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THE PRESENT STATUS OF JAGUARS (*PANTHERA ONCA*) IN THE SOUTHWESTERN UNITED STATES

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Jaguars, *Panthera onca*, are recorded in North America as fossils from the middle Pleistocene, approximately 850,000 years ago (Seymour, 1993). By the end of the Pleistocene, the jaguar's range had become restricted to the southern United States, and there was already a progression toward the shorter, stockier modern jaguar form (Kurtén and Anderson, 1980; Seymour, 1993). In Recent times, the jaguar's range became further restricted, reaching only as far north as Arizona, New Mexico, and Texas (Seymour, 1989).

By the beginning of the 20th century, resident populations were assumed to have disappeared from the United States, though wanderers continued to enter the country from Mexico (Davis, 1978; Nowak and Paradiso, 1983). Brown (1983) however, believed that regular sightings of jaguars in the southwest between 1900-1950 were indicative of a thinly scattered and declining resident jaguar population, not simply accidental wanderers, and Goldman (1932) still described them as regular residents in southeast Arizona. Brown (1986) also felt it was the predator-control programs concurrent with development of the livestock industry between 1880-1965 that fi-

nally eliminated the jaguar from the southwest. A recent assessment of the jaguar's current distribution (Swank and Teer, 1989) places the northernmost limit of established populations in central Mexico.

The jaguar has been listed as an endangered species from the Mexico border southward for more than 25 years (37 Federal Register 6476, 30 March 1971). In 1979, the United States Fish and Wildlife Service acknowledged an "oversight" in not listing the United States portion of the species' range and stated their intentions to correct the error (44 Federal Register 43705, 25 July 1979). This correction was not carried out until 17 July 1997, partly in response to events described below.

On 7 March 1996, a rancher and part-time hunting guide photographed an adult jaguar in the Peloncillo Mountains of southeastern Arizona (Glenn, 1996). Six months later, a second jaguar was photographed in the Baboquivari Mountains of southern Arizona. Both appeared to be males. In April and May of 1997, two additional unconfirmed sightings of jaguars were reported from the Baboquivari and Huachuca Mountains, respectively.

The photographs and sightings stirred local

and national interest in the jaguar, and prompted environmental groups to pressure the United States government to protect and declare critical habitat for the jaguar north of the Mexican border. Ranchers immediately feared that their use of state and federal lands was in jeopardy. State non-game agencies in Arizona and New Mexico, wanting to avoid federal intervention, developed a "Conservation Agreement" and a Jaguar Action Conservation Team to protect the jaguar, while not interfering with the livelihood of the human inhabitants of the region. The question remained, however, what exactly was it that needed protection?

At the request of the Malpai Borderlands Group, an organization established by ranchers, and supported by The Nature Conservancy, scientists, and private individuals in southeastern Arizona and southwestern New Mexico, I traveled to the Malpai Ranch on the border of Arizona and Mexico. From 21–26 June 1997, nearly 1,000 miles was covered by car, on foot, mule back, and by plane to talk to people, visit areas of the most recent sightings, look for tracks of big cats and prey species, and to examine the habitat, human settlement patterns, and potential travel corridors for jaguars in the mountains of southern Arizona, New Mexico, and the Sierra Madre Occidental of northern Mexico. June was selected as an optimal time to search for tracks and sign at available water sources in the mountains. Despite these efforts, no sign of jaguars was found, although tracks and sign were observed of puma (*Puma concolor*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), wild turkey (*Meleagris gallopavo*), mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus*), and javelina (*Pecari tajacu*). There were also no additional reports of jaguars or their sign in the areas of the most recent confirmed sightings.

The historic range of the jaguar has stretched from the wooded canyons of the Sonoran Desert, through the rain forests of South and Central America, to the flooded grassland mosaics of the Brazilian Pantanal and the thickets of the arid Bolivian Chaco region. But, the most robust populations of jaguars have been associated with tropical climates in areas of low elevation with dense cover and year-round water sources (Seymour, 1989; Emmons, 1991). Although more than 85 prey species

have been recorded in the jaguar's diet, jaguars prefer terrestrial mammals with a body mass greater than one kilogram (Seymour, 1989).

The fact that the southwestern United States has been the northern limit of the jaguar's range is not by chance. The more open, dry habitat of the southwest, although apparently suitable for the puma, is marginal for the jaguar in terms of water, cover, and prey densities. The nature of this landscape, ranging from open grassland/shrub communities to mountain woodlands, is not of recent origin but rather a product of both past climatic influences dating back to the Pleistocene, and to relatively recent human activities and settlement patterns in the area (Brown and Davis, 1995).

The greatest number of jaguar reports in North America during the 20th century have occurred in Arizona, yet state records list only 81 sightings between 1848–1994 (Girmendonk, 1994). Of these, 26 were evaluated as credible, and with the two most recently photographed jaguars, only 19 sightings are confirmed. A second list compiled by David Brown (pers. comm.) reports 60 jaguars killed or photographed in both Arizona and New Mexico since 1890. Of 20 individuals identified by sex, only five were females, three of which were with young. The last female with young was reported in 1910. Of 22 reports indicating the time of year of the sighting, 41% were during the winter months of November through January, with the remainder scattered throughout the year.

Attempts to examine landscape changes to define the "natural" state of jaguar habitat at some previous period in the American southwest is difficult. By the time of Spanish settlement in the 1600s, there already were large populations of Native Americans whose activities had greatly affected the ecological balance of the region (Hastings and Turner, 1980). The extensive grasslands were, at least in part, products of repeated fires set by Native Americans in the course of hunting activities. During the subsequent two centuries of Spanish rule in the desert southwest, domestic animals were introduced, so that by 1700, grazing livestock ranged widely throughout the region. By the late 1800s, with Native American cultures in decline and the Spanish gone, centuries of disturbance had already contributed to gross

changes in the landscape. As Americans moved westward, beginning a period of fire suppression, predator control, and large-scale cattle ranching, major watercourses and marshlands had already begun to dry up or become intermittent (Hastings and Turner, 1980; Hendrickson and Minckley, 1984). Much of the native wildlife were already replaced by free-ranging livestock (Hansen, 1992). By the early 1900s, species such as pronghorn (*Antilocapra americana*), white-tailed deer, mule deer, and peccaries were already absent or rare throughout large parts of the region (Hornaday, 1914).

Few animals have been incorporated into the religious beliefs, ideologies, and artistic traditions of ancient civilizations and modern peoples as often as the big cats. Examination of ancient and modern beliefs can often give insight concerning large predators that share the landscape with modern man. Jaguars, in particular, have been a dominant symbol and religious icon throughout much of the neotropics where they still occur as the largest carnivore (Rabinowitz, 1986; Saunders, 1991, 1995). Although Native Americans of the southwestern United States are relatively recent settlers, there is little indication that jaguars ever played a major role in their religious ideology, art, or culture. Instead, feline imagery decorating ritual paraphernalia were mostly patterned after the puma, which was regarded as the supreme hunter associated with rain, fertility, and warriors (Saunders, 1991; Hansen, 1992).

With at least a few reports each decade since the late 1880s, the jaguar cannot simply be considered an accidental wanderer into the United States. Yet, the southwestern United States has never been, at least in recent times, more than marginal habitat at the extreme northern limit of the jaguar's range. Upon critical examination of the available data on jaguar reports in the United States, several points stand out: 1) The number of confirmed or credible jaguar sightings are too few in number to indicate more than the possibility of small, short-lived jaguar populations north of the Mexican border over the last century. 2) The fact that 74% of the animals identified by their sex were male, may be indicative of dispersal movements from south of the border. Although evidence on the migratory or dispersing tendencies of jaguars is sparse (Perry,

1970), males travel over larger distances than females (Schaller and Crawshaw, 1980; Rabinowitz and Nottingham, 1986). A recent study on pumas in New Mexico showed male pumas dispersed an average of 71 miles, with a maximum dispersal of 122 miles (Logan et al., 1996). Faced with fragmented habitats, competition from other predators, and human activities, the possibility of long dispersals by jaguars from populations in Mexico is not unreasonable. 3) The likelihood of jaguars traveling across the border from Mexico, in addition to numerous reports collected by the author and others, points to a strong possibility of resident jaguar populations in northern Mexico, and the need to identify these populations and reassess the true northern limits of the species' distribution. 4) Three sightings of females with young is an indicator of jaguars possibly breeding in the United States in the early 1900s but is not indicative of a long term resident population. All sightings of females with young occurred during or before 1910, and no female has been reported since 1965. 5) The lack of substantial anecdotal evidence, mythology, religious beliefs, or folklore about jaguars in old books, by hunters, or recorded among Native American groups north of the Mexican border strongly suggests a lack of permanent presence even by relatively small numbers of individuals within the last several hundred years. The opposite is true for the puma.

How important are the few individuals that still make their way into the United States? Even if residency is not established, movements by jaguars north of the Mexico border make the southwest region of the United States still part of the present-day range of the jaguar. However, there is no indication that habitat in the southwest United States is critical for survival of the species, or that current ranching activities are preventing jaguars from re-colonizing an area where they do not appear to have resided in any viable numbers in recent times. Furthermore, although jaguars in Arizona and New Mexico have, in the past, been classified as a separate subspecies, *P. o. arizonensis*, based on skull morphology (Nelson and Goldman, 1933; Pocock, 1939), a more recent taxonomic evaluation of the jaguar, also based on skull measurements, found no significant differences among the recognized subspecies of jaguars (Larson, 1997). This calls into ques-

tion any management of wild or captive jaguar populations based on subspecies classification. In conclusion, I support the recent action by the United States Fish and Wildlife Service to list jaguars as endangered within the United States. However, I do not feel that available data indicate that any actions should be taken at this time to secure or manage potential jaguar habitat within the borders of the United States.

In conservation biology, where we deal with limited financial resources, dwindling natural habitats, and human populations as a part of the landscape, we must use our knowledge and resources wisely. Large predators, which need more space and resources than other species, are often the most difficult species to protect and manage for the future. Quigley and Crawshaw (1992) in designing a conservation plan for jaguars in the Pantanal of Brazil, realized the need to integrate ecological requirements with socio-economic realities of the region. Ultimately, if jaguars and other large predators are to be protected and managed successfully, we must use good science and good sense.

Resumen—Durante los años de 1996 y 1997, cuatro jaguares fueron vistos y dos fueron fotografiados en las montañas del sur del estado de Arizona. Estas fotografías impulsaron preguntas sobre el estatus actual del jaguar en los Estados Unidos, ya que únicamente se han confirmado 19 jaguares en Arizona desde 1848. Aunque los jaguares se han considerado en peligro por la agencia gubernamental United States Fish and Wildlife Service al sur de la frontera con México, nunca se han clasificado en peligro en los Estados Unidos. Desde principios del siglo XX, en los Estados Unidos se ha asumido que las poblaciones residentes de jaguares han desaparecido, aunque ocasionalmente se observan animales en México. Durante junio de 1997 el autor viajó a las áreas donde se han visto recientemente los jaguares, con el fin de examinar el hábitat, los patrones de asentamiento de las poblaciones humanas, y el potencial de ser un corredor de movimiento de jaguares en las montañas al sur del estado de Arizona, en el estado de Nuevo México, y en la Sierra Madre Occidental al norte de México. Luego de examinar el hábitat críticamente, y los datos disponibles sobre jaguares en informes realizados en el sur de los

Estados Unidos, se llegó a las siguientes conclusiones: 1) El número de observaciones de jaguares confirmadas o creíbles es muy pequeño, e indica solamente la posibilidad de una pequeña y efímera población en los Estados Unidos en la última década; 2) El hecho de que el 74% de los jaguares identificados sean machos, puede ser indicativo de movimientos de dispersión desde el sur de la frontera, ya que los machos tienden a movilizarse más lejos que las hembras. En presencia de hábitat fragmentado, competencia con otros depredadores, y actividades humanas, la posibilidad de una gran dispersión de poblaciones de jaguares desde México no es descartada; 3) La posibilidad de que jaguares crucen la frontera de México, junto con el gran número de reportes llevados a cabo en México por el autor, indican que existe una alta posibilidad de una población residente de jaguares en el norte de México, e igualmente señalan la necesidad de identificar estas poblaciones y determinar los verdaderos límites norteros de esta especie; 4) El que se hayan visto tres hembras con cachorros puede ser indicativo de que los jaguares se estuvieron reproduciendo en los Estados Unidos a principios del siglo, pero no es indicativo de que exista una población residente actual. Todas las observaciones de hembras con crías han sucedido antes de o durante 1910, y no se ha visto ninguna hembra desde 1965; 5) La carencia substancial de evidencias anecdóticas, mitológicas, religiosas o folklóricas sobre jaguares en libros antiguos, por cazadores, o anotaciones de indígenas nativos americanos al norte de México, sugiere que no hay una presencia permanente ni siquiera un número relativamente pequeño del jaguar en las últimas décadas. Lo opuesto a esto es el caso del puma. Aunque no se puede establecer que los jaguares residen en los Estados Unidos, sus movimientos en la región fronteriza entre México y los Estados Unidos hace que forme parte de la distribución del jaguar, por lo tanto esta especie debe ser igualmente protegida en esta región. No obstante, no hay indicación de que el hábitat al suroeste de los Estados Unidos sea crítico para la sobrevivencia de la especie, o que las actividades rancheras actuales obstaculicen la recolonización del jaguar en un área donde no parecen haber residido en ningún número viable en tiempos recientes.

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