11.6
5010-114

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FRANCES W WERNER, Tucson
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BUD BRISTOW

Deputy Director
ROGER J GRUENEWALD

End. Sp. R 2
JOHNSON

ARIZONA GAME & FISH DEPARTMENT
2222 West Greenway Road Phoenix, Arizona 85023 942-3000

March 1, 1984

James E. Johnson
Chief, Endangered Species
U. S. Fish and Wildlife Service
P. O. Box 1306
Albuquerque, New Mexico 87103

Dear Dr. Johnson:

Enclosed is the review copy you sent us of the draft New Mexico Ridge-nosed Rattlesnake Recovery Plan. Simple editorial comments are marked on the copy. Additional comments are offered below.

In general, we believe this document needs substantial revision. Part I is basically an incompletely condensed version of Applegarth's excellent 1980 status review of Crotalus willardi obscurus. Novel information is lacking in this report. Para-
B-1 phrasing would be improved by direct consultation with the original materials. It might be a better approach to attach the step-down plan to the original Applegarth report, with Applegarth himself doing the abridging necessary and incorporating the additional information available in Johnson (1983).

Despite these criticisms, we acknowledge the difficult task at hand for the authors. Little is known about obscurus. Few biologists have recorded for the scientific literature their field observations. Even fewer have attempted to study obscurus in the rugged Animas and San Luis mountains. Hubbard and Applegarth probably have as much field experience with and knowledge of the natural history of obscurus as anyone, save perhaps Degenhardt and Bogert and some anonymous "snakers" mentioned in any reference on obscurus.

It is remarkable that obscurus has gained Federal and New Mexico protected status without more knowledge being gained of it.
B-2 Even with the addition of the few specimens deposited in the University of Arizona collections and not included in Applegarth (1980) or Hubbard and Baltosser (draft), there appear to be well under 50 specimens in scientific collections or recorded as sight
B-3 observations by those authors. Clearly field work is needed in the Sierra San Luis at the very least.

An Equal Opportunity Agency

Aside from these general comments, there are specific criticisms to be made of the draft recovery plan for obscurus.

B-4 The range of the nominate subspecies, willardi, also includes the Huachuca and Patagonia mountains, as reported by Johnson (1983), a paper cited elsewhere in this recovery plan. The habitat descriptions on pp. 9-15 are neither complete nor entirely accurate, especially as regards Crotalus willardi as a species. The implication in paragraph two (p. 9) is that the elevated plateaus inhabited by willardi in the central and southern parts of its range in Mexico differ markedly from the pine-oak canyon bottoms it frequents in New Mexico and Arizona. In fact, for example, the canyons inhabited by willardi in the

B-5 Sierra del Nido are predominantly pine-oak, sharing many tree species with the northerly canyons. See also the comments by Hubbard and Baltosser at the bottom on Page 10, citing Armstrong and Murphy (1979) and Anderson (1962).

We question the habitat descriptions provided for obscurus insofar as they address riparian vegetation. The vast majority of records are from a narrow strip of canyon bottom along Indian Creek (p. 10). That is not coincidentally the most easily

B-6 traversed area in the Animas (B. Martin, pers. comm.). However, the vegetation description appears to stress what we would expect to be the vegetation of the slopes of the mountains. We would expect the vegetation configuration in the canyon bottom to be somewhat different, with more riparian species. Perhaps this is not the case, since the Animas and San Luis mountains are said (p. 10) to have a drier climate than those in which other willardi populations occur.

There is no reason to expect that other populations of willardi are as arboreal as obscurus apparently is (p. 16). The other subspecies, at least the nominate one, have been observed more often in the field with fewer observations of arboreal be-

B-7 havior recorded than for obscurus. They well may all be arboreal but present knowledge does not indicate so.

The statement on p. 16 indicating willardi may include

B-8 scavenging implies far more than appeared to be intended by the original author (not cited therein) of that statement, Applegarth.

The final paragraph of Reproduction, on pp. 17-18, is not clearly linked to willardi in general, let alone as an important

B-9 factor in the recovery plan. At the least, since it is almost verbatim what Applegarth stated, proper credit should be given.

The population estimates (snakes per unit effort) compared on p. 18 are not clearly comparable. No comment is made on the

B-10 habitats or total areas searched by the two different groups. If one focused on the bottomlands along Indian Creek, surely the catch per unit effort would be greater. However, attempting to

find obscurus on the drier slopes away from the creek is extremely valuable in identifying the actual area in which it lives. For "rare" snakes, whether they be truly rare or simply inconspicuous, catches per unit effort is better left unsaid. Simple comparisons to other species of snakes with which it occurs would be much more useful.

The arbitrarity in paragraph two on p. 19 (effects of collecting is so great that the arguments given carry no weight and little
B-11 value. We recommend deleting the entire paragraph or substantiating the reasoning behind the estimates given.

We have several comments to make about the step-down recovery plan developed by Hubbard and Baltosser (Part II, pp. 27-29). We strongly recommend consideration of development of 3-5 zoo popula-
B-12 tions of obscurus for captive breeding as a step in this plan. That would require medical investigation of the disease and infertility problems discussed by Jarchow (1982, pers. comm. to Johnson 1983). Otherwise, the step-down seems quite comprehensive and thorough.

In summary, the authors have provided a valuable service in taking the early steps needed to develop a recovery plan for obscurus. Given the lack of information available, the authors have undertaken a thankless and difficult task. This draft plan, with substantial revision and a commitment of resources necessary for implementation, could result in better management of a very restricted species.

We would be happy to offer further comment or assist you as needed.

Sincerely,

Bud Bristow, Director

Terry B. Johnson
Nongame Branch Supervisor

TBJ:rp
Enc.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

ADDRESS ONLY THE DIRECTOR,
FISH AND WILDLIFE SERVICE

In Reply Refer To:
FWS/OES

FEB 21 1984

Memorandum

To: Regional Director, Region 2 (ARD/AFF)

From: Acting Associate Director

Subject: Review of New Mexico Ridge-nosed Rattlesnake Recovery Plan - Technical Draft

We have reviewed the subject plan and offer the following comments:

1. Since the New Mexico ridge-nosed rattlesnake (NMRR) has a highly restricted range which also extends into Mexico, it would seem appropriate that the status and recovery needs of the subspecies throughout its range be addressed in order to fully evaluate, prioritize, and maximize the effectiveness of recovery actions for this subspecies. Therefore, we
C-1 suggest either the plan be revised to include Mexican populations with input and agreement from ~~Instituto Nacional de la Pesca~~ Fauna Silvestre, Mexico, or that a task be included in the Step-down Outline to "Develop a joint U.S./Mexico agreement for NMRR recovery efforts throughout its range."

Regardless of the subsequent direction of the plan, it would be helpful to
C-2 provide additional information in Part I on the status of the NMRR in Mexico, including more specific distribution data if available.

2. The goals or objectives identified in Part II should be reevaluated
C-3 to take into account the subspecies' entire range. Goals should describe, as specifically as possible, the criteria which must be met for delisting consideration; for example:

a) assurance of long-term protection of an identified amount of habitat through cooperative agreements, easements, acquisition, or other appropriate means (amount may need to be determined based on population studies under task 2.1);

b) assurance of continued legal protection from collecting through State and Mexican law; and

c) a minimum population size (this may in part be determined from field studies identified under task 2.1).

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FEB 24 1984

C-4 If it appears that the subspecies' status cannot be improved to a point at which delisting can be considered, this should be clearly stated.

3. Page 20 - The plan indicates that fire and/or excessive cattle grazing could affect the continued survival of the NMRR. Therefore, we suggest
C-5 a separate task be identified in the Step-down Outline to determine impacts of fire and cattle grazing on NMRR habitat.

4. Page 28, task 1.2 "Establish cooperative agreement with landowners" - subtasks 1.21 and 1.22 concern habitat protection and access control to prevent illegal take, while task 1.3 identifies the need for alternative protective measures if cooperative agreements cannot be obtained. We
C-6 suggest that task 1.2 be rewritten to state "Insure long-term protection of critical or essential habitat." The narrative can then identify some of the alternatives such as cooperative agreements, acquisition, and easements, and the need to determine and implement the most effective and appropriate alternatives. Access restrictions could be negotiated with cooperative agreements or easements or would logically become the responsibility of the Federal, State, or private conservation organization purchasing the habitat.

Subtasks 1.21, 1.22, and 1.3 should be deleted.

5. Page 28 - Many of the subtasks under task 2 "Investigate status and biology of ridge-nosed rattlesnake" can be eliminated as they are only describing some of the specific aspects of a discrete action item (see attached pages 28-29). A subtask should be identified only if it is going to be funded and implemented independently from other tasks or subtasks.
C-7 Specific details of an action item should be discussed in the Step-down Narrative.

C-8 6. Additional editorial and minor comments are noted on attached pages 1-3, 9, 10, 14-20, 23, 25, 26-29, and 33.

The authors have prepared a well written plan with excellent biological data, and we hope these comments will be helpful during the development of the next draft. If you disagree with these comments, please provide an explanation in a cover memorandum with five copies of the next draft.

James R. Fielding

Attachment

[illegible] Fielding

BRUCE BABBITT, *Governor*

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ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 942-3000

October 22, 1984

David Bowman
Endangered Species Biologist
U. S. Fish & Wildlife Service
P. O. Box 1306
Albuquerque, New Mexico 87103

Dear David:

Thank you for the opportunity to review the most recent version of the draft recovery plan for Crotalus willardi obscurus. Both Cecil Schwalbe, Departmental herpetologist, and I have reviewed it. We offer below comments that were not included in our earlier review (c.f. letter to USFWS, dated 1 March 1984). Several criticisms included in that earlier review but which did not result in revision of the manuscript are not repeated herein, although we still endorse them. Minor editorial lapses are noted on the draft.

Step-down Outline

Comments on this section are addressed through comment on the Step-down Narrative.

D-1 Goal. For the sake of consistency, we recommend revising the goal statement of either the Outline or the Narrative so that both read the same.

D-2 1.22 Correct spelling of Republic
Underline C. w. obscurus
Delete "within their borders"

D-3 1.3 If there are no more "alternatives" to list, simplify this to read as a straight-forward intent-to-acquire statement.

D-4 2.12 Snakes should also be sexed, weighed and measured.

D-5 2.2 Species lists of perennial grasses, shrubs, trees, etc. should be recorded for all capture sites. If this is what is intended by measuring "diversity", we agree but would re-word accordingly.

D-6 2.31 We urge that information on humidity (soil and air), rainfall (showered recently, etc.) and cloud cover also be recorded at time of capture or other observation.

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D-7 2.4 This section should mention (briefly) how prey items consumed will be monitored. Will obscurus be sacrificed, palpated or ...?

D-8 2.52 There should be a commitment in this section to gathering data on field and captive occurrence of diseases in obscurus.

D-9 2.53 We believe that not "every effort should be made to document mortalities resulting from human intervention or disturbance." As stated, this appears to imply an emphasis on individuals rather than on populations (e.g. habitats) in order to conserve the species. This attitude has hindered endangered species recovery programs and even a perception of it should be avoided. This comment applies as well to 2.54. Both should be restructured to address habitat issues, to reduce the potential for future misunderstanding.

D-10 3.0 Please clarify what other alternatives would be considered. Electrophoresis is mentioned in the Implementation Schedule but should be included in the Step-down Narrative also.

In general, the step-down plan and implementation schedule seem to us to be well conceived and adequate to the task at hand. I would, however, recommend that USFWS, New Mexico Game and Fish and this Department jointly explore the potential of an interstate Crotalus willardi management program under Section 6 of the Endangered Species Act. If Arizona is successful in entering into such an agreement, we might all obtain more data and achieve greater successes with lesser costs.

If we can be of further assistance, please contact us.

Sincerely,

Bud Bristow, Director

Terry B. Johnson
Nongame Branch Supervisor

TBJ:rp

GOVERNOR
TONEY ANAYA
DIRECTOR AND SECRETARY
TO THE COMMISSION
HAROLD F. OLSON

State of New Mexico

DEPARTMENT OF GAME AND FISH

STATE CAPITOL
SANTA FE
87503

October 26, 1984

Mr. David Bowman
Endangered Species Biologist
U.S. Fish and Wildlife Service
P.O. Box 1306
Albuquerque, New Mexico 87103

Dear David:

Enclosed is an edited copy of the "agency review draft" of the New Mexico ridgenose rattlesnake recovery plan. For the most part the changes are of a typographic nature but there have been a few additions to the plan.

E-1 In your review please note my editorial changes on the following pages:

✓ Title page	✓ Page 21	✓ Page 37
✓ Page 1	✓ Page 23	✓ Page 38
✓ Page 9	✓ Page 25	✓ Page 42
✓ Page 11	✓ Page 26	
✓ Page 14	✓ Page 27	
✓ Page 16	✓ Page 28	
✓ Page 17	✓ Page 33	
✓ Page 18	✓ Page 36	

If you have any questions or additional suggestions, please do not hesitate to contact me.

Sincerely,

William H. Baltosser

William H. Baltosser

Enc.

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OCT 30 '84

SE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
WASHINGTON, D.C. 20240

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In Reply Refer To:
FWS/OES

NOV - 8 1984

Memorandum

To: Regional Director, Region 2 (ARD/AFF)

From: Acting Associate Director

Subject: Comments on Agency Review Draft of the New Mexico Ridgenosed Rattlesnake Recovery Plan

F-1 We have reviewed the subject draft and provided comments in the margins on pages ii, 2, 3, 19, 20, 22, 23, 26, 28, 29, 31-33 and 35-43. In addition, we have the following comments concerning the Implementation Schedule:

F-2 1. The Implementation Schedule should not have entries for every task and subtask but should be limited to entries for the lowest distinct subtasks that can be practically identified. For example, the only entries needed under Task 5.0 are entries for 5.11, 5.12, and 5.2, providing that appropriate wording to adequately describe the tasks is added. Additional entries for 5.0 and 5.1 are redundant. In the case of this plan, entries should include subtasks 1.11, 1.12, 1.21, 1.22, 1.3, 2.11, 2.12, 2.2, 2.31-34, 2.4, 2.51-54, 2.6, 3.0, 4.0, 5.11-12, and 5.2.

NOV 13 1984

F-3 2. Column 8 of the Implementation Schedule refers to actions to be accomplished in FY 83 and FY 84. The regional midyear and end-of-year reports on the implementation of recovery plans do not reference any actions for this species. Refer to fiscal years in column 8 as FY1, FY2, and FY3. If any tasks are currently ongoing, column 9 should reflect it and reference the Program Advice.

F-4 3. Subtask 2.6 should have an entry in the Schedule.

F-5 4. The Schedule should contain a key which identifies all the abbreviations and the category and priority codes.

James R. Fielding

J. R. Fielding

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F-6 See also pp 6, 25, and 30.

We hope that these comments will prove useful in preparing this recovery plan for signature by the Regional Director. If you should disagree with any of the substantive comments, please provide your rationale to the Office of Endangered Species (OES). Upon approval of this plan, please notify OES. Also provide OES with 25 copies of the approved plan when they are available.

This is letter Con

Attachment

IN REPLY REFER TO:
(AHR)

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

POST OFFICE BOX 1306
ALBUQUERQUE, NEW MEXICO 87103

NOV 19 1984

MEMORANDUM

To: Assistant Regional Director - Federal Assistance, Fisheries & Engineering, FWS, Albuquerque, NM (Attn: Endangered Species)

From: Assistant Regional Director - Habitat Resources

Subject: Agency Review Draft Recovery Plan for the New Mexico Ridgenose Rattlesnake (Crotalus Obscurus)

We have reviewed the above recovery plan and feel it does a good job of presenting the status of the ridgenose rattlesnake and actions needed to protect this species. The following comments are provided for your use in finalizing the report.

G-1 Throughout the report reference is made to the Sierra San Luis and San Luis Mountains. If these are one and the same, we should be consistent in using one name.

On Page 24, Section 23 calls for determining activity, reproductive, behavioral, and related patterns. Does not behavioral patterns cover all of these? If not, behavioral patterns should be defined. We suggest this be
G-2 reworded as follows: Determine behavioral patterns including activity, reproductive, and other activity. Item 2.33, behavioral patterns, should be omitted.

On Page 27, Item 1.21 indicates "...terms of the previous cooperative
G-3 agreement with Gray Ranch/Pruett-Wray Cattle Company are still in effect." Are terms of this agreement in effect or just being carried out without an agreement?

G-4 On pages 31-32, Item 2.53 states "...at present, the effects of man have been minimized by restricting access to areas occupied by ridgenose rattlesnakes." However, the report indicates restricted access in the

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Animas Mountains only. Are there restrictions relating to the San Luis Mountains? If so, they should be discussed. If not, this section should be clarified.

A marked up copy of the report is returned for your use. If you have any questions regarding our comments, contact Dick Morgan.

Attachment

James G. Young