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STATUS OF THE JAGUAR, 1987

A REPORT

by

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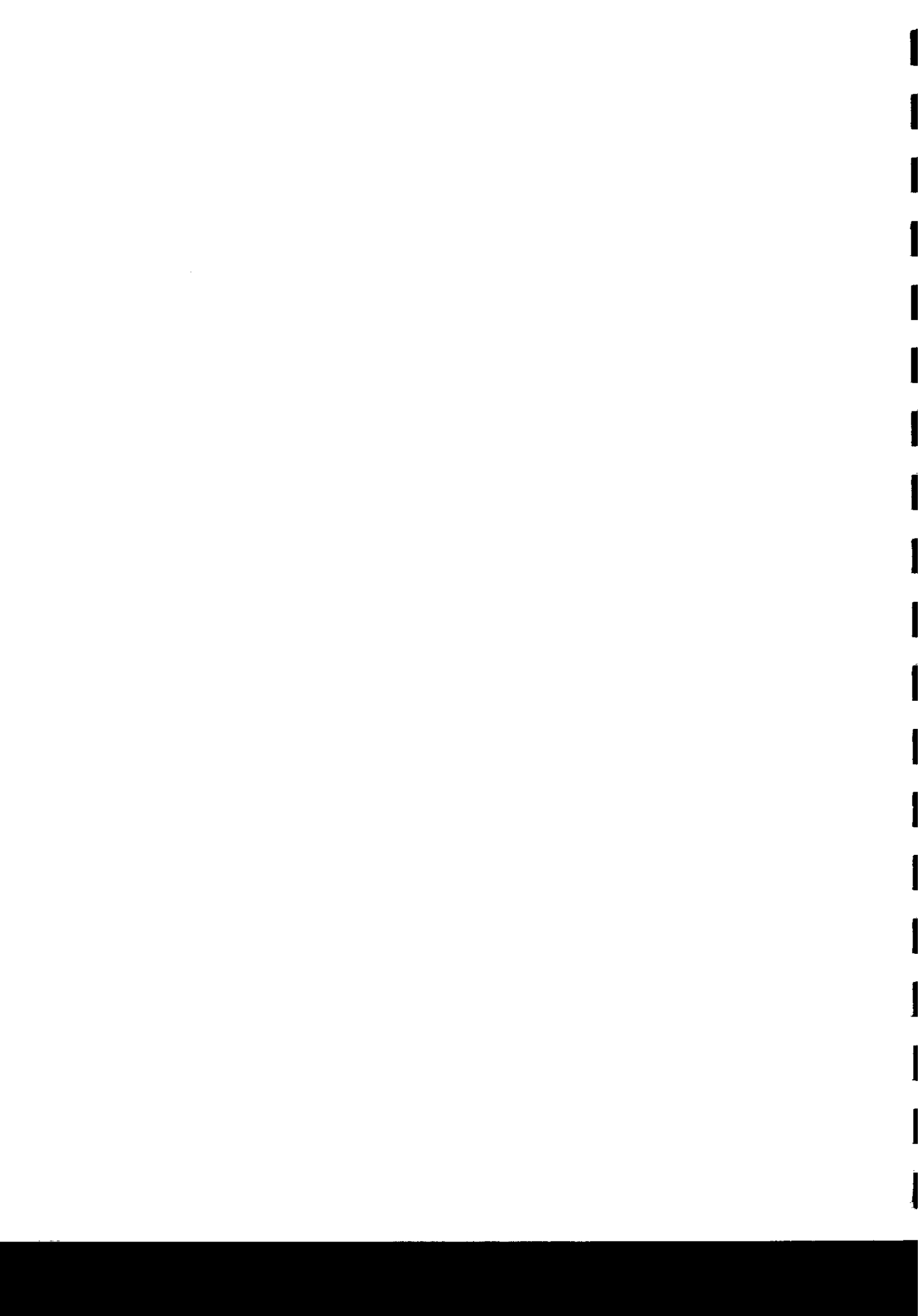
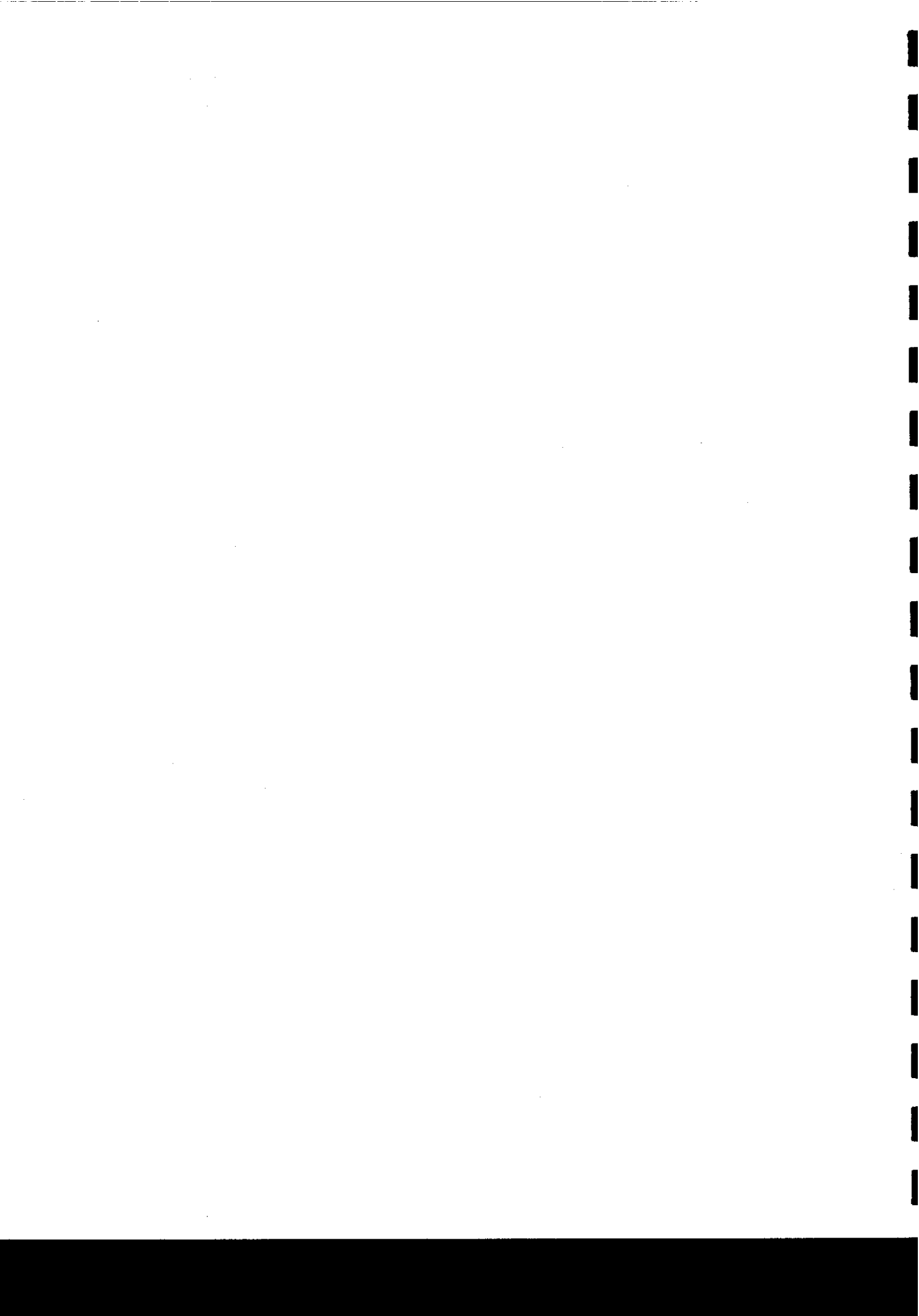
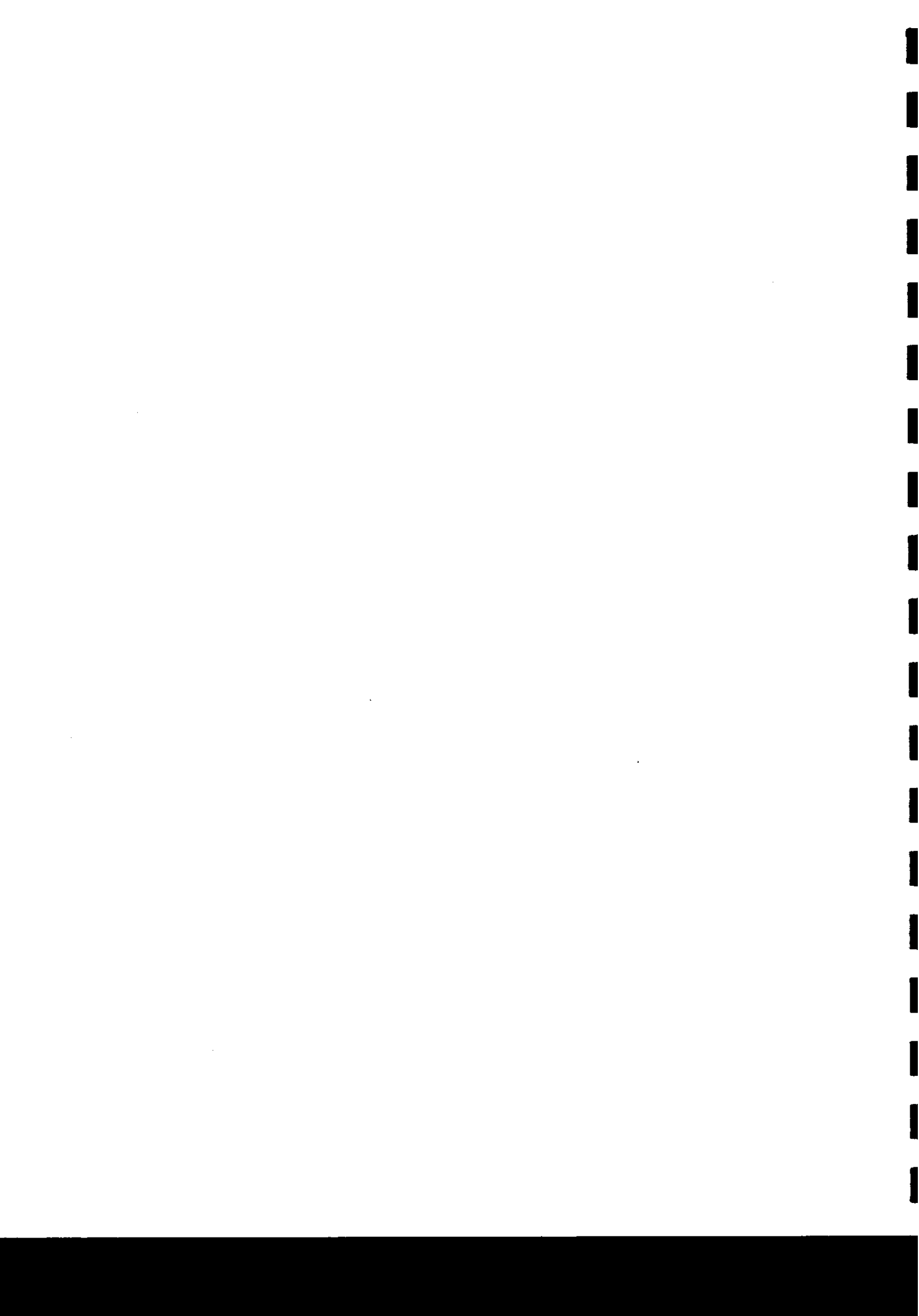


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SUMMARY OF RECOMMENDATIONS

(Extracted from Conclusions and Recommendations, page 33)

Under existing conditions of administration and management of wildlife resources in the countries in which the jaguar occurs, we conclude the species should be retained on Appendix I of the Convention on Trade in Endangered Species. We found no enthusiasm on the part of wildlife organizations or scientist/biologists to change its status; i.e., to take it off the protected list and permit hunting, nor do we recommend that its status be changed under existing conditions.

However, should sound management be instituted in selected areas of the jaguar's range, we view wise use of the species as a positive measure to protect its future in the long term. Loss of habitat will continue and this factor, not sport hunting, will likely deliver a telling blow to the species' persistence and survival in much of its present range. Given some economic worth, the species can likely be protected outside parks and reserves, many of which are presently the chief remaining bastions of protection for the species in certain countries.

INTRODUCTION

The jaguar was placed on the endangered species list by the U. S. Fish and Wildlife Service in 1972, on Appendix I of the International Convention on Trade in Endangered Species of Wild Fauna and Flora in 1973, and was designated a vulnerable species by the International Union for the Conservation of Nature in 1976. It was assigned to endangered status along with seven other spotted cats largely because of large numbers of skins and other products of these animals being traded throughout the world.

Great numbers of wild felids were being used in the fur industry for garments, purses, and curios. Decline in numbers of various species of spotted cats was blamed on heavy harvesting for the trade. Smith (1976) estimated the density of jaguars at one per $\frac{1,000}{\text{km}^2}$ or a population of 50,000 per 5,000,000 km^2 of the Brazilian Amazon Basin. About 15,000 were taken each year in the late 1960's. He presented tabular information from the Office of Endangered Species of the U. S. Fish and Wildlife Service which showed 13,516 were imported into the United States in 1968 and 9,831 in 1969. More than half of these were imported from Brazil with less than 1,000 each from Colombia, Peru, Bolivia, Paraguay, and Mexico in 1969. The number of skins exported was greatly reduced after the formation of CITES.

After 1976 the Federal Republic of Germany was the largest importer and consumer of skins of wild cats, and South America provided the bulk of cat skin imports (Caldwell 1984). Brazil was the most important source or country of origin of the exports through 1981. Lesser but significant numbers came in from Argentina, Paraguay and Colombia. Paraguay was

alleged to be the major exporting country after 1979. Even though exports of cat skins from Paraguay to Germany has decreased since 1979, the number is still very large and totaled 95,000 skins of several species of spotted cats in 1982.

The number of cat skins entering the commercial trade began to decline in the early 1980's (Caldwell 1984). Smith (1976) considered the jaguar populations in part of Para state of Brazil in the Amazon Basin to have made some recovery as early as 1974. Shipments of jaguar skins to the United States began to decline as early as 1969 (McMahan 1986); however, shipments out of Peru to other countries continued to escalate at least through 1970 (Myers 1973). The number of jaguars in trade continued to decline in the 1980's except for a shipment from Paraguay to Italy of 587 skins in 1980 (Broad 1987). Prices paid for jaguar skins reached a high of \$130 to \$180 U.S. in the early 1970's (Doughty and Myers 1971, Smith 1976).

The jaguar's pelage is definitive in character and poses no particular problem in identification; however, differentiation of spotted cat skins of other species was a factor in placing all of them on Appendix I.

By and large, sufficient information was not available to carefully assess the status of all spotted cats at the time of the Convention on International Trade of Endangered Species (CITES) and the decision was made to protect all species. If errors were to be made, the determination of conservation organizations was to favor protection of the species rather than risking over-exploitation or, even worse, complete extirpation or even extinction. Conservatism to reduce risk was and still is the

policy of the scientist/administrators of the U. S. Fish and Wildlife Service, CITIES, and other conservation agencies who make decisions on the status and proper placement of species where numbers are in question.

The problem with determining population levels of certain felids is obvious. The jaguar in its most pristine and favorable habitat is a relatively rare denizen of mostly dense forested habitat. It is largely nocturnal, secretive and clever in its habits, and widespread in distribution in the Neotropics. Like most carnivores, it is difficult to census, and little solid data has been published over large areas of its range. In sparse numbers, the problem of censusing these large animals is almost impossible over most of the South American continent and Central American core.

A great proportion of the literature on the jaguar is anecdotal records of occurrence and events. The status of the species has been reckoned through searches of a sparse literature and through interviews of wildlife scientists who have worked with local populations of the species. It is quite obvious, from evaluation of these reviews, that the jaguar's status is not definitively known from much of its range. Some studies have suggested that it is numerous, or relatively so in terms of cat populations, in some areas. It has been extirpated in others. Only sketchy information is available in the literature concerning its present range and population levels.

This much is known. It now occurs in a broad belt from northern Mexico through Central America and into South America as far south as Argentina. Although its original range has decreased, it still occurs in large blocks of the Amazon Basin and in disjunct populations of varying

numbers in Central and South America. It was thought the jaguar had been extirpated from the United States; the last known record was recorded in southeastern Arizona in 1971 (Nowak 1975, Brown 1983). However, a jaguar was killed in Arizona in December 1986 (Brown per. comm.). There is mounting evidence that it faces extinction in several Latin American countries including Argentina, Costa Rica and Panama. It is judged to be extinct in El Salvador, Uruguay and Chile and perhaps in the United States. It appears to occur in some numbers in every other sovereign country from Mexico to its southernmost range.

Several scientists have attempted assessments of the status of the jaguar. Most studies have been relatively localized studies of the ecology of the species. Others have attempted to evaluate the species' status with very sketchy data. The fact is that not a single investigator has been able to report with accuracy the numbers of cats in its range in any country.

Leopold (1959) reported the jaguar was practically extirpated from the tropical lowlands of Mexico, but was still present in good numbers in some areas of southern Mexico. Hornocker (1971) after a survey of five South American countries and Mexico, concluded that the jaguar has suffered major reductions in its numbers throughout its range, and that over-exploitation by hunters and losses of habitat were the major causes. He considered the species at that time to not be endangered, and that there were still vast areas of relatively undeveloped habitat where jaguars occurred in probably a pristine state. Paradiso (1972) reviewed scientific literature through 1970 and concluded jaguars were declining and were endangered throughout their range due to over-exploitation for

commercial purposes, the inadequacy of existing regulatory mechanisms, and the destruction of essential habitat. Melquist (1984) after a survey of 13 Latin American countries concluded that "cat ... populations are considered to be stable or perhaps increasing in some areas, but the general consensus for all species is that populations are continuing to decline. Over-harvest has had a reduced impact on populations in recent years because all Latin American spotted cats are protected by either national or international laws or both." He recommended the jaguar be given complete protection indefinitely. These evaluation or assessment studies are the only ones available and apparently form the basis for protection of the species on the various lists of threatened and endangered forms of life.

Only a few scientific field studies have been made since these assessments. Notable among these are studies of the jaguar in the Cockscomb Basin Forest Reserve in Belize (Rabinowitz 1983a, 1983b, and 1986), in the Pantanal Region in the State of Matto Grosso, Brazil (Schaller and Vasconcelos 1978; and Schaller and Crawshaw 1980) and in Chiapas of Mexico (Aranda, in press). Mondolfi and Hoogensteijn (1986) reported on the status of the jaguar in its remaining range in Venezuela.

Almost without exception, however, the prognosis for the future of the jaguar has been unfavorable. If it is to be saved, most biologists have recommended protection through carefully regulated hunting and through designation of large areas to some form of refuge where it can enjoy complete protection from habitat loss and competition with man's agricultural interests. They reported deforestation and development of intensive agriculture in the Amazon Basin as perhaps the greatest threat

to its continued existence.

ACKNOWLEDGEMENTS

A great many people in Central and South America contributed information and assisted in the development of this report. Chief among these were persons whom we interviewed and who contributed printed information from their respective organizations and countries. Most of these were biologists and administrators of conservation agencies of government. Others were from non-government, national and international conservation organizations, university scientist/educators, and hunters. Without fail, every person contacted in Latin America and elsewhere was interested in the project and went far beyond common courtesy to provide whatever information was available to them.

Safari Club International provided funds for the project. It made a grant to the newly formed National Fish and Wildlife Foundation for the work. Charles H. "Chip" Collins, Executive Director, National Fish and Wildlife Foundation, was responsible for administering the project and was most helpful.

Several biologists and professional conservationists in the United States reviewed a first draft of the report. Particular sections were sent to persons in Latin America for review. Archie Carr III and George B. Schaller, New York Zoological Society; Ronald M. Nowak, Office of Endangered Species, U. S. Fish and Wildlife Service; Amos Eno, National Fish and Wildlife Foundation; Jorgen B. Thomsen, TRAFFIC (USA); Maurice G. Hornocker, Wildlife Research Institute; and Peter Jackson, Cat Specialist Group, International Union for the Conservation of Nature reviewed the

first draft. Their comments and criticisms were especially helpful.

Dr. Carlos Rivero Blanco, Caracas, Venezuela was employed to assist in the translations of materials given to us in Spanish. These included many of the interviews, scientific papers, and reports especially germane to the project. He was especially helpful in interpreting nuances of Spanish for translation into English.

To all these and others not mentioned, we express our gratitude.

Finally, we wish to acknowledge the sparse data base for developing information on the numbers of jaguars in its great range in Central and South America. The report was put together as a first step from which we trust further field work will follow. We believe the information presented in the report is the best single source available at this time. Deficient as it may be in solid scientific data, it is nonetheless a fair representation of the status of this magnificent animal, its range, uses to which it is being put, and factors which now and in the future will impact it.

METHODS

Throughout the study literature on the jaguar was collected and reviewed. Contacts were made or efforts were made to get information on the jaguar in every country within its range. Interviews were held with government officials and biologists at universities and other institutions, with ranchers, professional hunters, and members of the general public who were knowledgeable and interested in the welfare of the jaguar. The interview form (Appendix I) was designed to obtain the information required by the Secretary of the Interior of the United States

in making decisions regarding the status of a species under the U. S. Endangered Species Act.

Several interviews were conducted at a symposium on the jaguar held at Manaus, Brazil in April, 1986. On the basis of that experience the form was revised, printed in both English and Spanish and used as a guide in conducting interviews for the remainder of the study.

In addition to the interviews conducted in Manaus, Teer and Swank conducted interviews in Caracas, Venezuela, April 5-9, 1986. The contract for the study was officially initiated on May 1, 1986. Between May 1986 and February 1987, Teer made three trips; visiting Argentina, Bolivia, Colombia, Costa Rica, Panama, Paraguay, Peru, Uruguay, and Venezuela. Swank made one trip; visiting Mexico, Belize, Guatemala and Costa Rica. From September through November Swank visited Brazil and Venezuela; and in addition, in the United States, interviewed Dr. Howard Quigley and Mr. Peter Crawshaw, who have worked on the jaguar in Brazil. Swank interviewed Dr. Alan Rabinowitz in New York in December. Rabinowitz worked on the jaguar in Belize over a two-year period. Written response to interview forms were received from contacts in Surinam and Honduras. Attempts to obtain information directly from Nicaragua, Guyana, and French Guiana were unsuccessful; hence, indirect information from persons located in countries around those above and other data were used to evaluate the status of the jaguar.

When possible, interviews were tape-recorded and later used to complete the interview form. In some instances respondents requested that they be permitted to complete the questionnaire in writing, and the tape either be disregarded or not used. When the respondent did not speak

English, an interpreter was used and the interview form in Spanish was used as a guide. Translations from Spanish to English were made by Dr. Carlos Rivera Blanco of Caracas, Venezuela. Transcribed responses of those interviewed follow each country in this report.

Maps of the status of the jaguar for each country were prepared from information obtained from the interviews or from other sources. Maps of the respective countries were provided to persons interviewed and they were requested to indicate the range and status of the species. For the most part respondents were in agreement on the status of the cat, but where there were variances, the decision was made by the author responsible for preparing the report for that country. Maps depict the original range occupied by the jaguar, areas within the range where it no longer has established populations, although an occasional animal may wander through, areas in which the population has greatly declined, particularly since the early 1960's, areas in which the population has declined, and areas in which the populations stabilized or increased since 1980. The term "increasing" was used because of reported responses to the population to decreased commercial taking with recent implementation of CITES regulations within the range of the jaguar.

RESULTS

Ecology

The original range of the jaguar (Panthera onca) extended north to the states bordering Mexico in the United States and south to the Rio Negro at about 45 degrees south latitude in Argentina (Hall 1981). This big cat is the only member of the genus of roaring cats in the new world.

It prefers a warm tropical climate, and is usually associated with water. Hence within its overall range it was not found at high elevations or in extensive arid areas. It requires dense vegetation for cover, but not necessarily tropical jungle. The jaguar is quite at home in the low thorn scrub of the Chaco and in the intermixed thorn scrub and grassland of the Pantanal, both seasonally flooded for a portion of the year. It was also common on the sea coasts, where it occupied mangrove swamps as well as tropical forests.

The home range of the jaguar varies with the habitat and the abundance of prey. Rabinowitz (1986) in the tropical forests of Belize found that four radio collared males ranged over areas from 11 to 16 km², and a male's home range overlapped the home range of two or more females. Schaller and Crawshaw (1980) from data on two radio collared females in the Pantanal of Brazil concluded that they ranged at least over an area of 25 to 38 km², and that males ranged over twice that amount. Almeida (1986), based on the identification of the tracks of individuals, concluded that in the Pantanal males wandered over an area of 30 to 50 km², and in areas of low jaguar densities the home ranges were greater. The daily hunting area of a jaguar is quite small. Rabinowitz (1986) found that his radio-transmitted animals hunted in an area of about a square mile for a week or so, then traveled to a new area during a single night, probably because prey species become more wary and difficult to capture.

Productivity of the jaguar is not well documented. Mondolfi and Hoogsteijn (1986) stated that the female first reaches sexual maturity at two to two and one-half years and males reach sexual maturity at three to

four years. Two cubs, and occasionally one to four, are born at any time of the year. Young nurse for about six months, and stay with their mother for one and one-half or two years. Rabinowitz (1986) concluded from the examination of teeth of dead jaguars in Belize that they seldom live more than 12 years in the wild. Crawshaw, from his studies in Brazil (interview) concluded that about 10% of a normal breeding population dispersed annually, presumably immature animals over and above the carrying capacity of the habitat.

In feeding habits, the jaguar appears to be an opportunist, subsisting on a great variety of animals. Mondolfi and Hoogsteijn (1986) in the lower Llanos of Venezuela listed the main prey of the jaguar as capybara (Hidrochaerus hydrochaeris), spectacled caiman (Caiman crocodylus), two species of freshwater turtles (Podocnemys unifilis and P. vogli) and the collared pecary (Dicotyles tajacu). Lesser prey were the white-tailed deer (Odocoileus virginianus), land tortoise (Geochelone carbonaria), iguana lizard (Iguana iguana), armadillo (Dasyopus spp.), porcupine (Coendou prehensilis), howler monkey (Alouatta seniculus), giant anteater (Myrmecophaga tridactyla), lesser anteater (Tamandua tetradactyla), nestlings of herons and other aquatic birds, anaconda snake (Eunectes murinus), and freshwater fish. In the grasslands, in terms of frequency of kills, they list beef cattle, horses, feral hogs, and donkeys. In forested areas, in addition to some of those listed above, the jaguar preys on agouti (Dasyprocta sp.), paca (Agouti paca), white-lipped peccary (Tayassu pacari), tapir (Tapirus terrestris), brocket deer (Mazama sp.), sloths (Bradypus sp.), and the giant armadillo (Priodontes maximus). They also hunt for and consume the eggs of freshwater turtles.

In addition to some of those animals above, Schaller and Vasconcelos (1978) listed dog, marsh deer (Blastocerus dichotomus), La Plata otter (Lutra platensis), and night monkey (Aotus trivirgatus). They concluded that jaguars killed 20 to 30% of a small population of capybaras at Acurizal Ranch in the Pantanal of Brazil over a period of two months, and that that rate of kill had a depressing effect on the population.

Range and Status; Past and Present

In Central and North America the jaguar once occurred over 1,482,000 km². Viable populations extended north to east central Texas; Santa Fe, New Mexico; and Grand Canyon, Arizona in the United States (Hall 1981). Breeding populations probably disappeared from the United States early in the 1960's; however, a jaguar was taken in Arizona in 1971 (Brown 1983), and one in December, 1986 (Brown, pers. comm.). The present most northerly established population reported by Mexican officials is in southern Sinaloa, thus the range has receded southward about 1,000 km.

Within Mexico and Central America the jaguar now occupies an area of approximately 483,800 km² or 33% of its original range (Fig. 1). In addition to the United States it has disappeared from El Salvador, and populations are especially precarious in Costa Rica and Panama. Within the area now occupied by the jaguar, populations are greatly reduced over about 136,700 km², or 28%, and reduced over 226,100 km², or 47%. On a more optimistic note, the population seems to be stabilized, or perhaps even increasing over the remaining 39% of its occupied territory. The Peten in Guatemala and the areas surrounding it in southern Mexico and western Belize have high densities of jaguar populations; i.e., high for

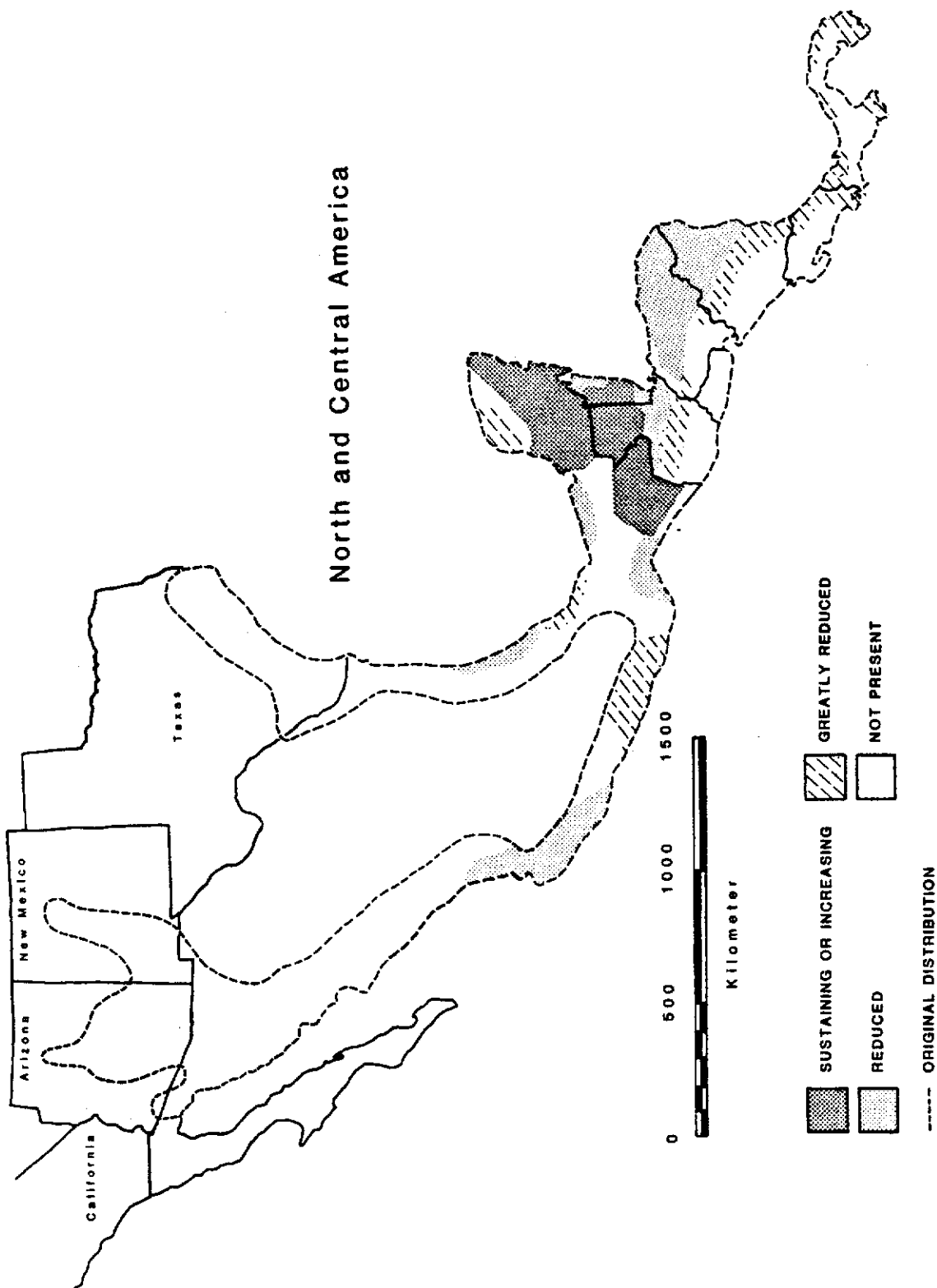


Figure 1. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

the species, in relatively undisturbed habitat.

In South America the jaguar originally occupied approximately 15,000,000 km², or 85% of the continent (Fig. 2). It extended south as far as the Rio Negro in Argentina, but its range has receded northward about 2,000 km, and it is now found only in three national parks in the provinces of Jujuy, Salta and Misiones in that country. In addition the species is no longer found in Uruguay. The species now occurs over an area of about 9,340,000 km², or 62% of its original range. Within that area in 1,522,000 km² or 16.4% of the occupied range it is greatly reduced and in 1,834,000 km², or 19.6%, it is reduced.

The jaguar population was considered to be sustaining or perhaps increasing over 5,984,000 km², or over 65% of the area it now occupies in South America. The Amazon Basin in Brazil, and the influence of the Amazon in southern Venezuela, in French Guiana, Surinam and Guyana, and eastern Colombia, Peru and Bolivia has resisted human development, which in turn has been beneficial to the jaguar population in that vast region.

Densities and Numbers

Biologists are reluctant to give numbers of animals, particularly for a species like the jaguar that wanders over a large area, is mostly nocturnal, secretive, and even where relatively abundant, seldom seen by humans. Thus it is only recently that it has been possible to get estimates of density of jaguars. Schaller and Crawshaw (1980), working with radio-collared animals, found a jaguar per 25 km² on one ranch and a jaguar per 22.5 km² on another in the Pantanal of Brazil. Almeida (1986) using tracks and drawing on Schaller's and Crawshaw's work, estimated that

South America

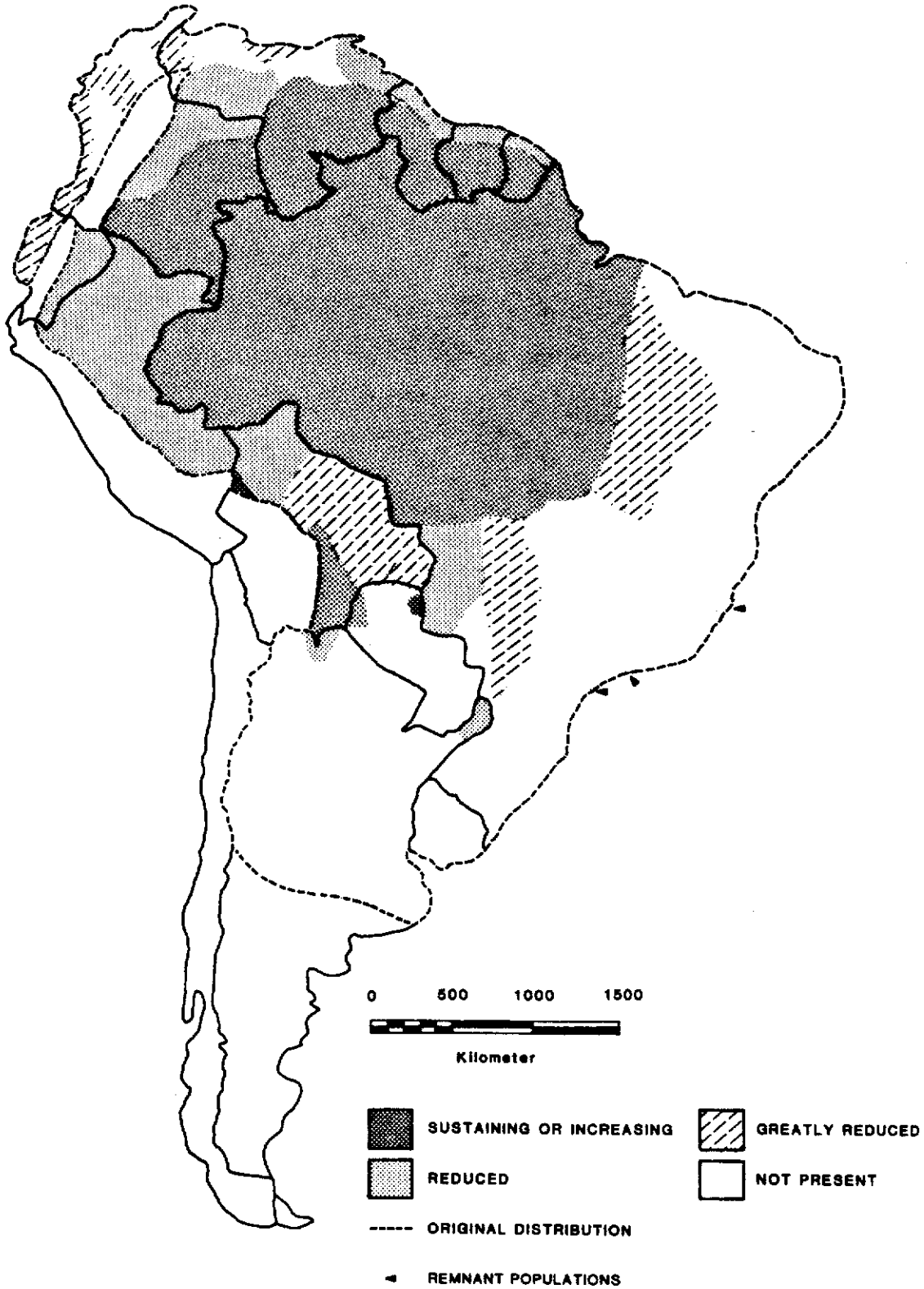


Figure 2. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

there were 3,500 jaguars in the Pantanal area, and its peripheral zone, and an additional 1,400 jaguars to the north of the Pantanal in the basin of the Guapore river. Almeida (1986) considered the rainforest habitat to carry a lower density of jaguars than the Pantanal, due to the lower prey base. In the forest he concluded that a male and a female jaguar, though living separately, would occupy an area together of 150 km².

Rabinowitz (1986), working with radioed animals, estimated a density of a jaguar per 6.5 km² in the Cockscombs area of Belize. That area was primarily rain forest-type habitat. In a similar habitat in the Laconden Forest of Chiapas, Mexico, Aranda (In Press), working with tracks, estimated a jaguar per 16.6 km², and a population of between 450 to 750 jaguars for the state of Chiapas. Biologist Santiago Billy, working in the Peten of Guatemala, estimated a density of a jaguar to 30 to 50 km², and a population of 500 to 800 animals for that area.

Causes of Population Decline

Loss of Habitat

Almost without exception loss of habitat was given as the major cause of decline of the jaguar. Tropical forests, which are the most extensive and definitely the most important remaining habitat of the jaguar, have been estimated at about 1,200 million ha in Latin America (UNFAO 1982). These forests are being cut for timber production, agricultural development and settlement, and the conversion to grass for cattle production at a rate that has alarmed the conservation world (Myers 1980). Annual deforestation rates in Latin America are currently among the highest in the world and are expected to increase (UNFAO 1982). Between

1976 and 1980, 3.8 million ha per year were converted to other uses. The great moist tropical forests of Brazil account for 35% of the losses in tropical America, and large areas are deforested each year in Peru, Venezuela, Bolivia, Colombia, Ecuador, and Mexico. Paraguay, Costa Rica, and El Salvador have especially high rates of deforestation, averaging over three percent annually. In six Amazonian states in Brazil the deforested area increased by more than 150% between 1975 and 1978 to 7.3 million ha (Tucker 1984). Vaughan (1983) calculated that on the average forest wildlife species in Costa Rica lost 35% of their existing forest habitat between 1940 and 1977. Nations and Komer (1984) concluded that Guatemala was losing its forest on the average of 900 km² per year. Similar losses are occurring throughout the range of the jaguar (Table 1).

Uses of trees for timber production removes the cover that is essential for both the jaguar and the species on which it preys. In addition, logging requires roads, which opens up the country to settlement. Both logging and settlement are precursors to an influx of people. It is customary for loggers to live off of wild game, and in many instances logging company employees in jaguar habitat are supplied wild game meat by professional hunters who are in direct competition with the jaguars for prey species (Tello 1986, and interviews).

Settlement of the land may follow logging, or it may be cultivated based on a slash-and-burn system. In either instance occupation of the land usually results in a lowered prey base for the jaguar. Subsistence agriculturalists traditionally use wild species to supply a great part of their protein requirements, and wild game soon disappears in those areas surrounding human settlements (Ojasti 1986). In addition, wild herbivores

TABLE 1. Deforestation in Tropical Countries, 1981-85¹

COUNTRY	CLOSED FOREST AREA, 1980 (THOUSAND HECTARES)	ANNUAL RATE OF DEFORESTATION 1981-85 (PERCENT)	AREA DEFORESTED ANNUALLY (THOUSAND HECTARES)
GROUP I²			
Colombia	47,351	1.7	820
Mexico	47,840	1.2	595
Ecuador	14,679	2.3	340
Paraguay	4,100	4.6	190
Nicaragua	4,508	2.7	121
Guatemala	4,596	2.0	90
Honduras	3,797	2.4	90
Costa Rica	1,664	3.9	65
Panama	4,204	0.9	36
Total	132,739	2.4	2,347
GROUP II²			
Brazil	396,030	0.4	1,480
Peru	70,520	0.4	270
Venezuela	33,075	0.4	125
Bolivia	44,013	0.2	87
Total	543,638	0.3	1,962
GROUP III⁴			
El Salvador	155	3.2	5
GROUP IV⁵			
Belize	1,385	0.6	9

¹ ADAPTED FROM: Table 5.10, p. 73, World Resources 1986.

² GROUP I. Higher than average rate of deforestation and large areas deforested.

³ GROUP II. Relatively low rates of deforestation but large areas deforested.

⁴ GROUP III. High rates of deforestation and small areas of remaining forest.

⁵ GROUP IV. Low or moderate areas of deforestation and small areas affected.

are attracted to the cultivated crops, and the cultivators are especially persistent and determined to eliminate any and all animals that compete with them for their planted crops. A comparison of the species used most frequently by rural people (Ojasti 1986) with the items high on the list used by the jaguar (Mondolfi and Hoogesteijn 1986) shows considerable overlap.

Some persons contend that a partial clearing of the forest may in fact be beneficial to the jaguar. They point out that all of the energy prior to clearing was concentrated in the canopy and supported species that were, for the most part, unavailable to the jaguar. Removal of the canopy is followed by an increase of the biomass at the ground level, hence increase of prey base available to the jaguar.

The expansion of the cattle industry into the Amazon Basin may initially be beneficial to the jaguar. Almeida (1986 and interview) believes that conversion of the tropical forests to ranching increases the wild animal biomass available to the jaguar as well as introducing a new and easy-to-catch prey base in the form of cattle and domestic (feral) pigs. Wholesale conversion of tropical forests to the production of cattle is not progressing at the rate once expected. Areas converted to grass must be constantly maintained by shredding, hand chopping, herbicide application or burning to keep the area from reverting to forests. This constant outlay of ever rising cost of resources accompanied by lower prices being paid for cattle has, at least temporarily, caused some ranchers to get out of the cattle business. While the rate of deforestation may have temporarily decreased, the long-term outlook is for definitely less tropical forest habitat, therefore, fewer jaguars.

Oil exploration was given as an activity that poses a potential threat to jaguar populations. The building of all-weather roads by oil companies opens up areas that otherwise would be inaccessible to settlement. Human activity leads to the demise of the jaguar population, as previously discussed.

Killing of Jaguars

Depredation Control

Clearing of the forest and planting the area to grass for cattle production presents problems of a different nature. The potential prey biomass may increase, but jaguars present the prospects of a major predator to livestock producers. Hunting and killing of jaguars is a common practice wherever the cat occurs in cattle-raising areas (Almeida 1986, Tello 1986, Crawshaw, Vaughan interviews), and probably was the major reason for the elimination of the cat from the southwestern United States and northern Mexico (Brown 1983, IUCN 1982). Keeping a pack of trained dogs, either by the individual rancher or a professional hunter that is available upon call, is traditional in ranching country. In addition to hunting and trapping the use of predacide to control depredation is a common practice in ranching areas; however, predacides were not mentioned in any of the countries as a problem leading to the decline of the jaguar.

Commercial Hunting and Trapping

Commercial hunting and trapping of jaguars for their pelts has declined dramatically since the early 1970s. This was acclaimed by almost

everyone contacted in all countries. Organized poaching rings in which fur buyers traveling through the back country purchasing jaguar pelts from local people reportedly is a custom of the past. Prices paid for good pelts have declined from as high as \$180 U.S. to as low as \$10, if the buyer will take them at all. The combination of putting CITES regulations into effect, increased enforcement of country laws, and the decrease in popularity of spotted cat skin garments have reduced markets for skins and is largely responsible for increases in jaguar numbers where they are alleged to be increasing (Caldwell 1984, Tello 1986, and Wildlife Trade Monitoring Unit 1985).

Opportunistic Killing

Opportunistic killing of the jaguars is practiced wherever the cat occurs. After habitat destruction, opportunistic killing is probably the most important depressing factor on the jaguar population throughout its range. Guns are traditionally carried by local people in many countries in Latin America, and jaguars are usually shot or shot at whenever encountered. People fear the jaguar because it obviously has the capacity to harm or kill a person, although no one cited an incident in which a jaguar carried out an unprovoked attack on a human, nor did we find such an account in the literature. The traditional fear of the animal, its practice of feeding on domestic stock, including dogs, and the competition it presents for wild game animals that constitute a major portion of the meat consumed, all combine to shower respect and attention on any person in the local community who has killed a jaguar.

Sport Hunting

Sport hunting for a trophy has declined, and is, in fact, illegal in almost all countries which have jaguars. Only in Mexico, in the past few years, has sport hunting for jaguars been legal, and then only under a permit basis. A hunting season for jaguars will not occur in Mexico in 1987. In Belize and Costa Rica a few jaguars have been taken by hunters under a system that permits them to kill problem animals that have taken cattle. Annually this has accounted for above ten animals in Belize and twelve animals in Costa Rica during the past few years.

Sport hunting of jaguars for pleasure with dogs is a common practice in ranching areas. It is traditional, and like most hunting, provides camaraderie and the opportunity to test the mettle of man against beast. Hunting for pleasure and for control of depredation on cattle is so intertwined, to those who carry on this practice, it is impossible to separate the two. Such hunting by ranchers still occurs in most countries, although to a lesser degree than in the past.

Commercial sport hunting occurs, but the level at which it is carried on is difficult to assess. Officials in one country alluded to a resident that was under investigation for allegedly guiding non-residents on jaguar-hunting expeditions.

Laws for Conservation of the Jaguar

All of the countries within the range of the jaguar have laws which forbid killing of the animal. In the recent past, as previously discussed, only Mexico has had legal sport hunting, and that was on a very limited basis.

Enforcement of laws prohibiting killing of jaguars varies from country to country, but generally enforcement is non-existent or is very lax. Almost without exception laws permit the killing of animals for the protection of domestic livestock, and this is universally used as the reason for persecuting the jaguar. In some countries permission of the authorities is required prior to taking the animal, but rarely is an investigation in the field performed prior to issuance of the permit.

Lack of personnel and resources to enforce regulations is an additional problem to all of the countries. Areas in which jaguars occur are usually undeveloped and frequently roadless, hence difficult to patrol with any efficiency. Staging areas for the collection of pelts for commercial purposes are investigated and pelts are seized by government officials. This practice is becoming more common, but is not uniformly carried out in all countries.

Obtaining a conviction in the courts for killing a jaguar is practically non-existent. Biologists have reported the killing of radio-collared animals to the authorities, with adequate evidence, yet there was no action taken to prosecute the person because the sympathy in local communities is with the person killing the jaguar.

All countries in the range of the jaguar, except Mexico, are now members of CITES. Enforcement of CITES regulations and an increase in the enforcement of local laws have been partially effective in controlling commercialization of the trade in jaguar skins. Enforcement at all levels, from the trapper to the processor, and the loss of world markets have been effective in decreasing the taking of jaguars for commercial purposes.

Protection of the Habitat

For the jaguar to remain part of the ecosystem over the long term in Central and South America a change in the attitude on the part of the people will be necessary, and large tracts of country will have to be set aside where wildlife and natural ecosystems have first priority. There are some encouraging developments. Every country in Latin America has established national parks or reserves where wildlife is offered some degree of protection (Table 2). In addition there are local reserves and protected areas, areas of less than 1,000 hectares, and areas that are hunted or where consumptive uses of wildlife is permitted that are not included in Table 2.

In Central America 46 conservation units totaling 4.3% of the land area have been established (Hartshorn 1983). The first conservation unit to specifically protect the jaguar was established in Belize in 1986. The Rio Platano Biosphere Reserve containing 350,000 pristine hectares was dedicated by Honduras in 1980. The Darien World Heritage Site, containing 597,000 ha, was established by Panama in 1981. Proposals are being considered for the establishment of large natural areas in the center of the best existing jaguar habitat in the State of Campeche, Mexico and in the Peten District of Guatemala.

To insure the protection of the jaguar will require setting aside of exceedingly large areas. It is wide-ranging, and in countries where it is the custom for people to depend upon wild animals to supply a part of their food, the jaguar will not be tolerated except where it clearly has first priority. Most of the parks and reserves, as now constituted, are too small to assure the future of the jaguar. In addition to persecution

TABLE 2. Major Protected Areas in Latin and North America, 1985¹

REGION	NUMBER	TOTAL SIZE (THOUSAND HECTARES)	PERCENTAGE OF TERRITORY PROTECTED 1985	PROTECTED AREA PER THOUSAND POPULATION 1985 (HECTARES)
NORTH AMERICA				
Mexico	29	938	0.5	12
United States	251	64,946	7.1	273
Total	280	65,884		
CENTRAL AMERICA				
Costa Rica	21	412	8.1	159
El Salvador	0	0	0.0	0
Guatemala	2	60	0.5	7
Honduras	4	423	3.8	97
Nicaragua	2	17	0.1	5
Panama	6	661	8.7	303
Total	35	1,573		
SOUTH AMERICA				
Argentina	29	2,594	0.9	85
Bolivia	12	4,708	4.3	739
Brazil	50	11,894	1.4	88
Chile	64	12,737	17.0	1,055
Colombia	30	3,959	3.8	138
Ecuador	12	2,627	9.5	280
Guyana	1	12	0.1	12
Paraguay	9	1,121	2.8	304
Peru	11	2,408	1.9	122
Surinam	9	582	3.6	1,650
Uruguay	6	29	0.2	10
Venezuela	34	7,389	8.4	402
Total	267	50,060		

¹ ADAPTED FROM: Table 7.1, pp 282-283, World Resources, 1986

from man when wandering outside dedicated areas, island biogeographic theory suggests that fairly large populations or intermixing of populations are necessary for genetic variability for the long-term survival of a species.

Setting aside areas and protecting them from encroachment will be a race with time. The human population in Central and South America is currently increasing annually at about three percent, which means that it will double in less than 20 years. The demand for land and resources to support that population is great and will increase. It will require great resolution on the part of any government to set aside large areas that will be suitable to insure jaguar populations.

Environments that are inhospitable to man have protected the jaguar in much of its presently occupied range. This applies to the eastern coasts of Honduras and Nicaragua, and to the Peten in Guatemala, and western Belize in Central America. It is certainly applicable to the Amazon Basin and the vast areas influenced by it in Brazil and the countries surrounding it. The jaguar will probably benefit from the inhospitable environment and the difficulties confronted by man to domesticate those areas only for another quarter century.

Hunting as an Incentive for Management

Support for hunting as an incentive for management of the jaguar is neither strong nor widespread in Central or South America. Both government and non-government persons believe that the infrastructure necessary to effectively control a limited quota of animals is not in place, and that governments are unlikely to allocate the necessary funds

to put an effective system in place within the near future. Most persons interviewed are concerned about the future of the jaguar, and are unwilling to risk any program that will possibly jeopardize the animal. We consistently detected hesitance on the part of government officials to take the responsibility for initiating what they considered an "experiment". Most believed that the information they had on population levels was inadequate, and therefore recommended stepped-up research programs prior to consideration of any relaxation of restrictions. Others recognized that increased revenue under the present systems would do little for the conservation of the jaguar. Revenue from licenses returning to the agency responsible for management of the wildlife, which we take for granted in the United States, evidently does not exist in any other country in the range of the jaguar. Wildlife officials in most countries mentioned the necessity of revenue going back into management programs as a link in the hunting incentive concept.

The present practice of the government issuing permits to take jaguars that are killing livestock in the countries of Belize, Costa Rica, Venezuela, Brazil, and possibly other countries, could be modified to recognize hunting as a legitimate means of managing the jaguar. Realistically, this is in effect now. Persons viewed by government offices as being responsible individuals are issued permits to take livestock killing animals. Taking the animal is frequently a combination of hunting for pleasure, and removing an animal that is a problem to both the landowner and the wildlife agency. In some countries a possession permit is issued to the person who took the jaguar, which serves as documentary evidence in that country that the animal was legally taken.

Such documents, and in fact the whole procedure, is rather on an ad hoc basis and is not recognized under the CITES regulations. Since such programs are in place, and in all probability will continue, recognition of such programs should perhaps be a matter to come under consideration by the member organizations of CITES.

CONCLUSIONS AND RECOMMENDATIONS

Although very little current scientific data are available and few substantive field studies of the jaguar's status and ecology have been conducted throughout its range, clearly the jaguar's range and numbers have shrunk dramatically since European settlement. The shrinkage was accelerated in the 1960's and 1970's when commercial exploitation of the species was practiced for world trade and when deforestation and development of natural habitats were increased to meet growing numbers of people and their needs.

Nonetheless, considerable jaguar habitat remains, not all of it in tropical forests, and jaguar numbers have begun to sustain themselves and even increase in some areas of its range as a result of loss of markets for jaguar skins brought about by the Convention on International Trade in Endangered Species (CITES). Jaguars are still taken in considerable numbers, the dimension of which can only be guessed at the present time. Most are killed to protect domestic livestock and by mestizos and other rural peoples who take them opportunistically and primarily for sale at local levels. Commercial hunting for jaguar skins has all but ceased in Central and South America. Some sport hunting occurs and this on large ranches, but with little effect on the species' future.

Deforestation and development of natural systems for agriculture and other uses has had the greatest impact on the jaguar and still poses a serious threat to it. By eliminating its habitat and its prey, the jaguar has safety only in the most remote areas and in parks and reserves that are given protection from incursions of people for various reasons. Development and losses of habitat are expected to continue, and with it, the jaguar.

All countries in Latin America have institutionalized conservation and protection of natural resources in their governmental structures. Agencies charged with administering and managing parks and wildlife resources are in place. Practically every nation has developed a list of scarce and threatened species, and all governments except one are signatory parties to CITES. Laws and regulations are in place and these, generally, fit the situations at hand.

Unfortunately, many conservation agencies of government are funded very poorly, their programs have the lowest priorities among other needs of the people, and field personnel to enforce regulations are practically non-existent. Laws and proclamations of government administrations are usually adequate to protect resources, but they are poorly if at all enforced in the outback where resources are exploited. In some cases, illicit trade in contraband animal and plant products are overlooked by authorities.

Dr. J. Ojasti (1984) summed up the problems of conservation of wildlife in Latin America as follows:

"The overall situation of wildlife in Latin America is troublesome. A critical observer would likely ask what sort of management, if any, is going on there.

Appropriate game laws and official agencies in charge

of wildlife now exist in most Latin American countries and some efficient management programs are in progress e.g. recovery of vicunas and guanacos in Peru and Chile, sustained harvesting of coypus and sea lions (Otaria, Arctocephalus) in Uruguay, and capybaras in Venezuela, breeding of primates in Brazil and Peru etc. The number and area of national parks are increasing. International treaties such as CITES and other agreements contribute in reducing the skin and primate trade. On the other hand, the game laws and closed seasons are generally ignored and even the national parks are not safe for wildlife. Most hunting practiced in Latin America would be termed poaching by European or North American standards. The law enforcement is lax or operative only in the checking points along main roads for urban sport hunters. Factors like long distances, lack of roads, price of fuel, guns and shells, scarcity of game, and landowners who prohibit hunting on their lands may afford more protection than the official game policy. The causes of this situation are complex and no easy solutions exist. The top administrators of developing countries face urgent problems of economic development, politics, education, health etc. and pay attention to the natural resources only when their productivity and monetary returns are large; when the resource becomes scarce, it is not politically important. This is the case of wildlife in many Latin American countries, due to excess exploitation and habitat damage for generations."

R. A. Ojeda and M. A. Mares (1981) concluded from their evaluation of conservation of mammals in South America that:

"We believe that it is highly unlikely that the trade in wildlife products will be controlled by individual nations. Many countries lack the necessary trained personnel to enforce wildlife laws, while others lack the inclination to do so. It is only through the closing of the world's wildlife markets that effective protection can be given to South America's fauna."

M. A. Mares (1986) was somewhat more sanguine in his appraisal of the future of the wildlife and natural world of South America when he wrote:

"Lack of solid data on rates of habitat conversion and on the basic biology of Neotropical organisms makes predictions of massive waves of extinction in South America premature. South America's problems regarding the use of natural resources are a result of historical, sociological, economic, and scientific factors. Most countries in South America have done a great deal to encourage conservation efforts, but the magnitude of the problem is well beyond

their limited economic means to solve. The problems of species disappearance in South America are of global importance. A successful solution will involve a coordinated and massive effort of governments and specialists in all aspects of conservation biology from throughout the world."

It is in this context by which the jaguar's future must be decided. While the species may be holding its own in a relatively large area of South America and in some small areas of the Central American Core, it is not adequately protected by the governments or the people in any area where it occurs. Nor does the future of the species seem any brighter when the rates of losses of its major habitats are evaluated. Such areas as the Amazon Basin are "protected by nature" because of limited access, but this protection cannot persist in the face of rapid deforestation and development occurring there.

Having reported the above, it is important and fair to state that the species could sustain some offtake in selected areas of Belize, Mexico and some regions of the Amazon Basin in Brazil, Venezuela, Bolivia, and perhaps Paraguay. As Tello (1986) stated in his survey of the species in Bolivia, "jaguars will be protected on the majority of the larger ranches where they occur, and if the species comes under a sound management program, e.g., hunting and photographic safaris, but mainly hunting, provided that farmers will receive a financial return that will pay for all of their domestic animals killed by jaguars. As a consequence of a sound management program for this species on the ranches, specific important habitats will also be saved and other animal species, such as Marsh, Pampas and Brocket deer; peccaries; tapirs, etc., will also receive protection. The increase of natural prey will decrease the predation by jaguars on the domestic livestock." (Underlined emphasis provided by

Tello).

Under existing conditions of administration and management of wildlife resources in the countries in which the species occurs, we conclude the jaguar should be retained on Appendix I of the Convention on Trade in Endangered Species. We found no enthusiasm on the part of wildlife organizations or scientist/biologists to change its status; i.e., to take it off the protected list and permit hunting, nor do we recommend that its status be changed under existing conditions.

However, should sound management be instituted in selected areas of the jaguar's range, we view wise use of the species as a positive measure to protect its future in the long term. Loss of habitat will continue and this factor, not sport hunting, will likely deliver a telling blow to the species' persistence and survival in much of its present range. Given some economic worth, the species can likely be protected outside parks and reserves, many of which are presently the chief remaining bastions of protection for the species in certain countries.

It is obvious to us that livestock owners will continue to protect their animals from predation by any wild animal. Thus some measures should be instituted to make the jaguar a positive rather than a negative force. To be sure, some few larger ranches will protect the species but not for protecting its long-term future but rather for its use as an object of sport hunting, illegal as it is in all countries. Attitudes are utilitarian among rural peoples and conservation presently is not a strong force in preserving wildlife for its own sake or for its future uses.

Thus we conclude that management schemes with periodic evaluations should be initiated in selected areas where the species has maintained its

numbers and where it presently is a factor in livestock management. Little organizational or financial support for such studies can be expected from in-country sources. Rather, a cooperative effort by in-country administrative authority and donor/scientific organizations will likely be necessary to develop any kind of management program.

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APPENDIX I
Interview Form

QUESTIONNAIRE OR INTERVIEW ON THE STATUS OF THE JAGUAR

Country: _____

Interviewer: _____ Date: _____

Person Responding: _____

Title: _____

Address: Organization: _____

Box or Street No.: _____

City: _____

State: _____

Country: _____

Phone: _____

Portion of the Country covered by the respondent:

1. Does your country (or area of country) have wild jaguar populations?
2. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?
3. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?
4. If you believe the jaguar to be either endangered or threatened is it because of:
 - A. Destruction, modification or curtailment of habitat.
 - (1) What type of destruction, or modification or curtailment of habitat is taking place?
 - (2) Where is this occurring?
 - (3) Over what portion of the jaguar's range is this occurring?

- (4) How long is this type of change likely to continue?
- (5) Are there comparable changes that are expected to begin within the next several years?

B. Over utilization for the purpose of:

- (1) commercial
- (2) recreational
- (3) scientific
- (4) educational
- (5) depredation control,
 - (a) What is your estimate for the annual average off-take of jaguar's for each of the above 5 purposes for the years 1980-85?
 - (b) Are there regulations or laws in your country to limit or restrict the taking of jaguars? (References or copies?)
 - (c) Are these limitations by season, numbers, areas, etc.? (Specify)
 - (d) Are these laws effective? (Reasons on which conclusions are based?)
 - (e) Upon what data are the limitations on harvest based (population estimates, past harvest numbers, age/sex ratios)?
 - (f) Is there an effective system to limit or restrict the export of jaguar skins in your country? (Specify)
 - (g) Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?
 - (1) Briefly describe the procedures.
 - (h) Is an approval from the country of import required prior to the issue of an export permit?
 - (i) Is there any evidence that legal taking of jaguar for export is facilitating or encouraging illegal taking?
 - (j) Is the country a member of CITES?
 - (k) If so, does it have in place an effective management authority and scientific authority?

C. Disease, parasites.

(1) Do you know of any diseases or parasite conditions that limits or has limited jaguar populations?

(a) Describe.

(2) Are there any published or unpublished reports on those problems?

D. Inadequate regulations or enforcement of same.

(1) Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

(2) Would you consider the effectiveness of the regulations to be adequate, somewhat adequate, or inadequate?

E. Other manmade or natural factors.

(1) Are there other manmade or natural factors not covered above that limits jaguar populations that could cause them to be endangered or threatened?

(a) Cite evidence.

5. From the information you have, or from personal experience, could you rate three of the above (A through E) as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

A. Briefly describe reasons for order in which ranked.

6. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

7. Are there populations of jaguars in your country maintaining themselves or expanding?

A. What are the sizes of areas occupied by such populations?

B. Do you have an estimate of the populations, either numbers or density?

(1) What is the basis of this estimate?

8. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

9. Can you cite published reports, or can you provide us copies of

unpublished reports upon which you base any of your conclusion on the jaguar?

10. Do you know of other studies on the status of the jaguar that have produced information that you consider scientifically sound and reliable?
 - a. Who conducted the study?
 - b. When was the study conducted, and over what period of time?
 - c. Where was the study conducted?
 - d. What methods were used?
11. What are the names and addresses of resident scientists or naturalists who could provide additional information on the jaguar?

APPENDIX II
Country Reports

ARGENTINA

DESCRIPTION

Argentina, the second largest country in South America in area (2,776,889 km²) and population (31,500,000 in 1987), is an ecologically diverse region. Unlike many of its neighbors, Argentina's population has few Indians; most of its inhabitants are of Spanish and Italian ancestry with varying fewer numbers of other ethnic groups. More than 85% of its people live in cities, and of these more than 50% are located in the Pampas Region where most of the larger cities occur. Five major ecological regions are found in the country: the northern forests, the thorn scrub Chaco, the Pampas in mid-country, Patagonia in the south, and the Piedmont (Cordilleras and foothills) and high mountains of the Andes on and along its western border with Chile.

The Grand Chaco or thorn scrub of the northern regions is a dryland forest that extends northward from the Rio Parana into Paraguay and Bolivia. A six-months winter drought prevails in most years; temperatures may reach 50 degrees C. The region is primarily grazing land but is also used for the production of charcoal and wood. It is flooded annually from overflows of the rivers during summer rains. Much of it is dense scrubland about 10 m in height with larger trees along the streams. Wildlife is relatively abundant but heavily used by native peoples and ranchers of the area.

Only remnants remain of moist tropical forests. Trees may reach 30 meters. Most of this forest has been eliminated in eastern Argentina, and the western forests are under great pressure from logging, farming and

ranching interests (Ojeda and Mares 1981). Several large national parks have been gazetted in the northern reaches of the region to protect wildlife, chief among which is the jaguar.

The Pampa is one of the great, rich grasslands of the world and is responsible for most of the wealth of Argentina. Large estates of wealthy landowners offer some protection to wildlife such as the Pampa deer which now is found only in sparing numbers where it was formerly abundant. Intensively used in row-crop and animal agriculture, the Pampa has two-thirds of the country's people of which most live in Buenos Aires and several other large cities. Much of its wildlife has been decimated through agricultural pursuits (loss of habitat) and hunting.

Patagonia is a dry scrub desert extending southward across Argentina from the area of the Rio Negro (39 degrees south latitude) to southernmost South America (Ojeda and Mares 1981). It is unsuited to farming. Sheep is the primary commodity produced on its dry, windswept ranges. One camelid, the guanaco and several carnivores including the mountain lion and fox (now very important as predators on sheep) and medium-sized rodents, characterize the region. The European hare and rabbit were introduced into Patagonia and have reached pest levels. The European red deer was also introduced and is an important animal in sport hunting. By and large, the region is economically poor and wildlife is exploited for whatever purposes serve its inhabitants.

The foothills of the Andes and the Andes themselves are also sheep-raising areas. Some of the area, in particular the Piedmont, is farmed. Its main products are sugar cane in transitional forests, cotton in the Chaco; corn, grapes in the Monte desert, and alfalfa. Wildlife is often

considered noxious to farming and ranching interests. Control of predators of sheep and depredators on grain crops, especially several species of doves and pigeons and various blackbirds and parrots, is widely practiced in the region and elsewhere in Argentina.

STATUS OF THE JAGUAR

The jaguar is an endangered species in Argentina according to scientists and administrators of wildlife resources. All persons whom we interviewed and the literature were unequivocal in this assertion. There have been no recent serious studies of the jaguar in Argentina. Only anecdotal records of its occurrence have been published. It was formerly widespread north of the Rio Negro which runs westerly from the Andes into the South Atlantic Ocean at about 39 degrees south latitude. It did not occur south of the Rio Negro according to all reports. It is replaced in Patagonia by the puma in the more open, windswept plains and protected valleys of this arid region.

Reports of jaguars remaining in Argentina differed. Estimates ranged from about 20 to 100 individuals. However, all reports were emphatic that the jaguar has been greatly reduced in its range and numbers and that its future is uncertain and precarious. Most reports were confident that less than 100 jaguars now occur in Argentina.

Jaguars remaining in Argentina are confined largely to three national parks in the northern reaches of the Provinces of Jujuy, Salta, and Misiones, all of which are contiguous with habitat suitable for the species in the neighboring countries of Bolivia, Paraguay, and Brazil. The three parks are Iguazu (55,000 ha) in Misiones Province, Calilegua

(76,000 ha) in Jujuy Province, and Baritu (72,000 ha) in Salta Province. Undoubtedly, some jaguars are in areas adjacent to the parks in Argentina and in neighboring countries, but little is known about their numbers.

FACTORS AFFECTING JAGUAR POPULATIONS

Losses of habitat and hunting are the chief factors that have and are affecting jaguars in Argentina.

Habitat

Much of the forests and grasslands of Argentina have been developed for row-crop and animal agriculture and they no longer contain the dense forest growths which are preferred by the jaguar and its prey. The jaguar occurred in the Pampa where it centered its activity in the gallery forests along streams. These areas have been given over primarily to farming and cattle raising. The jaguar, being much more vulnerable in these habitats than in dense moist tropical forests, disappeared early on from these riparian habitats. Those that still remain in Argentina are in the forested areas of northern Argentina in, as stated above, parks. It is here that most biologists expect them to remain if they are saved at all. There is some evidence that jaguars are increasing in the parks by immigrants from adjacent areas where they are hunted illegally and by increases through reproduction. The trends in development suggest that few if any will be present outside of protected areas in another decade or two.

Hunting

Hunting was assigned by most as the major cause of the loss of jaguars because habitat in some parts of the country could support the species and its prey if protection was given them. Jaguars have been hunted for sport, for their skins for domestic use and for export, and to protect livestock. Their prey has declined in the species' former range. Deer, peccaries, capybaras, pacas and other mammals constitute their main sources of food, and these animals have been decimated through hunting by both native peoples and settlers. Jaguars readily turn to livestock when wild prey is scarce. In former years many were killed to protect cattle and other livestock. Now, however, few are known to be taken to protect livestock.

Regulations

Argentina is a signatory party to the Convention on International Trade in Endangered Species. The Museo Argentino de Ciencias Naturales in Buenos Aires is the scientific authority for the country, and Sr. Jose M. Gallardo, Director of the Museum, is the person of account to the treaty.

Enforcement of Regulations

Hunting of the jaguar and the export of live animals and their parts are prohibited by laws of the country. Permits or licenses to take jaguars are not issued for any reason. However, illegal hunting does occur because there are few persons in rural areas to enforce the laws. Thirty-five jaguars were exported from the country in the past 10 years,

according to the Direccion Nacional Fauna Silvestre, and one according to records of Traffic, South America (see interview with Sr. Juan Villalba, Director, Traffic, S. A., Montivideo, Uruguay). The animal was sent abroad to a zoological park. There are no records or estimates of illegal kill of jaguars for obvious reasons. Those that are killed are probably taken opportunistically. It is believed by most administrators of wildlife resources that organized hunting efforts and traders who worked the outback and commissioned hunters for skins of spotted cats no longer exist in Argentina. The skins have declined in value and offer less incentive than ever before to such commercial ventures. Without question, CITES has brought about a decline in markets and price.

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Lic. Claudio Anabel Blanco, Biologist, Direccion Nacional de Fauna Silvestre, Buenos Aires, Argentina.

Lic. Pablo Canevari, Biologist, Parques Nacionales Argentinos, Santa Fe 690, 1059 Buenos Aires, Argentina.

Lic. Claudio Ernesto Chehebar, Biologist, Parques Nacionales Argentinos, Santa Fe 690, 1959 Buenos Aires, Argentina.

Ing. Francisco Erize, General Director, Fundacion Vida Silvestre Argentina, Buenos Aires, Argentina.

Dr. John E. Jackson, Biologist, Secretaria de Estado de Agricultura y Ganaderia, Instituto Nacional de Tecnologia Agropecuaria, E. E. A. San Luis, C. C. 17-5730 Mercedes, Argentina.

Dr. Jorge H. Morello, Presidente del Directorio, Administracion de Parques Nacionales, Santa Fe 690, 1059 Buenos Aires, Argentina.

Lic. Maurice Rumboll, Biologist, Parques Nacionales Argentinos, Calilegua Nacional Parque, Calilegua, Jujuy, Argentina.

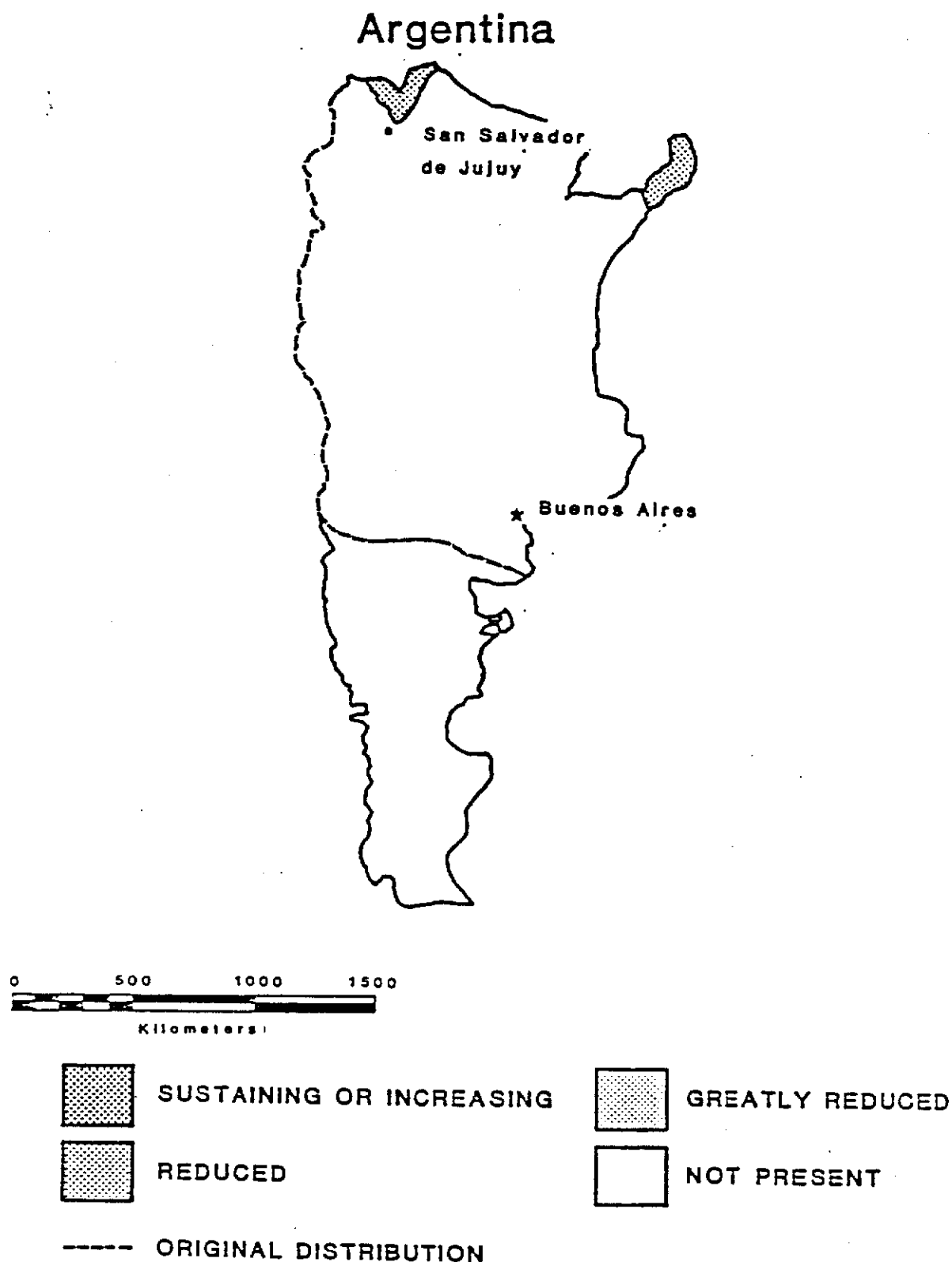


Figure 3. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

BELIZE

DESCRIPTION

Belize is bordered on the east by the Caribbean Sea, on the north by Mexico, and on the south and west by Guatemala. It is a small country, having an area of only 22,965 km². The country is sparsely populated (6.3 per km²) and human habitation is concentrated mostly along the north-east and central coast. The total population is about 145,000, with about 76,000 located in cities and towns. Sugar, citrus, forestry, and fisheries are the major industries. Sugar and citrus industries are located along the east and central coasts, with forestry primarily inland and to the south. Development of the forest industry is limited by the lack of access roads. There is only one improved road in the southern part of the country which parallels the coast south of Belmopan. In the north there are two improved roads between Belize City and Orange Walk Town.

The north and east coasts are low-lying with numerous inlets and lagoons. The area is poorly drained, contains numerous mangrove swamps, and is seasonally flooded for several months each year. In the southern part there is a narrow coastal plain which gives way to rugged mountains inland to the west. To the north, particularly in those areas seasonally flooded, the dominant vegetation is trees about 10 m or less in height. Low lying areas are interspersed within the trees, and those areas are covered with rough grasses and sedges. Inland and south the area is dominated by tropical galleried forest.

In the north the native vegetation has been cleared in some areas and

planted to sugar cane and citrus. Also ranching occurs, and in some of those areas exotic grasses have been established. Maintenance of such areas requires constant work to keep the forest from becoming reestablished.

STATUS OF THE JAGUAR

The information that is available indicates that the jaguar occurred throughout Belize. Areas to the east and north perhaps supported populations lower than those inland, but even there the jaguar made cattle ranching a hazardous enterprise. Now it is only around the towns where it can be said with certainty that there are no jaguars. Numbers have declined but there are still pockets of good populations scattered throughout the country. The best populations occur in the north, in the Corozal District, the west-central area, Orange Walk District from Hill Bank to Gallon Jug, and in the south in the Cockscomb Range and Mountain Pine Ridge in the Stann Creek and Cayo Districts. To the south in the Toledo District, the cat population declines due to heavy settlement and cultivation. Rabinowitz (interview) reported that few jaguars occur there, and those that occasionally show up probably have wandered in from Guatemala.

Belize has the highest densities of jaguars reported to us in interviews. Rabinowitz (1986) documented a density of a jaguar per 6.5 km² in the Cockscombs area. Bader Hassan (interview) considered this to be a conservative estimate. Rabinowitz documented an annual offtake of in excess of 100 jaguars, and Rabinowitz, Hassan, and Weyer (interviews) all estimated the annual offtake to be between 175 and 200 jaguars. For

Belize that would equal one jaguar killed per 725 km². An annual offtake of this magnitude would require a large population.

Those interviewed were in agreement that the jaguar population within the last five years has increased. Bader Hassan concluded that the present population is at about the same level that it was 20 years ago. The number of jaguars taken has decreased considerably from what it was 20 years ago. Hassan stated that five professional hunters were operating in Belize up to 1970, all concentrating on jaguars. He is now the only hunter in Belize that has trained dogs and hunts jaguars.

FACTORS AFFECTING JAGUAR POPULATIONS

Loss Of Habitat

Deforestation is the primary cause of loss of habitat for the jaguar in Belize. Much of this deforestation is due to commercial logging. It is most extensive in the south-central portion of the country now, but has occurred throughout the country in the past wherever logging was economically possible.

Deforestation for slash and burn agriculture has also been a traditional way of life in Belize. In the southern part of the country, in the Maya Reserve, because it is so widespread and intensive, it has practically eliminated the jaguar.

Clearing of the forest for cattle production has taken place in the north-central portion of the country. Initial clearing requires considerable effort, and maintenance to keep the forest at bay is an unceasing requirement, necessitating hand chopping, mechanical shredding, burning, or a combination of all three. Bader Hassan said that a

deforested area will be used by jaguars for hunting within two years after abandoned and will be used as permanent habitat within five years.

Because of the required maintenance of pastures and the drop in cattle prices the trend is downward for cattle ranching in Belize.

The future of about 284,000 ha of good jaguar habitat in the Hill Bank to Gallon Jug area, formerly owned by the British Export Corporation who used it for timber production, is now in question. The area was recently purchased and divided into three parcels by corporations from the United States, reportedly by Coca-Cola, Walter Michner of Houston, Texas and another company or person. Information supplied by the local people in Belize is that the one-third owned by Coca-Cola is to be developed for citrus production, and that Michner was investigating game ranching for his land. Nothing had been or was developing in July, 1986 when the interviews were conducted there. The future of the jaguar in that part of Belize, which is about a third of the remaining good habitat, will depend on the amount and distribution of the forest that is left. The potential for tourism development in Belize is great. The coast has at least as much attraction for fishing, scuba diving, and swimming as that area of Mexico located just to the north that has experienced tremendous development in the past 15 years. Ancient Maya ruins in Belize are abundant, but relatively undisturbed, and at present undeveloped. Moreover, the language in Belize is English which would be attractive to people from the United States, Canada, and other English speaking countries. Tourism will come to Belize; how soon and of what form will have an influence on the future of the jaguar there.

Utilization

Killing of jaguars is evidently on the decrease in Belize. The drop in demand for spotted cat skins and the increased effectiveness of the CITES regulations have practically eliminated commercial hunting for the skin trade. Taking of jaguars has also decreased due to decrease in demand. CITES regulations are having an effect, and those that have jaguar skins are finding no buyers. Hassen estimated that of the 175 jaguars taken in Belize last year probably less than 25 were sold. The others were left to rot, or dried then used as rugs, and soon disintegrated due to insects. Hassan said that buyers were paying less than a sum equal to \$10.00 U.S. for jaguar skins, if they buy them at all, whereas at the height of the demand skins were bringing from \$75.00 to \$150. This drop in price has reduced the incentive for hunting by local people, hence the reduced take. In Belize it was reported that a buyer previously passed through the country periodically and bought skins which he took to Mexico. His visits are now less frequent, and he now either does not buy jaguar skins or the amount he is willing to pay has declined drastically.

Jaguars are killed by the rural people of Belize, if the opportunity is presented, just as they are throughout the range of the cat. People fear for their children, their dogs and their livestock. Many local people in Belize carry guns, usually a shotgun. They are required to have permits, which are easily obtained, and are issued for hunting and protection of livestock. They now rarely specifically hunt for jaguars because of the effort required and little economic return, but if they see one they shoot it, and they may sit over a kill hoping the cat will

return.

Laws And Regulations

Hunting for jaguars has not been legal in Belize since 1970. The law however, provides that "any person may take such measures as may be reasonably necessary to protect himself or other persons from attack by any animal." The law further provides that "any landowner or owner of domestic animals or any person acting on his behalf may without any other authorization kill any wildlife threatening or causing damage to crops or domestic animals."

Under the act a person killing such wildlife must report it to the authorities within one month and pay a fee. The fee for a jaguar is \$50.00 Belize (\$25.00 U.S.). Most people do not report the kill of wildlife taken under the above provisions. If they want to export the skin the fee is paid and a certificate is given which can be used to export the skin out of the country. All fees regarding wildlife, including hunting licenses, go into the general treasury. Regulations regarding wildlife protection in Belize are adequate. They are subject to interpretation by those administering them, and, in that respect, in Belize there appears to be a lack of enforcement of the spirit of the law. Belize is a signatory to CITES, and species on the schedules are officially protected. The taking of jaguars for commercial purposes or for sport hunting is not permitted. As noted above, however, skins have been going out of the country for some time, reported to have been smuggled to Mexico. Mr. Bader Hassan of Orange Walk guides hunters for jaguars for which he has obtained a permit under the depredations

provisions above. He said he took 10 jaguars in 1985. He said that some of the hunters took the skins with them, and some he had in his possession.

Diseases Or Parasites

About the only information available on diseases and parasites of jaguars comes from the study by Patton et al (in press). The information was collected from scats of jaguars in the Cockscomb Basin in the study by Rabinowitz. Almost all of the scats collected contained eggs of hookworm. Although hookworms seldom kill an animal outright they are debilitating and probably reduce the vigor and the longevity of the host. Rabinowitz (interview) stated that jaguars in the wild seldom live beyond 11 or 12 years, whereas they reach an age of up to 35 years in captivity.

Legal Hunting As An Incentive To Management

If jaguar hunting could act as an incentive to management Belize is a country in which it could occur. A form of sport hunting is now taking place; that is, guided hunters are taking jaguars indicted as livestock killers. The practice is providing employment to local people, bringing revenue into the country, and if carried out in the spirit of the regulations, solving local depredation problems. Little money is going to the government, and that that does is not earmarked for wildlife management. Little revenue is now derived from the commercial value of the skins but a great potential exists from hunters willing to pay several thousand dollars for the opportunity to hunt a jaguar. Whether such a program would instill a sense of restraint for killing jaguars on the part

of the local people is debatable. The resource is available. The capabilities and the will to manage that resource by the government, and an acceptance of the program that would be in the best interest of the jaguar is open to question.

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Bader Hassan. Rancher and Hunting Guide. Box 9, Orange Walk Town, Belize.

Dr. Alan Rabinowitz, Biologist. New York Zoological Society, The Bronx Zoo. Bronx, New York 10460 U.S.A.

Belize

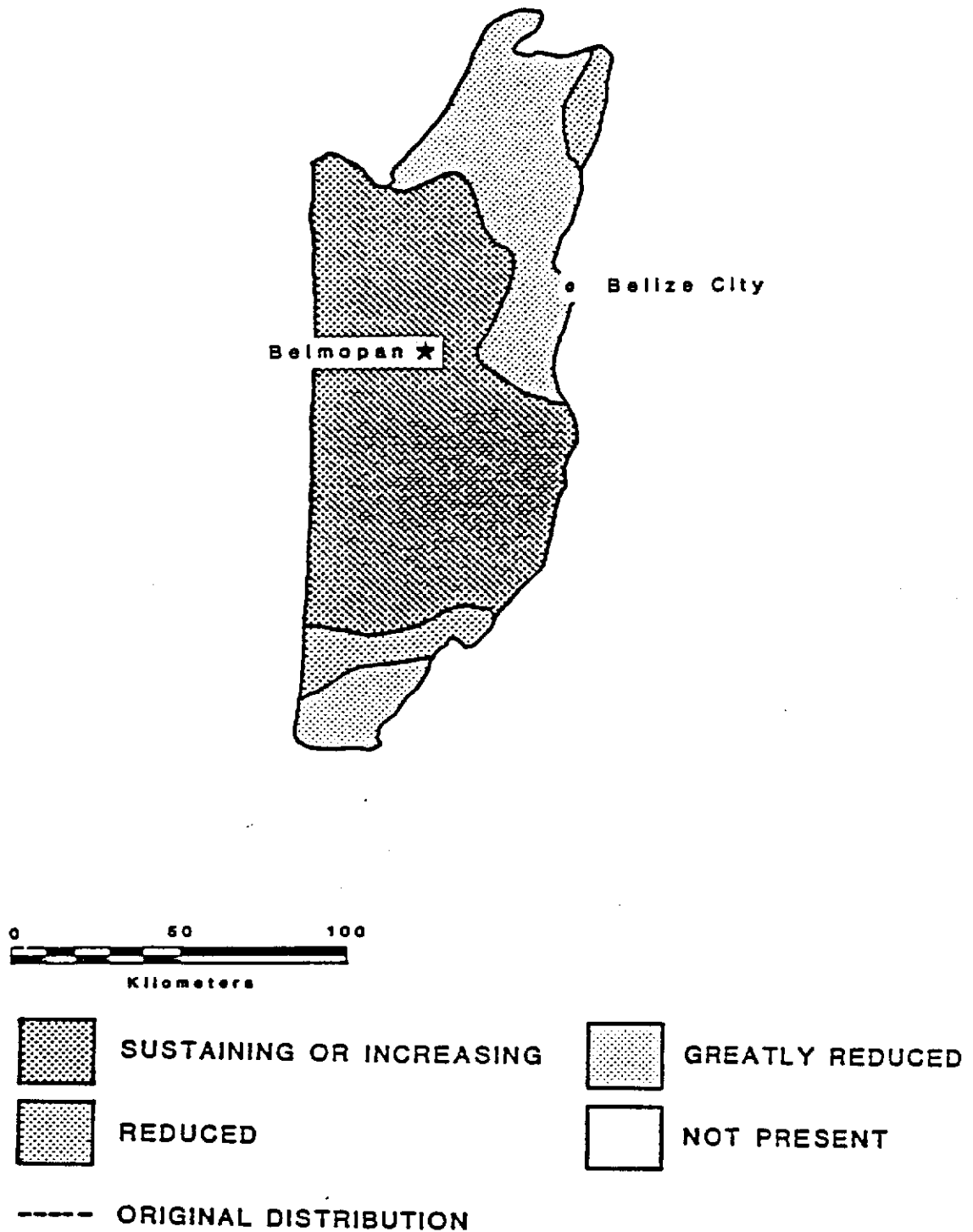


Figure 4. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

BOLIVIA

DESCRIPTION

Bolivia is one of the poorer nations of South America although it has considerable wealth of natural resources. Political unrest, poverty, and illiteracy are among the reasons for the nation's slow development. Revolutions and frequent changes in its government have characterized its political life. Its economic development and political stability have been influenced by its mining interests, especially its deposits of tin. In addition, it lost about half of its territory through wars to neighboring states over the years. The tin-mining industry controlled the government until 1930. A series of military dictators alternated with elected governments after 1930. The government returned to military rule in 1985 with the appointment of former President Victor Paz Estenssoro.

Most of the population are Indians or mixed Spanish and Indian ancestry. The population is largely rural and agrarian, and many of the rural people live in part from whatever resources of the land are usable and available to them.

A landlocked country, Bolivia is characterized by greatly contrasting landforms. The high Andes Mountains in the western part of the country overlooks a high, dry plateau. A huge lowland plain in the north and eastern part of the country contains several major ecological types including tropical rain forests, grasslands and swamps. The diversity of habitats is responsible for an abundant fauna which, as in many of the poorer South American countries, has been heavily exploited and unprotected for centuries. The Andean Highlands, also called the Altiplano, lies between the Andes and the Cordillera, and is a barren,

treeless plain inhabited largely by a low population of Indians who practice subsistence farming and stock raising. The Yungas is a small region northeast of the Altiplano on the western edge of the Cordillera. It has steep hills and narrow gorges with subtropical forests growing on the hillsides. The Valles are somewhat similar to the Yungas region but with more gently rolling terrain which support grasslands for grazing animals and for its many farms. Of greatest importance to wildlife is the Oriente region, a vast lowland plain extending across northern and eastern Bolivia. Moist tropical forests, grasslands, swamps and shrubby forests provide a variety of habitats. The river systems in the Oriente are a part of the Amazon drainage and when they overflow, as they do in the summer rains, much of the country is flooded. Farms in the southern part of the Oriente near Santa Cruz are important in producing food for the country.

Wildlife has always been important to local peoples as food and, in more recent times, as a source of income in international trade. The trade in live animals, skins, and other animal products has been linked with other contraband, namely, coca from which cocaine is made. In recent years, Bolivia has been a chief producer and exporter of coca which economists estimate is three times more important in foreign exchange than tin, its former chief export.

STATUS OF THE JAGUAR

As with most species of wildlife in Bolivia, the jaguar has declined in distribution and numbers. Hornocker (1971) reported that jaguars occurred in the Grand Chaco in southeastern Bolivia and in the tropical

forests of eastern Bolivia in what was then relatively pristine habitat. The species has not been intensively studied in Bolivia and numbers of the species are not known for any department or region of the country.

Ing. Oscar Mendez R., Jefe, Silvestre Nacional, Centro de Desarrollo Forestal, stated in our discussions that the jaguar occupies about 80% or about 500,000 ha of the land area of Bolivia. They occur in varying numbers in all regions of the country except the Altiplano and high Andes Mountains. The densest populations occur in all or parts of the States of Tarija, Chuquisaca, Oriental and Cochabamba. Smaller numbers occur in the State of Pando and the northern half of Beni. Third in density are the Chaco in the State of Santa Cruz and the forested areas of Beni.

Tello (1986) conducted a 4.5-month field survey on the status of wild cats including the jaguar in Bolivia in 1986. His findings agree with ours. He stated in a concluding paragraph:

"In Bolivia, jaguars are widely distributed in all areas below 3000 m. In general, they are considered common and even locally abundant particularly in areas below about 1000 m. However, they are rare, or severely declining in the vicinity of towns and larger villages. They are also common on large cattle ranches and still occur in many regions along the main roads. A high percentage of the jaguars annually killed in Bolivia are opportunistically shot on the most travelled roads, e.g. San Pablo-Santa Cruz. The species has a wide habitat tolerance and it appears that jaguars can be found in all types of habitat with some cover, either woody or grassy. Jaguars are by no means dependent on primary forests."

FACTORS AFFECTING JAGUAR POPULATIONS

Hunting

Bejarno (1973) reported on the causes of the decline of jaguars and other wildlife in Bolivia in a symposium held in Manaus, Brazil in 1973. He and persons whom we interviewed assigned hunting for commercial trade as the major cause of the decline. He stated that the fauna of Bolivian forests were similar in genera and species to those of the Amazon biota. However, in the last decade (1960's) prices paid for skins in international markets were responsible for the decrease of the jaguar and other felids. Export of cat skins was legal before CITES, and large numbers were shipped abroad. These were apparently legally shipped skins under permit by the Government of Bolivia. Table 3 contains statistical information compiled by the Ministerio de Agricultura in 1970 on the export of jaguar skins. While the number of dollars and the weights of the skins do not agree, it is quite obvious that many were exported in the 10 years beginning in 1960. In 1966, 182 skins were shipped from States of Santa Cruz and Beni alone. Hornocker (1971) reported that 7,758 jaguar skins were imported into the United States in 1970 alone.

Table 3. Export of Skins of Jaguars Between 1960 and 1969 From Bolivia

<u>Year</u>	<u>U. S. Dollars</u>	<u>Kilograms of Skins</u>
1960	\$ 5,680	1,185
1961	16,220	1,162
1962	18,675	1,076
1963	38,630	1,682
1964	36,630	384
1965	38,520	26,536
1966	35,310	636
1967	55,740	622
1968	30,200	395
1969	0	0

Native peoples, principally mestizos and others from the interior of the country, left their traditional vocations at the height of the skin trade and began hunting for jaguars and other spotted cats. Non-resident entrepreneurs from Bolivia as well as some from outside the country set up networks of hunters for taking wildlife of commercial value. Steel traps and other devices provided by them increased the efficiency and size of the take, and in the decade before CITES, Bejarno states that the populations of jaguar (and other spotted cats) were seriously depleted.

Tello (1986) believes that perhaps 300 to 400 jaguars are killed annually and concluded that the "future of the jaguars in Bolivia in very large part depend on the farmers' attitude toward the species, and if the farmers do not change their present attitude to a conservationist attitude, jaguars will be exterminated in the near future in the cattle farming regions."

He further concluded that the species can be preserved if farmers receive a financial return from hunting and photographic safaris of the species to offset losses of their domestic livestock. Tello emphasized that such a plan would succeed "only if a sound management program is established." By management, Tello refers to careful censuses and harvest quotas for the species in hunting blocks.

Regulations

Hunting of felids is prohibited in Bolivia but enforcement of existing laws is poorly done if at all. Campesinos kill jaguars on contact because there is some profit, even locally, from the sale of jaguar skins. Most illegal kills come about from this source and from

rural peoples to protect their livestock. It is almost certain that smuggling of jaguar skins from Bolivia exceeded exports permitted by the Government of Bolivia before the CITES treaty. However, there is little doubt that the treaty has reduced exports of jaguar skins because the price has fallen to make organized hunting uneconomic for mestizos and for those who purchase the skins for export. Nonetheless, some contraband shipments still are exported from Bolivia and these are alleged to be transported through Paraguay. Obviously, the dimensions of this activity and contraband are difficult to obtain.

Tello (1986) was dismayed at the apathy of employees of the agency of government charged with administering wildlife resources in Bolivia, the Centro de Desarrollo Forestal. According to Tello, "there is not a single wildlife ecologist, biologist or wildlife technician in the Centro de Desarrollo Forestal in all of Bolivia. Besides, the vast majority of the present staff of the Wildlife Department does not have any true interest in any of the wildlife fields."

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Sra. Maria Marconi, Coordinadora, Centro de Datos para la Conservacion de Bolivia. The Nature Conservancy International Program, Avenida 6 de Agosto No. 2376, Casilla 7,000, La Paz, Bolivia.

Ing. Oscar Mendez Rivera, Jefe, National Wildlife, National Parks and Hunting, Centro de Desarrollo Forestal, P. O. Box 6167, Ministerio de Asuntos Campesinos y Agropecuarios, 5 Pisa, Avenida Camacho, La Paz, Bolivia.

Sr. Armando Cardoza, President, Bolivian Wildlife Society, La Paz, and Past-President of PRODENA

Bolivia

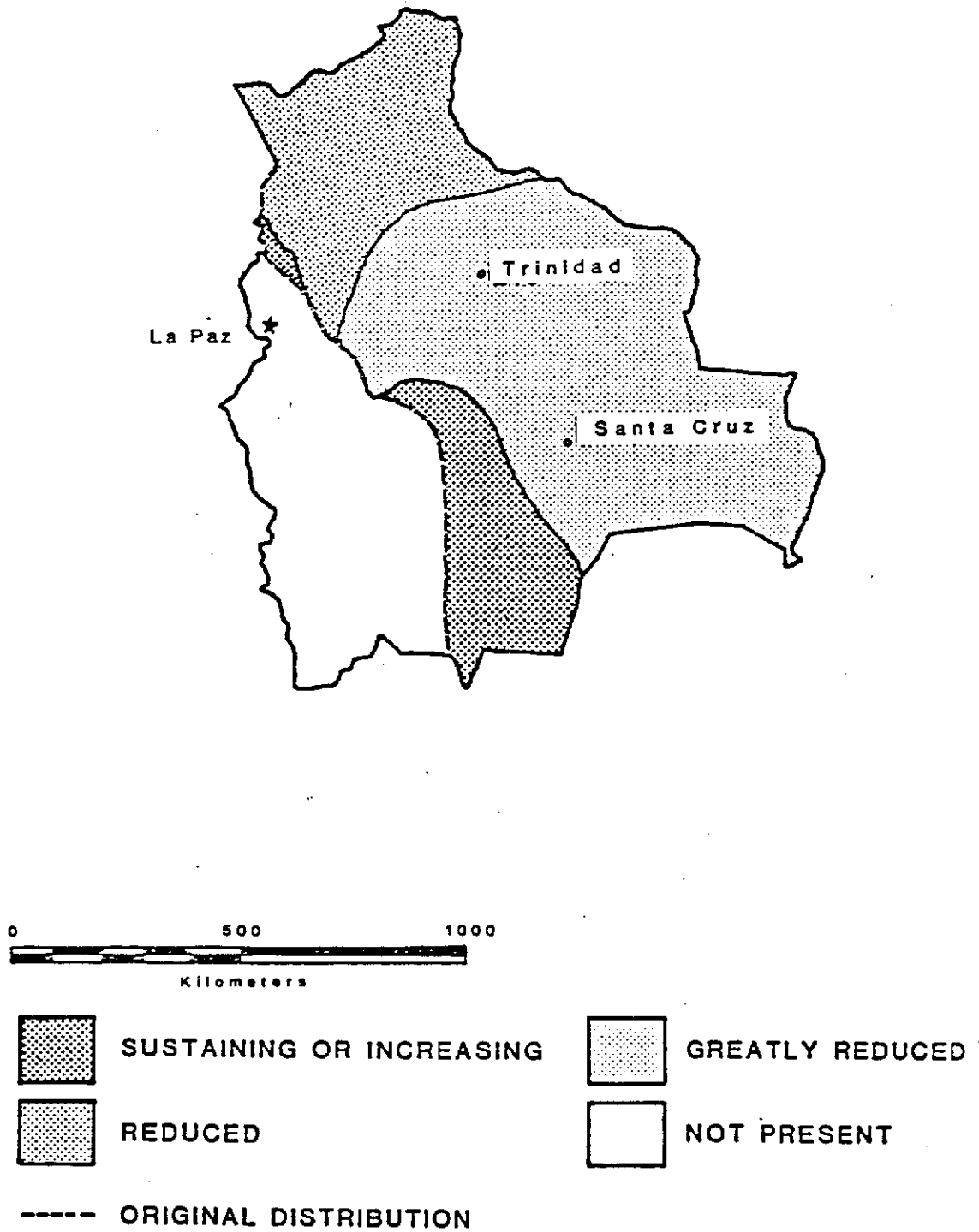


Figure 5. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

BRAZIL

DESCRIPTION

Brazil, the largest country in South America, is bordered on the east by the Atlantic Ocean, and is surrounded on the north, west and south by 11 other countries. In size (8,511,965 km²), it dominates the continent making up almost half of the total area. The population of 141,459,000 makes the average density 17 persons per km². Most of the people live in cities; that is, 73% are urban, and ten metropolitan areas have populations more than one million. About 8% of all Brazilians live within 320 km of the coast, and more than half live in the southeastern portion, either on the coast or the high country adjacent to the coast. About one-third of the people in Brazil are employed in agricultural activities. The country is a world leader in the production of agricultural products, producing coffee, bananas, cacao beans, corn, oranges, sugar cane, and soybeans. Brazil is South America's leading cattle producer. Cattle are found country-wide, and the cattle industry creates a problem for the jaguar.

Land areas in Brazil can be divided in a general way into three areas, the Amazon Basin, the Northeast, and the Central and Southern Plateau. The Amazon Basin covers most of northern Brazil, and in area encompasses over half of the country. It is primarily low in elevation, and covered by jungle and tropical rain forests. Rain falls throughout the year and is especially heavy from December to May. The Amazon and other giant rivers that are its tributaries wind through this country of towering trees and have thus-far restricted development of the area. The

government is vigorously pushing development, but at present only about 7% of the population live there. Northeastern Brazil is that part that bulges into the Atlantic Ocean. It consists of two distinct sub-regions, the coastal plain and the interior backlands, or sertao. The coastal plain is fertile and rainfall is sufficient and dependable, hence the country is farmed. The backland is hilly and has frequent droughts, hence this area is used chiefly for cattle production. The Central and Southern Plateaus lie south of the other two regions and make up only one-fourth of the area of the country. The temperature is moderate, ranging from 37° C. in the summer to 10° C. in the winter. Rainfall averages 130 cm per year, the rainy season lasting from November to May. This area has the most pleasing climate and about 50% of the people live there.

STATUS OF THE JAGUAR

The jaguar was originally found throughout Brazil. Now they have been practically eliminated from the northeast and are found only in isolated forested areas along the coast in the southeastern part of the country where they are in competition with the development and use of the land by people. In the thinly populated interior there are still good jaguar populations. Along the southeast coast there is a remnant population also between Sao Paulo and Curitiba. Both Crawshaw and Almeida (interviews) believe that this population will disappear within the next five to ten years. Almeida indicated that there is a remnant population also between Sao Paul and Rio De Janeiro. In the state of Espirito Santo north of Linhares there are also a few jaguars, and a small population, estimated by Crawshaw to not exceed 10 in number, exists along the Jucuruo

River northeast of Nanuque. On the southwestern border of the state of Parana, where it meets Argentina, there is a small population of jaguars in Iguacu National Park, South of there along the Uruguai River just north of Tres Passos there also are a few jaguars, estimated by Crawshaw to be not more than five or six animals.

The east-west line where jaguars do occur, but are under pressure from development and will probably be gone within the foreseeable future, is a matter of judgment. Almeida considered this zone to be, beginning from north to south, the southwestern parts of the states of Maranhao and Piau, the drainage basin of the Rio Tocantins in the state of Goias and the state of Mato Grosso Do Sul. The demise of the jaguar in this zone will depend on how fast the country develops in that particular area. The jaguar population is stable or perhaps increasing over most of the northwestern portion of Brazil. This includes the state of Amapa, the western two-thirds of Para, the northern half of Mato Grosso, and the states of Rondonia, Amazonas, Acre, and Roraima. Both Crawshaw and Almeida considered the jaguar to have been affected very little by development in this area.

Almeida (1986) estimated a jaguar population of 3,500 in the Pantanal area and its peripheral zone, of which 90% lies in the state of Mato Grosso and the other 10% in Bolivia and Paraguay. This was in an area of 200,000 km² of the Pantanal and another 24,000 km² of peripheral area. In prime habitat Almeida estimated a jaguar per 25 km², and in less prime habitat a jaguar per 50 and a jaguar per 100 km². Schaller and Crawshaw (1980) found a jaguar per 25 km² at two different ranches in the Pantanal.

North of the Pantanal, in the basin of the Guapore River, Almeida

estimated a population 1,400 jaguars in an area of 50,000 km². The density there was a jaguar per 35 km², and the habitat consisted of swamps, savannahs, escarpments, and deciduous forests, quite similar to that of the Pantanal. In the rain forest portion of the state of Mato Grosso, that is the northern half, where Almeida and Crawshaw considered the jaguar population to have thus far been little affected, Almeida (1986) calculated that a male and a female jaguar, though hunting separately, would occupy together 150 km² of forest. He considered the rain forest habitat less suitable to jaguars than the Pantanal due to a lower prey base. He further stated the limited development that has occurred by opening up the forest has contributed to the survival of young jaguars by providing cattle and pigs as prey, hence the population has increased.

FACTORS AFFECTING JAGUAR POPULATIONS

The future of the jaguar in Brazil will be determined by the pace of development, which to a great degree will be governed by the rate at which all weather roads or railroads are pushed into the back country. Products beyond those necessary for existence of the local population must be transported to the south and east for use by the people on the Plateau, or exported through that area for overseas use. Cattle and lumber, the two greatest potential products from this area, require relatively inexpensive modes of transport to be shipped over great distances. More intensive management for cattle production, particularly in the Cerrado and Pantanal areas of Mato Grosso and Mato Grosso Do Sul, will increase activities to reduce or eliminate the big cats. As native vegetation is replaced with

improved pastures and forested borders are cleared, less cover will remain for security, prey species will decrease, and the country will be less difficult to negotiate by ranchers in search of jaguars. Ranches will also become smaller, as land is divided among the heirs of the present large ranch owners. This in itself will tend to intensify the management of the areas. Cutting of the forests and converting the trees to lumber is on the verge of becoming economically feasible. Areas have been purchased with timbering as the objective, and the potential developers are awaiting inexpensive and dependable means of transport. Removal of the trees will decrease the carrying capacity for jaguars, but even more detrimental will be the construction of access roads necessary to get the timber out. This will open up the country for subsistence agriculture which inevitably follows logging in countries with expanding populations.

The rate at which Brazil will be able to develop its back country is difficult to determine. The government is aggressively pushing development, but the nature of the country itself resists changes. The Pantanal of the Mato-Grosso, which covers 200,000 km², is flooded from February to June, and is unlikely to be used for anything but livestock. The tropical rain forest of the Amazon Basin covers some 4 million km². Maintaining openings in this canopy of growth is an endless task of mechanical shredding, herbicide application, or hand chopping. A grass or other herbaceous cover that will prevent reforestation has yet to be discovered. An additional detriment to development of this area for livestock is the declining prices of cattle. This may be a temporary condition but in some areas where the maintenance of suitable grazing is a constant battle, ranching is becoming an enterprise of the past because it

is no longer economically feasible.

Development of the Amazon Basin will also be costly and slow. The rivers there are numerous and subject to tremendous fluctuations in levels. River crossings there will either be slow, by ferry, or require tremendous outlay in resources for bridges. Dams to regulate the river flow and for hydroelectric production are in the planning stages, but their completion is many years away. In both the Pantanal and the Amazon Basin jaguar habitat should be secure for the next 25 years.

Killing jaguars for depredation control by ranchers, and opportunistically out of fear and custom is likely to continue. One rancher, Richard Mason, who has a ranch in Mato-Grosso Do Sul, is reported by Crawshaw to prohibit the killing of the big cats on his ranch. This prohibition, however, is probably the exception. It is also unlikely that the government will change its practice of overlooking the taking of jaguars for cattle killing. Punishment for this offense, which is contrary to the laws in some but not other countries, is seldom used as a deterrent, as determined by this survey. The taking of jaguars for commercial sale of the skins has decreased in Brazil, as it has in other countries. Almeida (interview) reported that in Mato-Grosso skin dealers who formerly dealt in jaguar skins have either turned to caiman skins or have gone out of business. Exploitation of jaguar skins in Brazil began to decrease in the 1970s, and in 1982 made up only 0.9% of the confiscated skins held by IBDF offices (Duarte and Rebelo 1985).

REGULATIONS

Hunting of jaguars has not been legally permitted in Brazil since

1967. Taking of the big cats as a means of depredation control is not permitted by law but is usually overlooked by the authorities. Essentially the laws in Brazil are adequate but enforcement is lacking. A portion of this is due to the inadequacy of resources assigned to enforcement. Crawshaw reported that IBDF had seven agents covering five million km² in the Amazon Basin. The lack of will or the inadequacy of the legal system is also at fault. Punishment for taking cattle-killing or alleged cattle-killing jaguars is not meted out by the authorities. Brazil is a member of CITES and the regulations prescribed by the Convention are a part of the law. As mentioned above, taking of alleged cattle-killing jaguars is overlooked but hunting for sport or commercial purposes, and export of jaguar skins is not permitted. Skins are routinely confiscated at ports, airports, and at the border when found (Duarte and Rebelo 1985).

The government also carries out special operations to find skins at points of possible export, and skins are confiscated after reported by members of the public. Duarte and Rebelo (1985) reported that in 1982, 247 jaguar skins that had been confiscated were held by IBDF offices in Brazil. As in other countries, enforcement of the CITES regulations and decrease in demand have reduced the take of jaguars for commercial purposes in Brazil.

DISEASES AND PARASITES

Crawshaw stated that jaguars had no apparent problems with diseases or parasites in Mato Grosso Do Sul. In studies there, 27 jaguars were handled and no visible indications of diseases or parasites were found.

He did state, however, that ocelots seemed to have problems with diseases.

OTHER FACTORS AFFECTING JAGUAR POPULATIONS

Crawshaw stated there were plans by the Government to build some 80 dams in the Amazon Basin which if constructed would flood thousands of km². Such a development would decrease the carrying capacity for all terrestrial wildlife as well as increase human development and activity in the area. When, if ever, those plans will be put into place was unknown to Crawshaw at the time of the interview.

LEGAL HUNTING AS AN INCENTIVE TO MANAGEMENT

Almeida and Quigley were not optimistic about hunting providing an incentive for management of the jaguar in Brazil, whereas Crawshaw was guardedly optimistic. Almeida thought that the potential income would be inadequate to both government and professional hunters to cover the costs of such a program plus the net return to the hunters to pay off their investment and the return to the government to carry out the additional investigations to gather the necessary data. Crawshaw thought that a cooperative project between the government and the owners of large ranches, particularly in the Pantanal, could be developed into a program that would save the jaguar in cattle country. He hopes to develop such a program when he returns to Brazil. From his former studies he figures that about 5% of the population could be taken annually. The money received from hunters would provide local employment, which would enable the local people to buy meat which would somewhat solve the low prices now paid for cattle. The program would also demonstrate that the government

was attempting to alleviate the depredation problem now encountered by the ranchers.

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- Dr. Howard Quigley, Wildlife Biologist, Wildlife Research Institute, Box 3246, Univ. Station, Moscow, ID 83843. U.S.A.
- Mr. Antonio E. Almeida, Naturalist Rancher and Professional Hunter, Caixa Postal 840, Sao Paulo, Brazil.

Brazil

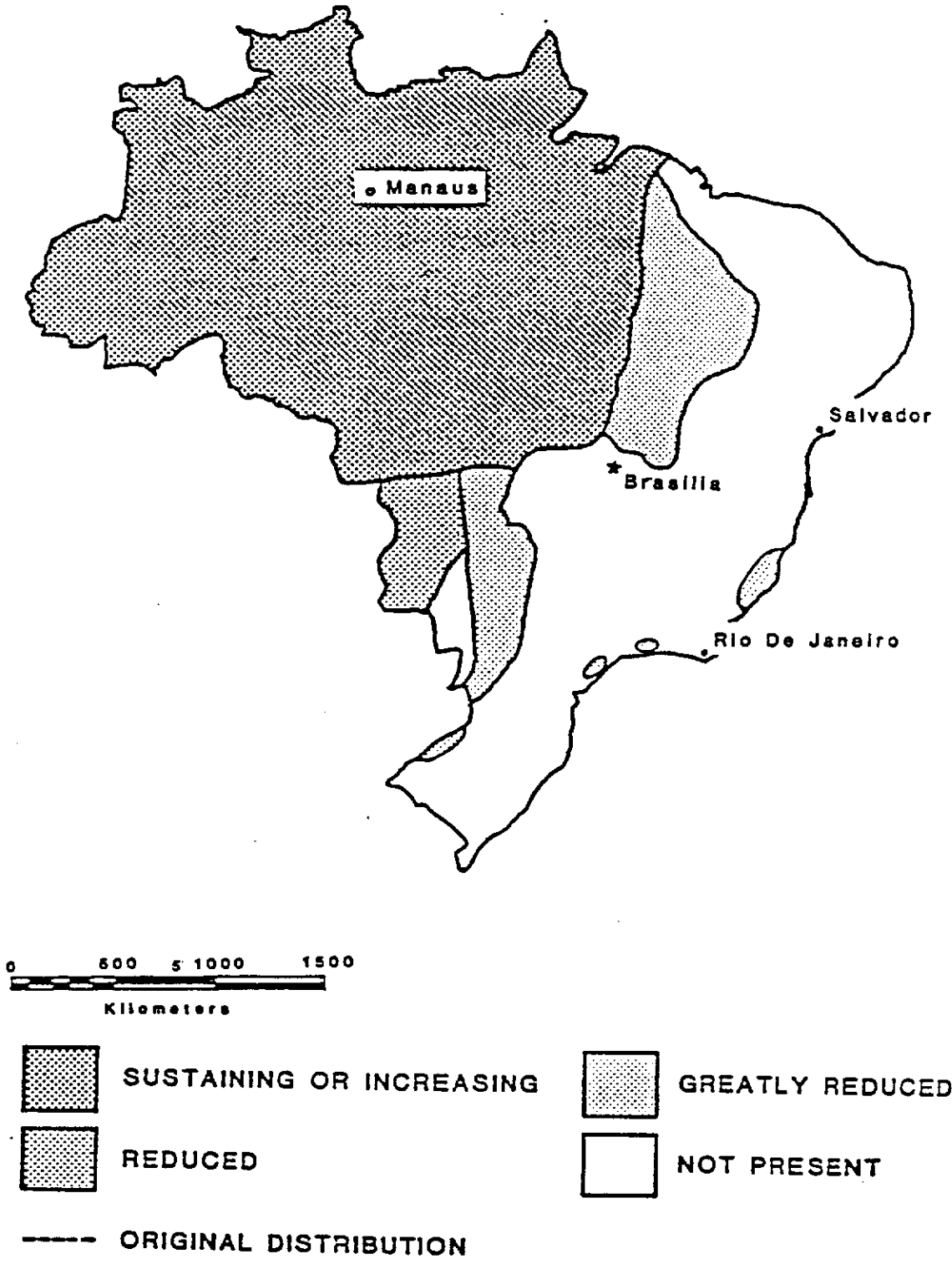


Figure 6. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

CHILE

DESCRIPTION

Chile, a relatively small country in South America, extends in a rather thin band for some 4,264 km along the Pacific Coast of South America from about mid-continent to Tierra del Fuego. It has a total land area of 756,626 km², and a population of 12,421,000, most of which are mestizos. Only about 17% of the people live in rural areas.

The land is primarily high mountain country of the Andes but contains other landforms which are diverse and sometimes inhospitable to man and his industries. The Central Valley of the Andes contains the richest soils of the country and is farmed. Mountains reach over 22,000 feet and are snowcapped. Other regions are extremely arid with practically no rainfall for months and even years. The windswept, rocky islands in Tierra del Fuego are thinly populated with few roads and with sheep ranches the major land use.

STATUS OF THE JAGUAR

Limited habitat occurred in Chile in pristine times, and because of development of it, jaguars have been completely extirpated from the country (Sr. Isaac M. Ortega, Sociedad de Vida Silvestre de Chile, personal communication).

SOURCES OF INFORMATION

INTERVIEWS

Ortega, Isaac M., Biologist. Sociedad de Vida Silvestre de Chile.
Present address: Department of Range and Wildlife, Texas Tech

University, Lubbock, Texas.

Chile

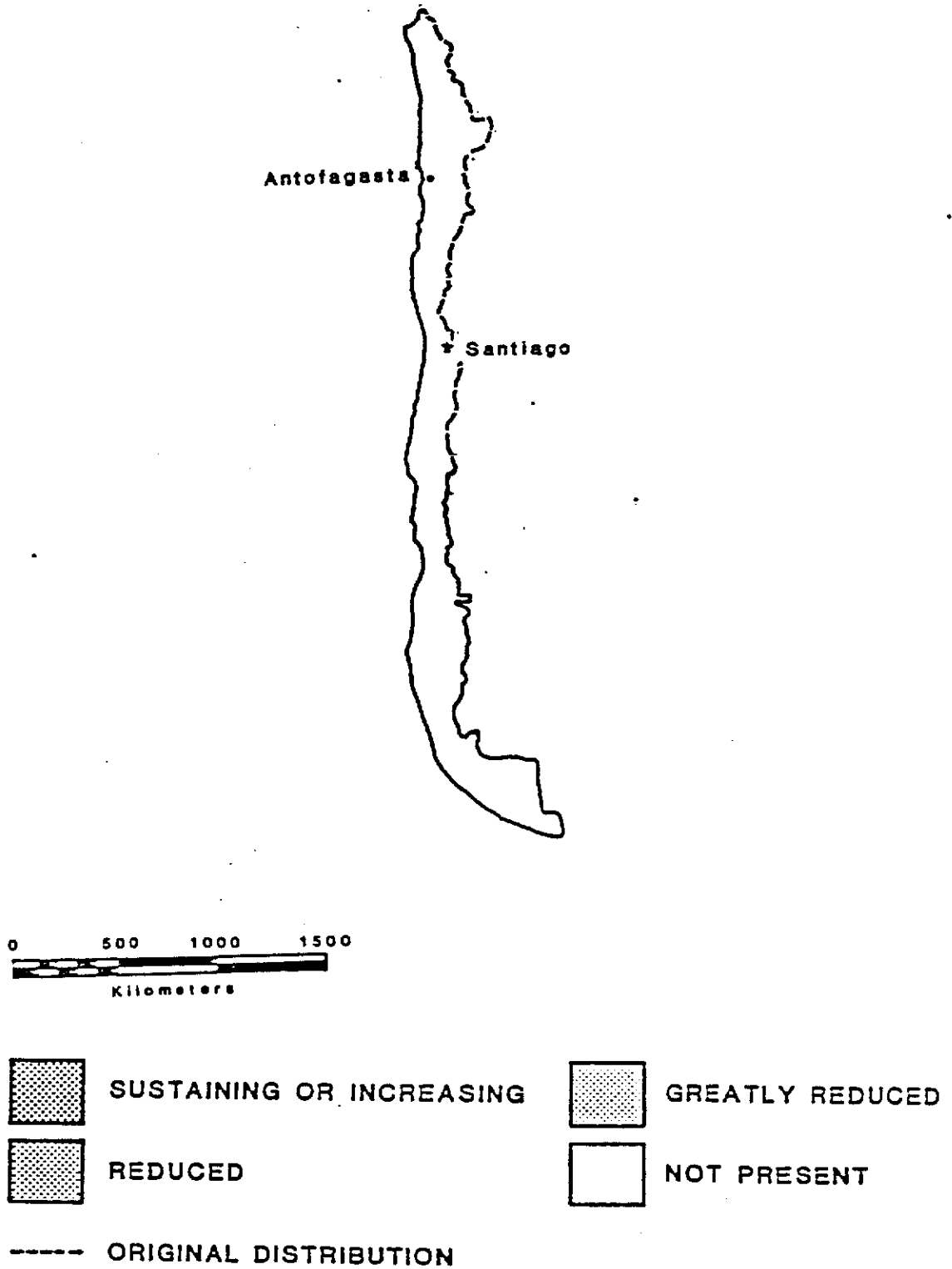


Figure 7. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

COLOMBIA

DESCRIPTION

Colombia is a republic of Spanish origin and has an area of 1,138,914 km² and a population projected to be 29,943,000 in 1987. About 50% of the population are mestizos, formed from intermarriages of Spanish and Indian races. Another 15% are mulattoes, peoples of mixed Indian and African origins, the latter entering Colombia in the slave trade. About 20% of the population is of European ancestry, primarily Spanish. A large percentage of the population is made up of campesinos, or rural Colombians who make their livings from the land. In recent times, however, many campesinos have made their way into large cities to find a better way of life which has imposed extreme poverty on them.

Ecologically, Colombia is made up of extremely diverse landforms and life. Its major types are the Coastal Lowlands, the Andes Mountains, and the Eastern Plains or Llanos. The Coastal Lowlands comprise the Caribbean Lowlands and the Pacific Lowlands. About 20% of the people of Colombia live in the Caribbean Lowlands; the Pacific Lowlands, a land of swamps and dense forests, has a very sparse population. The Andes cover about a third of the country and contains about three-fourths of the population. Most of Colombia's wealth - mines, fertile farms, and large factories - are in the valleys and basins of the Andes.

The Eastern Plains, which contain the Llanos and tropical forests similar to those of neighboring Venezuela and Brazil, comprise about 60% of the land area of Colombia. Only two percent of the people live in the region, and it is here that most of the wildlife of the original fauna

remains. It is a land of rivers, grasslands in the north and tropical forests largely in the south. Here too, as in its neighboring countries, the region has wet and dry seasons with inundation a regular occurrence during the wet season.

While its chief agricultural crops are coffee and cattle, the production of coca for export to the western world has become increasingly important if not the chief export for the country. Many campesinos have turned to production of coca in preference to other crops because of its value and because there is a ready market for it. While a few of the campesinos have improved their economic strengths, much of the wealth from coca accrues to a handful of "druglords."

STATUS OF THE JAGUAR

The jaguar is endangered in most of the country according to our contacts in Colombia; however, in the Colombian parts of the Amazon Basin, it still occurs in relatively good numbers. There, most authorities consider it is presently "increasingly threatened" with its long-term future uncertain. We were able to get only fragmentary information on the species in Colombia. Interviews with scientists of the the Government of Colombia (Instituto Nacional de los Recursos Naturales Renovables y del Ambiente - INDERENA) and with personnel of the National University (Universidad Nacional de Colombia) and non-government conservation organizations (Fundacion Natura) supported the present status of the species as endangered.

Colombia has been one of the principal sources of skins exported to Hong Kong, the Canary Islands, and West Germany, according to world

conservation organizations, and this trade gives basis for the apprehension of responsible conservationists in Colombia.

Information obtained during our visits to Colombia was sketchy. Moreover, aside from a rather large collection of skins and skulls confiscated by INDERENA from contraband animal shipments from which records of distribution of the species has been done, field studies have not been conducted there. None is in progress at the present time. Studies have not been done in the past primarily because of lack of experienced personnel and funds. More recently, field studies have been neglected due to the danger existing in some areas of the country where drugs are being grown and processed. It is alleged by scientist/educators in Colombia and suspected by the U. S. Fish and Wildlife Service that illicit trade in animal products is tied in with drug trafficking in Colombia.

FACTORS AFFECTING JAGUAR POPULATIONS

Even though traffic in skins of spotted cats has diminished as a result of CITES, of which Colombia is a signatory party, commercial trade in skins and destruction of habitat are still serious factors in the future of the jaguar.

Hunting

Hunting of jaguars (and other spotted cats) for their skins is still a common practice in Colombia. According to Dr. Jorge Hernandez Camacho, Biologist and administrative officer for research of INDERENA, most of the skins are taken by campesinos and are likely being gathered and exported

to Asia and Europe through neighboring countries of Panama and Brazil by organized "gangs." In the past, it was well known that skins from Colombia and neighboring countries were assembled in the town of Leticia, packaged and labeled falsely, and shipped to Brazil as Colombian products. From there, they entered world trade.

Killing of jaguars by sport hunters and by ranchers who seek to protect their livestock is considered relatively unimportant in the present status of the species. Sport hunting as a commercial enterprise is not viewed as a viable strategy for protecting the species. Monetary returns to the campesinos who are the major sources of illegal kill would be minimal and thus would offer no incentives for them to desist.

Habitat

Losses of habitat is viewed as the most serious long-term threat to the jaguar. The agricultural frontier is expanding, forests are being cleared, and settlements established in areas where the habitat was suitable for the species. The savannas of the Llanos are developed mainly for cattle raising but also for some farming. Clearing of the forests in the south, which is the last stronghold of the jaguar, is increasing.

Regulations

As mentioned above, Colombia is a member of CITES and has laws prohibiting the taking of jaguars and export of their skins and other parts. However, Colombia, like all South American countries, has a conservation infrastructure in its government but practically no enforcement personnel in the field to enforce its laws and police the

campesinos. Some say, moreover, that even with a strong field force, changing the attitudes of poor peoples to protect an animal they view as a source of income and as a threat to them personally and to their livestock would be a long-term and difficult educational program. Conservationists generally believe that attempts to develop commercial sport hunting would only increase illegal kill of spotted cats, again simply because there are not enough personnel to administer wildlife resources.

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Dr. Ernesto Barriga Bonilla, Director Ejecutivo, Fundacion Natura. Calle 94, No. 15-19, Of. 304, A. A. 55402. Bogota, Colombia.

Dr. Alberto Cadena, Mammalogist, Department of Zoology, Universidad Nacional de Colombia, Bogota.

Dr. Jorge Hernandez Camacho, Biologist and Research Officer, Instituto Nacional de los Recursos Naturales Renovables y del Ambiente (INDERENA). Apartado Aereo 13458. Bogota, Colombia.

Colombia

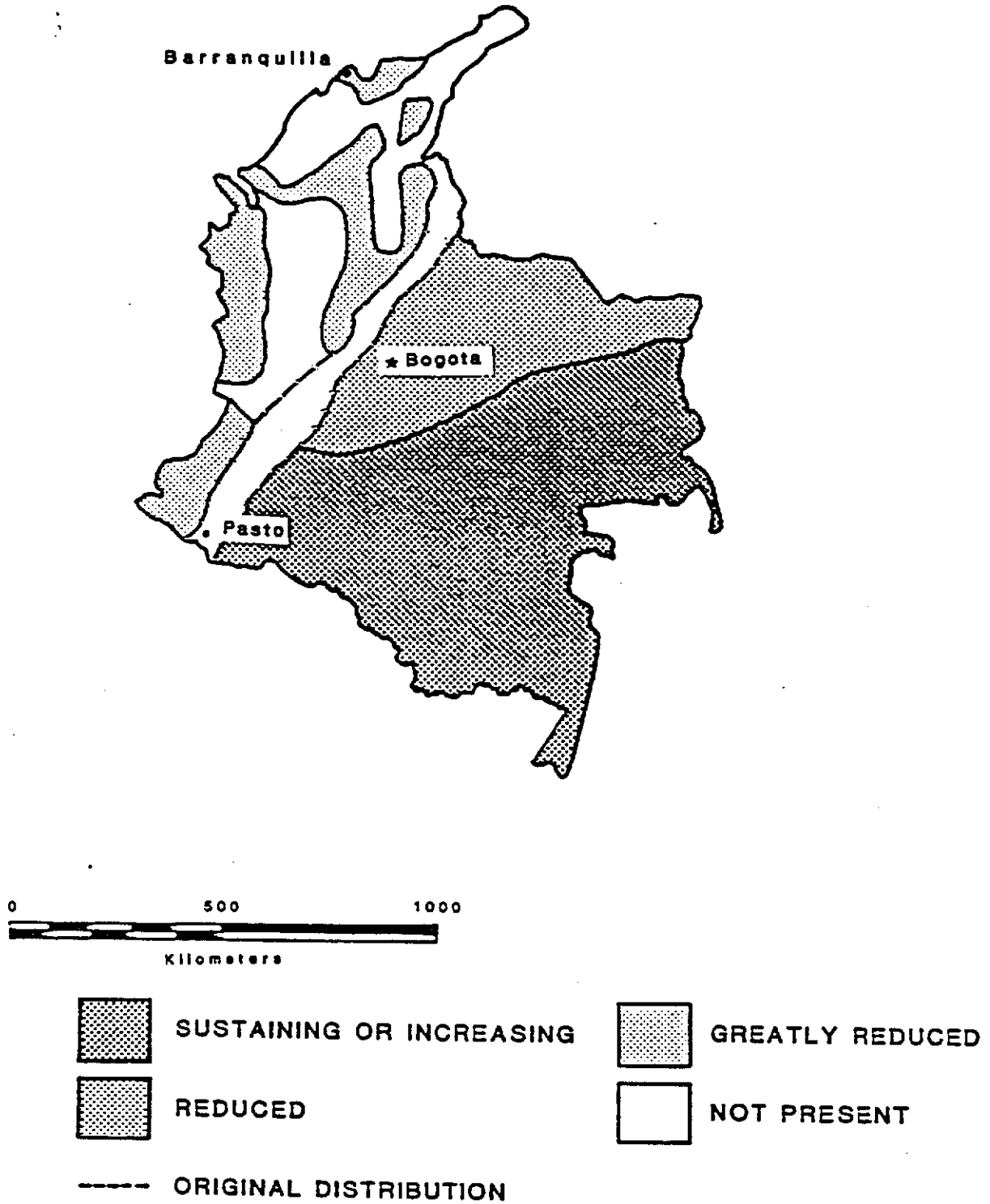


Figure 8. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

COSTA RICA

DESCRIPTION

Costa Rica is the second smallest republic in Central America (51,000 km²) with an estimated population of 2,645,000 people in 1987. Most of its population lives on six percent of the land in the intermountain Central Valley (Hartshorn, et al. 1982). A total of 1,687,885 ha or 22.9% of its land surface has been set aside as parks and protected reserves (Vaughan 1983). Intensification of land use and deforestation are increasing to meet the needs of the expanding population.

A series of mountain ranges running northwest-southwest divide Costa Rica into three major ecological regions: the Central Highlands, the Caribbean Lowlands, and the Pacific Coastal Strip (Hartshorn, et al. 1982). The Central Highlands are essentially a series of intermountain valleys which contain rich volcanic soils on which most of the country's food is produced. Coffee, bananas, beef, and sugar are chief exports. Tropical Moist Forests and Montane Wet Forests are extensive in the region. Tropical Dry Forests occur in the northwest in the Caribbean Lowlands and these occupy about 20% of the country. The Pacific Coastal Region or Lowlands are varied and much smaller in area than the Caribbean Lowlands. The population is largely descendants of mixed marriages (mestizos) between Spanish colonists and Indians. The growth rate is presently 2.2 percent and at this rate is expected to double every 28 years. By the year 2020, human numbers are predicted to reach 6.1 million (Hartshorn, et al. 1983). High inflation rates and devaluation of the currency has caused serious economic problems in the past few years.

Pollution due to increased consumerism, especially pollution in rivers from anionic detergent effluents, has lagged far beyond protective measures.

STATUS OF THE JAGUAR

Once common throughout its range in Costa Rica, the jaguar is now uncommon to rare, and its distribution has been greatly reduced. All persons contacted in Costa Rica for interviews stated that the species is endangered as defined in the CITES treaty. Vaughan (1983) and Sr. Eduardo Lopez-Pizarro, Head of Wildlife Services for Costa Rica, stated that about 7,000 km² of dense forest (60 to 90% forest cover), the species' primary habitat, remains in Costa Rica. Most of these areas are in parks and other kinds of protected areas. Vaughan (1983) used estimates of densities of jaguar in Brazil, Argentina and Venezuela to arrive at numbers of jaguars in the dense forests of Costa Rica. Using a range of densities between 0.014 and 0.1 per km², he estimated between 110 and 790 jaguars occurred in the largest contiguous suitable range which occurred in the State of Talamanca. The largest population of jaguars in a protected area was estimated between 27 and 190 individuals in La Amistad National Park. For all of Costa Rica, Vaughan reported an estimate of over 1,700 individuals. A few jaguars occur in altered areas; i.e., ecological types that have been deforested and put into other uses; however, by far the great number occurred in dense forest habitat. Sr. Lopez-Pizarro stated in the interview that the Wildlife Services of Costa Rica place numbers of jaguar optimistically at no more than 200.

FACTORS AFFECTING JAGUAR POPULATIONS

Vaughan (1983) used a ranking system of one to four to describe factors influencing jaguar populations in Costa Rica. He reported that hunting losses were minimal at the present time. He concluded from his evaluation that survival of the species was perilous because it was a relatively rare species with a low reproductive potential; its habitat was being seriously depleted and it could not adapt to altered habitat; and that, based on island biogeographic theory, there were no areas of suitable size remaining in Costa Rica to sustain a population of sufficient size (500 members) to provide long-term genetic fitness of the species.

Habitat

Loss of habitat was and is the primary threat to the species. An estimated 49,000 km² of dense forest habitat occurred in Costa Rica in pristine times. About 15,000 km² (31 percent) of dense forest habitat was deforested or modified to some serious extent by 1940. Another 18,000 km² were destroyed between 1940 and 1977 (Vaughan 1983). Exploitation of the forest for timber and for agricultural purposes is the cause of deforestation in Costa Rica as well as in most of the tropical forest regions of the world. Being a wilderness species, jaguar numbers have shrunk in direct proportion to deforestation.

Hunting

Costa Rica is a member of CITES and has outlawed all hunting of spotted cats in the country. Sr. Eduardo Lopez-Pizarro is the scientific

authority for the country. Sr. Lopez-Pizarro estimates some 14 jaguars are taken illegally each year, and if used in commerce, they are certainly sold in-country; i.e., not exported. The skin trade, from all accounts, is practically non-existent. When jaguars are reported to be killing livestock on a ranch or in a region, permits are issued to remove the animal(s). Several hunters that are members of hunting associations in Costa Rica are usually issued permits to take offending animals. Estimates of 10 to 12 permits per year are issued to take the offending animals and most are taken. Interviews with officers of three hunting associations located in San Jose and Heredia verified as much (see interviews with Srs. Ricardo Guardia V., Guillermo Rivera S., Ricardo Fernandez D., and Sr. Jorge Gamboa E.). Interestingly, these men, who have hunted most of their lives in Costa Rica, believed the jaguar to be in danger of extinction not by hunting but by continued loss of dense forest habitat. They were unanimous in their evaluation of the future of the jaguar; their assessment was that it would likely be relegated to protected parks and reserves in the future.

Regulations

As mentioned above, Costa Rica is a signatory party to CITES, and has strict regulations concerning the take and sale of animals and animal products. However, as with many Latin American countries, its laws are poorly enforced primarily because of lack of an effective field force. Nonetheless, CITES has practically eliminated commercial sales of jaguars by taking away the markets. According to Vaughan (1984), "Today, there is no public dealing in hides or live animals; only a few years ago, furs

were bartered openly in market places and leather shops."

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- Sr. Jorge Gamboa Espinoza, President, Asociacion CAPAZURI, P. O. Box 55, Canas, Guanacaste, Costa Rica.
- Sr. Ricardo Guardia V., President, Asociacion Nacional de Cazadores de Costa Rica, P. O. Box 6589, San Jose, Costa Rica.
- Sr. Guillermo Rivera S., President, Costa Rica Asociacion Herediana de Caza y Pesca, P. O. Box 7625, San Jose 1,000, Costa Rica.Sr.
- Sr. Eduardo Lopez-Pizarro. Dirreccion General Forestal, Ministro de Agriculutra y Ganaderia. Apdo. 10094, San jose, Costa Rica.
- Sr. Christopher Vaughan, Professor and Coordinator of Graduate Wildlife Programs, Department of Environmental Sciences, National University of Costa Rica, Heredia, Costa Rica.

Costa Rica

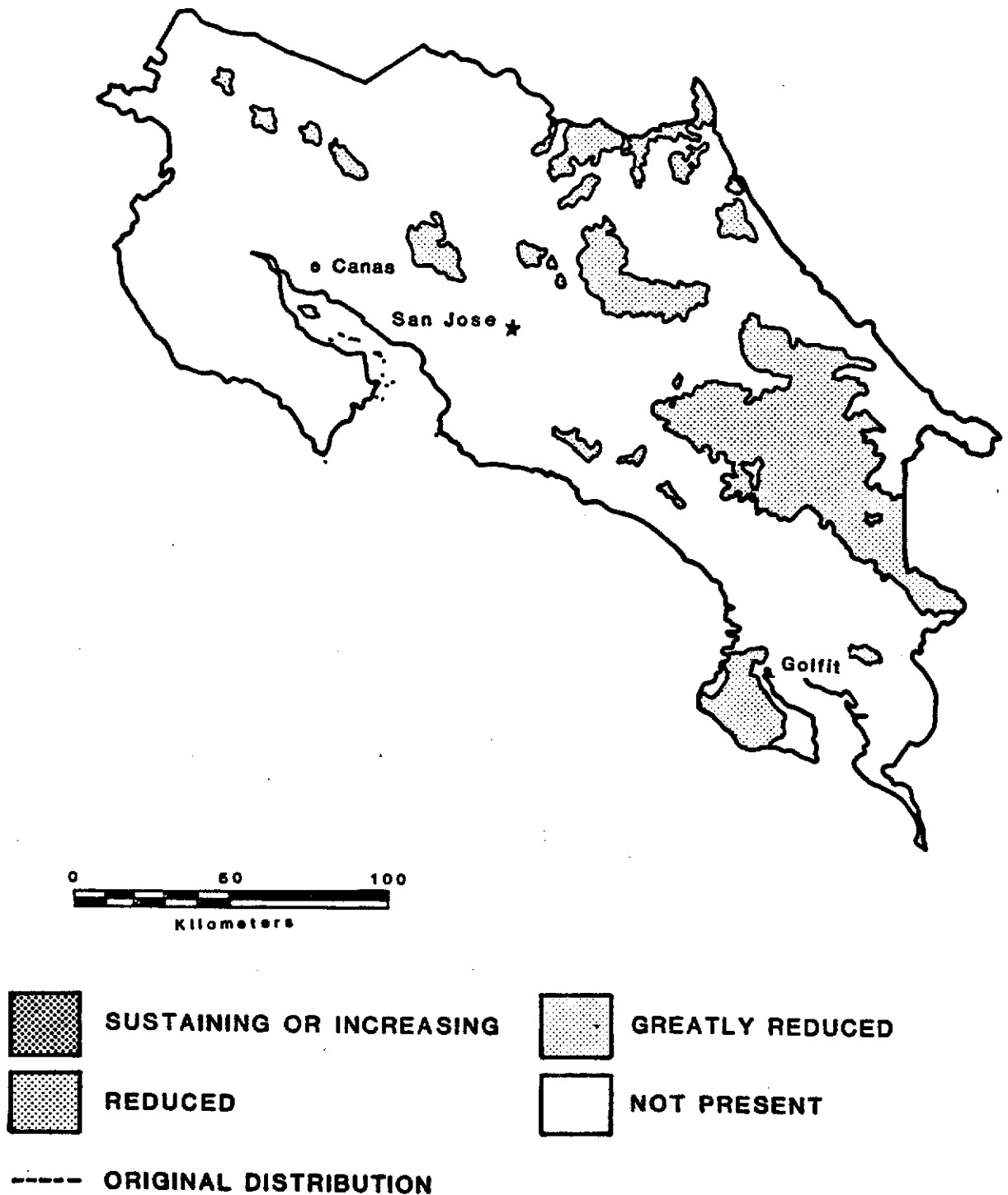


Figure 9. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

ECUADOR

DESCRIPTION

Ecuador is one of the smaller nations of South America. Settled by the Spainards, its population is now about 10% European, 40% Indian, 40% mestizo, and about 10% black. It has a land area of 283,561 km² and a population of 9,983,000. Except for the land east of the Andes Mountains, which bisect the country from north to south, the land has been developed for farming and cattle raising. The land east of the Andes is tropical forest and is a part of the Amazon River system. The Coastal Lowland is a flat plain along Ecuador's Pacific coast. It has been developed for farming and cattle raising but some swampy areas and tropical forests remain.

STATUS OF THE JAGUAR

The moist tropical forests of the Eastern Lowlands comprise the most important pristine jaguar habitat in Ecuador. The region is very sparsely settled and undeveloped and it is here that the jaguar still remains in sustaining populations. The numbers and precise distribution of the species in the region have not been described.

The Andes does not have jaguar habitat and when and if they occurred in the highlands, they surely were present in small numbers and perhaps only by transients in the foothills. Melquist (1984) quoted reports of recent sightings of jaguars in the Coastal Lowland. Very little information is available to estimate numbers or to describe the distribution of the species in this region.

FACTORS INFLUENCING JAGUAR POPULATIONS

As elsewhere in South America, hunting and clearing of the land for agriculture are presumed to be the most serious factors facing the survival of the species. Jaguars in the Amazon River portion of the Eastern Lowlands are expected to sustain themselves because the region is still undeveloped and will likely remain so for some time to come.

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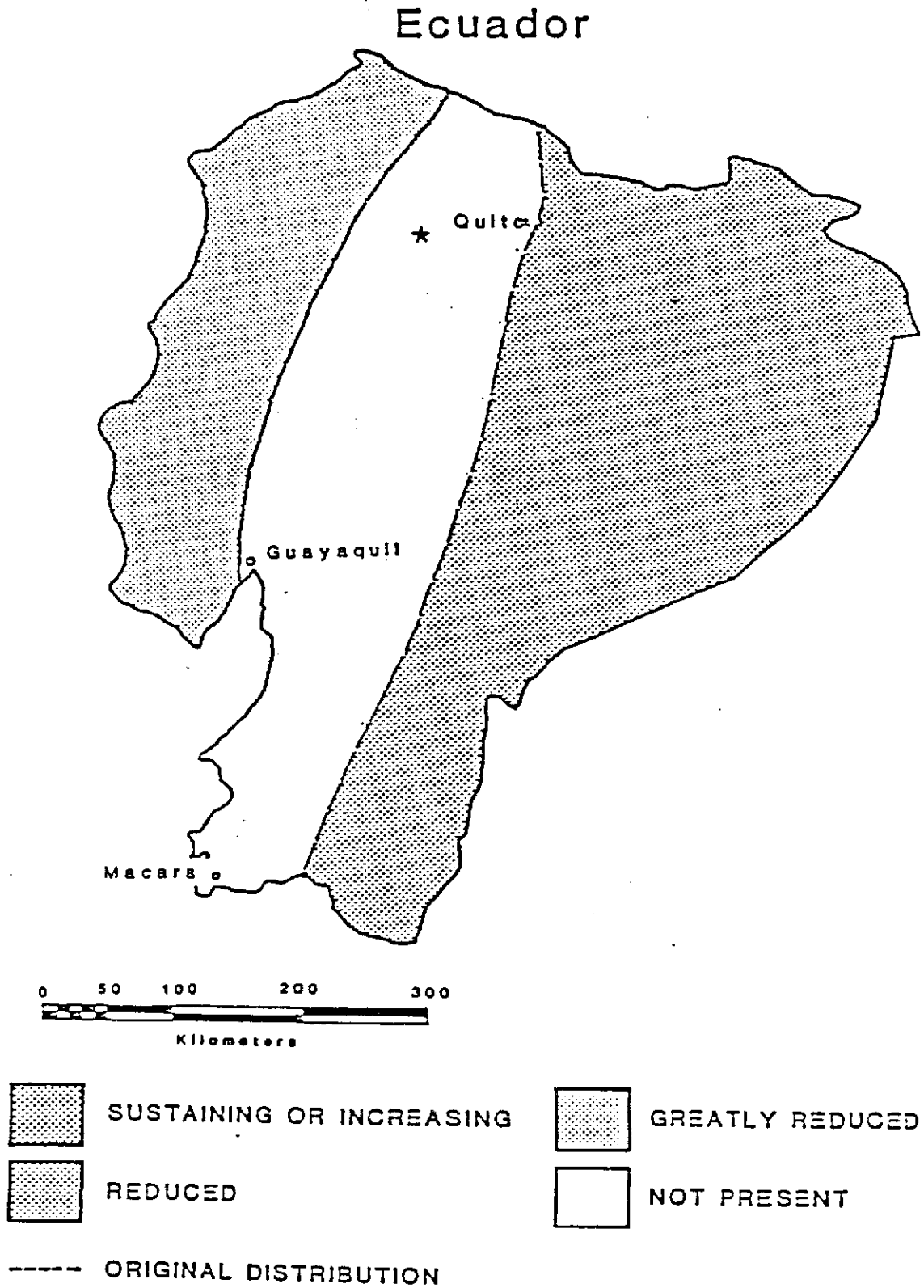


Figure 10. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

EL SALVADOR

DESCRIPTION

El Salvador is bordered on the west by Guatemala, on the north by Honduras and on the south by the Pacific Ocean. It is the smallest country (21,041 km²) in Central America and has the highest density of people with 281 per km² and a total population of 5,906,000. The population is 57% rural and 43% urban. Along the Pacific Coast a fertile low plain extends inland for 10 to 20 km. Swamps, grasslands, and tropical forests once covered this area but it has now been developed for farming. The central region is higher and about three-fourths of the population live there. The lower areas are farmed with subsistence farming and coffee plantations occupying much of the area. The northeastern area that borders on Honduras is higher and more rugged with some scattered forests and brushlands covering the shallow lava and volcanic hills. Only 12% of El Salvador is covered by trees and of that a little less than half is mature forest. Temperatures and rainfall permit year-around farming in El Salvador and much of the land is divided into small farms which are used for the production of beans, corn, rice, and other products for local consumption. Wildlife, in the form of birds and reptiles, provides a high proportion of the meat in the diet of the local people.

STATUS OF THE JAGUAR

Jaguars probably occurred throughout El Salvador at one time but they are considered to be extinct now, according to Sr. Manuel Benitez,

Director of Wildlife and Parks. The density and the activities of people, including the demise of potential prey, leave little probability of reestablishment of this species there. El Salvador became a member of CITES in 1987 (Thomsen, J. B., personal communication, August 31, 1987).

SOURCES OF INFORMATION

INTERVIEW

Sr. Manuel Benitez, Director of Wildlife and Parks, El Salvador, Central America.

El Salvador



SUSTAINING OR INCREASING



GREATLY REDUCED



REDUCED



NOT PRESENT

----- ORIGINAL DISTRIBUTION

Figure 11. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

FRENCH GUIANA

DESCRIPTION

French Guiana, a small South American country, is bordered on the south and southeast by Brazil, on the west by Surinam and on the northeast by the Atlantic Ocean. It covers an area of 91,000 km² and has a population of 73,000 people, which equals 0.8 person per km². Most of the people live along the coast with the interior a wilderness and almost totally undeveloped. About half of the people in the country live in Cayenne, the capital of the country. French Guiana has three land areas: a coastal plain in the north, a plateau in the center, and the Tumuc-Humac Mountains bordering Brazil to the south. Rain forests cover most of the country with an average of 330 cm falling each year. The country is dissected by more than 20 rivers that flow northeast to the Atlantic Ocean. The climate is tropical, with a year-around temperature averaging 27° C.

STATUS OF THE JAGUAR

Information available on the jaguar, primarily from Surinam, indicates that the cat has been little affected in French Guiana. Only the coastal area has been settled to any extent and there most of the people live in or near towns. Inland areas are unlikely to become developed for some time because the country does not have the financial resources for large-scale government-supported development projects.

French Guiana

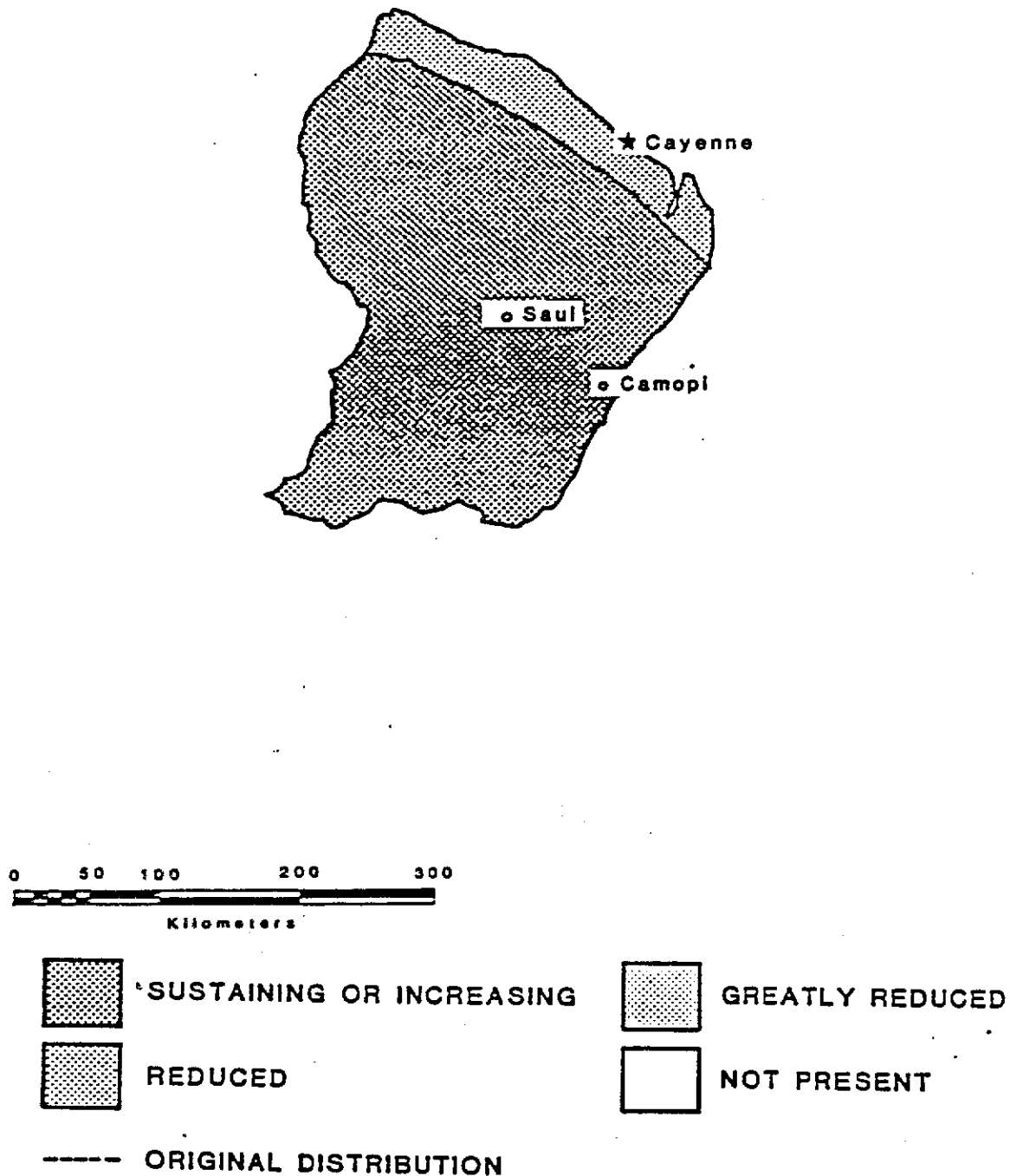


Figure 12. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

GUATEMALA

DESCRIPTION

Guatemala is bordered by Mexico on the north and west, by Belize, Honduras, and El Salvador on the east, and by the Pacific Ocean on the south. The country has an area of 108,889 km² and a population of 8,895,000. The distribution of the population is 59% rural and 41% urban. Population density is 82 persons per km², but more than half of the people live in the southern one-third of the country. Twelve percent live in Guatemala City. The population growth rate is high, 2.8% per year. Major agricultural products are coffee, bananas, corn, beans, beef, cotton, rice, and sugar cane. The main exported product is coffee.

Guatemala has three main land areas, the northern plain, the central highlands, and the Pacific lowlands. The northern plain makes up about half of the country in area, but is thinly populated and almost undeveloped. Most of the area is covered with a tropical rain forest but there are some grasslands in the northeastern portion of the country. The highlands consist of a chain of mountains extending in an east-west direction in the southern one-fourth of the country. Most people in the country live in the highlands and most of the cultivation occurs there. Corn and coffee are the major crops. The Pacific lowlands consist of a narrow belt of about 50 km stretching inland from the edge of the Pacific. In the recent past this area has undergone development for farming and cattle ranching; however, it is still sparsely populated.

STATUS OF THE JAGUAR

Under the CITES definition the jaguar would be considered threatened in Guatemala. Jorge Ibarra, Director of the National Museum, reported that 60 years ago the cat occurred throughout the country, and could be seen within a few kilometers of Guatemala City. The Peten, or northern plain area of Guatemala, has a good population of jaguars. Biologist Santiago Billy, who has spent the last two years in that area, estimates the jaguar population to be between 500 and 800 animals. This would be a jaguar density of 1 to 30 to 50 km². This appears to be a reasonable estimate considering the information obtained by the more intensive studies of biologists bordering the Peten. In the Cockscombs of Belize, Rabinowitz reported a density of one jaguar per 6.5 km², and in Chiapas of Mexico, Aranda reported a jaguar per 16.6 km². The Peten is relatively undeveloped and undisturbed, and the habitat for jaguars is comparable with that of the two other study areas. Just to the south of the Peten, in northern Huehuetenango, northern Quiche, Alta Verapaz, and Izabal, Biologist Billy estimated the jaguar population to be between 200 and 400 animals, or a density of one jaguar per 50 to 80 km². Jaguars occurred along the Pacific coast as recently as the early 1970s. Jorge Ibarra, Director of the National Museum, reported that good populations occurred there at one time but he thought the cat was gone from the area now. Biologist Billy thought that a few individuals, probably five to ten, still remained. In the Central Highlands there are no established populations of jaguars. A few cats are reported there each year but these are thought to be individuals that have moved in from the north, seeking new territories.

FACTORS AFFECTING JAGUAR POPULATIONS

Loss of Habitat

In the Peten the jaguar population is secure for the present, partially because of the disturbed political situation. Occupation and settlement of the country is not occurring. Some exploration for oil is taking place by Texaco Oil Company, hence limited access is being created by road construction. In the opinion of Biologist Billy, this oil exploration is not detrimental because Texaco enforces a rule that prohibits any of its employees, including local campesinos, from hunting or killing jaguars. Between the Peten and the heavily populated area to the south the country is becoming more settled and developed. The forests are being replaced with subsistence cultivation and jaguar habitat is decreasing. Biologist Billy estimated that in five years the cat may be approaching an endangered status in that area.

Utilization

Commercial hunting of jaguars in the Peten does exist, but has decreased in the last five years due to the drop in demand and prices paid for skins. According to Biologist Billy, jaguar skins in the summer of 1986 were selling for about 100 to 150 quetzales (\$25-\$35 U.S.), and he considered that most of the commercial trade was carried on by people coming in from Mexico. No total estimate of offtake was available; however, Billy reported that in 1985 over 100 jaguars were killed in the vicinity of Carmelita, a village in north central Peten. He considered the take to not be a factor limiting the jaguar population in Peten.

Laws and Regulations

The jaguar is completely protected in Guatemala under the general wildlife code, Decree No. 8-70, and the Endangered Species code, Decree No. 63-79. The wildlife codes are administered within the Department of Agriculture. Lack of enforcement appears to be common in Guatemala, as it is in most countries within the range of the jaguar. As in Belize and Mexico, many of the campesinos carry guns and kill jaguars when the opportunity is presented. It is improbable that this situation will change within the foreseeable future; however, the incentive of a high monetary return for skins seems to have disappeared, which will decrease the take of jaguars in the country. Guatemala is a signatory to the CITES convention, and at least on paper has a management authority and a scientific authority.

Diseases or Parasites

Biologist Billy reported that he had seen jaguars with a parasite, "a worm that gets under the skin and causes infection". He did not know how widespread this parasite was, nor its influence on the population of the cat.

Legal Hunting As An Incentive To Management

Both Biologist Billy and Biologist Ector thought that hunting should be considered as a management tool in Guatemala. The establishment of a management area for the jaguar in northwestern Peten was under consideration and legal hunting with some 10 permits each year was mentioned. It was not revealed whether this was the official position of

government and the plan seemed to be only in the formative stages.

SOURCES OF INFORMATION

INTERVIEWS

Sr. Santiago Billy, Ecologist. Instituto Nacional Forestal, Guatemala, Ciudad de Guatemala.

Sr. Edgard Ector, Biologist. Instituto Nacional Forestal, Guatemala, Ciudad de Guatemala.

Lic. Luis Villar, biologist, Centro de Estudio Conservacionistas, Universidad de San Carlos, Ave. de La Reforma, Zona 10, Ciudad de Guatemala.

Sr. Jorge Iberra, Director, National Museum, Ciudad de Guatemala.

Guatemala

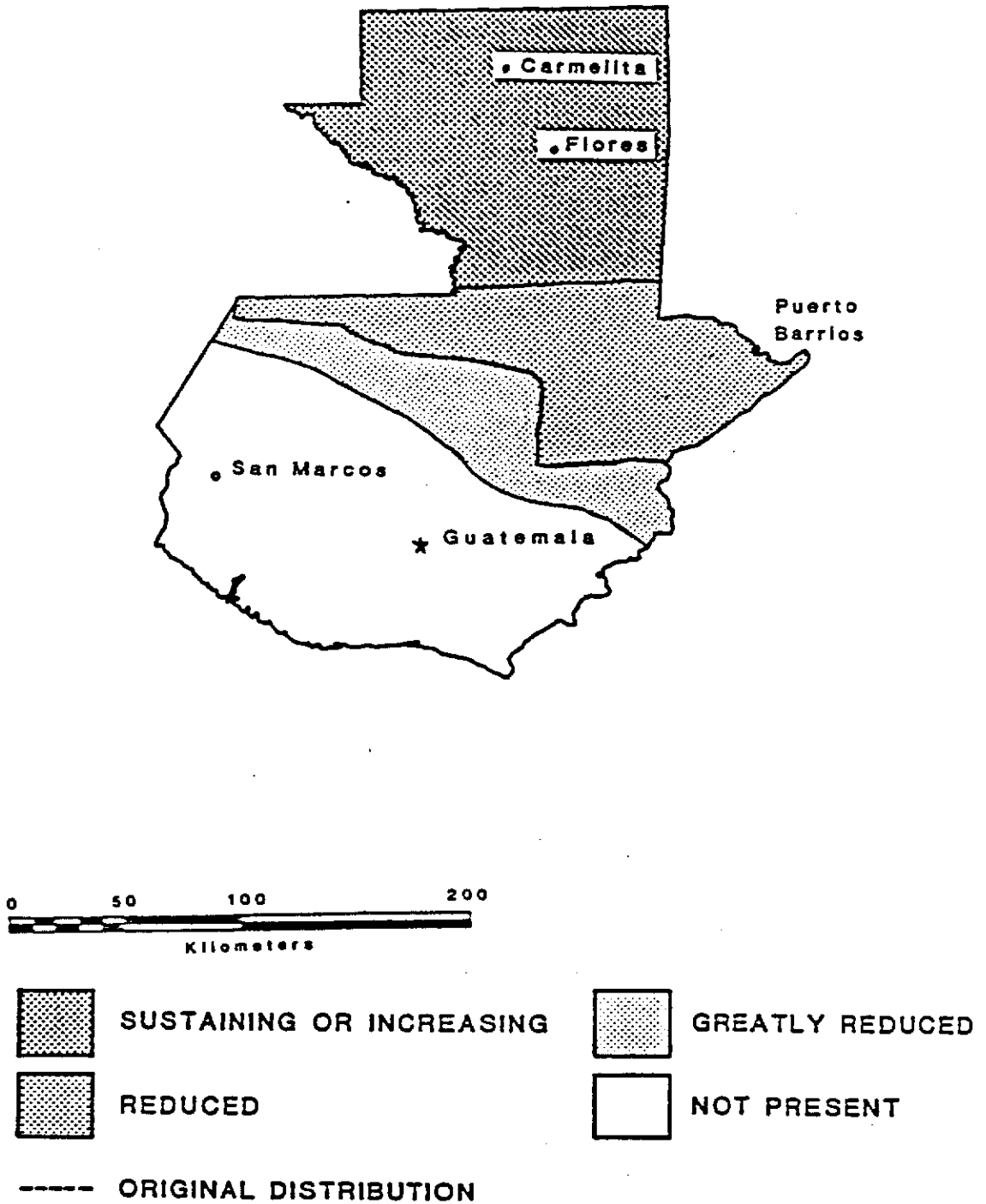


Figure 13. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

GUYANA

DESCRIPTION

Guyana, a small country in northern South America, is bordered on the east by Surinam, on the north by the Atlantic Ocean, on the west by Venezuela and Brazil, and on the south by Brazil. It is relatively small, containing 214,969 km². The population is 989,000, which equals a density of 4.6 persons per km². Most of the people (78%) are rural, and 22% are urban. There are three main land regions in Guyana, the coastal plain, the southwest plain and the forest plateau. The coastal plain is a strip of land three to 48 km wide that stretches along the Atlantic coast. It is below sea level at high tide. Sea walls, dikes and drainage canals make the area habitable and about 90% of the country's population live there. Most of the coastal plain is farmed and sugar cane and rice are the major crops. Southwest of the plain is the forest plateau, which covers 85% of Guyana. This is a land of thick tropical forests, much of it difficult to reach, and it is said that some of it has never been explored. The highlands occur along Guyana's southwest where it borders Brazil. This is an area covered with forested mountains and savannahs.

STATUS OF THE JAGUAR

No direct information was obtained on the status of the jaguar in Guyana. The amount of undisturbed tropical forest and amount of uninhabited or lightly populated area within that forest, along with reports from countries on jaguar populations adjacent to Guyana, certainly leads one to conclude that jaguars have not been greatly affected in the

country. It was reported that in the early 1970's, a professional hunter operated out of Georgetown who guided hunters for jaguars, but it is believed that this no longer occurs.

Guyana

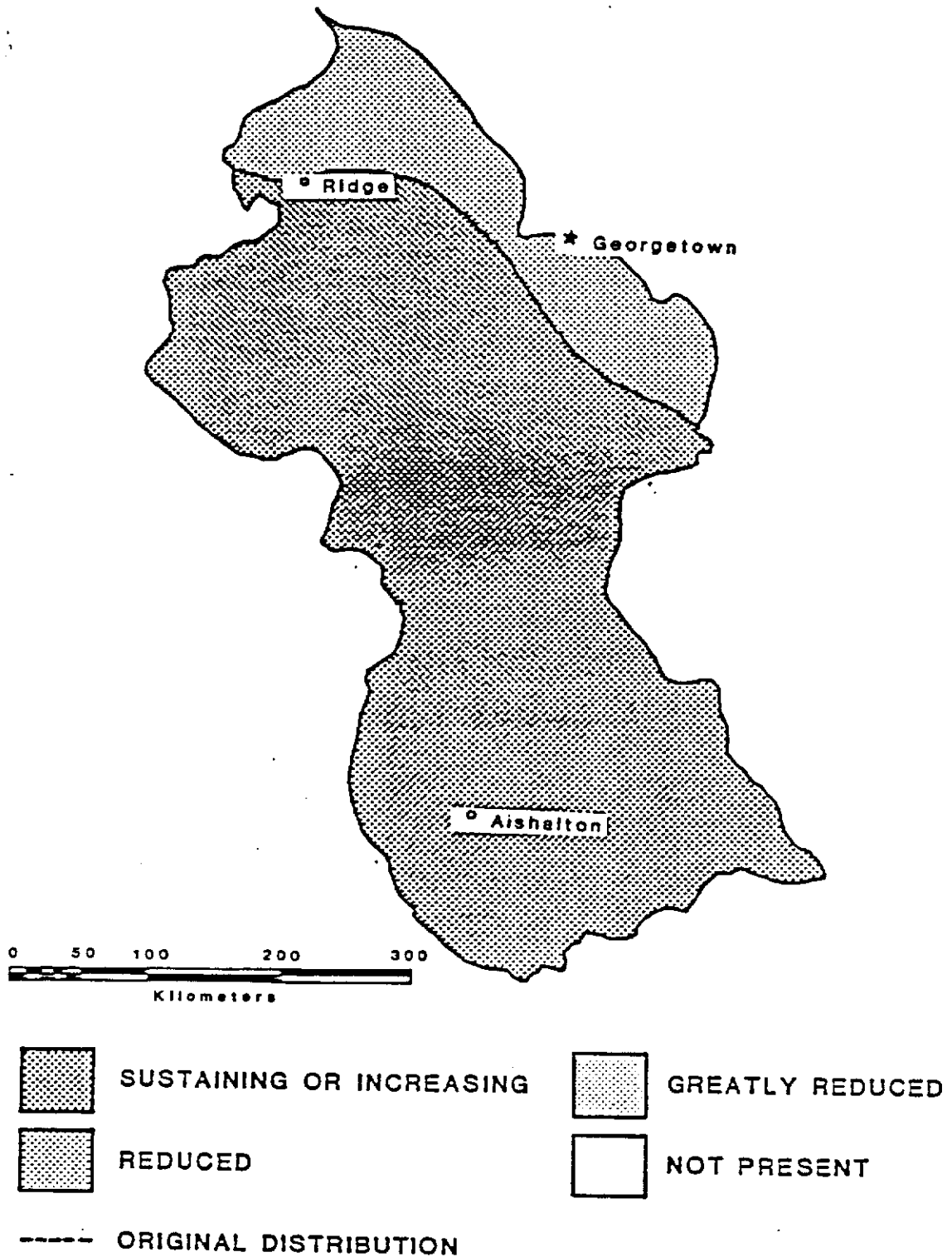


Figure 14. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

HONDURAS

DESCRIPTION

Honduras is in Central America. It is bordered on the south by El Salvador and the Pacific Ocean, on the southeast by Nicaragua, and on the north by the Caribbean Sea. It has an area of 112,088 km², and ranges in elevation from 2870 m to sea level. The population is estimated at 4,657,000, which equals 42 persons per km², and 40% are urban and 60% rural.

There are four main land regions in Honduras. The mountainous interior covers 60% of the country. Oak and pine forests are the dominant vegetation below 2100 m, while above that forests of broadleaf evergreens occur. A number of small upland valleys in the interior support many farmers, particularly in the western and central region. The northern coast is a narrow strip about 75 km wide by 200 km long that is covered by tropical lowland forests, cloud forest, and to the east, lowland pine savanna. The eastern two-thirds of this strip, making up the districts of Colon and Gracias A Dios, are sparsely populated.

The northeastern plain in the district of Colon is hot and wet, covered by tropical lowland forests, and is bisected by numerous rivers running into the sea. The Rio Platano Biosphere Reserve of 350,000 ha occurs in this area. Within the Reserve there are coastal mangrove, swamp forests along coastal lagoons, pine savannas, gallery forests and extensive broad-leaved forests.

The southern coast, on the Gulf of Fonseca, has mangrove trees bordering the shoreline, behind which stretches a narrow plain. This area

supports numerous farms and cattle ranches.

Honduras has a tropical climate, with a growing season throughout the year. The southern coast receives an annual average rainfall of about 100 cm, while the tropical rain forests of the northeast gets more than 250 cm. Corn is the major food item of the local people, and occupies the most cultivated land; however, bananas, pineapples, and timber are the major export commodities.

STATUS OF THE JAGUAR

Historically, the jaguar occurred throughout Honduras. It is reported to still be relatively abundant in the states or districts of Colon, Gracias A Dios and Olancho; however, the population has continued to decline in the past few years.

Bordering the above area to the southwest jaguar populations are sparse due to development of the country, and as one moves southward where the country is subdivided into small farms, the jaguar disappears completely.

FACTORS AFFECTING JAGUAR POPULATIONS

LOSS OF HABITAT

Loss of suitable habitat is the most important factor affecting the jaguar population in Honduras. Human population pressure is at present taxing the resources of the country, and the number of people is projected to double within the next 20 years (U.S. AID). Saubers (interview) says this is occurring on the fringes of the broadleaf forests at the moment, and estimates that this is affecting five to ten percent of the range of

the jaguar.

UTILIZATION

Killing of jaguars for commercial purposes and for protection of livestock occurs throughout the range of the cat wherever it comes in contact with humans. Estimates of the average annual off-take vary from 200 to 400 (Thorn, interview). From 100 to 300 of these are taken for commercial purposes and an additional estimated 100 are killed to protect cattle, pigs and chickens. Small caliber rifles are easily accessible throughout the country, which are used to take all wildlife (Thorn, interview, and U. S. AID).

Military personnel operating in jaguar range also are killing jaguars (Thorn, interview). Skins are confiscated when found by Ministry of Natural Resources personnel.

LAWS AND REGULATIONS

Taking of jaguars is completely prohibited by law in Honduras. Skins are confiscated when found, but according to both Thorn and Saubers, officials are easily bribed (interviews). Honduras is a member of CITES but evidently there is neither an effective management authority or scientific authority.

DISEASES AND PARASITES

No information was available on diseases and parasites of jaguars in Honduras.

LEGAL HUNTING AS AN INCENTIVE TO MANAGEMENT

Neither Thorn nor Saubers considered legal hunting to be feasible in Honduras at this time. The infrastructure to make such a plan successful is not present, and Saubers considered the ease of bribing officials to make it unlikely that money from such a plan would end up in either government coffers or in the hands of the local people (interview).

SOURCES OF INFORMATION

LITERATURE

United States Agency For International Development 1982. Honduras, Country Environmental Profile, A Field Study. USAID. Washington, D.C. 183 pp.

INTERVIEWS (Written Response)

Mr. Rodney W. Saubers, Chief of Project Defense Mapping Agency, Inter-American Geodetic Survey, Honduras Project, APO, Miami, FL 34022

Lic. M. A. Sherry (Pilar) Thorn, Professor, Department of Biology, Honduran National University, Tegucigalpa, Honduras

Honduras

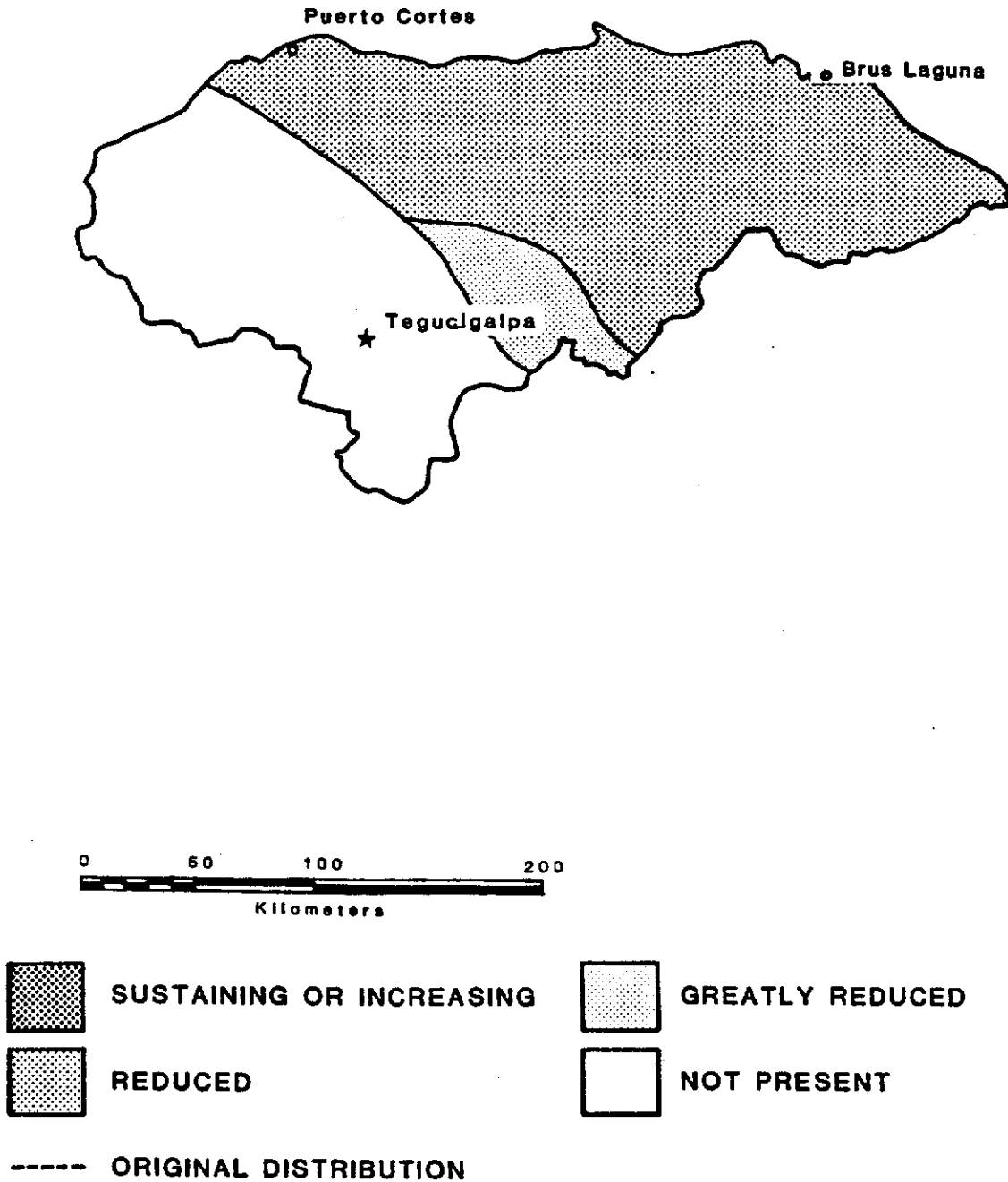


Figure 15. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

MEXICO

DESCRIPTION

Mexico is a large country, exceeded in size only by Brazil and Argentina of those countries within the range of the jaguar. It is bordered on the north by the United States, on the south by Belize and Guatemala, on the east by the Gulf of Mexico, and on the west by the Pacific Ocean. The country has an area of 1,972,254 km². The population in 1987 is estimated at 82,964,000, a density of 42 km². Population is growing at a rate of 2% per year. About 70% of the people live in cities and this proportion continues to grow. Much of Mexico is either too high or too dry to farm. Only 12% is in cultivation. Beef cattle production in some form occurs throughout Mexico and the area of forest cleared for cattle is accelerating. Major industries in Mexico are petroleum, mining, food processing and tourism. Food products exported are cotton, fruits and vegetables, coffee, and cattle. Corn is the major food item of the people and much of the landscape is devoted to its production wherever rainfall and elevation permit.

Towering mountains and a high plateau running down the center of the country cover more than two-thirds of Mexico. The northern portion of this plateau is high desert and supports only low bushes and a scrubby thorn forest. Farther south the vegetation changes to an oak-pine forest and south of Mexico City in the Chiapas highlands rainfall increases and the vegetation becomes more tropical in nature. On both the northeast and northwest coasts the country is arid and only the irrigated valleys are farmed. On the east coast, north of Tampico, the land is covered by low

tangled bushes and trees. South along this coast rainfall increases, changing the vegetation into a tropical rain forest in the state of Tabasco. On the Yucatan Peninsula the country once again becomes more arid and supports only low desert and semi-desert vegetation. The eastern portion of the Peninsula is dominated by low trees about 10 m high.

STATUS OF THE JAGUAR

Government wildlife officials and most non-government biologists consider the jaguar, nationwide, to be threatened. The jaguar originally occurred along both coasts of Mexico and its range extended inland but evidently it never occupied the inland high plateau. The population has been constantly decreasing but the rate of this decrease has accelerated in the past 20 years. Human population pressure leading to more intensive use of the land and the commercial utilization of spotted cat skins have been the forces leading to the decrease in jaguar numbers. Government biologists reported that the jaguar population has remained stable for the last five years in Quintana Roo, northwestern Yucatan, most of Campeche and Chiapas. The population has been moderately reduced in Tabasco, Oaxaca, Veracruz, northwestern Guerrero, western Michocan, most of Jalisco and southern Sinaloa. They have been considerably reduced along the border of northwestern Yucatan and northwestern Campeche, central Veracruz, Michocan, and central Guerrero.

Good jaguar populations and good habitat still exist in Quintana Roo and Chiapas. Biologist Daniel Navarro reported the good habitat still exists in Quintana Roo and that 500,000 ha in the southern part of the state and a similar size area near Tulum on the coast in the central part

of the state were being set aside as wildlife management areas. Densities or numbers of jaguars were not available for Quintana Roo. Biologist Marcelo Aranda, who began studying the jaguar in Chiapas in 1984, estimates that the cat in that state now occupies 10,800 km², or one-fifth of its original range. In his study area on the Bonampak River in northeastern Chiapas, he calculated a density of one jaguar per 16.6 km². For the state of Chiapas he estimated the total population to be between 450 to 750 jaguars. He believed that the jaguar population in Chiapas was stable but knew of no place in Chiapas or Mexico where it was increasing. Both soil and rainfall permit the growing of crops in Chiapas; however, much of the terrain is steep which leads to rapid soil erosion. In spite of this the forests are being rapidly removed to grow food, mostly corn, for the expanding population. Whether any areas in Chiapas can be set aside for wildlife is problematical. The area does not have the great tourist attraction of the coast that occurs in Quintana Roo and the land in Chiapas is more productive, hence there is less incentive to dedicate land to wildlife and tourism. Sotheastern Campeche is relatively undeveloped, sparsely populated, and has a stable jaguar population. Wildlife officials estimated the density there to be a jaguar to 40 km².

FACTORS AFFECTING JAGUAR POPULATIONS

Habitat

Loss of habitat is the major cause of the decline of the jaguar in Mexico. Where it is possible to cultivate the land, the forests are being cleared and replaced with subsistence agriculture. Where insufficient rainfall makes it impossible to grow crops, primarily corn and beans,

attempts are being made to clear the land and produce cattle. Slash and burn agriculture has been practiced in Mexico for centuries but it is now no longer possible to permit the forests to regrow before it is necessary to cut them again for cultivation. The landscape then becomes a sea of cultivation with a few scattered plots of forest instead of the reverse. Such areas cannot support jaguars because the wild prey species necessary for them to survive are not permitted to exist. Herbivores eat the crops, hence are fenced out or killed. Most of them are also intensively hunted or trapped for food. Utilizing the land for the production of livestock also poses problems for the jaguar. No one who knows jaguars, even those who love the animals, contend that they do not take livestock. Hence jaguars are killed where conflict occurs.

Guns are unusually common in Mexico. Men, going to and from their cultivated plots in rural areas, either walk or ride a bicycle, and hold a machete and hoe with a shotgun or a sling over their shoulder. It was said by one person that they would prefer to shoot a jaguar but if that opportunity was not presented they would, in order of preference, take a white-tailed deer, a Brockett deer, a peccary, a turkey, then anything else that shows up. Regulations in Mexico permit people to use any means to protect themselves and their crops from wildlife which locally is translated into year-around hunting. Elimination of habitat for the jaguar will continue and will probably accelerate along with population growth in Mexico. Ultimately all land except that which is unsuitable for habitation such as mangrove swamps or other wetlands, and mountainous areas will be settled if the trend in human population growth is not reversed.

Utilization

Overutilization is also contributing to the decline of the jaguar in Mexico. Jaguars are taken wherever and whenever the opportunity is presented. Opportunistic taking probably exceeds all other types in Mexico. Wildlife officials estimated the annual average offtake for all purposes in the last five years to be from 175 to 200 jaguars. That may be conservative because the estimated offtake for Belize is reported to be from 175 to 200. In Chiapas, Biologist Marcelo Aranda documented the killing of six jaguars from the middle of 1984 to the middle of 1986, two opportunistically but the skins were sold commercially, and four reportedly for cattle-killing. He knew that other jaguars were being taken but could not verify this.

The decrease in prices paid for jaguar skins has reduced the incentive for commercial hunting in Mexico as it has elsewhere. Reportedly, untanned jaguar skins currently bring about \$25 U.S.; however, in Belize they were being sold for as low as \$10 U.S. Guided illegal sport hunting was reported to be the cause of the highest offtake by the wildlife officials in Mexico City. The guides are Mexican nationals. Officials reported that the majority of hunters were from Mexico and they either did not know or were unwilling to say where the other hunters came from. Undoubtedly, some of them came from the United States. When I was in Mexico City, officials were attempting to apprehend a guide who resided in Mexico City, and who I was also attempting to contact. I had been informed by a person in the United States that he was one who was knowledgeable about the status of the jaguar in Mexico.

Regulations

Legal sport hunting under a quota system has been permitted in Mexico. Wildlife officials in Mexico City reported that 66 jaguars were legally taken in the country in the past five years. From 1966 up to and including 1985, 251 permits were issued (Table 4). In 1985, 20 permits were issued. Eight of the permittees reported kills, four reported no kills, and eight did not report back. Twelve permits were authorized for 1986. Results of the hunt were not obtained because the interviews for this study were conducted in Mexico prior to the hunting season. Legal hunting for jaguars throughout Mexico was eliminated for the 1987-88 season. Regulations specify that a permit is required to kill a jaguar that is causing damage to property; however, non-official sources reported that these regulations are rarely complied with. Usually the jaguar is hunted without getting a permit. If the animal is shot the skin is either sold and smuggled out of the country, or it is retained by the hunter and either tanned locally or dried and used as a rug or a wall decoration. Commercial utilization of jaguar skins was not evident in Mexico.

Skin and leather shops were visited. Skins of some of the smaller cats and other wild animals were evident but only one belt made of jaguar skin was found. This could have been passed up by anyone not knowing the differences in the patterns of the skins of the spotted cats. Permits for sport hunting of jaguars issued in the past by the government have been relatively expensive but the money has not been earmarked for wildlife protection and management.

TABLE 4. Jaguar hunting permits issued in Mexico, 1966-1986.

Year	No. Permits	Resident	Non-resident
1966	4	1	3
1967	8	6	2
1968	2	1	1
1969	7	3	4
1970	14	9	5
1971	18	9	9
1972	10	5	5
1973	4	2	2
1974	28	24	4
1975	18	17	1
1976	17	14	3
1977	10	9	1
1978	16	14	2
1979	13	7	6
1980	16	7	9
1981	9	5	4
1982			
1983	11		
1984			
1985	26		
1986	20		

CITES REGULATIONS

Mexico is not a signatory to the CITES convention although the wildlife officials in Mexico City stated that the Government was considering making a move to become a member. Hunters of jaguars who have been successful are issued a paper certificate which will permit them to export out of the country the head and hide of the animal. No effort is made on the part of officials to determine from the targeted country of imports as to whether import will be permitted. Theoretically, the normal customs check at the point of embarkation is designed to catch skins intended for illegal export. It was impossible to determine the magnitude

of illegal shipment of jaguar skins from Mexico. It was admitted everywhere that the practice was present. People in Mexico said that skins were being smuggled through Belize and Guatemala whereas people in Belize and Guatemala thought that the skins from those countries were being smuggled through Mexico. In all of those countries one thing was certain: prices and demand have decreased dramatically within the past two years.

Adequacy vs Enforcement of Regulations

Regulations in Mexico, as written, are adequate. Enforcement of these regulations, as in much of Central and South America, is inadequate. As one official put it, we have the will but not the means. Funds to support adequate enforcement in the field are not available to the wildlife agencies. In Mexico wildlife officials have, on several occasions recently, enlisted the aid of the armed forces. This has been partially successful, but for the most part the operations have involved short-time assignments for specific enforcement activities and have not been particularly successful in decreasing illegal taking and hunting of jaguars. The outlook for more and better enforcement was viewed optimistically in Mexico. More people are being trained as biologists and efforts are being made in the public schools and elsewhere to increase the awareness of the value of wildlife and natural resources. How long it will be before enforcement becomes sufficiently effective to become a realistic management tool is debatable.

DISEASES AND PARASITES

No information was available of the influence of diseases and parasites on jaguars in Mexico.

LEGAL HUNTING

Legal hunting would perhaps be a viable option in Mexico. Jaguars are considered to be quite valuable by hunters and the opportunity to hunt them is in high demand. Permits issued by the government in Mexico in 1985 sold for \$2000 U.S. to nonresidents and \$1000 to residents and all available permits were issued. Nonresidents probably paid at least an equal amount to resident guides for their services.

Most persons interviewed in Mexico were in agreement that legal hunting would provide an economic incentive for management of the jaguar but such a program would have to be accompanied or preceded by adequate enforcement and recognition by the public of the economic value of the cat. Biologists said such a program would have to be preceded by considerably more research and the adoption of a management strategy for the jaguar. Wildlife officials said that government would have to change the law to provide for the income from permits and licenses to be earmarked for management and protection of the cat and other wildlife.

SOURCES OF INFORMATION

INTERVIEWS

Dr. Antonio Landazuri, Director, Flora y Fauna Silvestres (and staff), Rio Elba No. 2, PISA 8, Mexico D.F. 86500.

Dr. Venardo Villa, Professor, Instituto de Biologia, National Autonomous

University of Mexico, Apdo. Postal 70233, Mexico, D.F.

Lic. Daniel Navarro, Biologist, Center of Investigations for Quintana Roo,
Apdo. Postal 886, Cancun, Quintana Roo.

Lic. Marcelo Aranda. Biologist, Instituto Nacional de Investigaciones
sobre Recursos Bioticos, Calle Real de Guadalupe No. 25, San Cristobal
de las Casas, Chiapas.

Dr. Miguel Alvarez del Toro, Zoologist, Instituto de Historia Natural,
Apartado Postal 6, Tuxtla Gutierrez, Chiapas.

Mexico

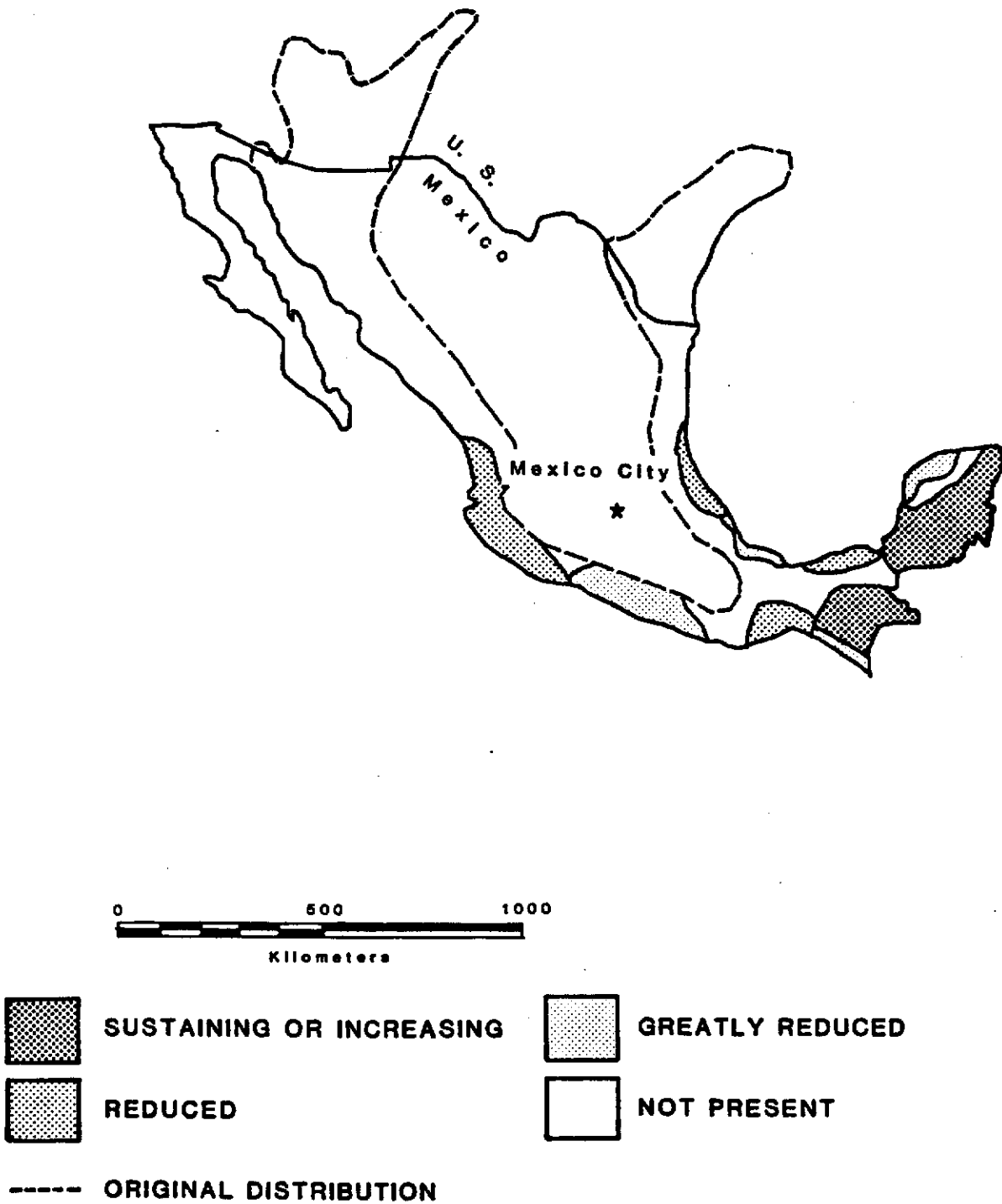


Figure 16. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

NICARAGUA

DESCRIPTION

Nicaragua is bordered on the west by the Pacific Ocean, on the east by the Caribbean Sea, on the south by Costa Rica, and on the north by Honduras. It is the largest Central American country with an area of 130,000 km². The population is 3,502,000 with 59% urban and 41% rural. The density is 27 persons per km². About 60% of the people live in a fertile region on the Pacific side which makes up approximately one-fourth of the total area of the country. The Caribbean side of the country is thickly forested, and few people live there.

The country can be divided into three general regions. The Pacific Region is mostly a low area extending along the coast from Honduras to Costa Rica. Mountains rising up to 910 m (3000 ft.) occur right along the coast. This region receives about 150 cm (60 in.) of rain annually and the rainy season is from May to November. Temperatures average about 27° C. (80° F.) throughout the year. The Central Highlands is a region of forest-covered slopes and valleys. Some areas receive as much as 250 cm (100 in.) of rain and temperatures average about 18° C. (65° F.). The Caribbean Region is mostly a flat plain, sloping upward with highlands toward the west. Rain forests cover most of the region with an average annual rainfall of 419 cm (165 in.) which falls throughout the year. Farming which is concentrated in the Pacific Region is the country's major industry. Cotton is the major cash crop which is grown on large cooperative, private, or state-run farms. Bananas, beans, coffee, corn, rice, and some beef cattle are mostly grown on small farms and are

consumed locally. Farmlands make up less than 15% of the total area with thick forests covering more than half of Nicaragua.

STATUS OF THE JAGUAR

The political instability in Nicaragua precluded a visit to that country and to our knowledge there are no published reports on the status of the jaguar there. It certainly occurred throughout the country at one time. It may not now occur on the Pacific side of the country but it does occur and is probably relatively abundant on the Caribbean side. The area is lightly populated and the tropical forested area is suitable for jaguars. Moreover, jaguars occur along the border in Costa Rica, hence it is logical that they also occur in Nicaragua.

Persons interviewed in Honduras and Costa Rica knew very little about the status of the jaguar in Nicaragua. It was indicated that there were some movement of jaguars out of Nicaragua into Costa Rica, and that habitat and other factors affecting the population in Nicaragua were similar to those in Honduras.

Nicaragua

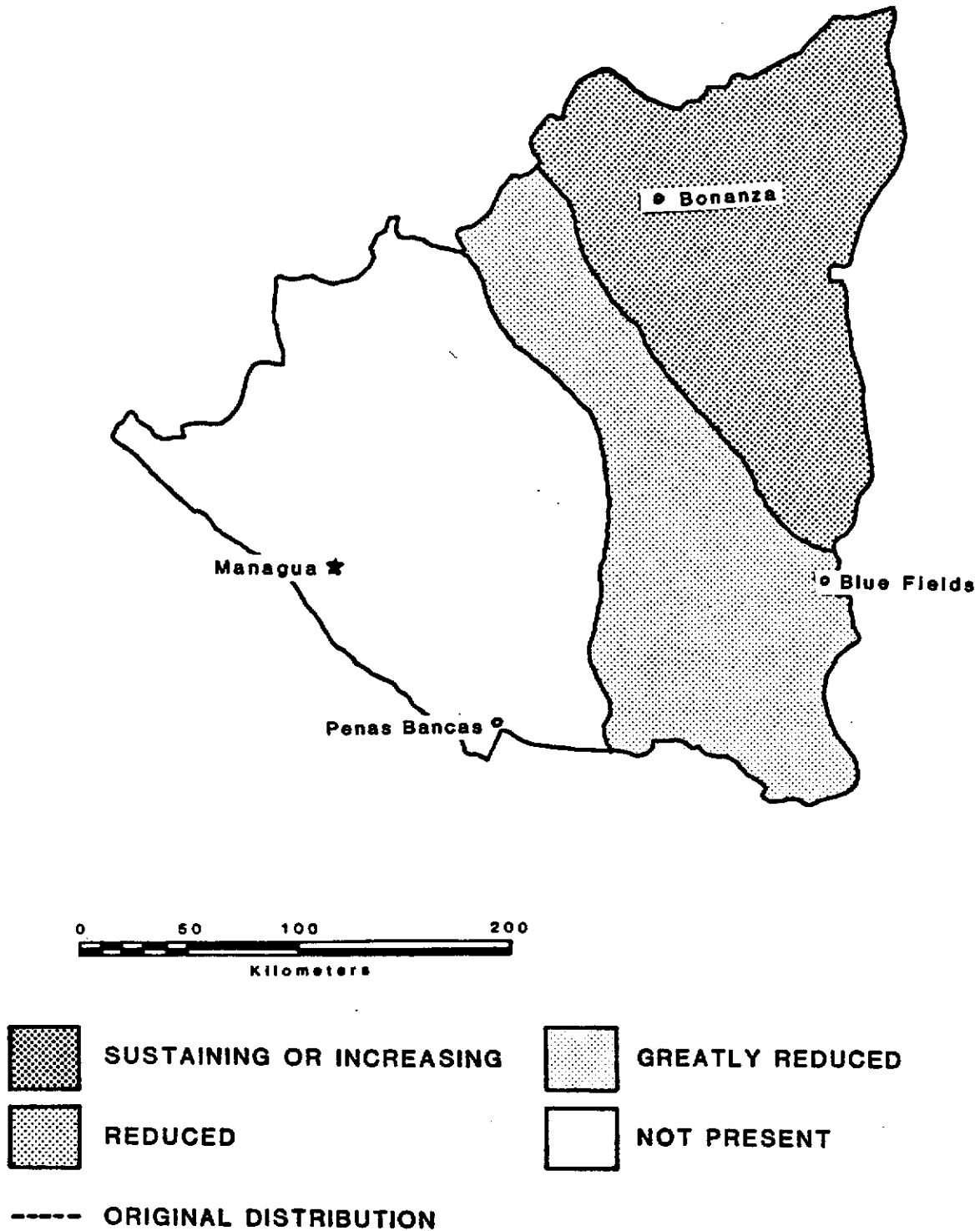


Figure 17. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

PANAMA

DESCRIPTION

Panama, a small country of 77,082 km², known for its canal and its strong ties with the United States, has a population estimated at 2,274,000 in 1987. About half of the population resides in the cities and the remainder in rural areas. Most of the people are of mixed blood, either of Indian and Spanish (mestizos) or African and Indian (mulattoes) ancestry. Spanish is the major language, and most of the rural people are farmers. Wealth is concentrated disparately in white and a few Panamanian professional families. Consequently, sport hunting is not widely practiced among the people; however, campesinos take animals for use in their kitchens and for whatever trade might be available to them.

Much of the country is suitable for wildlife and there remains in the Coastal Lowlands and the Central Highland, the two major landforms of Panama, representatives of most species of wildlife that occurred there in pristine times: monkeys, spotted cats including the jaguar, parrots and other tropical birds and mammals.

The Coastal Lowlands are narrow strips on both the Atlantic and Pacific sides of the country. Much of the Pacific Lowland is farmed, and thus much of its wildlife has been extirpated. The Atlantic Lowland is less fertile and contains habitats for jaguar and other wildlife.

The Central Highland is a mountainous region with peaks reaching 3,475 m and extends from the Costa Rican border, decreasing in height eastward to the Panama Canal. The land rises again east of the Canal where the mountains reach about 1,800 m.

STATUS OF THE JAGUAR

The jaguar is considered endangered in Panama by all persons of both government and non-government conservation organizations. Only anecdotal information is available; field studies of the species have not been conducted in the country. However, all say its habitats and its numbers have shrunk in recent years to precarious levels, but that some evidence suggests that it has begun to increase in recent years.

Professor D. M. Botello L., Secretary of the Renewable Natural Resources Department of the Government of Panama and the administrative authority for CITES for the country, considers it endangered and its long-term future as extremely hazardous. Professor Botello and Dr. Nathan B. Gale, a veterinarian and enthusiastic conservationist with the United States Department of Defense in the Canal Zone, considers the largest remaining numbers to be in the parks, principally Darian National Park which is contiguous with the species' range in Colombia and in the proposed Parque la Amistad which is contiguous with the species' range in Costa Rica. Jaguars are also found in the lowlands of the Atlantic Coast and in the basin areas of the Provinces of Panama and Colon which includes the Soberania and Chagre National Parks. None of those with whom we spoke would venture any kind of estimates on jaguar numbers in any region of the country.

Drs. Ira Rubinoff and James Karr, Director and Deputy Director of the Smithsonian Tropical Research Institute in Panama, stated that most species of wildlife including the jaguar has begun to increase since CITES was put into effect for the country. There were no suggestions nor enthusiasm for permitting hunting of the species in Panama for any

purpose.

FACTORS INFLUENCING JAGUAR POPULATIONS

Hunting is considered important in the decline of jaguars in Panama, but it is of secondary importance to losses of habitat.

Hunting

While exploitation of jaguars for commercial purposes has been stopped largely by poor markets resulting from CITES, commercial hunting was identified as a major but secondary cause of the decline in jaguar numbers in Panama. Prior to 1983, from 40 to 80 jaguars were taken annually, according to Professor Botello. Since 1984, very few skins have been confiscated which reflects the decrease in commercial exploitation and trade.

Sport hunting is still practiced but it appears that commercial hunting has all but stopped as an important force in the future of the species. Dr. James Karr, an ornithologist with the Smithsonian Institution's Tropical Research Institute, has conducted field studies of birds on the new Pipeline Road in central Panama since 1967. The area is now gazetted as a national park and Dr. Karr reported that his encounters with parties hunting deer and other animals have decreased dramatically. He has noted an increase in the frequency of sightings of cat tracks and droppings. Undoubtedly, hunting continues in Panama as skins and cubs of spotted cats are occasionally displayed in native markets in villages and towns especially in the outback. Killing of jaguars to protect livestock by ranchers and farms probably continues unabated.

Habitat

Loss of habitat is the primary cause of the decline of jaguars and the greatest threat to the jaguar's future in Panama. As new roads are built into formerly inaccessible areas, logging, agriculture, and settlements become factors in loss of habitat. The construction of a pipeline across the Isthmus of Panama and the extension of the Pan American Highway another 150 miles in the last four years has opened up country that was largely undeveloped. Expectations are that such development will continue with increased threats to wildlife habitat.

Regulations

Hunting and trade in all wild animals are prohibited by laws and administrative decrees in Panama. Some 82 species of animals are listed as endangered. Of this number, six species of felids including the jaguar are on the list. La Ley Forestal prohibits hunting of all species, and Resolution 1003 prohibits trade and commerce of all wild vertebrates. Enforcement of laws is not adequate even though the nation's Defense Force is charged with assisting in enforcing the laws.

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INTERVIEWS

Professor Dimas M. Botello L., Secretaria de la Direccion Nacional de Recursos Naturales Renovables. Paraiso-Corregimiento de Ancon. Apdo. 20116, Direccion de Recursos Naturales Renovables, Panama City, Panama.

Dr. Nathan B. Gale, D. V. M., United States Army, Department of Defense, Centro de Propagacion de Especies Panamenas en Vias de Extincion, Panama Canal Zone, Panama.

Dr. Eustorgio Mendez, Zoologist, Laboratorio Comemorativo Gorgas.
Apartado 6991, Zona 5, Panama City, Panama.

Dr. Ira Rubinoff and Dr. James Karr, Director and Deputy Director,
Smithsonian Tropical Research Institute, APO Miami, 34002. Panama
City, Panama.

Panama

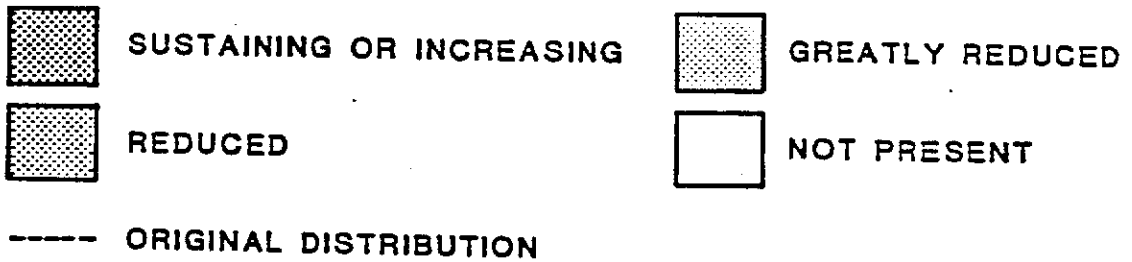
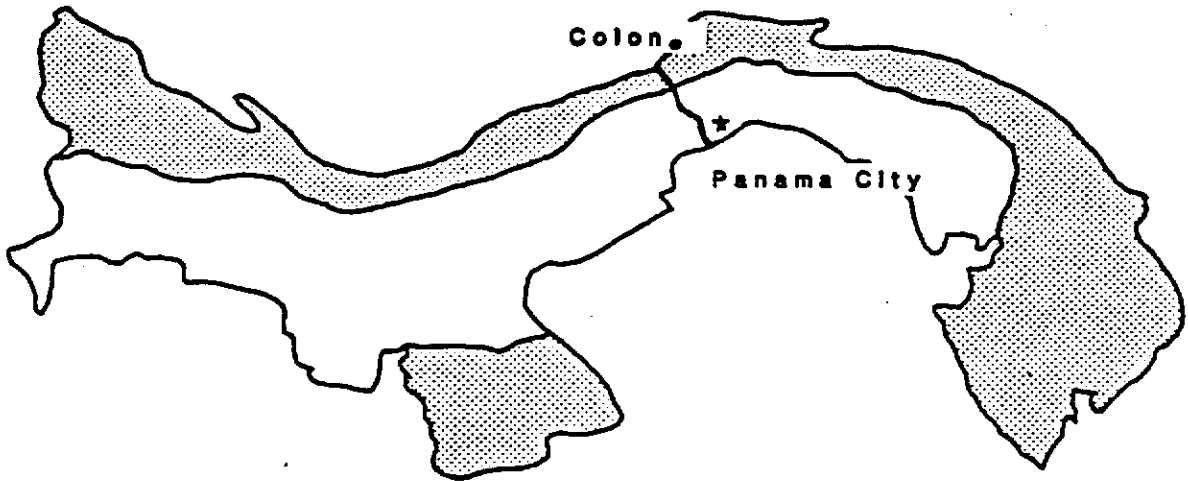


Figure 18. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

PARAGUAY

DESCRIPTION

Paraguay is a small (406,752 km²), landlocked country in interior South America. About 95 percent of its population (estimated at 3,897,000 for 1987) are mestizos resulting from intermarriages of Indians and Spanish. The rest of the population consists of small numbers of Indians in several tribes located primarily in the Chaco and immigrants from Germany, Japan, China and Korea. Fifty-eight percent of the population is rural and most practice some form of subsistence agriculture or work on large landholdings. Agriculture and forestry are the country's chief industries, and its main products are livestock and timber produced from its great wealth of native forests and grasslands.

Paraguay is divided into two major ecological regions separated by the Paraguay River. The area west of the Paraguay River, commonly termed the Occidental, comprises the Chaco which is contiguous with the Gran Chaco of Argentina and Bolivia. The eastern region, or Oriental, is made up of part of the Paraguay and Parana River Basins and comprises 39 percent of the land area of the country. Only 57,000 people (1.7 percent of Paraguay's total) live in the Chaco (US AID 1985); the remainder live in the more productive agricultural and hospitable lands of the eastern region.

Ecologically, the two regions contain markedly different habitats. The Chaco is an alluvial plain of level topography made up of coarse grasses, scrub trees and thorny bushes. Winter droughts and summer floods characterize the region. The lowlands and swamps along the Paraguay and

Pilcomayo Rivers are periodically flooded from overflows during summer rains. Some of the country's best grasslands occur in flood zones. The forest vegetation in the Chaco ranges from scrub trees or brushwood in the westernmost dry zone at the Bolivian border (rainfall less than 600 mm) to a heterogeneous forest flora with trees ranging up to 20 m high in the moist eastern edge at the Rio Parana (rainfall up to 1,300 mm) (US AID 1985).

Forests in the eastern region, or Oriental, are by far the most important commercial forests in Paraguay. The region is described by Holdridge (1969) as "warm temperate moist forest life zone." These forests are primarily in the basins of the tributaries of the Parana River (US AID 1985). Because of river transport and opening of new roads into the region, selective exploitation of commercially important forest resources has occurred. Expansion of agriculture also into the Eastern forests is a most serious cause of deforestation.

Some 21.4 million ha or 52 percent of the total area of Paraguay are classified as various kinds of grasslands (US AID 1985). The grasslands occur primarily between isohyets of rainfall of 800 (Chaco) and 1500 mm (Misiones, in the Eastern Region). They range in character from semiarid savanna to swamps and marshlands that are seasonally flooded during summer. Most are in hydric soils or wetland regions.

STATUS OF THE JAGUAR

Knowledge of the distribution and abundance of the jaguar in Paraguay is fragmentary at best. Studies of the species have not been conducted in the country and none is underway at present. However, all references and

the little data that are available attest to a serious decline in jaguar numbers during the past thirty years.

The Biological Inventory Project, a government agency administered by the Department of Forests, National Parks and Wildlife, has the task of conducting surveys and inventories of the fauna and flora of Paraguay. A modest effort, its headquarters and museum are in Asuncion. It maintains a small field force in various regions of the country. Members of the Project, staffed by Paraguayans and Volunteers of the United States Peace Corps, reported that the jaguar is endangered in Paraguay, and it is likely to continue to decline under present conditions. Parks and protected reserves are insufficient to protect it from man's industries and agriculture in much of its present range. Records of the occurrence of the jaguar, which are seriously deficient for the country at large, were assembled by the Biological Inventory Project to chart the distribution and relative abundance of the jaguar. Dan Drennan, a Peace Corps Volunteer attached to the Project, provided information for the map.

The most widely distributed and densest populations occur in the dry Chaco. Estimated at a density of one jaguar per 25 km², they occur in the most northwestern part of the Province of Chaco which is contiguous with Bolivian populations. Here in the Chaco, the Parque de Defensores del Chaco was established for the protection of the jaguar. Two other regions of the Gran Chaco in Paraguay contain populations estimated at one per 50 km². These are in the Provinces of Alto Paraguay and Nueva Asuncion. Another population in the moist Chaco, estimated at one per 75 km², occurs in the Province of Alto Paraguay along the Rio Paraguay. While records

of the jaguar are not available for some other areas of the Gran Chaco, undoubtedly they occur sporadically and perhaps in isolated populations throughout.

The Eastern region, or the Oriental, contains jaguars in very low numbers, estimated at less than one jaguar per 500 km². However, isolated islands of habitat probably support higher densities. One of these areas is reported to be Coagazu National Park where densities are estimated at one per 75 to 100 km². Locations of other isolates are unknown, but it is known that the jaguar has been extirpated from rather large areas of the region.

Sr. Hilario Moreno, Chief of the Department of Forests, National Parks and Wildlife, differs somewhat in his assessment of the jaguar's status in the country. He agrees with most evaluations that the jaguar has been decimated in the past, but holds that it has increased more than 300 percent in Paraguay since commercial hunting of the species for its skins has decreased as a result of CITES. Nonetheless, Sr. Moreno recommended that the species should continue to have absolute protection because, even though illegal hunting has been curtailed, the loss of habitat continues and ultimately the species will be confined to parks and protected reserves.

FACTORS INFLUENCING JAGUAR NUMBERS

The loss of habitat and commercial hunting are held as the major causes of the decline of the jaguar in Paraguay.

Habitat

A good part of the species' habitat has been lost in the eastern region (Oriental) through exploitation of native forests for timber and other wood products and for animal and row-crop agriculture. The forest area in the region was reduced from 68,364 km² to 41,770 km² between 1945 and 1976 (US AID 1985). At a conservative estimate of the rate of deforestation occurring between 1976 and 1984, forest lands in the eastern region were expected to amount to no more than 35,000 km² at present. Data on this projection have not been published but it is expected to be a reasonable prospect. Thus deforestation has resulted in the loss of about 50 percent of the primary habitat of the jaguar in the Oriental of Paraguay.

Loss of habitat in the Chaco has not been serious, especially in the dry Chaco where few commercial timber species are found and where rainfall and terrain are inadequate for intensive agriculture. About 24,692,500 ha (60.7%) of the total land area of Paraguay is in the Chaco. Of this total, grasslands of various kinds account for 11,438,799 ha. Cattle ranching is the chief use of the land and conflicts between jaguars and cattle occur. Almost without exception, it is reported by knowledgeable persons, jaguars are killed on contact by ranchers whenever possible.

Six national parks, two protective forests, and one national reserve make up the total areas for protecting representative ecosystems and various species of life in Paraguay. The protected areas, currently totaling 1,120,538 hectares or 2.75% of the land area of Paraguay, were established between 1966 and 1981 (US AID 1985). In the Chaco, 4.45% of the land is protected whereas only 0.13% is protected in the eastern

region. Most parks and protected areas were established since 1975. The Defensores del Chaco Nacional Parque, which contains 780,000 ha and comprises more than two-thirds of the total land set aside in protected areas, was established primarily to protect the jaguar, according to Sr. Hilario Moreno, Chief of the Department of Management of Forests, National Parks, and Wildlife.

According to several sources, the protected reserves are not well staffed and are frequently violated by hunters. Some hunters are alleged to be military personnel who have access to all areas of the country. Further deforestation and agricultural development can be expected in much of the species' range, and it is on this basis that biologists and others in Paraguay recommend that the species be kept on the endangered species list.

Hunting

All interviewees suggested that hunting has been an important cause of the decline in the jaguar in Paraguay. They reported that jaguars are feared and killed opportunistically by rural peoples because the animal has an aura of mystery and fearsome demeanor about it. Thus they are killed on contact by campesinos and European settlers. Some are killed to protect livestock. Indians and mestizos have few weapons except those provided by ranchers and commercial hunters. Sport hunting has been practiced by the more affluent citizens of the country and by hunters from abroad. Some hunting, although illegal, still occurs but has not nor is it at present a serious drain on jaguar numbers. Reportedly, a safari company operates in Asuncion for hunting parties wishing to take jaguar.

While sport hunting may not be important to the current status of the species in Paraguay, organized commercial hunting for sale of the skins has been the most damaging activity in the decline of the species in Paraguay. During the height of the commercial trade in animal products (before CITES), a good skin brought US\$180 in Belem, one of the major ports of exit of animal products in Brazil (Doughty and Myers 1971).

While the trade in spotted cat skins has been curtailed by CITES resulting from the decrease in the price of the skins and the problems with shipping and marketing them, jaguars are still taken for commercial purposes. Rural Paraguayans receive less than US\$10 per skin at present according to wildlife specialists in Paraguay. In the 1960's and early 1970's, Belem, Brazil was the most important export center for wildlife products including skins of the jaguar taken in the Amazon Basin of Brazil and neighboring countries.

Asuncion, Paraguay is now reported (Caldwell 1984) to be an important exit center for contraband animals and animal products gathered from the Gran Chaco and Amazon Basin. As the traffic in skins decreased in the major ports of Brazil, exports from Paraguay increased. Twenty-nine thousand skins of five species of spotted cats were shipped from Paraguay in 1976; the number increased to 230,000 skins in 1979. It is likely that most of these skins came from outside Paraguay; however, the origin of the skins has not been determined.

Jaguar skins were seen in a leather shop and mounts of the species were also seen in two shops in Asuncion in late 1986. Two tanneries operating in Asuncion were reported by the Biological Inventory Project to process jaguar and other spotted cat skins. Information was not available

on numbers being processed, sold and shipped from the country at the present time for obvious reasons. Sr. Oscar Carvalho, U. S. Agency for International Development at the U. S. Embassy in Asuncion, stated that skins are usually "passed through" the country as "in transit" goods and were not confiscated by customs officials as they might be if the source of the shipments were Paraguayan.

Regulations

Hunting for all species was banned in Paraguay in 1975 by Presidential decree (Decreto No. 18,796), and Paraguay is a member of CITES. However, the laws are not enforced in the country, hunting is uncontrolled, and the protected areas are frequently trespassed. There are too few government personnel in the field to enforce existing laws.

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- Sr. Oscar Carvalho, U. S. Agency for International Development, U. S. Embassy, Asuncion, Paraguay.
- Daniel J. Drennan, Peace Corps Volunteer, Biological Inventory Project, U. S. Peace Corps, U. S. Embassy, Asuncion, Paraguay.

Ing. Raul Gauto, Coordinator, Centro de Datos para la Conservacion, Nature Conservancy International Program, CC 3303, Asuncion, Paraguay.

Gina C. Gould, Peace Corps Volunteer, Biological Inventory Project, U. S. Peace Corps, U. S. Embassy, Asuncion, Paraguay.

Ing. Hilario Moreno, Chief, Department of Management of Forests, National Parks and Wildlife, Ministry of Agriculture and Livestock, National Forest Service, Asuncion, Paraguay.

Paraguay

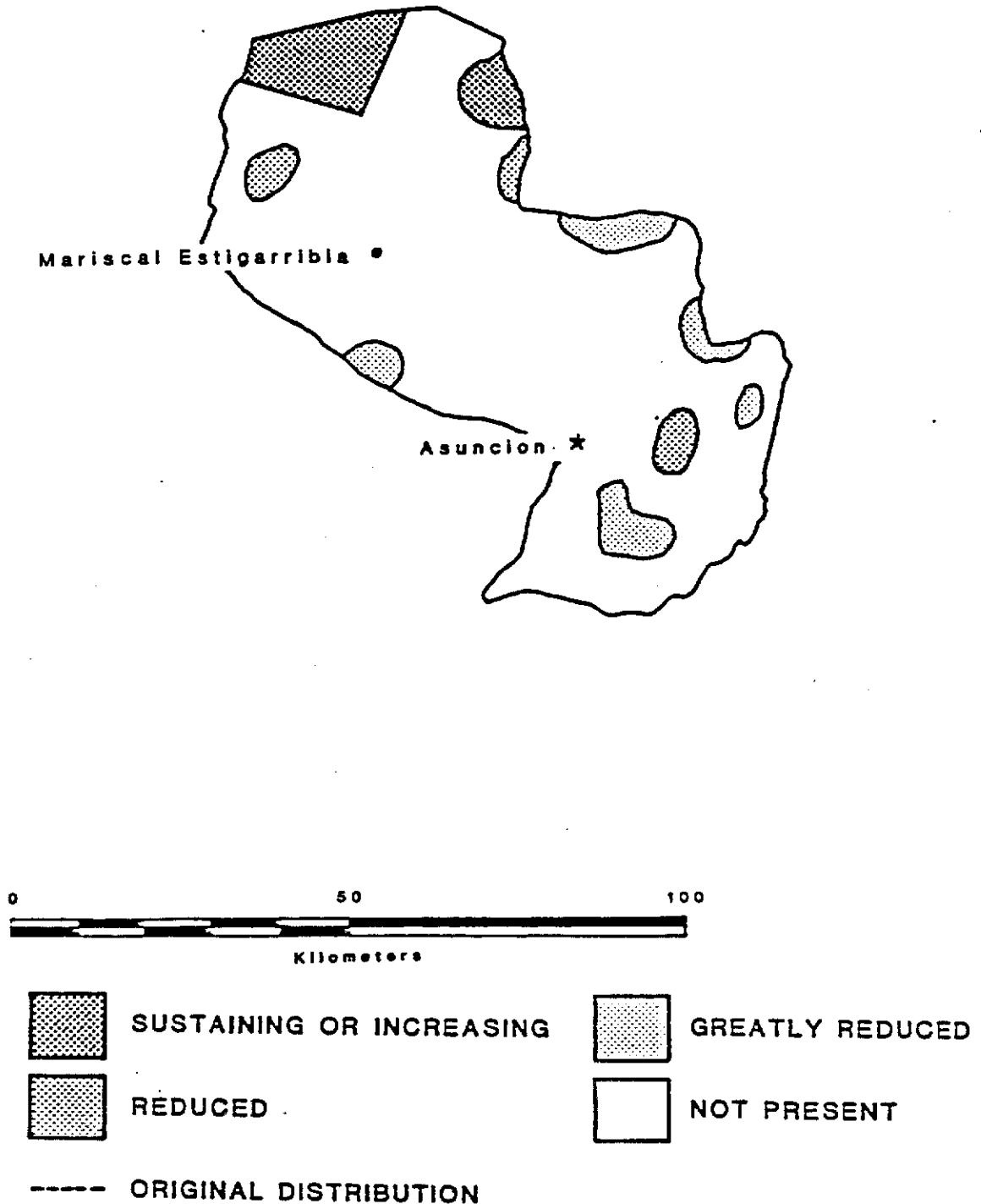


Figure 19. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

PERU

DESCRIPTION

Peru is the third largest country in South America. It has an area of 1,285,216 km² and a population estimated at 20,727,000 in 1987. About one-third of the population are Indians of many different tribes and the rest are primarily of mixed Indian and white ancestry (mestizos). About two-thirds of the population live in cities. Most of the rural inhabitants are small subsistence farmers.

Ecologically, three major regions make up the country: the Coast, the Selva and Highlands. The Coast consists of a strip of land on the Pacific Coast between the Ocean and the Andes. Most of the area is dry desert but some farming with irrigation does occur there. The Highlands are primarily the Andes. Few trees grow in the region and grazing is the chief use of the land. The Selva has two subregions, the high and low selva. The high selva consists of the foothills of the Andes, and unlike the foothills on the Pacific slope of the Andes, the foothills on the eastern slope is covered with forest vegetation. The low selva is a flat plain of thick rain forests. The origin of the great Amazon River is in the low selva.

STATUS OF THE JAGUAR

The jaguar is an endangered species in Peru according to all accounts which we could evaluate. It occurs in fair numbers in the low selva especially in the river systems of the Amazon Basin of Peru. It extends southward in decreasing numbers to the city of Cepaua which is south of

the city of Pucallpa, according to Ing. Galo Lopez Preciado, of the Consejo Nacional de Ciencia y Tecnologia (CONCITEC).

Grimwood (1969) reported the jaguar occurred in the 1960's throughout the selva region of the Amazon and "is also known to the west of the Andes in the Zarimilla Province of the Department of Tumbes." It has also been recorded from Hda. Taulis in the Department of Cajamarca.

FACTORS AFFECTING JAGUAR POPULATIONS

HUNTING

Illegal hunting is an important source of mortality of jaguars in Peru. Hunting is done to protect livestock and for trade of the skins. Grimwood (1969) stated that 12,704 jaguar skins were exported from Iquitos in the 20 years prior to 1966. Ponce del Prado (1978) reported that 5,544 jaguar skins were exported from Peru from 1966 through 1972.

The size of the kill and the current status of trade in skins in Peru is not known; however, it is suspected that CITES has had a beneficial effect on trade in animal products there as it has elsewhere in the Amazon Basin.

HABITAT

Loss of habitat is the major reason for the decline in jaguar numbers in Peru. Clearing of the forest to establish cattle ranches has been a major factor in habitat loss, and clearing for this purpose continues in the Amazon Basin. Highway development has allowed much of the tropical forests to be opened for oil exploration and for timber. Highway entry is the first step in loss of habitat in tropical forests of the region, and

the Peruvian government has an aggressive road-building program.

REGULATIONS

Peru has regulations which prohibit the take of jaguars and export of their skins. However, they are not enforced and there apparently is no provision for special permits to take animals which are threatening livestock.

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Enrique G. Ortiz, Ornithologo. Asociacion Peruana para la Conservacion de la Naturaleza (APECO), Parque Jose de Acosta 187, Magdalena, Lima 17, Peru.

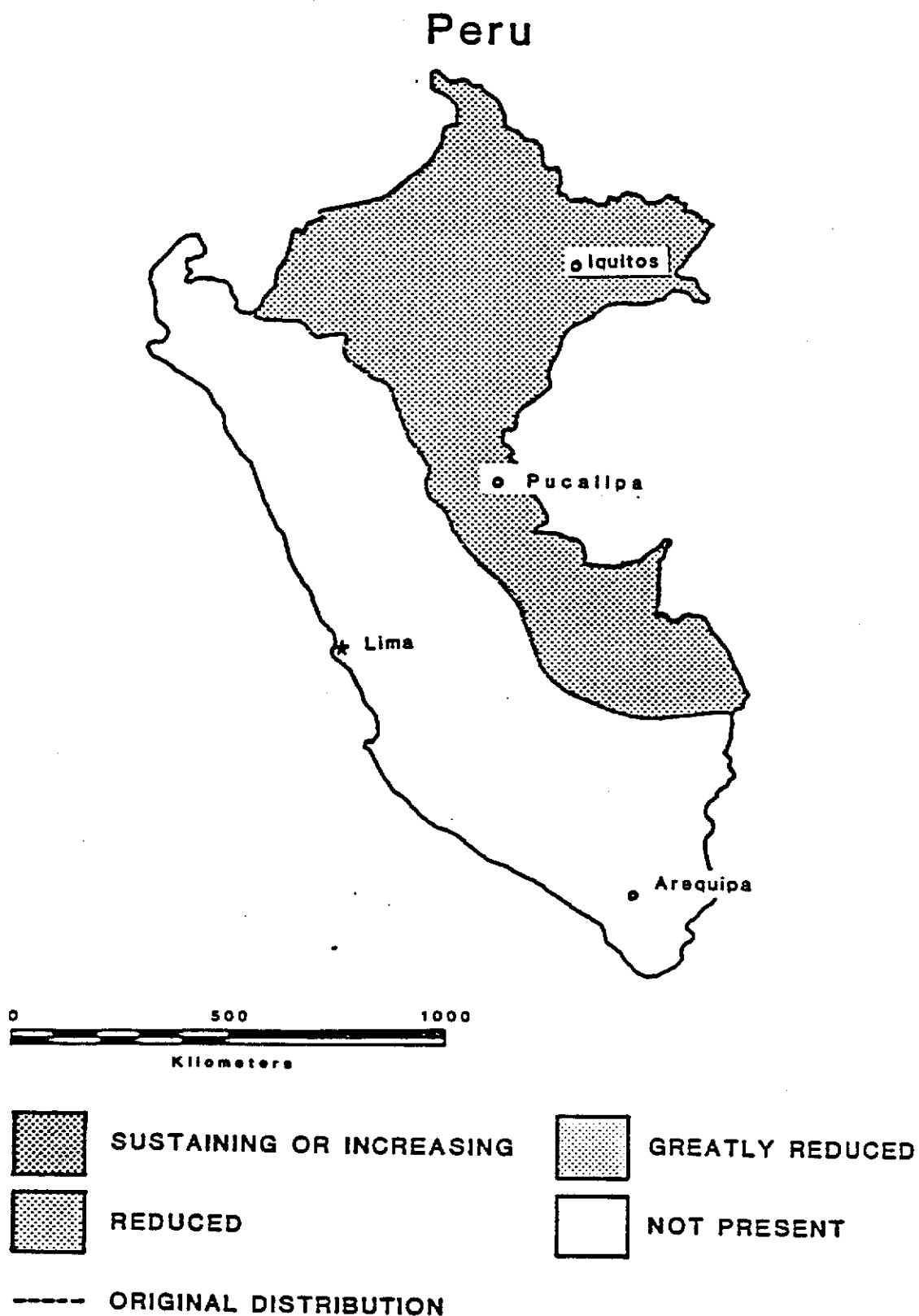


Figure 20. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

SURINAM

DESCRIPTION

Surinam is located in South America along the north-eastern coast, with Guyana on its west, French Guiana on its east, and Brazil on its south. To the south the country rises until it reaches the summit of the Toemoooc-Hoemat Mountains, which borders Brazil. Surinam has a surface area of 163,256 km². It also has a small number of people with an estimated population of 391,000, which equals six persons per km². About 40% of the people live in or around Paramaribo, the capitol, and country-wide 54% are rural and 46% are urban. Most of the people live on a flat coastal plain that extends inland from the Atlantic Ocean 16 to 80 km. Much of this area has been drained and is in farmland. Rice is grown on about three-fourths of this farmland, but bananas, coconuts, and sugar cane are also important. Eighty percent of Surinam is covered with virgin tropical rain forest, and the land is dissected by numerous north-east flowing streams, making the area ideal for jaguars.

STATUS OF THE JAGUAR

The jaguar has been relatively unaffected in Surinam. It is considered by government to be neither endangered or threatened; however, it is classified as endangered because Surinam is a member of CITES. The jaguar occurred throughout the country, and now only in the developed coastal strip has the population declined due to changes in habitat and the activities of man. During the last five years the population has remained stable, or may even have increased due to additional protection by Government enforcement of the CITES regulations. Logging and

development of the inland areas of Surinam will probably eventually come, but such events are many years off. Along the coast the jaguar will continue to decline; however, several preserves for wildlife have been proposed, and if established, the jaguar will continue to exist there.

FACTORS AFFECTING JAGUAR POPULATIONS

Loss of Habitat

On the coastal strip development for farming and agricultural activities will continue to degrade the habitat for the jaguar. The rate of development will progress as human population increases. Inland, the tropical rain forest has been little affected, and the jaguar population there is expected to remain stable within the foreseeable future.

Utilization

Utilization is considered to have had no influence on the population in the recent past. A few animals have been taken in the coastal zone for the protection of livestock when sanctioned by the local forest officer or the local police. It is believed that practically no jaguars are taken illegally because on patrol none are found by the police force. TRAFFIC reports indicate that a few hides of jaguars and ocelot find their way out of the country, but there is apparently no organized poaching.

Laws and Regulations

The hunting or killing of jaguars is prohibited in Surinam by "De Jachtwet" (Game Law) G. B. No. 25, "Het Jachtbesluit" (Game Resolution) G. B. 1970 No. 104, and "De Natuurbeschermingswet" (Nature Conservation

Law). G. B. 1954 No. 26. Suriname is a member of CITES, and the Government believes the regulations within the country are enforced and are effective. Where exceptions are made and jaguars are shipped out of the country for scientific purposes, an import permit is required from the country of destination. The last live jaguars shipped out of the country was in 1979, when two were sent to the zoo in Trinidad. The Government believes that the shipment of jaguar skins out of the country is negligible.

Diseases or Parasites

There is no information available on the influence of diseases or parasites since no studies have been conducted.

Legal Hunting

Legal hunting is not permitted. It is the opinion of government that legal hunting could be a source of revenue, but such a move would be disastrous to the jaguar population.

SOURCES OF INFORMATION

INTERVIEWS

Mr. S. A. J. Malone (Written Repsonse) Head of Surinam Forest Service
Nature Conservation Division, Research Section Surinam Forest Service.
Cornelis Jonghbawstr 10, Postbox 436 Paramaribo.

Mr. Joep M. Moonen (Written Response), former Director, Paramaribo Zoo;
noted Consultant of Herptefaua, Ft. Myers, P.O. Box 50127, Ft. Meyers,
FL. 33905-0127, U.S.A.

Surinam

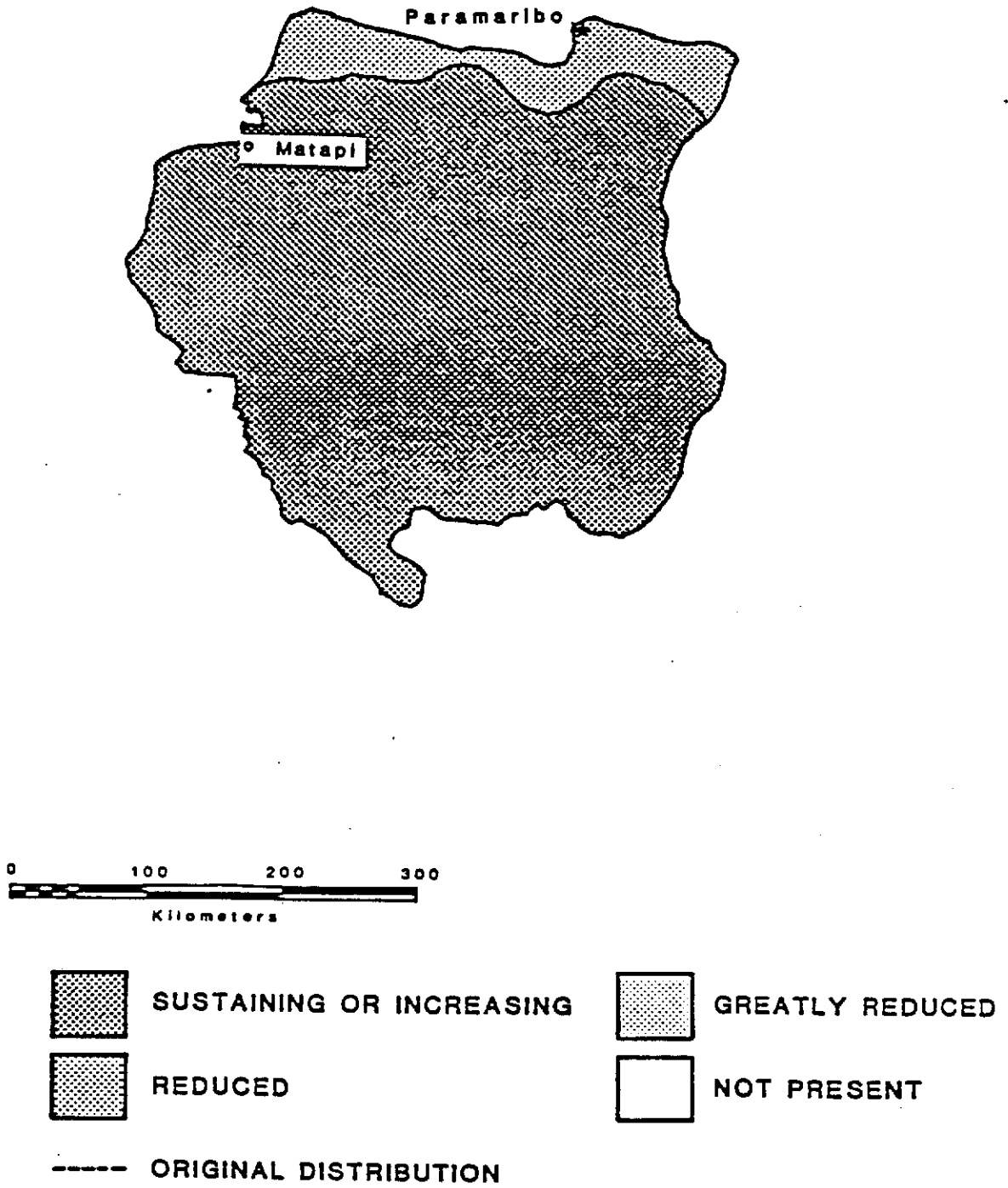


Figure 21. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

UNITED STATES

DESCRIPTION

The states of Texas, New Mexico, Arizona and California were the northern-most extension of the range of the jaguar. In extreme east Texas pine forest is the dominant vegetation with frequent lowlands of hardwoods. The south Texas plain is dominated by thick low brush; however, according to historical reports, when first occupied by the Spaniards it was savanna grasslands with the streams skirted by live oaks. West Texas is dominated by mountains and valleys with the vegetation ranging from desert-like at the lower elevations up to pine forest at the tops of the mountains. This continues on westward through New Mexico to central Arizona. To the west of Tucson the country becomes more arid, the mountains lower in elevation with fewer and smaller trees, and the country is predominantly low Sonoran desert. The above four states occupy an area of 1,711,634 km², and have a human population of 41,917,270, making the density 24 people per km². In west Texas, New Mexico, and Arizona there are large expanses of country thinly populated or unoccupied; however, cattle are ranched over all of the country that is not in some kind of restriction, such as national parks or reserves.

STATUS OF THE JAGUAR

The original range of the cat in the United States extended from extreme east Texas, west to Baja, California, and as far north as Santa Fe, New Mexico and Grand Canyon, Arizona (Hall 1981). Establishing a time period for the elimination of the jaguar as a resident in the United

states is difficult because of infrequent occasions an animal wanders north from Mexico. Evidence of established populations existing as late as the early 1900s is verified by the taking of females with young. Brown (1985) notes that Lang (1960) reported the taking of a female with her young at the head of Chevelon Creek south of Winslow, Arizona, in the fall of 1910. Brown (1985) also reported that the Arizona Daily Star on June 6, 1906 reported the killing of a female and the capture of her two cubs in the Chiricahua Mountains. The two cubs were then offered for sale in Bisbee. There are several records of females taken in Arizona, the latest reported for 1963.

A young male jaguar was taken sometime between Christmas and New Years, 1986 in the Dos Cabezas Mountains, southwest of Wilcox, Arizona (D. Brown, personal communication). Brown speculated that this animal wandered north from Mexico, which he also believed accounted for most of the records of jaguars taken in the 1950s and 1960s. Prior to the animal taken this past December the second-most recent record was of one taken in Arizona in 1971 (Brown 1983). Hoffmeister (1986) reporting for that state lists three killings in the 1950s, four in the 1960s and one in 1970. These may all be authentic records; however, it is known that a professional hunter was bringing live jaguars into the state beginning at least as early as the first half of the 1960s.

The last authentic jaguar record for Texas was in 1946 (Russell 1971); however, the Boone and Crockett Club Records of North America Big Game (Boone and Crockett Club 1981) lists one taken in the Big Bend in 1962.

Apparently the jaguar disappeared from New Mexico around the turn of

the century. Bailey (1931) reported one killed near Grafton in Socorro Country in 1900, one in Otero County in 1902, one in San Miguel County in 1903, and one near Magdalena in 1905. The last record for California was 1860 (Guggisburg 1975); however, Leopold (1956) reported one taken in Baja California, Mexico in 1955, which he postulated had wandered north from Mexico, crossed the Colorado River, probably south of Mexicali, and traveled south to its point of collection.

FACTORS AFFECTING JAGUAR POPULATIONS

Habitat

Apparently the jaguar was never abundant in the United States for whenever it was taken it attracted attention. Its original range was confined to an area that in many respects has not been drastically altered in the last 75 years, and the other native big cat, the puma, is still abundant in certain areas within the original range of the jaguar. Two of the jaguar's commonly used prey species, armadillo and javelina, are also still common in their original range in the area. The combination of low densities, uniqueness, and the activities of the livestock industry to control or eliminate potential predators probably resulted in the demise of the jaguar in the United States. Because of the nature of the habitat, which evidently was marginal, the success for re-establishment the jaguar in the United States is questionable. Large areas that are suitable that are not under the influence of the livestock industry, in one way or another, are rare. A re-introduction program would therefore meet political opposition. In addition, providing protection for the released animals, once they wandered outside of a wildlife reserve or a national

park, would be very difficult if not impossible.

Regulations

The United States is a member of CITES, hence the jaguar is completely protected by federal regulations within the country.

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Southwestern United States

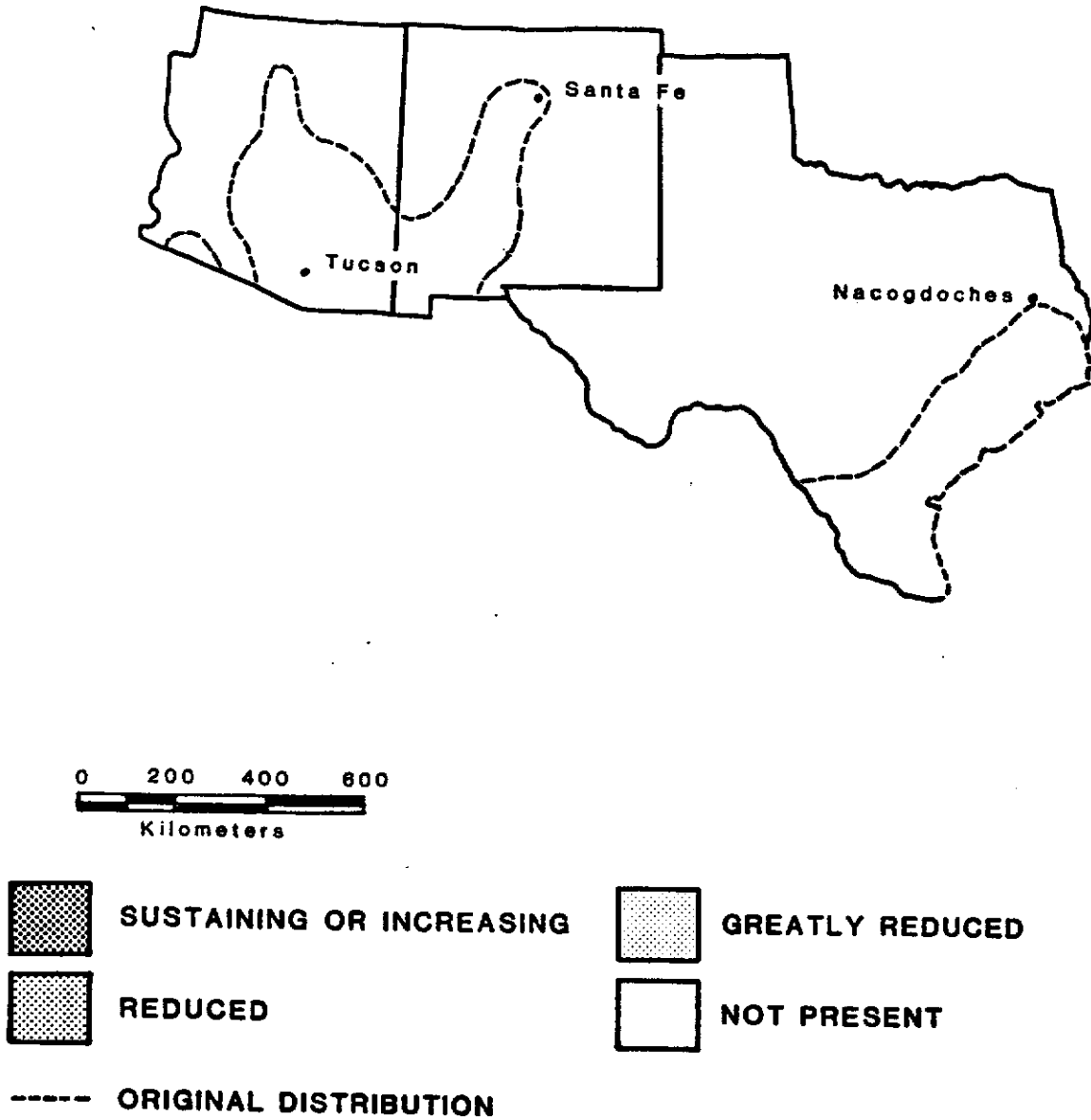


Figure 22. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

URUGUAY

DESCRIPTION

Uruguay, a small country on the Atlantic coast of mid-continent South America, has an area of 176,215 km² and a population of 2,972,000. Its people are largely of European origin, its Indian population having been practically eliminated by a series of conflicts in the early settlement period of the 1700's.

The two main ecological systems are the Coastal Plains and the Interior Lowlands. Over 97% of its natural habitats have been developed. The country has a well developed agricultural economy with agricultural products providing most of its export income. The Coastal Plains have rich soils and it is here that most farming takes place. The Interior Lowlands comprise about four-fifths of the land area of Uruguay and are grasslands devoted mainly to cattle ranching.

STATUS OF THE JAGUAR

James G. Teer visited Montevideo on July 2, 1986, and met with Sr. Juan Villalba, Director, TRAFFIC, S. A., concerning the status of the jaguar in Uruguay and to obtain any records of kill and trade in jaguars from TRAFFIC records.

Sr. Villalba verified the common knowledge that the jaguar was extirpated from Uruguay in the beginning of the 20th century. Moreover, the records of TRAFFIC, S. A. did not contain any references to illegal kill or trade in jaguars. Considering the stage of development of the country's natural landscapes and the lack of wild prey for the jaguar, it is highly unlikely that the jaguar can be re-established in the country.

SOURCE OF INFORMATION

INTERVIEWS

Sr. Juan Villalba, Director, TRAFFIC, S. A., Carlos Roxlo #1496-301,
Montevideo, Uruguay.

Uruguay

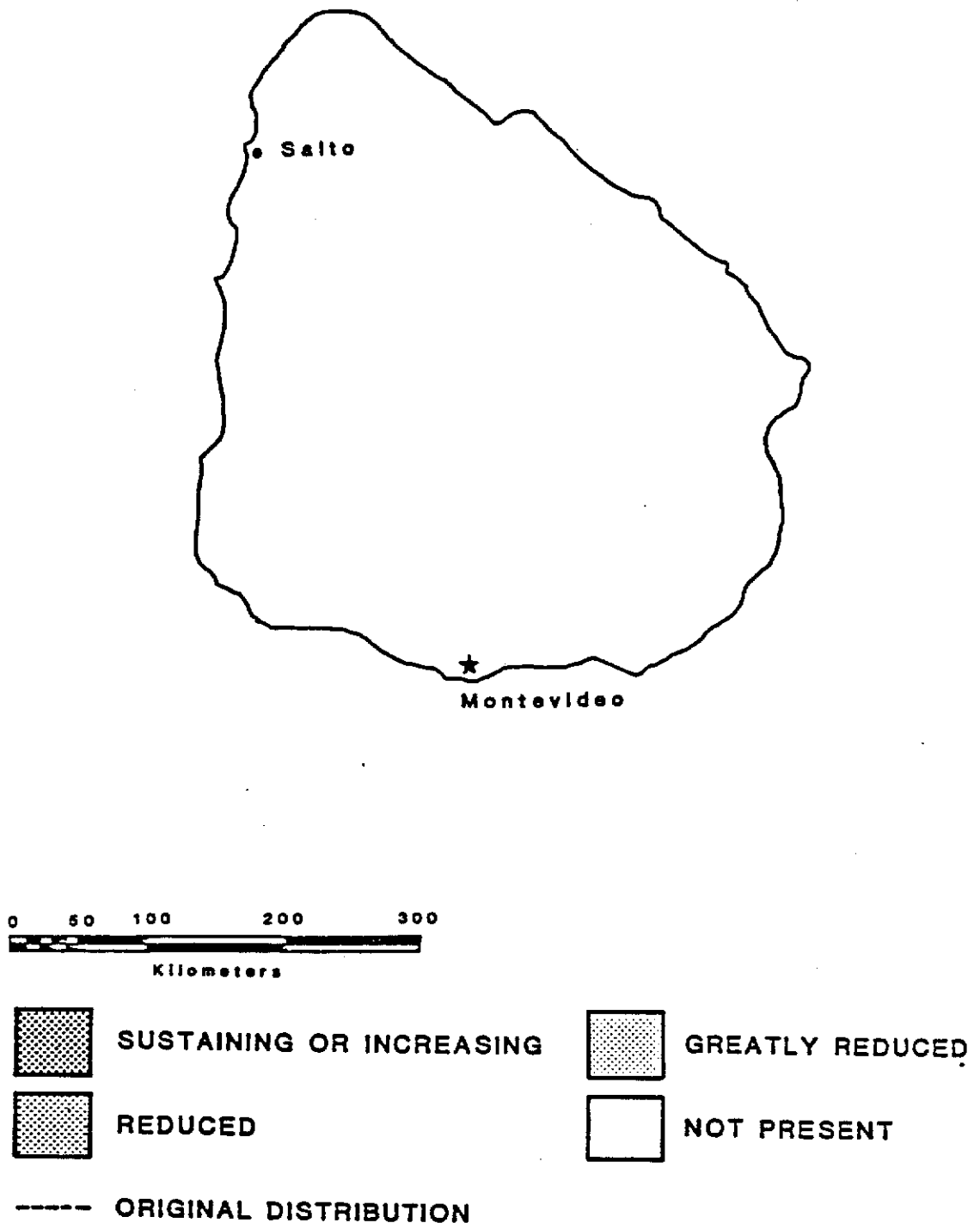


Figure 23. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

VENEZUELA

DESCRIPTION

Venezuela, an oil-rich, developed nation of South America, has a population projected at 18,408,000 for 1987. Of this number, 81% is urban. Literacy is also very high. It is a diverse country in ecological terms and encompasses some 912,050 km². The northern parts of the country are the most densely populated and are developed with both row-crop and animal agriculture as major industries. Three-fourths of the farms are less than 20 ha in area. However, most food is produced on larger holdings and the small farms are subsistence farms for rural peoples. Major crops are cotton, sugar cane, corn, coffee, and rice. Livestock ranching is also important in large sections of the country.

Four major landforms or ecological types occur in Venezuela: the Maracaibo Basin, the Andean Highlands, the Llanos, and the Guianan Highlands. The Maracaibo Basin consists of Lake Maracaibo and adjacent lowlands. Petroleum is Venezuela's major source of foreign exchange, and the oil and petrochemical industry is located in the Maracaibo Basin and on Lake Maracaibo itself. About 1.5 million barrels of crude is exported each day, largely to the United States. Considerable environmental degradation in the region has been assigned to the oil industry.

The Andean Highlands are located south of the Maracaibo Basin and extend across Venezuela. Three mountain ranges make up the region: the Merida Range, the Central Highlands and the Northeastern Highlands. Most of the population of Venezuela live in the Andean Highlands, in rural environments for the most part, where farming of the intermountain valleys

is a chief occupation.

The Llanos comprises about 26% (237,000 km²) of the country (Ramo and Ayarzagüena 1983), and extends through central Venezuela from east to west to the Orinoco Delta on the Atlantic Coast. The Llanos are contiguous with the same ecological zones in Colombia and is the primary cattle ranching area of Venezuela. The great Orinoco River and its tributary system drain the region. The climate is seasonally very different with the rainy season extending from May through October at which time much of the Llanos are inundated. In the dry season, vegetation is dried and brown, totally unlike the verdant aspect of the wet season. The Llanos comprises many kinds of vegetative communities of which the dry tropical forests and grasslands with various subsets of the two types are chief constituents (Ewel and Madriz 1968). Farming is practiced in some sections of the region.

The Guiana Highlands comprise about one-half of the area of Venezuela and the vegetation is largely moist tropical forests of the Amazon Basin. Here in the Guiana Highlands, the natural world has been largely untouched. Its vegetation and animals have been "protected by nature" because of the region's remoteness and inaccessibility. Important features of the region, aside from its great diversity of life in the tropical forests, are the great tepuis or large tablelands formed by erosion of the highlands by the many river systems. Angel Falls arises from one of these great mesas and falls 997 m to the floor below.

STATUS OF THE JAGUAR

The weight of opinion among conservationists in Venezuela (wildlife

biologists, mammalogists, and hunters) places the jaguar as a threatened species in Venezuela. According to Mondolfi and Hoogesteijn (1986), the jaguar "has a widespread distribution, in suitable habitats, throughout the Venezuelan mainland, from near sea level to elevations of about 1,000 m." It has become increasingly scarce or completely extirpated in some regions of Venezuela, but sizeable, stable numbers remain and are even increasing in the Llanos and the Guianan Highlands, according to Raphael Hoogesteijn, Armando Michelangeli, Carlos Rivero Blanco, and Herman Zingg (see interviews).

In areas where they reportedly occur in very sparse numbers (primarily north of the Orinoco River), according to Mondolfi and Hoogesteijn (1986), "jaguars have been reported from mountainous regions of the States of Falcon, Lara and Yaracuy; in the coastal lowland forests of the States of Carabobo and Yaracuy; in the mountainous country of the north central region (States of Miranda, Aragua and Guarico); in the western part of Lake Maracaibo (State of Zulia); and in eastern Venezuela in the Peninsula and the Gulf of Paria (State of Sucre) as well as in the Orinoco Delta (Delta Amacuro Territory)."

Whereas densities of the jaguar are known in very relative terms, some indirect evidence has been presented for Venezuela. Hoogesteijn, Mondolfi and Michelangeli (1986) reported 17 jaguars (six adult males, one juvenile male, nine adult females, and one cub) were killed in a two-year period by hunters in an area of 300 to 350 km². These data translate to a density of one jaguar to about 20 km². Whether these were resident or transient animals was not reported. In the statement summarizing findings of the symposium on Wildlife Management in Neotropical Moist Forest which

included papers on the conservation status of the jaguar, Peter Jackson, President of the Group of Felid Specialists of IUCN, and Bertrand des Clers, Directeur, Fondation Internationale pour la Sauvegarde du Givier, reported a population estimate for Venezuela of 4,000 to 5,000 individuals (Jackson and des Clers 1986). However, we could find no substantiating information given in the symposium from which the information was supposedly derived.

Hoogesteijn, Mondolfi, and Michelangeli (1986), using density figures reported by Smith (1976) estimated the population to be between 2,500 and 3,600 in Venezuela.

By and large, the bulk of opinion (opinion is all that is available for Venezuela; no intensive studies of jaguar numbers have been conducted there) of wildlife biologists and hunters places the average density of jaguars at one per 50 to 100 km² south of the Orinoco River. There are no reasons to believe densities of jaguars in the Llanos and in the tropical moist forests of the Guianan Highlands are substantially different from those elsewhere. Here, Schaller and Crawshaw (1980) reported home range sizes of radio-tagged jaguars on two small ranches in the Pantanal region of Matto Grosso in Brazil at one per 25 km² and Rabinowitz (1986) reported a density of a jaguar per 6.5 km² in Belize. Undoubtedly, jaguar densities are spotty in distribution, and average densities are much lower than reported on selected small areas like those studied by Schaller and Rabinowitz.

FACTORS AFFECTING JAGUAR POPULATIONS

Habitat

Without exception, losses of habitat are blamed for the extirpation of jaguars in much of the pristine range of the species. This is especially true in the northern, more developed parts of Venezuela. While a few jaguars remain in the region, they have retreated to the more inaccessible areas such as higher mountains and lowland forests. Clearing of the land for agricultural pursuits and settlement and for forest products are the vital cause of the species' decline.

Overshooting has also been a factor but seemingly sufficient numbers remained in most areas to replenish their numbers. However, when the habitat was destroyed, the jaguar was lost. As suggested above, the jaguar has maintained its numbers in the southern part of the country due primarily to the region's inaccessibility. Undoubtedly, the great tropical forests of the Amazon Territory and other states of the region are at risk, and subsequently one might expect reductions in the jaguar from continued losses of habitat.

Hunting

Overshooting has been a factor in the decline of the jaguar in some areas, according to some reports. Before the Convention on International Trade in Endangered Species was enacted, a great many spotted cats, including the jaguar, were taken for commercial purposes. Many of these allegedly found their way into Colombia where they were exported. Some are allegedly taken now and find their way into Paraguay where they are

transferred into international trade. However, knowledgeable persons in and out of government agree that commercial trade in skins has declined dramatically since CITES came into effect. But killing of jaguars continues in even the remotest areas by rural peoples. Their skins are prized by local peoples for several reasons: as a token of their prowess as hunters and, in some cases, because there is a strange mystique surrounding the animal and some fear it. Some skins are sold in-country; however, prices have declined as a result of CITES and there is no longer the strong stimulus for profit in taking spotted cats.

The Llanos has always been a favorite sport hunting area (Velutini 1978), and the tropical forests in the Guianan Highlands are also favored areas. However, the difficulty in getting into remote areas of the latter has protected it somewhat. According to Herman Zingg (interview), an ardent jaguar hunter with a commercial aircraft rental service in Caracas, many hunters have lost their lives in going in and out of the region south of the Orinoco River because of the lack of aviation support systems there.

Hunting is still practiced by a few sport hunters, most of which are residents of the country; however, sport hunting is on the wane in Venezuela. Others take jaguars to protect livestock. Sr. Gonzalo Medina, Biologist, Asesor en Manejo de Fauna for the Division de Fauna Silvestre in Venezuela, believes killing of jaguars ostensibly to protect livestock is a serious mortality factor and is largely responsible for the species' decline in Venezuela. One source, Dr. Carlos Rivero Blanco, believes the number to be less than 50 annually for the country. Another source, Raphael Hoogsteijn, estimates that about 80 are taken in two states,

Cojedes and Barinas, alone. Obviously, estimates of the number taken illegally or to protect livestock are gross estimates or guesses.

Whatever else may be factors in the species' life and times, it is certain that the primary reasons for the decline in jaguar numbers in many parts of Venezuela, as elsewhere in South America, are habitat losses and unmanaged hunting.

Regulations

As implied above, Venezuela is a member of CITES, and hunting of jaguars for any purpose is prohibited by statute. Nonetheless, laws are poorly enforced in Venezuela for the same reasons as elsewhere in Central and South America: too few personnel including the National Guard to manage and enforce laws and the lack of a conservation ethic among the people in areas where the jaguar occurs. Consequently, protection of the jaguar in Venezuela is inadequate and its future is at risk.

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INTERVIEWS

- Rafael Hoogesteijn, Veterinarian, Aptdo. No. 3083, El Trigal, Valencia, Edo. Carabobo, Venezuela
- Lic. Gonzalo Medina, Biologist, Asesor en Manejo de Fauna (Fauna Management), Division de Fauna Silvestre, DAR-DGSAM, Ministerio del Ambiente y de los Recursos Renovables, Torre Sur, Pisa 22, Centro Simon Bolivar, Caracas, Venezuela.
- Sr. Armando Michelangeli, President. Fundacion Terramar S. C., Universidad Simon Bolivar. Pabellon 1, Ofc. 26, Caracas, Venezuela.
- Dr. Carlos Rivero Blanco, Private Environmental Consultant and Wildlife Biologist. C. R. B. Consulting Ecologists. Edificio Uno, P. 1, Of. 1-2, Calle Chacaito. Sabana Grande, B. Monte. Caracas 1050, Venezuela.
- Lic. Mirna Quero, Biologist. Jefe, Division de Fauna Silvestre, DAR-DGSAM, Ministerio del Ambiente y de los Recursos Naturales Renovables. Torre Sur, Pisa 22, Centro Simon Bolivar, Caracas, Venezuela.
- Sr. Herman Zingg. Aeropuerto la Carlota, Base Francisco de Miranda, Caracas, Venezuela.

Venezuela

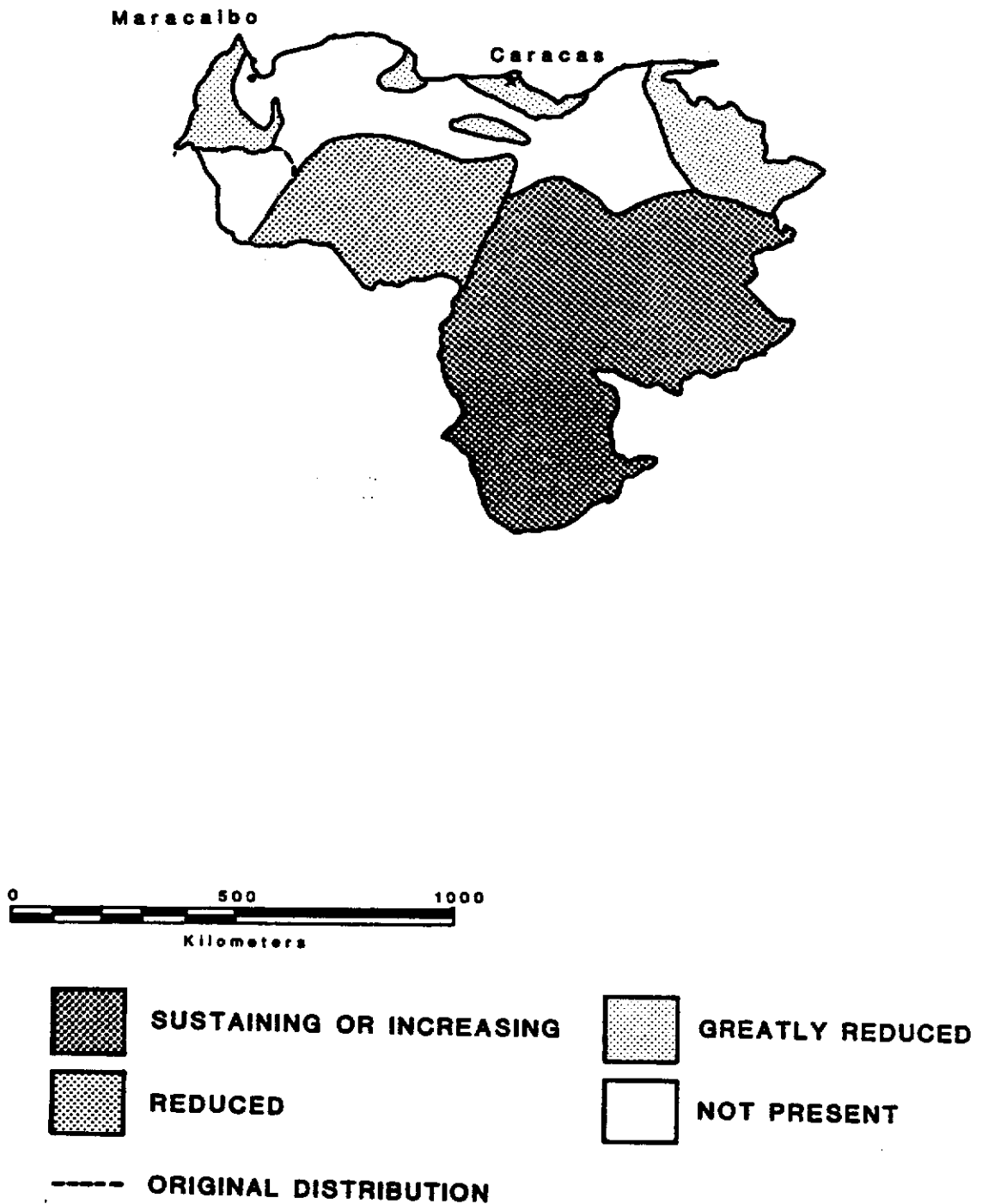


Figure 24. Status of the jaguar in 1987, based on population trends from 1980 to 1987.

APPENDIX III

Interviews

Interview by Dr. James Teer with Lic. Jorge Luís Cajal. Biologist, Dirección Nacional de Fauna Silvestre (Wildlife Department) , Buenos Aires, Argentina.

Date: June 30, 1986.

Q. Mr. Cajal Do you have jaguars in your country?

• Cajal. Yes.

Q. In your opinion, are they more abundant or less abundant than they were five years ago?

• Cajal. They are less abundant.

Q. Less abundant. And do you consider them endangered or threatened under the definitions?

• Cajal. Endangered.

Q. Endangered. And what are the reasons for their being put into this category?

• Cajal. The first reason is commercial.

Q. Overhunting?

• Cajal. Yes. Overhunting.

Q. What about habitat. Is deforestation involved? Loss of habitat?

• Cajal. Yes. Deforestation.

Q. Is this loss of habitat over all of the jaguar range, or just in certain areas?

• Cajal. Yes. Just in certain areas.

Q. Why are jaguars hunted? For what purpose?

• Cajal. Commercial.

Q. For sale of skins?

• Cajal. Yes, for sale of the skins.

Q. Do you have any information on the number of jaguars that were taken in the last five years.

• Cajal. A few down - one jaguar per 100 Km².

Q. Oh. You are giving me the densities? Do you think there is less than one per 100 Km²?

• Cajal. Yes, fewer than that.

Q. I've been told they are confined almost entirely to the national parks. Do they occur outside of national parks?

• Cajal. Yes

Q. In the - in good numbers?

• Cajal. No, no. In very low numbers. Few.

Q. Are there regulations in your country for controlling hunting?

• Cajal. Yes. We have laws to regulate hunting.

Q. Are these laws effective?

ARGENTINA - CAJAL

• Cajal. No. Because the problem in the - fauna cannot patrol.

Q. Not enough people to patrol and to carry out the laws. Do you have some system to restrict the export of jaguar skins? You must have some laws to govern export.

• Cajal. We have only laws, but it is not an effective system.

Q. Again, because not enough people to carry out the laws?

• Cajal. Yes.

Q. Is your country a member of CITES.

• Cajal. Yes.

Q. And who is the scientific authority for that?

• Cajal. González Ruiz, the director of this office.

Q. Do you know of any other source of mortality such as diseases or parasites or accidents such as being run over by a vehicle that can cause the loss of jaguar?

• Cajal. No.

Q. Are there any other natural factors - any other sources of mortality - that cause the decline of jaguars? Any other reason for them to be decreasing in numbers.

• Cajal. No.

Q. Do you have any reports or published information, any scientific studies that have been made in Argentina on the jaguar?

• Cajal. For Argentina, no.

*Nothing?

• Cajal. Nothing.

Q. Do you think they are still decreasing?

• Cajal. Yes. Still decreasing.

Q. I've been told that slash and burn agriculture, or deforestation, is important in the loss of jaguars in other parts of Argentina, where now they no longer occur. In the areas where they have been completely killed out or lost, is the reason mainly because of agriculture and deforestation and loss of habitat?

• Cajal. Deforestation.

Q. Thank you very much, sir, for the information.

**Interview by Dr. James G. Teer with Lic. Claudio Anabel Blanco, Biologist,
Dirección Nacional de Fauna Silvestre, Buenos Aires, Argentina. Date: June 30,
1986.**

Q. Sr. Blanco, does your country have wild jaguars at the moment?

• Blanco. Yes.

Q. Are they more abundant or less abundant than they were five years ago?

• Blanco. I think they are less abundant, but it is not known.

Q. Less abundant but not really known. Do you consider them to be endangered or threatened under the present definitions of the two categories?

• Blanco. I think they are in danger of extinction.

Q. What are the major reasons for their decline in numbers?

• Blanco. The major reasons are declination of prey populations, and hunting.

Q. Is hunting being done for commercial purposes, for sale of the skins?

• Blanco. Yes. This is one reason. Another reason may be fear and social habits.

Q. Just for sport hunting?

• Blanco. No. Fear by the local people. This is happening now. Maybe 10 years ago, hunters from Buenos Aires and other big cities came to hunt, but not today, because it is almost impossible to find an animal in the wild.

Q. Do they hunt for protection of livestock?

• Blanco. I think this is one reason they hunt.

Q. So you say the primary reason for this decline and their endangered status is because there has been overhunting for skins and for the fear simply the local people have, and also for protection of livestock.?

• Blanco. Yes.

Q. Do you have laws that protect the animal?

• Blanco. Yes. It is prohibited to hunt jaguar over all the country.

Q. The season is closed entirely. Is this an effective law? Is it carried out?

• Blanco. No. Local people hunt the animals without knowing the law, and the hides are commercialized or smuggled. It is highly illegal.

Q. Do you have a sufficient number of law enforcement people that patrol?

• Blanco. The numbers are too short.

Q. Do you have laws that prohibit the export of hides outside the country?

• Blanco. Yes we have agreed - we are a member of CITES.

Q. Is your organization the scientific authority for CITES?

ARGENTINA - BLANCO

No. The scientific authority for CITES is the Museo Argentino de Ciencias Naturales.

Q. Is there any source of natural mortality?

• Blanco. I don't know. It is not known.

Q. Any diseases or parasites?

• Blanco. It is not known.

Q. What about the loss of habitat? At one time the jaguar occurred in many areas of Argentina and now it's confined, I understand, to the northern parts, and mainly on national parks. Is it the loss of habitat the reason for the decline over the country at large? Or has it been overhunting?

• Blanco. I think the main reason is overhunting.

Q. Do you have any kind of information - published documents, reports, or scientific studies on the jaguar?

• Blanco. No I don't.

Q. There has not been any scientific studies made?

• Blanco. Not that I know of.

Q. Do you think jaguars that presently occur in the north are maintaining their numbers or declining?

• Blanco. I think they are declining.

Q. If you had to put a density estimate, is there any way in very broad terms, you would say they are as abundant as one per 100 Km², or one per 50 Km², or one per 25 Km², or even less than any of these?

• Blanco. One per 500 Km². I think this is a very superficial question. We don't know even the distribution of the actual populations. The jaguar once occurred south of the Río Colorado, Even south of that.

That means the original distribution of the jaguar was in Argentina over 2,000,000 Km². Patagonia starts at the Río Colorado.

Q. What is the present distribution to your knowledge?

• Blanco. To my knowledge, they live in the humid forested mountains of the selva to the maringo.

In some parts of these mountains, and the most isolated spots of the dry Chaco, and in the province of Misiones close to the national parks (Iguazú), and in the parks in the northwest - Barituna in the selva. It is not possible to give a density. The National Parks Office may have some ideas.

Q. They have no data.

• Blanco. There is a work published by Crespo. Do you know him?

Q. No is he in Buenos Aires?

• Blanco. I suppose. He's retired. He knows something about the jaguar.

ARGENTINA - BLANCO

Q. Is he an anthropologist?

• Blanco. No, he's a biologist. He has been doing work on mammal populations in Iguazú National Park. He may know.

Q. Could you put his name down on the questionnaire so I could follow up on that? I might contact him. Thank you very much , Sr. Blanco, for the interview.

Interview by Dr. James G. Teer with Lic. Pablo Canevari, Biologist, Parques Nacionales Argentinos, Buenos Aires, Argentina. Date: June 30, 1986.

Q. Mr. Canevari, the purpose of this interview is to obtain information on the status of the Jaguar in Argentina. We are conducting the survey for the U. S. Fish and Wildlife Service. The purpose is to use the information for determining the status as an endangered species. First of all, does your country have populations of jaguar?

• Canevari. Yes. Very few.

Q. Are they less abundant or more abundant than they were five years ago?

• Canevari. I don't know. I suppose a little less abundant. It's not big difference, I suppose. All hunting is prohibited.

Q. You think they are a little less now.

• Canevari. Yes.

Q. Under the endangered species act, a species is considered endangered if it is in danger of extinction. Do you consider the jaguar in danger of extinction in Argentina?

• Canevari. Yes, I suppose, yes.

Q. What are the main reasons for its peril or for its decline? Has it been overhunting? Has it been loss of Habitat? Or has it been some disease or some parasite?

• Canevari. No. I suppose mostly by hunting. The loss of habitat is important, of course, and they all act together because the jaguar is hunted for sport and also because the jaguar kills cattle.

Q. So it is mainly overhunting but also because of loss of habitat due to deforestation?

• Canevari. In some areas, yes. Maybe in Misiones Province the people hunted jaguars also prior to the deforestation of the area.

Q. Do they hunt them for commercial reasons - for sale of skins? Do they hunt them for sport or protection of livestock?

• Canevari. Most cases, I suppose, for protection of livestock. The hunting of jaguar is prohibited.

Q. There is a law against it?

• Canevari. Yes.

Q. So overhunting is the main reason.

• Canevari. I suppose. We formerly had jaguars south to the Río Negro, more to the south in very open areas. The change of the habitat there is not so important for the jaguar. But the problem in a very open area is that it is very easy to hunt jaguars.

Q. Is this in the Chaco?

• Canevari. Yes.

ARGENTINA - CANEVARI

Q. Do you have any information on the numbers of jaguars taken by hunting in the past five years?

• Canevari. No, I really have no idea. I suppose very few. We have very few jaguars in Argentina.

Q. The jaguar is completely protected by law?

• Canevari. Yes.

Q. Do you consider this laws effective? Are they effective in controlling hunting?

• Canevari. No.

Q. What is the reason?

• Canevari. We have very few people to make controls in the country. Anyways, we have very few areas for the jaguar in Argentina now. Mostly national parks. In the national parks protection is better. So the jaguars survive only here, mostly.

Q. So most of the remaining jaguars are protected in parks. And you don't have enough people to patrol.

• Canevari. No. In the parks, yes. But when I said we lost very few jaguars in the last five years, I suppose, because most of the jaguars are inside national parks. So we have very few outside the parks. So hunting is controlled.

Q. Do you have laws that prohibit the exportation of skins?

• Canevari. Yes, we have laws, but the problem is it is very difficult to make all these controls. Three days ago I saw a jaguar coat in a shop in Buenos Aires. Three months ago I saw another in a different place.

Q. So they are being sold in the stores?

• Canevari. Yes. I normally make a call to the people of the Direction of Fauna saying there is a coat of jaguar.

Q. Do they confiscate it?

• Canevari. Normally, yes.

Q. Is your country a member of CITES?

• Canevari. Yes.

Q. Is there a scientific authority in Argentina.

• Canevari. Yes, it is the Museo Argentino de Ciencias Naturales.

Q. Is it Mr. Ruiz?

• Canevari. No, Mr. Ruiz is the Director of Fauna, the Dirección Nacional de Fauna. This is the museum. The director of the museum is José M. Gallardo.

Q. Are there any other factors of mortality - natural mortality - that are important to the jaguar?

• Canevari. I don't know. I suppose no.

Q. Do you know of any published information, scientific papers or reports on the jaguar?

ARGENTINA - CANEVARI

• Canevari. There is a paper in Neotrópica, a scientific magazine from La Plata Museum. And I don't remember exactly how many years ago. If you want, I can not remember the date - maybe around eight or ten years ago. The situation of the jaguar in Argentina.

Q. And this is put out by the museum?

• Canevari. Yes, by the museum of La Plata. The magazine is Neotrópica. It's the only scientific information about jaguars in Argentina that I know. Also there is a book with information on the former distribution of the Jaguar in Argentina by Carmen.

Q. If I gave you density figures, very broad figures of jaguars of less than one per 100 Km² or one per 50 mi. or one for 50 Km², I should say, or even one per 500 Km², what would be your response?

• Canevari. Well, its very difficult to say. Its very different in the different areas of the country. I can tell you in which places I know there are jaguars in Argentina. But I suppose the idea of density in Iguazú National park.

Q. What would you say a rough estimate of numbers in Iguazú?

• Canevari. In Iguazú, I suppose, there are... I saw two times jaguars in Iguazú. I suppose 20 jaguars in Iguazú.

Q. That would probably be the most densely populated area in Argentina?

• Canevari. I suppose yes. I don't know really what a census in Barituna National Park. In northwestern Argentina, near Bolivia. It's very mountainous and with forest also. It's very difficult to see. And also Callileja has some jaguars, but very few.

Q. That's also in the northwest?

• Canevari. In the northwest.

Q. There are three parks in the northwest that have jaguars?

• Canevari. Only two, I suppose. Barituna for sure, and Callileja, maybe. Callileja had jaguars ten years ago prior to the creation of the park. I don't know what occurs now. I suppose but few.

Q. Do you know of anybody that's currently working on jaguars in Argentina?

• Canevari. No, I don't. Another work of Kranepool published by the Museo Argentino de Ciencias Naturales. He said something about jaguars here but very few. But he said there were maybe only ten jaguars in Iguazú! I suppose there are a little more now.

Q. Mr. Morello said that jaguars are coming into the park because of protection. He thinks there is some build-up now.

• Canevari. I don't know. This may occur. There are some jaguars in Misiones Province outside the park. There is jaguars in Santiago de Esteno in the Chaco area. There are provincial research corps here and there are jaguars here.

Q. How many?

ARGENTINA - CANEVARI

• Canevari. I don't know. I suppose we have less than 100 jaguars in Argentina. A high number. Less than 100 in all the country, I suppose. Really I don't know.

The following National Parks have jaguars:

Iguazú (55,000 Ha.) in Misiones Province. With an effective protection. There is an important population, more or less 20 specimens.

Calilegua (76,000 Ha.) Jujuy Province, with protection.

Baritú (72,000 Ha.) Salta Province. There is an important population. The surrounding environment is little disturbed.

Q. Nobody knows, but that's an idea. Thank you very much. sir.

**Interview with Claudio Ernesto Chehebar, Lic. en Ciencias Biológicas,
National Parks Administrator. Santa Fé 690. (1059) Buenos Aires. Argentina.
Phone: (01) 311-4250. Date: July 10, 1986.**

Portion of the country covered by respondent:

All of the country.

Q. Does your country (or area of country) have wild jaguar populations?

• Chehebar. Yes.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Chehebar. Less abundant (in my country).

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Chehebar. In my country, it is endangered.

Q. If you believe the jaguar to be either endangered or threatened, which would be the main causes?

• Chehebar. Destruction, modification or curtailment of habitat.

Q. What type of destruction, modification or curtailment of habitat is taking place?

• Chehebar. Felling of tropical forest trees for agriculture, cattle breeding or looking for exotic species. Felling of the "monte chaqueño" and alteration of it for cattle breeding.

Q. Where is this occurring?

• Chehebar. Towards the North-East of the country in the Misiones tropical jungle, in the tucumano-oranense tropical jungle (to the North-West), At the oriental, central and occidental Chaco.

Q. Over what portion of the jaguars distribution is this occurring?

• Chehebar. Over all the southern portion of its distribution.

Q. Is over-utilization occurring?

• Chehebar. Yes, but it is secondary with respect to habitat destruction, or in any case, it induces habitat destruction.

Over-utilization occurs mainly for commercial and predation control purposes.

Q. What is your estimate for the annual average off-take of jaguars for the years 1980-1985?

• Chehebar. There is no data.

ARGENTINA - CHEHEBAR

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Chehebar. Yes. Hunting is prohibited in all provinces.

Q. Are these limitations by season, numbers, areas, etc.?

• Chehebar. Restrictions are total.

Q. Are these laws effective?

• Chehebar. They are hardly effective (but they are not nil).

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Chehebar. Exportation is prohibited.

Q. Is the country a member of CITES?

• Chehebar. Yes.

Q. If so, does it have in place an effective management authority and scientific authority?

• Chehebar. Management authority: Dirección Nacional de Fauna Silvestre.

Scientific authority: Museo Argentino de Ciencias Naturales "Bernardino Rivadavia".

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

• Chehebar. No.

Q. Are there any published or unpublished reports on these problems?

• Chehebar. No.

(I only know of one Colombian report: Algunos aspectos sobre manejo, reproducción y costos de producción del jaguar (Panthera onca, Lineo 1875) en condiciones de cautividad.- Velez G. y Ocampo de P. Marta- Fac. Nac. de Agronomía, Medellín, V32, N°2, 1979.)

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate.?

• Chehebar. They are adequate.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat adequate or inadequate?

• Chehebar. Inadequate.

Q. From the information you have, or from personal experience, could you rate three of the causes, as to first important, second important and third important cause in depressing the jaguar population in your country or area?

• Chehebar. 1. Destruction, modification or curtailment of habitat; 2. Over-utilization. 3. Inadequate regulations or enforcement of same.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

ARGENTINA - CHEHEBAR

• Chehebar. No. Due to the drastic reduction in the species' distribution in Argentina, and to the small area sizes occupied by jaguars today.

Q. Do you have an estimate of the populations, either numbers or density?

• Chehebar. No.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

• Chehebar. No. Only those of Schaller in Brazil.

Q. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base any of your conclusions on the jaguar?

• Chehebar. See: Arra M. Distribución de Leo onca (L) en Argentina. Neotropica 20 (63) (1974).

Q. Do you know of other studies on the status of the jaguar that have produced information that you consider scientifically sound and reliable?

• Chehebar. No.

interview by Dr. James G. Teer with Ing. Francisco Erize, General Director, Fundación Vida Silvestre Argentina. Buenos Aires, Argentina. Date: July 1, 1986.

Q. Mr. Erize, the purpose of this interview is to gather information for the U.S. Fish and Wildlife Service in its review of the status of the Jaguar. I will ask a few questions and you may respond in any manner that you wish.

Does your country have wild jaguar populations?

• Erize. Yes, it does.

Q. Are they more abundant or less abundant than they were five years ago.?

• Erize. It's difficult to tell whether they are less abundant than they were five years ago. We assume that they are because we know that the traffic of jaguar skins goes on illegally, of course. So there's no reason to presume it would be more abundant. We know, of course, that it is a lot less abundant than many years ago.

Q. Do you consider them still to be endangered?

• Erize. Certainly, there's no reason why we would think it has become more abundant. The populations we know of are very small.

Q. Could you tell me in general terms what parts of Argentina still have jaguars?

• Erize. We know for sure that the jaguar is found in northern Misiones, in parts of Formosa, in the eastern and northern parts of Salta and Jujuy, and possibly in Chaco and northern Santiago de Estado.

Q. What has been the major factors in the decline of jaguar in Argentina?

• Erize. Man's encroachment in its habitat. Basically, through persecution because of fear of competition for cattle, with danger of predation on cattle and danger for man, and then, of course, the value of its pelt. In recent years this would have become more important.

The jaguar had a much greater distribution Argentina. Faithful information about jaguars reaching the edge of Patagonia - this is the Río Colorado. There is sufficient information of jaguars present around Buenos Aires at the end of last century. There are amusing cases - well, amusing not all the time, I presume, but very curious cases of jaguars attacking people in Santa Fe. Well documented cases.

Q. Are the jaguars being hunted at the present time?

• Erize. Well we know they are, although it's illegal to hunt them or illegal to trade their skins. But we know there's an illegal traffic on their skins.

Q. I suppose you have laws that govern the hunting of jaguar. The season is completely closed?

ARGENTINA - ERIZE

• Erize. Yes. It is illegal to hunt jaguars. Of course we have state legislation and national legislation. I presume it is forbidden within all the provincial legislation. This means that it is illegal to - any inter-provincial traffic on jaguar is illegal and, of course, any importation or exportation.

Q. Do you have any information on the numbers of jaguars that might have been taken in the last five years?

• Erize. No, there are no data.

Q. Do you have laws that govern the importation or exportation of jaguar skins and live animals?

• Erize. As far as I know, importation and exportation of skins would be forbidden. Live animals, according to CITES permits. That would be for special cases such as zoos. That is an assumption. I don't really know the CITES regulations in detail.

Q. Are these laws effectively carried out in the field?

• Erize. No they are not. There is very little enforcement of the hunting laws or the wildlife protection laws.

Q. Are there any other factors of mortality such as diseases and parasites?

• Erize. Sorry. I would add something else. It is even likely that you might find jaguar skins in shops in Buenos Aires. And this, of course, would be in conflict with the national legislation. Yet this would be possible for one of two reasons. One, an assumption that the skins have been owned for a long time or that they are from ancient stock. Or secondly, the complete lack of enforcement of those laws in the city of Buenos Aires. The Wildlife Direction; the Dirección Nacional de Fauna, has almost no inspectors. I think they have only one now, and they have a few voluntary inspectors that started their functions last year, but which, I believe, find great difficulties for acting. You were asking about disease...

Q. Disease or parasites of any other mortality factor.

• Erize. No. We know nothing about that. The only reliable information you could get will be within the national parks. In national parks such as Iguazú, there is a variable number of rangers and they would record such information. Obviously, if there was such situation within Iguazú, you could infer that it is a factor affecting larger populations or larger areas. Yet, if the population in Iguazú is healthy, you could assume that the same would apply to other populations.

Q. If you had to choose between these different factors: overhunting, loss of habitat, natural mortality such as diseases or parasites, which of the three would be important in the decline of jaguars throughout Argentina?

• Erize. Historically, probably, the loss of habitat. Recently, I think it is more likely to be commercial hunting because, although there is demolition of forests still going on, probably there is

ARGENTINA - ERIZE

a greater impact through hunting because the percentage of the habitat that has been recently reduced is probably not as high.

Q. Do you think that jaguar population in the north, in the parks of Iguazú and those three parks in the northwest, are maintaining themselves? Do you think they are, more or less, about the same?

• Erize. I have been President of the National Parks Administration and many times honorary advisor to several of the Presidents. So this is the reason why I may have information or I have kept notice of the ranger records through a rather large period of time. And the - my impressions is that sightings of jaguars have been more abundant in Iguazú these days. But I would think that the population is doing well.

Now, if one looks at Iguazú, the area is certainly small. It's about - it's smaller than 60,000 hectares, but up to know Iguazú is still connected to areas which are in wild condition, areas not being national parks. Yet this is a temporary situation. The situation is going to get worse. The Fundación and while I was president of the National Parks, I've tried to get the Army to transfer some areas that it has neighboring the park in order to enlarge the park. To be feasible, those areas have not been modified extensively.

The purpose the Army had for keeping them was for lumber. One such area in particular strangles the park in two. This was the area of greater concern for me.

Also, there is a small piece that is very significant - about 1,000 hectares - but significant strategically as habitat. And then there is a possible expansion to the east of the park. One could easily expand it 4,000 hectares more, carving them out of this army land, and still not taking all of it. So this would still allow a rather large extension of land to be transferred to the town of Iguazú for its expected growth. So you would not be strangling the future development.

Q. I get from what you are saying that one of the real needs is to set aside larger areas to protect the population that remains.

• Erize. Surely. The future of the jaguar of Misiones depends on enlarging the protected area over there and the kind of enforcement you would have over there. The Iguazú National Park has been quite successful in the latest years in the enforcement of the law. I would say this basically that during the last eight years or so.

There are possibilities for enlargement of the area. There is a provincial park nearby and there is some intention of creating some other protected areas that would connect Iguazú with these. We have been fighting or lobbying all this time to get a larger reserve created in that area as a compensation for the Paraguay Dam, a hydroelectric project that is going to flood one of the best wildlife areas in Misiones. So that at least half of that basin, the eastern half, which is not going to be greatly affected, is the project that we want to be protected and connected with Iguazú. One of the

ARGENTINA - ERIZE

problems, one of the advantages of Iguazú, although being small, it is connected with the Brazilian park, and the Brazilian park is much larger. It is 150,000 hectares.

So there you should have a good international area except for one thing. If you look at the map, the area is very much strangled in one point, strangled by a loop of the river that carves a good piece of what could be the Brazilian territory out of it and into Argentina. But this loop is already outside of the national park.

One of the efforts I made when I was President of the Park Service was trying to persuade the Province of Misiones to exchange that piece of land for some other property that national parks had in San Pérez. This was needed in order to perfect the link between the Argentina Park plus the western section of the Iguazú Brazilian Park with the the main part of this Brazilian park.

Q. I have one more question. Do you know of any current studies that are being conducted by any organization or individual on jaguar in Argentina?

• Erize. No. Maurice Hornocker came once to Argentina with the thought of studying jaguar here, but he discarded the idea later.

I could add a couple of -

We discussed so far the situation in Misiones where the hope for the jaguar is linked with the hope of expanding the protected area.

In Salta and Jujuy, the areas about to be discontinuous - you have Banitú, Calileja, and El Rey. But El Rey, up to where I know, has no jaguars so far. One could reintroduce jaguars probably but it's a bit small. And also one would have to bear the political consequences in mind. Cattle breeders around the park would certainly not welcome the idea.

But in that area, there will be agricultural lands and cattle - breeding lands in between this protected areas. Today, there is a considerable amount of wilderness and even outside the parks there is a good deal of habitat that has not been transformed. But it's going to be lost little by little.

So there we would have to think of discontinuous populations.

In western Formosa and Chaco, the situation would be better. We have no information except for one of our people - one of our collaborators - Dr. Costa, who carried out an expedition to Chaco about 8 or 9 years ago. He did see a number of jaguar skins being transported. So - but the impression he got on that occasion that jaguars were still to be found in this area which is very little populated.

There is a better opportunity for preserving large chunks of land over there. Opportunity in that the area is not privately owned, little populated, and so on. The problem is whether the government is going to be willing to preserve large bits of land .

There are about two or three projects of national parks in the area. If they would prosper, the situation could improve.

ARGENTINA - ERIZE

One other thing that I can add is that regarding Misiones, the Fundación has been, as I said, very active in trying to preserve a large area in Misiones. One of the key issues will be whether we are able to obtain a particular piece of land. The Uruguay River in the area not to be flooded has in its northern margin fiscal lands. In its southern margin, it has privately owned lands. We figure that if we were able to buy the southern shore from the landowners - it doesn't have to be a large amount of land - but if we could manage to acquire that piece of land, forcing or stimulating or however you might like to qualify it, that we would be putting pressure on the government of Misiones for the sake of its extending the reserve up there.

And in which case, the protected area linked with Iguazú could be very important in the region of some 80,000 hectares, to be added to Iguazú.

There's one other thing. If we were able to be present over there, we could manage to have one of our rangers there. This could reflect upon or have an influence on the kind of enforcement that the province would have. We would be stimulating or contributing to the province establishing the proper control.

Q. When you say we could have one of our rangers, you mean one of the Fundación's rangers?

- Erize. Yes.

Q. I appreciate the time you've given me, sir.

Interview with Dr. John E. Jackson, INTA. Casilla de correo 17. 5730 Villa Mercedes. San Luis. Argentina . Phone: 0657-22616. Date: July, 1986.

Q. Does your country (or area of country) have wild jaguar populations?

• Jackson. Yes.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Jackson. Less.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Jackson. Endangered.

Q. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat?. If so, what type of destruction, or modification or curtailment of habitat is taking place?

• Jackson. Clearing forest and associated activities.

Q. Where is this occurring?

• Jackson. Misiones; Formosa.

Q. Over what portion of the jaguar's range is this occurring?

• Jackson. 50 %.

Q. Is over-utilization for commercial, recreational, scientific, educational or depredation control purposes occurring?

• Jackson. Recreational, illegal sport hunting (Misiones). Depredation control (Formosa).

Q. What is your estimate for the off-take of jaguars for each of the above 5 purposes for the years 1980-1985?

• Jackson. Not known.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Jackson. Prohibited.

Q. Are these limitations by season, numbers, areas, etc.?

• Jackson. Total restriction.

Q. Are these laws effective?

• Jackson. Not 100 % applied.

ARGENTINA - JACKSON

Q. Upon what data are the limitations on harvest based?

• Jackson. Not applicable.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Jackson. The legislation exists, the control does not.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

• Jackson. Not exported legally.

Q. Is an approval from the country of import required prior to the issue of an export permit?

• Jackson. Not applicable.

Q. Is there any evidence that the legal taking of jaguar for export is facilitating or encouraging illegal taking?

• Jackson. Not applicable.

Q. Is the country a member of CITES?

• Jackson. Yes.

Q. If so, does it have in place an effective management authority and scientific authority?

• Jackson. Ostensibly but no staff and no funds.

Q. Do you know of any diseases or parasite conditions that limits or has limited jaguar populations?

• Jackson. No.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Jackson. Inadequate.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat adequate, or inadequate?

• Jackson. Adequate.

Q. From the information you have, or from personal experience, could you rate three causes as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

• Jackson. 1. Destruction, modification or curtailment of habitat; 2. Inadequate regulations or enforcement of same; 3. Over-utilization.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Jackson. No.

Q. Are the populations of jaguars in your country maintaining themselves or expanding?

ARGENTINA - JACKSON

• Jackson. No.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

• Jackson. No. Parques Nacionales Argentinos have done some work in Iguazú National Park.

Q. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base any of your conclusions on the jaguar?

• Jackson. No.

Q. Do you know of other studies on the status of the jaguar that have produced information that you consider scientifically sound and reliable?

• Jackson. No.

Q. What are the names and addresses of resident scientists or naturalists who could provide additional information on the jaguar?

• Jackson. Parques Nacionales, Santa Fé 690, Buenos Aires.

Mauricio Rumboll, casilla de correo 40, 3.370 Foz de Iguazú, Misiones, Argentina.

Note: My information is all "second hand", based on conversations with people in wildlife work in Argentina

Interview by Dr. James G. Teer with Dr. Jorge H. Morello, Presidente del Directorio, Administración de Parques Nacionales. Ave. Santa Fe 690. Buenos Aires 1059, Argentina. Date: June 30, 1986.

Dr. Teer met with Dr. Morello on June 30, 1986 at his office in Buenos Aires. He was very cordial and requested that I talk with his biologists, Sr. Canevari, Sr. Chehebar and Sra. Marchetti.

He stated that jaguars occur now in the northeast and northwest parts of Argentina and while there are little field data, most occur within national parks. These are Iguazú in the province of Misiones, and in Calilegua and Baritu in the province of Jujuy.

He said that there may be an increase in numbers of jaguars in Iguazú because the pressures of slash and burn agriculture may be forcing some from outside to come into the park for its habitat and protection.

Jaguars are some times seen in Iguazú. A film crew has been there. The numbers in the northwestern parks are not known . However, Lic. Maurice Rumball has been transferred from Iguazú to Calilegua National Park, and he should obtain information there and in other areas of the northwest.

Mr. Morello asked for a copy of the final report.

Interview with Maurice Rumboll, Argentine National Parks, Calilegua, Jujuy , Argentina. Phone: 22046. Date: August 14, 1986.

Portion of the country covered by the respondent:

Calilegua and Iguazú National Parks.

Q. Does your country (or area of country) have wild jaguar populations?

• Rumboll. Yes.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Rumboll. Calilegua, the same. Iguazú, more.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Rumboll. In Jujuy Province, endangered. In Misiones Province (Iguazú), threatened.

Q. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat?. If so, what type of destruction, or modification or curtailment of habitat is taking place?

• Rumboll. Deforestation in Misiones.

Q. Where is this occurring?

• Rumboll. Misiones Province.

Q. Is over-utilization for commercial, recreational, scientific, educational or depredation control purposes occurring?

• Rumboll. For commercial purposes: hides, recreational: poaching and depredation control.

Q. What is your estimate for the annual average off-take of jaguars for each of the above 5 purposes for the years 1980-1985?

• Rumboll. In Iguazú about one per year to poachers.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Rumboll. Yes. No hunting or trapping or commerce.

Q. Are these limitations by season, numbers, areas, etc.?

• Rumboll. Total.

Q. Are these laws effective?

• Rumboll. No.

ARGENTINA - RUMBOLL

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country ?

• Rumboll. Rangers in the parks (forbid).

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

• Rumboll. No.

Q. Is there any evidence that the legal taking of jaguar for export is facilitating or encouraging illegal taking?

• Rumboll. No.

Q. Is the country a member of CITES?

• Rumboll. Not yet I believe.

Q. If so, does it have in place an effective management authority and scientific authority?

• Rumboll. Effective management authority no. Scientific authority yes.

Q. Do you know of any diseases or parasite conditions that limits or has limited jaguar populations?

• Rumboll. I saw a skinny one once in Iguazú.

Q. Are there any published or unpublished reports on these problems?

• Rumboll. No.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Rumboll. Control is nonexistent.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat adequate, or inadequate?

• Rumboll. Inadequate.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

• Rumboll. Disappearance of habitat.

Q. From the information you have, or from personal experience, could you rate three of the above as to the first important, second important and third important cause in depressing the jaguar population in your country or area ?

• Rumboll. Destruction, modification or curtailment of habitat and other man-made or natural factors, first; poaching second, predator control third.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Rumboll. No.

Q. Are populations of jaguars in your country maintaining themselves or expanding?

ARGENTINA - RUMBOLL

• Rumboll. No.

Q. What are the numbers of jaguars in Iguazú?

• Rumboll. More or less 20 in 55,000 Ha. in Iguazú.

Q. Do you have an estimate of the populations, either numbers or density ?

• Rumboll. See above.

Q. What is the basis of this estimate?

• Rumboll. Observation of tracks over a limited area.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

• Rumboll. Somay, D. XIV Reunión Ecología .Iguazú, April 1985

Q. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base any of your conclusions on the jaguar?

• Rumboll. No. On experience.

Q. Do you know of other studies on the status of the jaguar that have produced information that you consider scientifically sound and reliable?

• Rumboll. No.

Q. Who conducted the study?

• Rumboll. Somay

Q. When was the study conducted, and over what period of time?

• Rumboll. 5 years, 1981-5.

Q. Where was the study conducted?

• Rumboll. Iguazú National Park.

Q. What methods were used?

• Rumboll. Observations in the field.

Q. What are the names and addresses of resident scientists or naturalists who could provide additional information on the jaguar?

• Rumboll. Somay, Daniel.

Parque Nacional Iguazú.

3370-IGUAZU.

Misiones. Argentina.

Complementary data:

Jaguars in Calilegua National Park.- I know of 2 (or perhaps 3) in some 5,000 Ha. - the central part of this park (and the most narrow) all of which are running into trouble by killing cattle outside the Park - poor neighbors !. The park is 76,000 Ha. total, so I expect there are lots more but it is all so inaccessible that very little is known about this new (6 years old) National Park.

Interview by Dr. Wendell Swank with Badder Hassan, Rancher and Hunting Guide, Box #9, Orange Walk Town, Orange Walk District, Belize. Date: July 30, 1986.

Portion of the country covered by the respondent :

Whole country, but more knowledgeable about northern half.

Q. Does your country (or area of country) have wild jaguar populations?

• Hassan. Yes.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Hassan. More abundant now and more abundant than 10 years ago. About the same numbers as 20 years ago.

Q. What is the basis for this opinion?

• Hassan. Observations and comparison with former observations. Up to 1970 there were five professional hunters operating in Belize. I am the only hunter now, and only cattle killing jaguars are now permitted to be taken.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Hassan. Threatened. At the present rate of development in the country perhaps the jaguar will become endangered in 25 years.

Q. If you believe the jaguar to be either endangered or threatened what is the major cause?

• Hassan. Destruction, modification and curtailment of habitat is the most detrimental.

Q. What type of destruction, or modification or curtailment of habitat is taking place?

• Hassan. Clearing for livestock production and maintaining it in pasture by shredding. Some people, however, are going out of the cattle business due to low prices, and the areas are returning to jaguar habitat in three years.

Q. Where is this occurring?

• Hassan. This is occurring over most of the jaguars range in Belize, however areas abandoned are now about equal to areas cleared.

Q. How long is this type of change likely to continue?

BELIZE - HASSAN

• Hassan. It depends on prices of cattle, but clearing is decreasing, and some people have discontinued ranching.

Q. Are there comparable changes that are expected to begin within the next several years?

• Hassan. Slash and burn is continuing, but it is considered not to be detrimental, as an area is used 2 years then abandoned, and it returns to jaguar habitat in three years.

Q. Is over utilization of jaguars occurring in Belize?

• Hassan. Jaguars are being killed. About 175 annually have been killed over the last 5 years, of which only about 10 were legally taken as cattle killers. The number taken is decreasing because prices are drastically reduced and people are having difficulty in finding buyers. In the mid-1970's buyers were paying as much as \$75 to \$150 US for skins. Now they are paying \$10, if they are buying at all.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Hassan. Yes. Only jaguars that kill domestic livestock may be taken. Livestock taken is primarily cattle, but also sheep, goats and pigs are taken. The puma not as much of a problem.

Q. Are laws limiting the off take effective?

• Hassan. Laws are somewhat effective, but jaguars are still being taken. Most are killed by rural people who can legally carry shotguns. It is opportunistic taking.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Hassan. Only jaguar skins taken legally (a livestock killing jaguar) may be exported. A person pays \$ 50.00 Belize (\$ 25 .00 U.S.) and an export permit is issued.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

• Hassan. There is no tagging procedure. Only a paper certificate is issued.

Q. Is an approval from the country of import required prior to the issue of an export permit?

• Hassan. No.

Q. Is there any evidence that the legal taking of jaguar for export is facilitating or encouraging illegal taking?

• Hassan. No.

Q. Is Belize a member of CITES?

• Hassan. Yes.

Q. Is there in place an effective management authority and scientific authority?

• Hassan. No. Not as specified in the regulation of CITES.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

• Hassan. No.

BELIZE - HASSAN

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Hassan. Laws are adequate.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat adequate, or inadequate?

• Hassan. Enforcement is practically non existent.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

• Hassan. No.

Q. From the information you have, or from personal experience, could you rate three of the above as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

• Hassan. Destruction of habitat first, over utilization, second.

Q. What are the reasons for order in which ranked?

• Hassan. Destruction and development of habitat is somewhat permanent. The market for jaguar skins is declining, hence the pressure to kill the animals for skins is declining.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Hassan. Yes. If I could legally guide for hunters I would employ 5 people full time and give rewards for information on location of only full size male jaguars, and would provide funds for employment of enforcement staff.

Q. Are the populations of jaguars in your country maintaining themselves or expanding?

• Hassan. Overall population is expanding since the decline of the commercial skin trade. This is mostly in numbers and not in area occupied by jaguars

Q. Do you have an estimate of the populations, either numbers or density?

• Hassan. I think the estimate by Alan Rabinowitz is conservative.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

• Hassan. No.

Q. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base any of your conclusions on the jaguar?

• Hassan. No.

Interview by Dr. Wendall Swank with Alan Rabinowitz, Research Biologist with the New York Zoological Society, The Bronx Zoo, Bronx, N.Y. 10460, Dec. 26, 1986.

Portion of country covered by respondent: All of Belize.

Q. Does Belize have wild jaguar populations?

- Yes.

Q. Are jaguars in Belize, in your opinion, more abundant, less abundant, or about the same as they were five years ago?

- In that portion of the country where jaguars still exist, I would say that they are more abundant.

Q. What is the basis for this opinion?

- This opinion is based on interviews with hunters, loggers and others, then comparing that information with that that I obtained on my personal surveys of the population in December of 1982.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in Belize or in areas with which you are familiar?

- In Belize, I would consider it to be threatened.

Q. What do you consider to be the major cause of the threatened status of the jaguar?

- It is due to destruction of habitat; deforestation.

Q. Over what portion of the jaguar's range is this occurring?

- Over all of it.

Q. How long is this likely to continue?

- There is no sign of this decreasing in the immediate future.

Q. What about slash and burn agriculture?

- This has been going on for centuries. Industrial cutting is more destructive.

Q. Would you consider overutilization a factor?

- Utilization in itself is not detrimental, but when considered along with destruction of habitat it is detrimental. I documented over 100 jaguars taken in Belize within one year.

Q. What is your estimate for the annual average off-take of jaguars for the years 1980-1985.

- Somewhat over 100.

BELIZE - RABINOWITZ

Q. Are there regulations in Belize to limit or restrict the taking of jaguars?

- Yes, hunting of jaguars is illegal.

Q. Are the laws enforced?

• No. The laws are not enforced. Even when I informed the authorities when one of my radioed jaguars was killed, and the person admitted it, nothing was done.

Q. How are cattle depredation complaints handled?

• Permits are issued to take cattle killing jaguars, but no one checks out those complaints prior to giving out the permits.

Q. Is export of jaguar skins permitted?

- I don't think so, not legally.

Q. Is Belize a member of CITIES?

- Yes.

Q. Do you know of any diseases or parasite conditions that limits or has limited jaguar populations?

• I believe that parasites are a factor in decreasing the length of life of jaguars. They live only about 11 or 12 years as a maximum in the wild, whereas they live up to 35 years in captivity. Parasites are a major cause of death, or at least a contributor. Virtually all of the jaguars that I was able to check in Belize were loaded with hookworm, and hookworms can have a debilitating effect.

Q. Are there jaguar populations in Belize that are maintaining themselves or expanding.

- There are populations that are both maintaining themselves and expanding.

Q. Do you have an estimate of the population, either numbers or density?

• Yes. I estimated the density in my study area as one jaguar per five to six square miles. (see Rabinowitz, 1986, p.310.) I had 25 to 30 jaguars in the 154 square miles of the Cockscomb Basin.

Q. You were in Belize long enough and studied the jaguar there long enough to get a good grasp on the general situation. Could you give me a summary of the status of the jaguar, as you see it?

• In analyzing the jaguar population in Belize, the country can be divided into the northern and southern areas. In the northeastern area, the Corozal District, the country is relatively heavily populated and developed. In the past this area has been the sugarcane and cattle area. People living in that part of the country are relatively well off. Many of them have four-wheel drive vehicles and shotguns, and they hunt jaguars. As a consequence of development, hunting, and human population pressure, jaguars in that part of Belize are rare. There are some pockets of cats that occur right along the coast that have mangrove, are relatively inaccessible, and are not developed, but these are small.

The northwestern area, that is the Hill Bank to Gallon Jug area, is undeveloped at this

BELIZE - RABINOWITZ

time. This area has good soil, and will be developed for agriculture at some time in the future. It has recently been acquired by Coca Cola, and is reported that it will be developed for citrus production. Just when this will occur is unknown to me. The population of jaguars in this area is now good, but if developed into citrus production the population will certainly go down. This area is now hunted by people living in the north, so the population is probably not as high as it was, say ten years ago. The best we can hope for when this area is developed is that there will be small pockets of forest left, hence will provide some habitat for jaguars.

The far southern area, the Toledo District, is a Maya Reserve. It is heavily populated and agriculturally developed. Except for a few pockets of jaguars spilling over from Guatemala around the San Antonio area, there are virtually no jaguars there.

In the central part of the southern area, the Stan Creek area, the jaguar population is good. The jaguars there are maintaining themselves, and are actually increasing. They are not heavily hunted. The people are poor, so they do not have transportation and there are few guns. The area is rugged, which limits encroachment back into the mountains.

So essentially there are two areas of good jaguar populations, the Stan Creek and the Gallon Jug areas. The outlook for the Stan Creek area is good. The Government has recently declared a portion of the area The Cockscomb Basin Jaguar Preserve, preventing deforestation or development or settlement. The future of the Gallon Jug area will depend upon how soon the area is developed, and how it is to be used.

The long term outlook for the jaguar will depend upon how much forest we are able to maintain. We are attempting to work with the government to establish forest reserves; not national parks, but multiple use areas. If these can be established, and illegal hunting can be controlled, I can foresee jaguar populations in Belize thriving well into the next century, and perhaps another fifty to a hundred years. The problem we are facing, as I see it, is development. Belize has been relatively undiscovered, but now people have found it and outside money is pouring into the country for various types of schemes. A lot of development schemes have failed in the past, and while many of these will fail they will still have the effect of deforesting the foothills, which are some of the richest areas. Looking down the road twenty years I predict that jaguars will be present and relatively abundant, at least in certain pockets. In the country as a whole, populations may not be thriving, but there will still be pockets of good jaguar populations.

Interview by Dr. Wendell Swank with Dora and Dona Weyer, President and Member of the Belize Audubon Society. Belize Audubon Society. P.O. Box 101, Belmopan. Belize. Date: July, 29 1986.

Portion of the country covered by the respondent:

Whole country, but primarily the Southern half of the country.

Q. Does your country (or area of country) have wild jaguar populations?

• Weyer. Yes.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Weyer. Probably about the same, but recent studies have shown that we have some of the highest densities of jaguars in the world.

Q. What is the basis for this opinion?

• Weyer. Based on literature from other studies and the study by Alan Raboniwitz.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Weyer. Considered to be threatened, because of pressures put on habitat by increasing human population.

Q. If you believe the jaguar to be either endangered or threatened what do you consider the major cause?

• Weyer. Modification of habitat is the most detrimental.

Q. What type of destruction, or modification or curtailment of habitat is taking place?

• Weyer. In north Belize there is a lot of slash and burn, and development for sugar cane.

Q. Over what portion of the jaguar's range is this occurring?

• Weyer. Probably over one third of the present range.

Q. How long is this type of change likely to continue?

• Weyer. Indefinitely.

Q. Are there other causes of decline, such as overutilization?

• Weyer. This is probably the second major cause for concern, although it is getting more difficult to dispose of skins due to lack of demand. Most skins are smuggled into Mexico, but numbers are becoming fewer each year. Some jaguars are also run over by cars.

BELIZE - WEYER

Q. What is your estimate for the annual average off-take of jaguars' for the years 1980-1985?

• Weyer. About 200 per year.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Weyer. Yes. They can be taken legally only when issued a permit by government to control depredation of livestock.

Q. Are these limitations by season, numbers, areas, etc.?

• Weyer. The reports of the predation to government are not investigated prior to issue of a permit. The holder of a permit is to pay \$ 50.00 Belize after killing a jaguar, but no one reports back.

Q. Are these laws effective?

• Weyer. Laws are not effectively enforced. Everyone knows this, hence no one follows the procedure.

Q. Upon what data are the limitations on harvest based?

• Weyer. No legal harvest quotas are set.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Weyer. Permission to export skins for sale is not given, hence they are smuggled across the border, primarily to Mexico.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

• Weyer. The export permit is a paper certificate, issued by the government upon payment of \$ 50.00.

Q. Is there any evidence that the legal taking of jaguar for export is facilitating or encouraging illegal taking?

• Weyer. No legal taking is permitted, except for livestock damage control.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

• Weyer. No.

Q. Would you consider the present laws adequate?

• Weyer. Laws are adequate but they are not enforced.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Weyer. Somewhat adequate. Laws have restricted commercial export.

Q. From the information you have, or from personal experience, what would you rate as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

• Weyer. 1 st., destruction of habitat, 2 nd., unrestricted take (illegal) by residents.

BELIZE - WEYER

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Weyer. Maybe, but income must first, by legislation, be returned for the management of wildlife instead of going into general revenue.

Q. Are the populations of jaguars in your country maintaining themselves or expanding?

• Weyer. Some populations are maintaining themselves, and maybe some are expanding.

Q. What are the sizes of areas occupied by such populations?

• Weyer. Probably in 1/3 rd. of the area maintaining or increasing, and 2/3 rds. maintaining or decreasing .

Q. Do you have an estimate of the populations, either numbers or density?

• Weyer. No. Alan Raboniwitz probably has the best information.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

• Weyer. No.

Q. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base any of your conclusions on the jaguar?

• Weyer. Only Raboniwitz.

Q. Do you know of other studies on the status of the jaguar that have produced information that you consider scientifically sound and reliable?

• Weyer. Not in Belize.

Interview by Dr. James G. Teer with Sr. Armando Cardoza, President of the Bolivian Wildlife Society, La Paz, and Past President of PRODENA. July 8, 1986.

Q. Sr. Cardoza works primarily with condors and vicuna in the Altiplano of Bolivia and says he is not too familiar with the jaguar in the tropical forests of Bolivia. However, sir, we'd like to see if you have any - if not data - then feelings or opinions about the uses that are being made of the jaguar in Bolivia. Are they being killed for commercial sale of their skins? Are they being hunted for sport? Are the campesinos and estancias protecting their livestock?

Cardoza. My information is not complete. I am working with vicunas in the high plateau. But we know that the jaguar is killed by commercial hunters - 100 percent sure - in order to export the skins. I know jaguars and other felines are exported with very low prices here in Bolivia but with high prices out of my country.

Q. The information we have seems to point to Paraguay as the place where most of the skins leave - Paraguay being the collecting point. Skins come in from Brazil and from Bolivia and in Paraguay as well and then are shipped out of Paraguay.

Cardoza. Yes, it's very hard for me to say Bolivia is worse in exports in the last year than Paraguay. The President of Bolivia has issued a decree to close commerce on animals and animal products.

Q. The President of Bolivia has closed down commercial hunting?

Cardoza. Yes, now the new policy, the new conservation laws for the jaguar and other species, are in force. There is a complete prohibition hunting for vie years in Bolivia.

Q. No hunting of anything?

Cardoza. Yes, nothing.

Q. Are the laws effective? Are they being enforced?

Cardoza. Yes. I think they are very positive. We are very happy with this new development.

Q. Are there any organizations, or is it common knowledge that there are commercial organizations involved in animal products? Sales?

Cardoza. There are here in Bolivia some with enterprises - companies - that come here with money to purchase animal products.

Q. The best knowledge we have is that most of this is out of West Germany and Japan?

Cardoza. It includes the Americans and Germans.

Q. How do they ship the material out of Bolivia? Do they send it through regular shipping channels?

Cardoza. There was in the past complications with the national authorities. That was the problem.

Q. But now now?

BOLIVIA - CARDOZA

Cardoza. May be there is something now, but legally it is closed completely. We have policing problems, and problems with export of cameloids - llamas and vicunas. They are exported to the United States. Bolivia cannot export them. Peru cannot export them. Chile can export them. What happens is that exports from Chile are from Bolivia and Peru. for Chile they are sent to the United States. We have complained to the United States with no results. Now we have taken the information to AFTOSA, the organization for controlling hoof and mouth disease. We sent information to the United States Department of Agriculture that it was dangerous because of hoof and mouth disease.

Q. For cattle?

Cardoza. For cattle and other animals. About 15,000 cameloids - llamas and vicunas are in the U.S.

Q. That might have caught their attention?

Cardoza. Yes.

Q. Thank you very much, Sr. Cardoza, for the information.

BOLIVIA - MARCONI

Interview by Dr. James G. Teer with Sra. María Marconi, Coordinadora, Centro de Datos para la Conservación de Bolivia, The Nature Conservancy International Program. Avenida 6 de Agosto N° 2376, Casilla 7000, La Paz, Bolivia. Date: July 8, 1986.

The Nature Conservancy International Program in Washington, D. C. has established several data centers in South America and The Caribbean. The one in La Paz is very new, only about two months old, and is just getting started in organizing itself and getting settled in their offices on Avenida 6 de agosto N° 2376.

Sra. María Marconi said there are no data yet available from their Center, and it would be some time, a year or so, before they could service conservation needs in Bolivia. They hope to be a data bank for biological and conservation material for use by anyone who needs it. They also wish to serve as a contact point in issues that affect the environment and conservation of natural resources including, specifically, wildlife and wild lands.

She suggested I see Sr. Oscar Méndez, but was not optimistic about obtaining any data, published or not in Bolivia. She stated there have been no ecological studies of the jaguar in Bolivia, and faunal studies are scarce also.

BOLIVIA - MENDZ

Interview by Dr. James G. Teer with Ing. Oscar Méndez Rivera, Jefe, National Wildlife, National Parks and Hunting. Centro de Desarrollo Forestal, P.O.Box 6167, Ministerio de Asuntos Campesinos y Agropecuarios, 5^a Piso, Avenida Camacho, La Paz, Bolivia. Date: July 8, 1986.

The interview was held in Ing. Méndez's office, and was conducted in Spanish with the assistance of a young man with some little skill in English.

Sr. Méndez said that about 80% of the 1,500,000 Km² in Bolivia was inhabited by jaguar. Their distribution is practically throughout the country except the altiplano.

The densest population occurs in all or parts of the States of Tarija, Chuquisaca, Oriental and Cochabamba. Sr. Méndez clearly wanted this to be understood as approximate.

The second most dense areas of jaguars in Bolivia are in the States of Pando and the northern half of the Río Beni.

The remainder of the country was ranked third in density and includes a part of the Chaco in the State of Santa Cruz and also forested areas of the State of Beni.

Sr. Méndez did not wish to estimate the densities of jaguars in any of the areas. He said it is not known and would be most difficult to obtain.

He said that Dr. José Tello of IUCN is presently in Bolivia for the purpose of studying the status of all spotted cats that occur in Bolivia.

When asked about contraband of animal products, he said that there was a great deal of commercial trade in spotted cat skins and other animals and plants. Although there are laws prohibiting the hunting of cats, it is not enforced because the government does not have the resources to put people into the field as rangers and wardens.

Interview by Dr. Wendell Swank with Mr. Antonio E. Almeida. Amazon Safaris, Caixa Postal 840, Sao Paulo, Brazil. Phone: 2270922. Date: October 28, 1986.

Portion of the country covered by the respondent:

All of Brazil, but more information on the state of Mato Grosso do Sul.

Q. Does your country (or area of country) have wild jaguar populations?

• Yes.

Q. Are jaguars in your opinion, more abundant, less abundant, or about the same as they were five years ago?

• About as abundant, and perhaps more abundant on a nation wide basis.

Q. What is the basis for this opinion?

• Getting information on jaguar abundance from all available sources, such as ranchers, tour operators, former hunters, and other people who are in the field.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• The species is endangered in the isolated remnant forests in eastern Brazil. Population is probably decreasing in the states of Maranhão, Piauí, western Bahia and northern Goiás (see map). Not even threatened in remainder of country.

Q. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat?

• Destruction of habitat is primary cause of concern.

Q. What type of destruction, or modification or curtailment of habitat is taking place?

• Areas are being cleared for ranching and agriculture.

As paved roads extend westward development of the country increases. Where prior to paving it was uneconomical to cut the forests, the improvement in ease of transportation makes logging economically feasible. Logging also brings more disturbance and people into the area which reduces the suitability of the area for jaguars. Extensive logging is probably ten to twenty years away, but it is coming.

Clearing areas for cattle production is also occurring, but this may not be detrimental to the jaguar; particularly the clearing of tropical forests. Populations of jaguars are not high in such

BRAZIL-ALMEIDA

habitat because of low populations of available prey. Once opened, those species living on vegetation growing close the surface increase and when domestic livestock is introduced another source of prey is made available to the jaguar. Also many ranchers release large numbers of domestic pigs, which are readily taken by the jaguars. This additional food supply definitely has a beneficial effect on the jaguar population.

Q. Where is this occurring?

- States of Mato-Grosso and Amazonas.

Q. Over what portion of the jaguar's range is this occurring?

- Over about one third of its total range in Brazil.

Q. How long is this type of change likely to continue?

- Probably for some time; however, some areas planned for development have been eliminated.

Q. Is there over-utilization for commercial, recreational, scientific, educational or depredation control purposes?

- This is not now a factor. Hunting jaguars for the sale of skins has decreased considerably. Persons who formerly bought jaguar skins have gone out of business, and some have turned to alligator skins.

Ranchers continue to take a few, but for the most part they are not efficient hunters. Jaguars in Mato Grosso do not come to bait, and only occasionally to an old kill, so sitting over bait is unproductive. Ranchers normally do not have well trained dogs, and they are seldom sufficiently motivated to put forth the effort to become effective and efficient hunters. One rancher in the Amazon basin at Juina (?) in the state of Mato Grosso, covering an area of 60,000 hectares, reported in April of this year (1986) that eleven jaguars have been taken over a period of the past thirty months. My experience, however, has shown that ranchers over estimate jaguars taken by one-third to one-half.

Q. What is your estimate for the annual average off-take of jaguars for each of the above 5 purposes for the years 1980-1985?

- I have no data upon which to base an estimate.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

- Yes. It is illegal to take jaguars.

Q. Are these limitations by season, numbers, areas, etc.?

- No seasons are set. All areas are closed to jaguar hunting.

Q. Are these laws effective?

- Not really.

Q. Would you give reasons on which your conclusions are based?

BRAZIL-ALMEIDA

- The laws are not enforced.

Q. Upon what data are the limitations on harvest based (population estimates, past harvest numbers, age/sex ratios)?

- Seasons are closed.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

- There is no legal export of jaguar skins.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

- No legal export of jaguar skins.

Q. Is the country a member of CITES?

- Yes.

Q. If so does it have in place an effective management authority and scientific authority?

- I do not know.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

- No. Jaguars I have examined have all appeared to be in good shape.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

- Regulations are adequate.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat adequate, or inadequate?

- Effectiveness is not adequate because enforcement is not carried out in the field.

The hunting of jaguars for sport has been closed in Brazil since the late 1960's. Permits to take depredating jaguars were issued by local agricultural officers to take jaguars up to 1976, at which time it was stopped. At present ranchers are taking jaguars without authorization.

Government does have some enforcement personnel in the field but they are few in number. My hunting camp was checked about eight years ago. Enforcement people now frequently check our fishing camp, but they are primarily checking for illegal fire-arms.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

- None that I can think of.

Q. From the information you have, or from personal experience, could you rate three of the above as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

- 1 st. Destruction and modification of habitat, 2 nd. Over utilization for depredation control

BRAZIL-ALMEIDA

and 3 rd. Inadequate enforcement of regulations.

Q. Would you briefly describe reasons for order in which ranked?

- Currently there is not a high off-take of jaguars, whereas modification of habitat is continuous. Human pressure is motivating changes in the habitat to produce more food and fiber for man.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

- I don't believe so. The amount of money that could be generated from the number of permits that could be issued would not be sufficient to provide an incentive to either government or professional hunters.

Q. Are there populations of jaguars in your country that are maintaining themselves or expanding?

- Yes, certainly. Jaguars in the Pantanal, state of Mato Grosso south of Guiaba and in the Juruena River Basin (see map).

Q. Do you have an estimate of the populations, either numbers or density?

- See report by Tony Almeida. Conference on jaguars at Manaus.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

- Yes. I know of the reports by Schaller and Crawshaw for Brazil, Hoogestejn for Venezuela and Rabinowitz for Belize.

Q. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base any of your conclusions on the jaguar?

- See Almeida, A. 1976. Jaguar hunting in the Mato Grosso. Stanwill Press, England 194 pp.

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Manaus, April 1986.

**A SURVEY AND ESTIMATE OF JAGUAR POPULATIONS IN SOME AREAS OF
MATO GROSSO.**

Antonio Eduardo d'Andrada de Almeida.

Introduction

Since beginning to guide visiting ornithologists we have been able to observe the current status of the jaguar (*Panthera onca*) in some of the areas where we formerly took hunters. From February '85 to February '86 five localities were visited, all within a radius of 200 km. from the town of Cáceres, Mato-Grosso. During these visits numbers and sex of some of the jaguars inhabiting them were annotated. An estimate of the jaguar population in the Pantanal of Mato-Grosso is offered, as well as a contribution for an eventual assessment of *Panthera onca* in Amazonian Mato-Grosso. Jaguar densities along the valley of the river Guaporé are also briefly discussed.

Vegetation Types mentioned in this report include:

'Cerrado' which are savannas covered in varying degrees with generally stunted and twisted trees from 2 to 10 meters high. This biotope is spread over circa 1.5 million square kilometers of the Central Brazilian Plateau.

Deciduous Forests, consisting of trees from 5 to 25 meters in height clothe the hills along the edges of the Pantanal as well as inselberg formations within it. Most of these trees lose their leaves from June to September, but near rivers and streams and the edge of the swamp are some evergreens, notably shady *Attalea* palms, a favorite jaguar cover. Where the tree cover is less dense a thick undergrowth of bamboos and various thorny species prevails in these forests.

'Pantanal' is a flat plain of nearly 200 thousand square km. averaging 100 meters above sea level and lying roughly between 16 and 21 degrees South and 55 and 58 degrees west. From February to June it is mostly flooded by the Paraguay river and its tributaries. Vast grasslands cover it, interspersed with which are thickets of dense bush, lagoons and sluggish creeks.

Amazonian rain-forest consists of evergreen trees up to 50 meters in height, with little undergrowth. This forest, presenting from the air the aspect of a green carpet, covers practically all the northern half of Brazil for some 4 million square kms, and extends into contiguous areas of adjacent countries.

Criteria for counting jaguars and defining their sex

Jaguars are furtive animals, active chiefly at night, at dawn and dusk. By day they keep to excessively dense thickets, where visibility may be less than 5 meters. Unless bayed by dogs they are therefore rarely seen. But size and sex of jaguars can be determined by their tracks (Almeida, "GroBwildjagd in Brasilien", Paul Parey Verlag, 1979)

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The measurements given here are across the width of the tracks of the forefeet, from the edge of the outer to the edge of the inner toes.

In Pantanal, where, due to abundance of prey, jaguars are 30 to 40 % larger than in the 'cerrado' or the Amazon forest, tracks of adult males will vary from 11 to 13.5 cms (for animals weighing between 80 and 120 kilos, 176 to 264 pounds), those of females from 9.5 to 11 cms (for animals that weigh between 60 and 90 kilos, 132 to 198 pounds). In the Amazon forest and cerrado an adults male tracks will be equivalent in size to those of Pantanal females, to which the cats also compare in weight. A female jaguar's spoor from these regions will measure from 8 to 9.5 cms for animals weighing between 45 and 60 kilos (99 and 132 pounds).

Now jaguars from the Pantanal will constantly wander, particularly during the wet season, 30 kilometers and more into the adjacent cerrado and deciduous forest. Cerrado jaguars, on the other hand, rarely come down to the edge of the swamps, and I have never known them to venture within it, but occasionally the tracks of a cerrado male may be mistaken for those of a Pantanal female. A cerrado female should not be mistaken for a puma (*Felis concolor*), as the pumas' feet have smaller pads and more elongated toes. Jaguar feet have relatively larger pads and more rounded toes. The tracks of young males (up to two years of age) may also be confused with those of adult females, of course, so that definition of sex is sometimes aleatory. Males three years old, however, already leave tracks larger than most females.

No exact method, but only experience, permits us to be fairly sure we are not counting jaguars of similar sized spoor more than once. Precise measurements of many tracks of the same cat over different types of ground are, of course, very important. We know, too, that females, except when on heat, move within a more restricted territory than males, and are not likely to travel more than 3 - 4 kms in one night. A male occupies a greater area and may move 10 kms or more in a night, from one point to another within his territory, which often overlaps those of two or more females.

In regions of prime habitat and high jaguar densities in the Pantanal, a male may occupy 30 - 50 square kms and females 15 - 25 sq. kms. Young males (2 - 4 years old) in these regions usually travel widely, living marginally in territories of older males and being pushed out of one after another until they are finally able to settle in their own range. In areas of lower jaguar density both male and female jaguars may cover correspondingly larger territories, and Quigley, Crawshaw and Schaller (Biological Investigations in the Pantanal, Nat. Geographical Society Reports, 1976 Projects) recorded 110 square kms for a male (albeit a young animal) and 50 sq. kms for a female, in Miranda, in the southern Pantanal.

Sometimes from the comfort of camp one can get a more certain indication of the numbers of jaguars in an area than in many days' searching for tracks. This is when they call or roar. George Schaller (Movement Patterns of Jaguars, Biotrópica, 1980) mentions that during his two years' stay

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in the Acurizal ranch in the western Pantanal he never heard a jaguar roar, but actually they call quite frequently and it is uncommon to be camped in jaguar country for a week and not hear at least one cat giving voice. Sometimes one jaguar will answer another, and occasionally yet a third will join in the conversation. One memorable April night (jaguars are most vocal from January to April) we heard four jaguars calling back and fourth from different points of the compass around camp. These calls, heard usually at night, at dusk and dawn, although often not a certain indication of sex, permit one to establish a jaguars location and proceed thither at first light to examine tracks.

Jaguars do not usually scratch up the ground with their hind feet after defecating, as do pumas and certain other large cats, but there are yet other ways in which they advertise presence. They claw certain trees (this occurs frequently in some regions, less frequently or not at all in others). They bite, tear up and roll on bushes and clumps of grass at regular intervals of circa 500 meters along their trails. They urinate on certain bushes and trees, which scent marks, when fresh, can be smelt by humans. The first and third methods are used by both sexes, the second only by some adult males.

Areas visited within the last 13 months.

Area 1. which was visited in February 1985 is a block of roughly 10 by 10 kms of typical Pantanal, lying at the foot of hills covered in vast deciduous forests. Tracks were found of three very large males, one smaller male and two female jaguars. A male and a female called to each other one night. Another night a lone male gave voice.

Since at this time of the year the whole region, excepting certain thickets of jungle and, of course, the adjacent hills, is under water, progress is by canoe. Tracks are found on islands which form refuges for all the large mammals that graze in the flooded swamps: cattle, marsh-deer (*Blastocerus*) Capybaras (*Hydrochoerus*), for a host of smaller animals such as monkeys, snakes, birds, etc, and for the jaguars and ocelots (*Felis pardalis*) which prey on these species. The felines establish themselves on certain large islands or groups of islands, among which they swim with ease. Many jaguars, however, prefer to leave the flooded areas at this season and hunt in the adjoining hill country.

In February one of the large males was killed by a band of alligator poachers camped on one of the islands. In April a juvenile female which was raiding cattle in a clearing of the forest near the main ranch house, 25 kilometers from the edge of the marsh, was shot by a ranch hand. A young male who was with her, probably her brother, escaped and has now become a confirmed stock killer in the area.

Area 2. was visited in April. Tracks were searched for along a belt of cerrado some 15 kms long by 5 wide which adjoins a marsh of circa 30 kms by 10 kms. The division here is formed by a stream of 10 - 15 meters average width, bordered on both sides by thick growths of swamp vegetation and

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stands of deciduous forest. The marsh, which forms an arm of the Pantanal, is choked by dense jungle and practically impenetrable whether by horse, foot or canoe. Marsh-deer, Capybaras and alligators (*Cayman crocodilus*) abound here, providing plentiful food for jaguars, only some of which ever leave the swamp to raid cattle in the cerrado.

On one side of this marsh, along the edge of the cerrado, we observed the tracks of two large males and two females. One pair were courting, their spoor was mixed, and on two nights we heard them calling to each other. These four cats, however, probably represent no more than 10 % of the jaguars inhabiting the region, most of which stay in the marsh, as we found out on the rare occasions we were able to penetrate it, while some raid cattle on the other side of it.

In May a ranch hand, fishing along the stream in late afternoon shot a juvenile male, which had probably been engaged in stalking capybaras and alligators.

Area 3 comprises two separate extensions of cerrado totaling circa 10 thousand hectares (100 sq. kms), which are surrounded by some 50 thousand hectares (500 sq. kms) of deciduous forests. These forests in turn are on one side contiguous to Pantanal, along the edges of which a belt of dense, partly submerged vegetation forms a barrier some 50 kms long by 2 - 10 kms wide.

In one of the cerrado areas is a pasture which held at the time around 500 head of tame cattle. Here in May a female jaguar accompanied by one or perhaps two cubs about four months old had killed at least 6 head of cattle within 10 days. All these cases were within 500 of within each other, 3 within 50 meters. Two carcasses were of fully grown cows weighing circa 250 kilos each. Their necks were broken and their faces twisted around towards their hind quarters, showing the typical manner by which jaguars destroy larger animals. Two kills were heifers weighing around 90 - 100 kilos each, and two were calves of around 40 - 50 kilos apiece. Pregnant females and those with cubs kill far more prey than normally (Almeida, 1979), and there were doubtless carcasses we did not discover.

In the other savanna area some 1000 head of wild cattle came out to graze at night, hiding by day inside the forest. Tracks of two males and one female were found in this open plain, but again these cannot represent even 10 % of the jaguars inhabiting this entire wilderness, the greater part of which cannot be reached, and which constantly feeds jaguars into the adjacent cattle country. One male called once at dusk.

In August when the region was revisited the cattle-killing female was still killing cattle, but on a lesser scale. The spoor of the two large males was no longer seen, but this can be considered normal, for as the dry season progresses most jaguars leave the high areas and descend towards the Pantanal.

In September Area 1 was revisited, our project being to film the hyacinth macaw (*Anodorhynchus hyacinthinus*). It was now the height of the dry season. Two weeks before our arrival a jaguar had been killed by ranch hands. For a month it had been living off cattle which grazed

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in cerrado some 12 kms from the edge of the Pantanal. The skin and teeth of this cat, which I examined, belonged to an old male jaguar. Three jaguars had therefore been eliminated on this ranch since our last visit in February.

At the very edge of the Pantanal, where we transferred baggage from car to horses, were the tracks of a medium sized male. On the way into camp, 10 kms away, we saw the spoor of a very large male, and just before coming into camp the horses shield away from the spoor of a female which had evidently just crossed our trail. During our eight day stay in the region the tracks of four females, two very large males and the smaller male were observed. A female and male were together. A solitary female called close to camp on two different nights. Recent kills (none more than five days old) were found of one cow, six calves and two capybaras. Numerous older carcasses were also seen.

At least 7 jaguars were therefore hunting across this area of some 100 sq. kms of grasslands intersected by meandering streams and dotted with numerous thickets of dense jungle. The ranges of some of these cats obviously included adjacent areas not visited by us. On the other hand we probably identified only about 70 % of the jaguars actually using the stretch of country we did visit.

To the south is similar habitat. To the east is a ranch of 60 thousand hectares (600 sq. kms) where the owner forbids his cowboys to shoot any jaguars. Here the jaguar density is reputedly even higher.

In September we heard complaints from several ranchers concerning at least four jaguars that were raiding their cattle near the Cáceres-Cuiabá road, some 10 - 40 kms from the edge of the Pantanal, but did not check any of these out.

Area 4 is a region of sub-amazonic rain forest where evergreen trees up to 35 meters high cover fertile land in hilly country along an affluent of the Sepotuba, itself a tributary of the upper Paraguay.

Here a similar situation prevails as in the Amazon forest proper, further north. There being no natural pastures, ranchers cut down part of the forest to plant grass, chiefly '*Panicum maximum*' which also affords excellent cover for the big cats, growing to a height of 2 - 3 meters. The ranch in question contains three thousand hectares of planted grasslands surrounded by 22 thousand hectares (220 sq. kms) of forest. In neighboring ranches are further extensions of forest.

Several entreaties from the rancher friend who put his plane at our disposal and asked us at least to give him some advice resulted in a short visit in December when we talked to ranch hands and visited scenes of recent kills. The overseer calculated an average loss of five head of cattle per week. This would implicate two or three jaguars. Partly responsible was a female with two half-grown cubs. All three had returned to a kill, been shot at and missed by a cowboy sitting up on a platform. One morning of our visit a large stallion of quarter-horse type was brought in. The left side of its face

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was deeply scratched. The left eye was gouged out and hanging loose. Deep fang marks across the withers had not, however, severed the spinal cord. There were claw marks also on the back and sides. In January, perhaps due to our reluctant advice, a large male was shot by a ranch hand over a carcass.

(Thanks are due to R. Mason for information concerning area 4)

Area 5 is a savanna of some two thousand hectares surrounded on three sides by extensive deciduous forests. On the 4 th. side a jungle averaging 300 meters in width and consisting chiefly of ficus trees and Attalea palms separates the savanna from the Pantanal.

This region, when a wilderness, used to be a favorite jaguar haunt. We were curious to visit it again five years after a ranch had been installed, and in February '86 accepted an invitation from the rancher to peruse his property.

Fifty hectares of forest have been cut down and grass planted. The savanna has been fenced off and a few hundred head of cattle put in, otherwise little has changed. While we were there a very large male jaguar and a female approached each other along a fence line at night, calling back and forth. A third jaguar whose tracks could not be verified, called from the swamp on two nights. One day the ranchers brother brought news that 30 kms away, in the cerrado country near the main road, he had seen a large jaguar sitting in the middle of the car track in broad daylight (11 a.m.). This is a rare occurrence indeed and upon verification it turned out that the jaguar, a male, had killed a cow that night and was guarding it from vultures for a second meal.

An estimate of the jaguars in the Pantanal

The Pantanal, roughly 90 % of which lies in the states of Mato-Grosso and 10 % in Bolivia and Paraguay, occupies some 200 thousand square kilometers. Favorite jaguar pray (capybaras, cayman and cattle) are abundant in the marsh, and peccaries, tapirs and cattle, in the surrounding hill country.

At least 50 thousand square kilometers, mostly in the North and West, is prime jaguar habitat, harboring an average of one jaguar per 25 sq. kms, or a total of 2.000 jaguars. Of the remaining 150 thousand sq. kms perhaps 75 thousand sq. kms of less favorable habitat, where cover is not so extensive or dense, nevertheless probably still supports one jaguar per 100 sq. kms, or about 750 jaguars.

The Pantanal is a rectangle roughly 650 kilometers from North to South by 300 kilometers from East to West. Considering, for the sake of simplicity, its perimeter only as a straight line (which of course is not correct, since many large ranges of hills enter it at right angles, providing extensive border zones which are cut across in our simplified calculations) we would have 1900 kilometers

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around the edges of the flood-plain. Of these at least 800 kilometers consist of broken country where rocky hills, ravines and forested valleys provide a refuge for the large cats second only to the dense coverts of the Pantanal itself. Thus a discontinuous belt of this biotope, 30 kms wide by 800 in length, totaling 24 thousand sq. kms, supports in the dry season one jaguar per 50 sq. kms, and perhaps double this number during the rains. Counting it, however, at its dry season density, we would have some 500 jaguars regularly inhabiting this region. Another 800 kilometers of the remaining perimetrical zone, consisting of similar but less broken country will support one jaguar per 100 sq. kms, or circa 250 jaguars.

So with 2000 jaguars living in the prime Pantanal habitat and 750 using the less favorable Pantanal, we would come up with 3500 jaguars inhabiting the whole flood plain and its immediate vicinity. Taking into consideration that we have counted 75 thousand square kms of Pantanal and 9000 sq. kms of perimetrical zone at jaguar population zero, I think this can be considered a fairly accurate estimate.

Contribution to an eventual assessment of jaguars in Amazonian Mato-Grosso.

Some 500 thousand square kilometers of rain forest covers the northern parts of Mato-Grosso along the valleys of southern tributaries of the Amazon such as the Aripuana, Juruena, Arinos, Teles Pires, Xingú and Araguaia. The rain forest begins about 400 kms north of the Pantanal. The intervening cerrado country has been much developed in recent years and only marginal populations of jaguars survive there. But as cerrado gives way to high forest we enter jaguar country again.

Our visits to this region date some ten years, when cattle had not yet been widely introduced. At that time I calculated that a male and female, though hunting separately, would occupy together some 150 sq. kms of forest. Observations were conducted along the Teles Pires river, where a ranch had recently been opened. A few hundred head of cattle grazed in a 1000 hectare clearing, but none of these had yet been touched by the cats, though two jaguars regularly patrolled the fence lines. Due probably to the relative scarcity of prey in the virgin forest no overlapping of males' territories seemed to occur. A car track which had been hacked through the jungle formed the boundary between the range of one adult male and that of another. One night both came together on either side of this track, walked some way along it, called repeatedly at one another but did not cross over. Conditions now seem to have changed, however. Jaguars have from all accounts been concentrating around the clearings and take full advantage of the new and abundant food supply (cattle and pigs) which has been put at their disposal. We have heard complaints of stock losses from all regions of Amazonian Mato-Grosso, from Aripuana in the West to Araguaia in the East.

Comparatively little (perhaps 5 %) of the forest has so far given way to grassland. Government

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policy has been to allow no more than 50 % of the area of any ranch to be deforested, but due to the enormous expenses involved few if any of the larger properties have even approached these quotas, 10 % or less being the figure usually achieved. The refuge of the forest is, therefore, always at hand for the jaguars, and since it is probable that the now localized, plentiful and easy prey has already resulted in a greater surviving number of jaguar cubs, in the short and medium term at least jaguars seem headed for an increase in numbers in Amazonia.

The Guaporé River

An important population of jaguars occurs in the basins of the middle and upper courses of the Guaporé river and its affluents. This region comprises circa 50 thousand sq. kms of swamps, savannas, escarpments and deciduous forests and is in many respects similar to the Pantanal. It begins some 300 kms west of Cáceres and 400 kms further north grades into the Amazon forest. Here during fairly recent visits ('81, '82, '83) I calculated a jaguar density very little lower than the Pantanal itself, or one jaguar per 35 sq. kms, for a population of 1400 jaguars.

Interview by Dr. Wendell Swank with Mr. Peter Crawshaw, Biologist. IBPE, National Parks Department. Institute of Forest Development. National Parks Department, IBDF/DN. Ed. Palacio do Desenvolvimento, 12 andar, Brasilia / DF 70057. Brazil. Phone: 2243241. Date: November 1, 1986.

Present address: Dept. of Wildlife and Range Science 118 Newins-Zigler Hall Univ. of Florida, Gainesville, FL 32611.

Portion of the country covered by respondent:

Mostly the Pantanal region of Mato Grosso, but I know the situation in other national parks in Brazil, and in general Brazil as a whole.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Crawshaw. Less abundant.

Q. What is the basis for this opinion?

• Crawshaw. General reports, working 6 years in the field, realizing that where jaguars were once common, now when one is killed it is newsworthy.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Crawshaw. In the Amazonian rain forest of Brazil it would be threatened, south of the Amazonian forest I would consider it endangered. It would be endangered in two thirds of the country.

Q. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat?.

• Crawshaw. Destruction of habitat is most important in reduction of the species.

Q. Where is this occurring?

• Crawshaw. Over two-thirds of its range.

Q. How long is this type of change likely to continue?

• Crawshaw. It probably will continue and accelerate.

Q. Is over utilization for commercial, recreational, scientific, educational or depredation control purposes occurring?

• Crawshaw. There is over utilization for sale of hides. Also in Pantanal there is killing of

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jaguars for depredation control, and for recreation. In ranching country jaguars are taken partly for depredation control and partly for recreation. Ranch owners do not like jaguars and pay fees for jaguars that are killed, however the ranch hands enjoy jaguar hunting, and the person who kills a jaguar is admired. In addition, people in rural areas are afraid of the jaguar, and are apprehensive about their children, their dogs and their livestock. The pumas take livestock, but people are not afraid of the puma.

Q. What is your estimate for the annual average off-take of jaguars for each of the above 5 purposes for the years 1980-1985?

• Crawshaw. I don't know, but on the 2500 square kilometer ranch where I worked four years, five jaguars were killed.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Crawshaw. There is no legal hunting of jaguars, but taking of animals causing damage is overlooked.

Q. Are laws regulating the take of jaguars effective?

• Crawshaw. The laws are not effective. There is a lack of enforcement due to lack of resources, lack of officers and also lack of support by the public.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Crawshaw. The government prohibits export, but skins are smuggled out of the country.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

• Crawshaw. No export is permitted.

Q. Is there any evidence that legal taking of the jaguar for export is facilitating or encouraging illegal taking?

• Crawshaw. Yes. Taking of jaguars for depredation control encourages the people to hunt.

Q. Is the country a member of CITES?

• Crawshaw. Yes.

Q. If so does it have in place an effective management authority and scientific authority?

• Crawshaw. No, there is the will in the country, but not the means.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

• Crawshaw. No, ocelots seem to be affected, but not jaguars.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Crawshaw. Laws are adequate.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat

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adequate, or inadequate?

• Crawshaw. Far from adequate.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

• Crawshaw. Any development project. There are approximately 80 dams planned for the Amazon basin, which if built, will flood thousands of acres. This will have an impact on all wildlife.

Q. From the information you have, or from personal experience, could you rate three of the above as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

• Crawshaw. 1 st. Destruction of habitat, 2 nd. hunting for livestock control and recreation, and 3 rd. commercial hunting in the Amazon.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Crawshaw. Yes, but it would have to be very carefully controlled, and begin on a small scale. I think this is the only way we will be able to preserve the jaguar south of the Amazon. The Pantanal would probably support three professional hunters. These hunters could take cattle-killing jaguars. That is, with dogs there is selectivity. The dogs are put down at the kill and in this way they tree that particular cat.

Q. Are there populations of jaguars in your country maintaining themselves or expanding?

• Crawshaw. In the Amazon basin the population is stable, the animals are maintaining themselves. Those isolated populations on the east coast are in jeopardy.

Q. Do you have an estimate of the populations, either numbers or density?

• Crawshaw. On the Miranda ranch, which consisted of 2500 square kilometers, we estimated 52 jaguars, or one jaguar per 48 square kilometers.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

• Crawshaw. In the area where we were working in the Pantanal we estimated the density at 3.2 jaguars per 100 square kilometers. We worked there four years.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to the people in local areas to provide an incentive for its protection and management?

• Crawshaw. Yes, but it would have to be very carefully controlled, and begin on a small scale. I think this is the only way we will be able to preserve the jaguar south of the Amazon. The Pantanal would probably support three professional hunters. In a jaguar population increasing at a

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normal rate about ten percent of the population disperses each year. Five percent of the population could be taken by hunting. These hunters could also take cattle killing jaguars. That is, hunters with dogs can be selective by putting the dogs down at the kill, and in this way they tree that particular cat.

Interview by Dr. Wendell Swank with Dr. Howard Quigley, Wildlife Research Institute. Box 3246, University Station. Moscow, ID. U.S.A. Phone: 208-885-6871. Date: September 19, 1986.

Portion of the country covered by the respondent:

State of Mato Grosso do Sul, Brazil.

Q. Does your country (or area of country) have wild jaguar populations?

• Quigley. Yes.

Q. Are jaguars in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Quigley. Less abundant.

Q. What is the basis for this opinion?

• Quigley. My three years in the area witnessing habitat loss, documenting jaguars which were killed by hunters and, knowing the habits of the animal and its reproductive potential.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Quigley. In Mato Grosso do Sul it is threatened, and in Brazil in general it is threatened.

Q. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat? If so, what type of destruction, or modification or curtailment of habitat is taking place?

• Quigley. Removal of native forest to plant pasture.

Q. Where is this occurring?

• Quigley. Over much of the Pantanal region.

Q. Over what portion of the jaguars range is this occurring?

• Quigley. Over a "significant" portion, especially if one includes land cleared for agriculture.

Q. How long is this type of change likely to continue?

• Quigley. More than two decades at approximately the same intensity.

Q. Are there comparable changes that are expected to begin within the next several years?

• Quigley. Not on this scale.

Q. Is there over-utilization for commercial, recreational, scientific, educational or depredation control purposes?

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- Quigley. For recreational and depredation control purposes.

Q. What is your estimate for the annual average off-take of jaguars for each of the above 5 purposes for the years 1980-1985?

- Quigley. A minimum of 9 animals from the 5000 km² I was familiar with.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

- Quigley. Yes.

Q. Are these limitations by season, numbers, areas, etc.?

- Quigley. Limitation by season; there are none.

Q. Are these laws effective?

- Quigley. No.

Q. What is the basis for this opinion?

- Quigley. Hunting continues unchecked. There is lack of enforcement.

Q. Upon what data are the limitations on harvest based?

- Quigley. The limitation (no hunting) is (was) based on the fact that they knew almost nothing about the status of wildlife populations, while there was plenty of evidence of harvest.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

- Quigley. There is a system, but I don't know how effective it is.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

- Quigley. I don't know.

Q. Is an approval from the country of import required prior to the issue of an export permit?

- Quigley. I don't know.

Q. Is there any evidence that legal taking of jaguar for export is facilitating or encouraging illegal taking?

- Quigley. I don't know, but I suspect it would.

Q. Is the country a member of CITES?

- Quigley. Yes.

Q. If so does it have in place an effective management authority and scientific authority?

- Quigley. I don't know.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

- Quigley. No, not that I'm aware of in the Pantanal.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

- Quigley. The regulations are adequate.

BRAZIL - QUIGLEY

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat adequate, or inadequate?

- Quigley. The enforcement is inadequate.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

- Quigley. High water years can reduce the available dry ground for several years, thus reducing prey populations, and, with some lag time, predator populations.

Q. From the information you have, or from personal experience, could you rate three of the above as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

- Quigley. In order of importance, presently: destruction, modification or curtailment of habitat; over-utilization for recreational and depredation control purposes; inadequate enforcement of regulations; other man made or natural factors (high water years), and diseases or parasites.

Q. Would you briefly describe reasons for order in which ranked?

- Quigley. Personal observations for three years in Pantanal led me to that ranking. Up to 10 to 20 years ago, over utilization was probably more important. Now though hunting is important, habitat destruction is, and will be, more important.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

- Quigley. It is doubtful.

Q. Are there populations of jaguars in your country maintaining themselves or expanding?

- Quigley. Probably maintaining, not expanding. (Let's define a population to be at least 50 breeding individuals).

Q. What are the sizes of areas occupied by such populations?

- Quigley. 4,000 to 5,000 km² in North-eastern Pantanal and Southern Pantanal, and probably central Pantanal.

Q. Do you have an estimate of the populations, either numbers or density?

- Quigley. One jaguar per 70 to 100 km².

Q. What is the basis for this estimate?

- Quigley. Telemetry data.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

- Quigley. Rabinowitz and Nottingham, 1986, J. Zool. London, September. or October. Schaller and Crawshaw, 1980, Biotropica 12(3):161-168. Schaller and Vasconcelos, 1978, Z. Säugetierkunde 43:296-301.

Interview by Dr. James G. Teer with Ernesto Barriga Bonilla, Director Ejecutivo, Fundación Natura. Calle 94 # 15-19, of. 304, A.A 55402. Bogotá, Colombia. Date: August 26, 1986.

Q. Sr. Barriga, does your country still have populations of wild jaguars?

• Barriga. Possibly two...

Q. A few. Do you have any opinion about their abundance. Are they more numerous now than what they were, say, five years ago, less abundant or remaining about static?

• Barriga. I would say that they are less abundant. Because of the hunting pressure and, mostly, the destruction of the forest where they live. It's so serious in the country that the population has had a great reduction.

Q. Do you know the definitions of endangered, threatened and so on. Do you consider the species to be endangered, or is it threatened in your opinion?

• Barriga. Highly endangered.

Q. What has been the cause of the decline of jaguar in Colombia?

• Barriga. The skin trade and the destruction of the habitat.

Q. Has it been merely for commercial reasons? Skin trade. How about hunting? Has that been a problem?

• Barriga. Hunting has been something very small in Colombia because jaguar hunters are taking it mostly for business, not for the pleasure of hunting.

Q. So it's mainly "campesinos"?

• Barriga. Campesinos who are financed by the skin dealers, including some of the general ones who once in a while used to come here to Colombia to pay for those skins to the campesinos and people like Mike Tsalikis who lived in Leticia.

Q. Do you have any hunters coming in from out of the country say, from the United States or from Europe to hunt jaguars for sport?

• Barriga. Not that I know. A lot of people come to hunt doves here but not for jaguars.

Q. I see, they come in to hunt birds, doves, pigeons and things like that?

• Barriga. Yes, pigeons and things like that. That's all.

Q. What form does the destruction of habitat take? Is it for agriculture or for development of cattle ranches?

• Barriga. Both. The settler starts cutting down the forest and burns the forest to settle down, as a way of having some kind of property, and then later on he sells that property to big land owners and then later on they settle down with cattle or whatever.

Q. Where is most of this kind of habitat destruction taking place?

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• Barriga. All over the country.

Q. I see. Do you have any idea or any estimate of number of jaguars that are taken by these campesinos each year?

• Barriga. No.

Q. There's no information available?

• Barriga. Yes. You can find some of that, information at INDERENA the National Resource Institute.

Q. O.k.

• Barriga. But remember something, it's information that nobody is going to have straight because it's illegal.

Q. But are there regulations and laws in Colombia that regulate hunting and the take of these spotted cats?

• Barriga. Yes. There are good laws. The point is that there are not enough people to enforce them.

Q. There is not enough wardens or guards...

• Barriga. Wardens or guards, yes.

Q. I see. But these laws are infective in terms of them being carried out in the field?

• Barriga. But they still work, because they control the airports. They do have people especially in the parks. So there is some control.

Q. There must be laws that regulate the export of animal products in Colombia.

• Barriga. There are, yes. They also are given by INDERENA.

Q. Is there any kind of approval that you can get from the government for export of an animal product? Say...

• Barriga. You have to. There is a whole bunch of regulations for exporting products of animals, but of course, you have to follow the regulations of the countries.

Q. Is Colombia a member of CITES?

• Barriga. I guess so, because if I'm not wrong, it was signed a couple of years ago by the last administration.

Q. Do you know who the scientific authority is in Colombia? Is it someone in INDERENA ?

• Barriga. Oh, yes, Colombia is a signer of CITES. As a matter of fact, the vice-president of the animal commission, or something like that of CITES, is Vicente Rodriguez, who is the head of fauna of INDERENA, a person that you should interview. Because he is also the representative of all the Latin American countries to the CITES commission group.

Q. I'll try to see him. Do you consider that there are any other factors other than commercial hunting or over-hunting and the loss of habitat that could be involved in the decrease in jaguar

COLUMBIA - BARRIGA

numbers? What about diseases and parasites, and any other factors of the country?

• Barriga. That's something that I guess has to be studied later on.

Q. Better information.

• Barriga. Better information.

Q. Do you know any studies that are being done presently, or in the recent past on jaguar numbers, or ecology?

• Barriga. Again, Jorge Hernandez was working with some students of the National University, and one of them was working on his thesis, or his thesis was done on some problems on the populations of the spotted cats. They, by the way, had the opportunity of using a series of something like 2,500 skins, of which 80 % were jaguars that INDERENA confiscated years ago...

Q. Over many years...?

• Barriga. No, that was one shipment, something like eight or ten years ago. It was one of the worst ones. Hernandez may give you all the figures and the dates and all.

Q. Do you know of any literature, any published reports or scientific papers that have been done on the jaguar in Colombia?

• Barriga. In Colombia, I guess the last one was one that somebody presented at the Caesar Kleiberg Institute meeting on spotted cats about three or four years ago, in Kingsville Texas.

Q. This might have been Rafael Hoogesteijn?

• Barriga. Somebody like that. And Mondolfi from Venezuela, who has a lot of information from Colombia.

Q. Do you believe that the present population of jaguars in Colombia is static, or maintaining their numbers, or are they still decreasing?

• Barriga. I guess they may be still decreasing because of the destruction of the habitat.

Q. Do you have any ideas of the distribution of the jaguar in the country. Could you trace on a map where you think the major populations of jaguars occur?

• Barriga. The major populations of the jaguars today may occur just in the Orinoco and in the Amazonas areas of Colombia. The populations in the Magdalena valley are almost gone. And there might be some few, but very few, specimens left in the lower part of the Magdalena river, and maybe towards the Chocó area.

Q. Chocó...

• Barriga. Chocó, yes on the Pacific coast.

Q. But most of them would be in this Amazonas region?

• Barriga. Amazonas and Orinoco regions.

Q. That would be contiguous with that same kind of habitat in...

COLUMBIA - BARRIGA

• Barriga. In Brazil and Venezuela.

Q. Right, okay.

• Barriga. There used to be jaguars here, up to something like ten or twelve thousand feet high. There are some records of jaguars collected about 20 miles east of Bogotá, here in the highlands. And there is even one of those specimens in the National University in the collection there. Maybe that might be another person that you can contact, Dr. Alberto Cadena. He is the curator of mammals of the Instituto de Ciencias Naturales of the National University of Bogotá.

Q. That was the next question ... who else would have information? Now, María gave me information on Jorge Hernandez, and I understand there is another person at the university...

• Barriga. Carlos Arturo Mejía.

Q. Mejía, that's right.

• Barriga. Yes, he's an ecologist. He was working in Africa on giraffes. Yes, he might have some information but Alberto Cadena is the curator of the main collection of mammals here, at the National University. The other person. Are you going to be somewhere else besides Bogotá?

Q. I'm going to Caracas tomorrow.

• Barriga. Okay, so you don't have time to interview other people in Colombia. But Alberto Cadena in the National University. Vicente Rodriguez, you must visit him. He is the head of the fauna division of INDERENA.

Q. O.k., I'll get that address in a few minutes from you. So, Rodriguez and Hernandez and Mejía.

• Barriga. And Cadena ... Cadena has a Ph.D from the University of Texas, or something like that

Q. Well, thank you very much Ernesto, for the information. I will send this report to you for your further consideration and for editing if you'd like.

**Interview by Dr. James G. Teer with Dr. Alberto Cadena, Mammalogist,
Universidad Nacional of Colombia.**

Q. Dr. Cadena, does your country still have populations of jaguars in the wild, in some numbers?

• Cadena. Yes, but they are very, very, very scarce. Very few of them.

Q. Are they more abundant, or less abundant, or more or less remaining static in numbers, over the past five years?

• Cadena. I would say it's declined.

Q. Declining?

• Cadena. Completely.

Q. What are the principal factors that are involved in the decline?

• Cadena. Well, there are many factors, one is the destruction of the forest, and because of that you see less and less numbers of tigers in there.

Q. So, it's mainly the clearing. Deforestation.

• Cadena. Deforestation, yes.

Q. Does hunting or commercial trade in skins have any part in this decline?

• Cadena. Yes, it had. Ten years ago, not now.

Q. Not now?

• Cadena. Because the trading of furs or hides, or whatever you call them, stopped because of the trade of drugs. People who lived there in that area used to hunt, even the Indians.

Q. The campesinos ...

• Cadena. Well the ... how do you say, the ... what we call the Indians or indigenous people. They used to hunt a lot for the trade in hides. But now because of the increase of drugs, exchange or plantations they abandoned hunting. But now it is deforestation that is taking the jaguars.

Q. Do you consider the species endangered or threatened under the definitions that are being used by IUCN and other ...?

• Cadena. In Colombia I would say ... I don't know. It's difficult to say. Between the two, actually.

Q. Endangered is defined as that it is in danger of extinction throughout all of its range or a significant portion of its range, and threatened if it is likely to be endangered in the foreseeable future. Not very much difference. In any case, do you feel the species is declining?

• Cadena. Yes.

Q. And that deforestation and the development of agriculture are the main reasons at the present time?

COLUMBIA - CADENA

• Cadena. Let's phrase one problem. It is not only because of destruction of habitat. In the areas where there used to be jaguars or in the areas where there was a lot of forest, deforestation took place, but not for people to inhabit it. I would say, in most of the areas, I would say, the Amazon and the Orinoco they cut the forest

Q. For timber?

• Cadena. Not, quite. Timber is one part, but mainly for the planting of coca.

Q. Coca.

• Cadena. Yes, that's right.

• Cadena. It's tragic. For example, in the areas of Araracuara. Araracuara used to be areas that most of the indigenous people cut just one hectare for crops for agriculture. Now they change completely just to plant coca, because they earn more money with a coca plantation than with other crops.

Q. Do you have any idea, any information, about the numbers of jaguars that are taken every year, or in any period of time?

• Cadena. No. It's very difficult.

Q. Not known.

• Cadena. I mean I'm not in the position to have that information. Maybe Jorge Hernandez has it. He's in a government office which knows more about the trading of furs and things like that.

Q. Right. Do you know of any scientific studies that are underway at the present time on the jaguar?

• Cadena. No.

Q. Are there any published information on studies that have been done in the past ten, fifteen years?

• Cadena. No.

Q. No one has worked on the species, it's ecology or...?

• Cadena. No. Nobody. Actually the only study that I know about is a study that was made by Jorge Hernandez, in INDERENA with several furs that were taken away from the people

Q. He has a very good collection of skulls and other material that have come from contraband.

• Cadena. We don't have that material because we just study animals and not the contraband.

Q. I suppose that Colombia has laws, regulations, that regulate hunting? Is the jaguar protected by these laws?

• Cadena. Yes.

Q. Is there any kind of seasons or any ways that people can hunt jaguar?

COLUMBIA - CADENA

• Cadena. No. The law is for protection of the jaguars but laws are for cities, not for the field.

Q. So the laws are there but they're not enforced?

• Cadena. That's right.

There are no people to enforce the laws in the country in the areas where the jaguar lives. And people hunt. I've seen, once, just recently, this past December in the area just by the Orinoco, in Puerto Carreño, it's close to Venezuelan area, it's just on the border with Venezuela on the Orinoco, I saw one hunted the night before. It was exposed, over there, because it was hunted. They killed it because this animal was killing cattle.

Q. livestock.

• Cadena. Yes, livestock.

Q. I suppose that the farmers, ranchers can protect their livestock.

• Cadena. Yes.

Q. Is that legal?

• Cadena. Yes, it's legal.

Q. Do you know any other factor that might be involved, other than this deforestation ... are there any kind of diseases or parasites or man-made factors that might be involved in the animal's future?

• Cadena. No, because it's so, so scarce. It's very very difficult to know the exact population, or if they're in good health or not. It's very, very difficult.

Q. Do you have any records or any kind of distribution map of its present status? Is that generally known?

• Cadena. No, it's not known. I would say just guessing, that the distribution is just in the forested areas, wherever the forests remain.

Q. One final question, do you think that the present population of jaguars Are they still declining, or are they maintaining themselves?. Or since the signing, or the convention of CITES, has that had an effect in population numbers?

• Cadena. It's very difficult to say, because, well, we don't know what was in the population in the past. So we don't know what the present situation of the population is.

Q. So there is no base line data to compare with. Jorge Hernandez says that there are fewer jaguar skins being traded, and so he thinks that CITES has had an effect.

• Cadena. That's true, but what I said before.

Q. Deforestation is extremely..

• Cadena. Yes, one is that, and the other is the drugs, too.

Q. Then you think it's that pervasive. It's having an effect on clearing of land for drugs.

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• Cadena. Yes.

Q. That's tragic, isn't it.

• Cadena. It's tragic. I mean, if somebody has been, for example, five years ago, on the Orinoco, in the Guaupes, in the Guaviare, in the ... all these rivers that go through the Amazonas or the Orinoco, they are completely deforested around the rivers. They used to be completely forested.

Q. Would it be dangerous for a gringo to go in there?

• Cadena. It depends where you go.

Q. I'm not suggesting that I'm going.

• Cadena. No, no. Yes, in some areas it's very dangerous. Even for us. I've been in areas that it's not only drugs, it's also guerrilla, the combination of the two.

Q. Is there any other information that you'd like to have recorded?

• Cadena. Actually, I've been many, many times in the field, but I would say in very few occasions have I seen jaguars, in very few.

Q. Or signs of jaguars.

• Cadena. Or signs of jaguars. In some areas they maintain more or less, and they used to be more or less hunted. I mean there are people there, that is the Sierra Nevada de Santa Marta, around the Sierra Nevada. In that area occasionally you hear about people hunting jaguars. Or I have seen signs there, footprints of the jaguar. In other areas it's very, very scarce.

Q. Thank you very much, sir, for the interview.

**Interview by Dr. James G. Teer with Dr. Jorge Hernandez Camacho.
Instituto Nacional de los Recursos Naturales Renovables y del Ambiente
(INDERENA), Apartado aéreo 13458, Bogotá, Colombia. Date: August 26, 1986.**

Q. You've explained, Sir, that the development in the Llanos, from oil and from agriculture and from some other activities, has affected jaguar numbers.

• Hernandez. Certainly, yes. Not only due to the many settlers that are arriving, the problem of the increasing of cattle densities, but also a safe source of money. I mean the skins are an additional source for the settlers.

Q. Do you think that the jaguar is as numerous now as it was say, five years ago in this country? Are they maintaining their numbers? Are they increasing?. I'm talking about not only the Llanos, but Colombia, generally.

• Hernandez. I believe that the prohibition of commercial hunting of jaguars that was approved in Colombia by INDERENA in 1973 has had a positive effect in diminishing the commercial trade, and, of course, the numbers of animals that were killed exclusively for the skin. For instance, let us say many years ago, there were still found, before the activity was prohibited by law, a dog trained to hunt jaguars was worth 50,000 pesos or so. Still there were parties of people, real professional hunters, wandering in the Amazonas region and remote places looking for jaguars, ocelots, margays and in occasions otters and giant otters. These sort of parties have definitely disappeared in the last few years due also to CITES.

Q. CITES?

• Hernandez. Certainly it has been positive in many ways, but we are aware that the illegal trade still survives.

Q. Do you know where these skins are being taken? Are they being collected and sent abroad and used in the garment industry?

• Hernandez. No. There are attempts to establish a tanning industry specializing in high quality pelts of otters and spotted cats in Colombia. This industry is no longer working in the country since almost two years ago. They have tanned small lots that they had assembled previous to the prohibition, but after all this activity, the business was abandoned. So that all trade, except for a small amount that is locally used, goes out of the country. You know, at this moment, they are not very acquainted with the importers. But until 1980, for instance, a lot of skins were sent, for instance, to Hong Kong, Singapore, and even Europe, to West Germany. Probably there are still gangs, you know gangs of smugglers, working through Panamá, even using small planes to go on this sort of goal and in through Brazil. We have had, it's hard to say...but we have had, on several occasions, bad experiences with Brazil in that the Brazilian

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authorities sometimes have not been as effective as would be desired. On occasions, skins, the Brazilian skins are assembled there, located transitorily in the neighborhood of Leticia, and then using falsified documents, are imported to Brazil as Colombian products. Then they are smuggled out from Brazil.

Q. Maybe into Hong Kong or Europe or somewhere.

• Hernandez. Yes.

• Hernandez. And to the Canary Islands, too.

Q. Well, considering that there has been some improvement from CITES, would you still classify the jaguar as endangered or threatened or would you take it off of the list altogether?

• Hernandez. No, increasingly threatened.

Q. Increasingly threatened.

• Hernandez. As a matter of fact over most of the length of the territory of the country, it has been depleted in by man.

Q. And the future of the jaguar is...?

• Hernandez. The future of the jaguar is very uncertain due to the expanding of the agricultural frontier, the occupation of new lands, settling on new lands, destruction of habitat. Not only the destruction and deterioration of habitat but the increase of hunting pressure.

Q. Is there any hunting that's coming in from European or American hunters coming down for sport hunting? Is there any kind of business attendant to that?

• Hernandez. No, this sort of activity, eventually, if it's regulated, could be accepted, but we are very uncertain about it's convenience and, in my own opinion, these activities wouldn't be really profitable for the country. Certainly, it would give several local advantages like investments, local improvements and occupation for people, and foreign money, dollars, to be left in the country in undeveloped areas. But in the long run it would be unadvantageous, mainly due to difficulty to control illegal hunting

Q. To control the activity. Do you think that even though there could be some economic value attached to jaguar and hunting of jaguar, that that would not be sufficient to compensate for...?

• Hernandez. No, certainly not. It would be advantageous if we could develop certain facilities in national parks where people could go and observe the jaguars in nature.

Q. Tourist trade could be more important.

• Hernandez. Yes, but this sort of tourism.

Q. Do you have laws and regulations, Government laws, that prohibit or protect jaguar and other...

• Hernandez. The commercial hunting of jaguars is...uh..

COLUMBIA - HERNANDEZ

Q. Prohibited?

• Hernandez. Yes, prohibited. And the importation of jaguars or jaguar products of any sort. But also hunting is regulated, but the enforcement is very weak. The economic system negates any intents of controlling activities.

Q. I see, there is not enough people out in the...

• Hernandez. No, we have not enough. But nothing of facilities, nothing of trained people. So that jaguars could be killed by many people and even defense could be alleged in a court in justification.

Q. Of all the factors that are involved in jaguar numbers, which would you consider the most important: hunting, destruction of habitat, natural mortalities such as diseases and parasites, inadequate regulations or enforcement? What are the most important of all? Would you assign...

• Hernandez. Perhaps the most serious problem now is the destruction of habitat, number one. After that, hunting pressure.

Q. Do you think hunting pressures have been reduced as a consequence of the CITES agreement in international trade.

• Hernandez. Certainly, yes. I think that the illegal exportation has diminished considerably.

Q. Do you know of any studies that are being made, or have been made in the recent years of jaguar populations, or is there anybody out in the field doing ecological work in Colombia?

• Hernandez. No, unfortunately not.

Q. Do you have any references or publications that we could use, or be useful to us in this evaluation?

• Hernandez. No, not in particular

Q. Just very little printed information...on population studies.

• Hernandez. Yes. In effect, perhaps one of the most difficult problems to be evaluated at this moment are the movements, the local movements of animals, the real size of their home ranges

Q. About the only studies that have been made of that in recent years have been George Schaller's work in the Pantanal in Brazil.

• Hernandez. Incidentally, I believe that this study... eventually a similar study, would be very convenient to be done here. There could be, say, a national park, or perhaps better facilities than the Pantanal could provide. I mean not in terms of large areas but in terms of a habitat more easily handled. If we could experience that in this fashion, not so large or extensive areas of swamps and swampy forests, and more concentrated areas that would be stupendous. For instance, in the Tut National Park, or Macari National Park in the Colombian part of the Amazonas.

Q. That population would be contiguous with the one in the Darién Park in Panamá?

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• Hernandez. No. The(?) National Park, unites directly with the Darién Reservation in Panamá. But we don't have any real evaluation of the populations of jaguars there. Incidentally, something that in terms of migration, local migration, the local movements of the jaguars, something that should be taken into consideration in future work, is the fact that one of the main preys of the jaguar, the white-lipped peccary here, migrates.

Q. White lipped peccary?

• Hernandez. Yes. It has permanent movements and the territories have never been properly established here. Someone apparently estimated the area covered by a party. It was a party of 50 to 100 animals and the area covered was on the order of 100 km² or so, perhaps even less in good years. In the Llanos the peccarys could be observed during the dry season crossing the savannas, sometimes crossing a distance of several km, let us say, 5, 10 km across the savanna, going from one gallery forest to the next one. Those movements must certainly affect the movements of jaguars.

Q. And jaguars may be attendant to those animals, move with them?

• Hernandez. Well... so far as I can tell, whenever you find a medium size of white lipped peccarys, you must hide.

Q. Well, thank you very much for the information

Interview by Dr. James G. Teer with the directors of several hunting associations in San José, Costa Rica:

Sr. Ricardo Guardia V., President, Asociación Nacional de Cazadores de Costa Rica, P.O. BOX 6589, San José 1000, Costa Rica.

Sr. Guillermo Rivera S., President, Costa Rica. Asociación Herediana de Caza y Pesca, P.O. BOX 7625, San José 1000,

Sr. Ricardo Fernandez Delgado, President, Asociación Herediana de Caza y Tiro, 100 m. Este Muñoz y Nanne, San Pedro Montes de Oca, San José Costa Rica. Central America.

Sr. Jorge Gamboa Espinoza, President, Asociación CAPAZURI, P.O. BOX 55, Cañas Guanacaste, Costa Rica.

Date: September 15, 1986.

Q. Gentlemen, are there still populations of jaguar in Costa Rica?

• Guardia. Yes. My name is Ricardo Guardia, I'm the president of the National Costa Rica Hunting Association. I'm a member of Safari Club International also. Yes, there are definitely populations of jaguars in Costa Rica, but they have declined quite drastically over the last few years because of habitat destruction mainly. The estimates of the game department, which are, as I say, estimates, because it is very difficult to count them, situate the number of animals in the country at between one hundred and one hundred and fifty. I have hunted mainly on the Pacific side where they are less plentiful than on the Atlantic side, which are rain forests and which are very difficult to hunt. You have to hunt on foot, you cannot use horses in the area. In the Guanacaste area, where I have done most of my hunting, I have seen occasionally, on very few occasions, tracks, I have heard them two or three times roaring at night and I haven't laid eyes on one yet. I've sat for them, waiting for them over a dead cow, and I've had them twice come in and snatch the cow at night without my being able to see them. They are very secretive they are very fast, and they are very silent. On one occasion one of them snatched a Hereford from about fifty yards. It was drizzling and it was soft grass, and it just snatched the Hereford and walked away with it on a very dark night and I never noticed the difference until it dawned and the Hereford wasn't there. On another occasion, I had tied a fishing line to the leg of a Hereford, of a cow, of a big bull, as a matter of fact. That was on the Atlantic side. It was in very thick jungle and when the jaguar sensed something was amiss, it tried to drag the bull away. When it did so, it yanked a branch behind me which had been tied to the fishing line, and that in turn I think was what scared the jaguar. It immediately ceased pulling, and by the time I got up and tried to shine the light on it, it was gone. Of course, the moment the light was in the vicinity, the jig was up. In my opinion they are... I don't know if to say threatened or endangered in

COSTA-RICA - GAMBOA

Costa Rica, I believe endangered.

Q. Señor Gamboa, you are a hunter and also the president of an association. What are your experiences with the jaguar now? Are they more abundant now than ever, or less, or what is the status?

• Gamboa. I am the president of the CAPASURI Association. I have only had two experiences with jaguars on the Atlantic side near Las Tres Marias mountain range. I noticed (from tracks) that they were moving from that area to the Tortuguero Lagoons when the turtles were coming out to lay eggs. I also had a similar experience at the Guanacaste Province. On the Atlantic side of the Orosí mountain range, I saw the track of a very large tiger. But it is my opinion that it is an endangered species as before it was much more common to be able to see their tracks in the area.

Q. Señor Rivera, what is your experience with the species, and would you please identify yourself and tell us what association you belong to?

• Rivera. Yes, I'm Guillermo Rivera and I am a member of the Heredia Association of Hunters and Fishermen. My experience with the jaguar in Costa Rica is a little scarce and my personal experience directly with the animal has occurred only twice in my life. Once in the National Park of Santa Rosa some five years ago, when I could hear some noise in the branches in the bush. I could feel the smell very clearly because this was very close to the shore so the sea breeze was blowing to the side where I was so I could smell very clearly the characteristic smell of these cats. But my first experience with cats of this type was some fifteen years ago in the Caribbean area near the Panamanian border. There I could see tracks of a big jaguar that probably crossed my way just a few minutes before I crossed it because they were fresh, they were wet. This place was very close to the river. Probably the animal was crossing the river and going in the bush so I could see very clearly the tracks and they were wet, so that's why I believe the animal just crossed in front of me perhaps a couple of minutes before. The rest of my experience in this sense has been only by stories of other hunters who have told me about their own experiences in the last year with the animal. As a matter of fact, most of them really feel disappointed because they could never see it. They only felt it or heard it or believed that the animal was around but they never saw it. The majority of these experiences were at night so they had light limitations and all that, and probably that was one of the reasons why these people could not see the animal. We all know the way they move and the caution they take with people. So I believe that besides the limitation of light, probably the animal was really careful of letting them see him.

Q. In your opinion, should we classify the jaguar as endangered? Is it endangered or...?

• Rivera. Definitely it is endangered. As Mr. Gamboa told you just before, the animals that have been hunted in the last year are less and less. So that means clearly that probably only in the National Parks where very deep forest, mainly the rain forest of the Talamanca range occurs, can

you find a few animals.

Q. Señor Fernandez, what is your experience with the jaguar as a hunter and as the president of a hunting association?

• Fernandez. I am more a conservationist than a hunter now; I do not do much hunting at this moment. Some forty years ago I went hunting in the Talamanca Cordillera area. A lady told me that a big cat had come near her house and snatched two of her chickens and that she had occasionally heard it roaring at night. Next day I went hunting with my dogs as I was in a hunting expedition and the dogs picked up the track of an animal. Three or four hundred meters from where they had found the track they treed the animal. It was a black jaguar. It was very near the lady's house and it had become well acquainted to the area. I was carrying a thirty zero six rifle and very easily I was able to walk up to it, as the dogs would not let it down the tree, and I shot it in the shoulder. It was huge. I estimated it's weight at some 250 pounds. It measured about 1.50 meters long (from head to tail). That was the only jaguar I saw in the area, but other hunters told me that with some frequency they killed tigers in the area. This happened some forty years ago, approximately. After that I never laid eyes on another jaguar.

Q. Señor Fernandez, do you consider it to be endangered at the present time?

• Fernandez. Yes, it is my opinion that the jaguar is endangered at the present time.

Q. All of you have said that the animal is endangered. I take it from that that you would not be interested, or would have no interest in seeing hunting of the jaguar opened again?

• Guardia. Regarding that question, as most of the people who have dealt with the jaguars know, they very frequently turn cattle killers, and they can be a real problem for the cattle raisers. It is common; I have hunted jaguars that have killed in excess of thirty five head of cattle in one farm. That can be ruinous to the farm owner. So under those circumstances, our game department issues limited permits, once the damage has been proved, to destroy such animals. On such a basis I have been able to hunt them but unfortunately with no success so far.

Q. So you think that a farmer or a rancher should be permitted to protect his livestock or his property from these animals?

• Guardia. That's a good question. In India I understand that they pay the rancher the price of the cows that are killed by the tigers to avoid shooting them. Over here there is no such program. And even if they were not allowed to shoot the jaguars they would probably in the end poison them or kill them in some other manner as the damage they do is too great to afford any other solution.

Q. Would any of you like to comment on the last question? Should hunting be permitted in some limited cases.

• Gamboa. I don't think hunting should be permitted because of destruction. The myth of the jaguar destroying a lot of cattle is less severe than the destruction done by the coyote on those

animals.

Q. What do you think has been the cause of the decrease in jaguar, in Costa Rica? What have been the major factors in its decline?

• Fernandez. I believe the main cause is lack of food. The jaguar's habitats are normally very dense forests of which in Costa Rica there are very few left. And a lot of forest burning occurs in the forests where they used to live. Timber exploitation and ranching growth also bring destruction of forests which are the jaguar's normal habitats.

• Guardia. I have an opinion too. The main reason is the destruction of habitat. There also existed the habit, in Costa Rica, when jaguars were much more plentiful, mainly in the farms in Guanacaste, to hire professional hunters with dogs to track down and kill cattle killers. They also used poison like strychnine in the cows killed by jaguars, due to their habit of returning to eat after the kill, and that, of course was disastrous to the jaguar populations.

Q. Gentlemen, the next question is whether there is illegal hunting of jaguar and is there any trade or commercial trade in skins that might be being sent to Europe or to the U.S., or somewhere? Señor Rivera?

• Rivera. Yes, I am sure of that. As a matter of fact in the past, some 20 to 30 years ago, it was very common to kill all kinds of cats, like maybe jaguar for selling the skin, as a trophy and for using the fur for coats and things like that. And I remember some comments regarding the high price that was paid for these skins. Of course, this kind of activity increased illegal hunting. You know, in America in general, the cats are really scarce as compared with the cats in other continents. With so intensive hunting of the few animals that lived here in the past, that for sure reduced the population. Even today I know that some people kill them precisely for making ... for trading the skins.

Q. Are these skins being used in local trade or are they being shipped to other countries where they're made into garments and materials of the like?

• Rivera. Well, I don't know exactly because I'm not familiar with those days. Nevertheless, I believe that many of these skins were exported to other countries, mainly Europe and probably the United States.

Q. Señor Gamboa, do you have information on trade in jaguar skins or of illegal hunting?

• Gamboa. What I can say about the jaguar everybody knows in our country. Any hunter who sees a jaguar will shoot it automatically whether it's authorized or not. All these people know that jaguar skins are very valuable. This is a temptation for illegal traffic (because legally it is prohibited) in the country or out of it.

Q. Señor Fernandez, there are laws in Costa Rica that regulate hunting but are they enforced so that the jaguar can be protected by these laws?

• Fernandez. We have a game law which establishes severe penalties for whoever infringes it,

regarding animals whose hunting is prohibited. One of the animals that is protected by this law is the jaguar. However, jaguars are so attractive to hunters that whenever they learn of one living in a particular area they organize a hunt to try and collect it. They are rarely successful because jaguars are an endangered species, but now and then we will see a "campesino" with a jaguar skin who is willing to sell it.

Q. One last question, what do you consider the future of the jaguar to be in Costa Rica? Will it still remain in protected parks or will it be eventually killed out completely?. Señor Gamboa, do you want to answer that?

• Gamboa. Well said, our national parks will be the only place where the jaguar will be found in the future. The rest of the areas are being made accessible through roads; the use of these roads forces the jaguars out of the area. And those that run into a hunter are always shot.

Ricardo, would you like to add something to that?

• Guardia. Yes, according to the estimates of the game Department, some twelve jaguars are shot per year illegally. That is one a month. That number of jaguars collected annually is not considered to go to the detriment of the species. But what they do consider is that the destruction of habitat is the main reason for their decline. It is my hope that in some way they can be protected and preserved for future generations.

Thank you very much gentlemen, muchas gracias.

Interview by Dr. James G. Teer with Eduardo López-Pizarro, Biologist, Agronomist, Head, Wildlife Service, 10094, San José, Costa Rica. Date: April 6, 1986.

Q. Are there jaguar or tiger populations in your country?

• López-Pizarro. Yes.

Q. Are they more abundant, less abundant or the same as five years ago?

• López-Pizarro. The population is about the same as five years ago; it is in a stabilized state.

The estimate of the Wildlife Service is around 150 individuals.

Q. What is the basis of your opinion.

• López-Pizarro. There are several sources: part of it is experience we have in the field; another one is Chris Vaughan's research, a biologist who teaches at the Universidad Nacional; the hunters we have interviewed; the frequency of the tracks and or jaguars we have seen and reported attacks to livestock.

Q. Considering the definition of endangered or threatened status of animal species as defined in the Endangered Species Act, how do you define the situation of the jaguar in Costa Rica?

• López-Pizarro. Based on my experience in Costa Rica and in the area of Central America with which I am familiar, I would say the species is in danger of extinction. The species should not be considered threatened because the actual populations are infinitely inferior in number to what they probably were in the past. Of course, we have no scientific evidence to prove the existence of larger populations in the past. Considering the loss of good jaguar habitat during the last fifty or sixty years, we can estimate there were many more than today.

Q. Can you elaborate on the causes of the decline of the jaguar populations in your country? Is the cause the destruction, modification or curtailment of the habitat? If so, can you specify?

• López-Pizarro. The destruction of the habitat is definitely the cause, and the biggest problem in Central America is the deforestation of the virgin forest. It is estimated that deforestation is happening at a rate of 60,000 to 70,000 ha per year in Central America. This means virtually the elimination of all the forest habitat for the jaguar. There are swamps and other habitat types which are contiguous with the forest habitat and these are also disappearing. The populations of jaguars in these areas are much smaller than in the forests.

Q. Those 60,000 to 70,000 ha are they only within Costa Rica or in the general Central American area?

• López-Pizarro. It is the figure we have for Costa Rica, but it is also presumed to be the same for each country in the area.

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Q. Where is this destruction of habitat occurring?

• López-Pizarro. In Costa Rica, we have only about 15 thousand Km² of forested land which is totally protected. There are some forest preserves in production which have some small jaguar populations which are gradually disappearing. These are mostly in the north, in the southern part, and the Osa peninsula, in the Atlantic side in the Limón province. The dry Pacific zone is totally deforested, although we have detected about three pairs of jaguars between the zones of Murciélago, Santa Elena and Parque Nacional Santa Rosa. In Palo Verde, the last known jaguar individual was killed by campesinos in 1963, in what today conforms the Palo Verde National Park, contiguous to the wildlife refuge bearing the same name.

Q. For how long do you think the change in the jaguar habitat will continue?

• López-Pizarro. Well, in Costa Rica we are taking very drastic legal decisions. We have a new law which tries to prevent habitat destruction although in other countries in the region we do not know for sure.

Q. Do you expect any changes in the present situation in the foreseeable future.

• López-Pizarro. No. We have taken steps to protect what is left of the virgin forest, and other regions of the country are of no importance to the jaguar as a habitat.

Q. What is your estimate of the mean annual number of individuals taken during the last five years for the purposes of commercial, recreational, scientific, educational and or depredation control? Are there any signs of over-utilization?

• López-Pizarro. We have had no commercial hunting since 20 years ago. If it ever occurred, the specimens were commercialized within the country. We have no recreational hunting of the species. We do not authorize scientific nor educational hunting of the jaguar. In the area of depredation control we issue an average of some 14 permits annual.. The wildlife management office issues the hunting permit, which is free of charges. We use some hunters known to the office, like Dr. Ricardo Guardia or Dr. Sergio Bonilla. Besides the 14 jaguars killed with our permits, we believe there is an illegal killing of 14 other individuals which makes the total annual number 28 individuals.

Q. Are there any regulations or laws in your country which limit or restrain the hunting of jaguars?

• López-Pizarro. Yes. In reality the local law establishes the species status as endangered and all species in this category are protected from hunting, capture or harassment.

Q. This would be in any place, time or season?

• López-Pizarro. Yes. This is in any place or situation except when there is any danger to livestock or agriculture.

Q. Are the laws effective?

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• López-Pizarro. Yes. Partially in respect to sport hunting for other species besides jaguar. For jaguar there is more respect. If someone is found guilty of killing a jaguar he is sanctioned drastically, with 30 to 90 days of prison, changeable to a fine and registered as a delinquent. But as I told you there is an estimate of some 14 animals illegally killed each year, but we get to know this several years after it happens. This is mainly due to lack of knowledge on the part of the campesinos which do not know that they can ask for a legal permit when the animals pose a threat to livestock.

Q. Is there an effective method to limit or stop the export of jaguar skins in your country?

• López-Pizarro. It is completely forbidden.

Q. Is your country a member of CITES?

• López-Pizarro. Yes.

Q. Is there an official authority for CITES in Costa Rica?

• López-Pizarro. Yes. I am the administrative authority for CITES in Costa Rica, and also the representative in the Standing Committee in Switzerland for Latin America. The Biologist's College has the scientific authority for CITES. The implementation of both has been very effective. In the administrative field, we have trained customs personnel in collaboration with the U.S. Government.

Q. Do you know of any disease or parasite that affects jaguar populations in Costa Rica?

• López-Pizarro. No. We have no information and are beginning to study this.

Q. Are there any reports published on this problems?

• López-Pizarro. No. Not on diseases.

Q. Do you consider that the export regulations in your country adequate?

• López-Pizarro. Yes. There is a record of an illegally exported jaguar skin from Costa Rica that was confiscated in Miami about four years ago. This was reported by the U.S. Fish and Wildlife Service to our office. Within the country, we have confiscated some ocelot, puma and caucel (small spotted cats) skins in three cases. Tourists were attempting to take them out through the airport.

Q. Are there any other natural or artificial factors which may cause the jaguar to be endangered?

• López-Pizarro. The status of the jaguar populations can not be explained only by the presence of habitat. There are other independent factors as the existence of adequate food, the illegal hunting, known to happen, but not known in terms of exact numbers, or problems brought by inbreeding of the small groups. The areas that are being protected are not all large enough, and this goes against what island theory dictates. As you know, it is better to have a large continuous habitat than a series of small discontinuous patches for a species as demanding as a big feline. There is still a bigger problem. We have a great religious tradition that classifies the animals as good and bad. Any animals like the crocodiles, snakes, or any spotted cat are not good to have around.

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There is no known record of an attack from a jaguar on a human being in the forests of Latin America. However, our campesinos tend to use such principles in classifying the animals in their surroundings.

Q. Is there any influence from volcanic activity?

• López-Pizarro. It is very low. The eruption of Volcan Irazú in 1963 probably, but all lava and debris were driven and blown to the area of the central valley and not to the forest area.

Q. Considering habitat destruction, over-utilization, disease, inadequate regulations, or other natural or man-made factors as the possible causes of the decline of jaguar in your country, can you point to the three more important ones in your own experience?

• López-Pizarro. In Costa Rica, the habitat destruction is the only important cause. In the area of Central America habitat destruction is of prime importance again, except that in countries like El Salvador and Nicaragua, the skin trade was allowed and was an important factor.

Q. It is practically extinct in El Salvador.

• López-Pizarro. Yes, it is.

Q. What is the situation in the rest of Central America?

• López-Pizarro. Honduras and Guatemala are the ones with the largest populations. The whole population of jaguars in Central America could be around the 700 individuals.

Q. What about Nicaragua and Panamá?

• López-Pizarro. In Panamá it could be in Darién. There are swamps where there might be some. Nicaragua is a special case because of the war. Some campesinos from Aguasarcas, a week ago near the frontier at about nine kilometers from it, reported the presence of a group of jaguars. The species has never been known to occur there, and people suspect they have been driven into Costa Rica by the pressure of the presence of people in the area. Thus now we might have five exiled jaguars in Costa Rica.

Q. Do you think legal hunting of jaguar in your country could supply sufficient monetary return to provide protection and management for the species?

• López-Pizarro. Sincerely, as the official responsible for the Service in Costa Rica I would not recommend such a thing considering the few animals we have. Since the only animals we have are restricted to fixed size protected areas, the actual population will not grow. We will probably keep having cases of some of those animals endangering livestock. Since what we do at the moment is to give away a free permit, it may be interesting to consider a special system of bidding, calling those interested parties to bid for the permit to kill the animal and thus get an economic revenue from such activity. At the same time, the damage inflicted to the livestock is always noticed after some time, and by then, the pressure from the land owner is very strong and demanding for prompt action. Under such circumstances it is difficult for hunters from the U.S. or Europe to bid for

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a license in a short time.

Q. Are populations in your country growing or decreasing?

• López-Pizarro. They are maintained at the moment but very probably will decrease in the future.

Q. Which is the size of the areas occupied by those populations?

• López-Pizarro. I do not have the data now, but summing up the Guamacho Forest Preserve, the Amistad National Park, the Indian reserves and the wildlife refuge Tapantín might sum up to 280,000 ha which forms the most important part. To this we might add Corcovado, with 50,000 ha including Osa preserve and the northern part of Río Colorado now a refuge with 120,000 ha. These are the most important zones with good habitat for jaguar. Anyhow, in the central volcanic range we also have jaguar, near to the Braulio Carrillo National Park with 50,000 ha. There are other areas with swamps and altered vegetation where two or three pairs can be found, plus the ones we mentioned as invaders from southern Nicaragua. There are a few reports of isolated animals in the southern Pacific side of Costa Rica. In Parvita, Quepos, Guanacaste except Santa Rosa, it is extinct. Maybe a few animals still survive in the volcanic cordillera of Guanacaste.

Q. Do you have an estimate for the number of animals in Costa Rica

• López-Pizarro. The Wildlife Service of Costa Rica estimates that there are about 150 individuals maximum and a very optimistic guess would be 200 jaguars. This is in accordance with the area of habitat still existent. We have 15,000 Km². It would be one animal per each 100 Km². In his theoretical work, Chris Vaughan estimates from 223 to 1,700 or more animals. This is illogical. It is a theoretical work.

Q. What is the basis for this estimate?

• López-Pizarro. In my case it is my experience. In the case of Chris Vaughan, he bases it on the theory of available habitat which is not entirely true.

Q. Do you know of any work on jaguar done in Costa Rica?

• López-Pizarro. The one I just mentioned done by Chris Vaughan, titled: "Endangered Wildlife Species in Costa Rica". There are copies available. There is another paper not very reliable made by Dr. Merfis and based on interviews with several people who gave too high population estimates of jaguars for Costa Rica.

Q. Which other scientists or persons can contribute more information for this study in Costa Rica?

• López-Pizarro. It would be interesting to speak to Dr. Sergio Bonilla Salas. He is a dentist, a professional hunter because he has gone to Africa and other places to hunt. Lic. Ricardo Guardia Vásquez, a Lawyer. Armín Castro is one of the old hunters. Jorge Gamboa is the President of the Hunters Association of Guanacaste. From them you could learn about other people. Among

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the scientists, the zoologists in Costa Rica study mostly small animals and only very few study large animals like Christopher Vaughan.

Q. Thank you very much for your time.

• López-Pizarro. You are welcome.

Interview by Dr. James G. Teer with Christopher Vaughan, Coordinator of Graduate Wildlife Programs, Department of Environmental Sciences, National University of Costa Rica. Costa Rica, San José. Phone: 37070-39. Date: September 15, 1986.

Q. Chris, we have a number of questions that we'd like to ask. I'll go over these and you may answer in any form or fashion you like.

Q. First of all, I know that Costa Rica has jaguars, in the wild ... wild populations. But the question is, in your opinion, are they more abundant, less abundant or about the same as they were 5 years ago?

• Vaughan. Less abundant than they were 5 years ago.

Q. Has there been a continual decline in their numbers over the years? Say, starting in the last thirty years?

• Vaughan. It's difficult to say, number wise, because no one has ever done a census on jaguar populations, but habitat wise they have lost most of their dense forest habitat.

Q. Then do you consider them, under the present definitions of endangered species and threatened species, as defined by the Endangered Species Act of the United States, to be endangered or threatened?

• Vaughan. They're definitely an endangered species in Costa Rica.

Q. What are the principal causes of their decrease in numbers over the years?

• Vaughan. O.k., in the 1970's there was a commercial trade in jaguar skins. Nicaraguan traders would come into Costa Rica every month, every few weeks, and travel around the different points in the country and buy pelts from jaguars, other cats and other wildlife species. That ended more or less in the time that CITES was appearing, and also the Nicaraguan war. In more recent years I think that there could probably in general, I think that there are two factors that affect the jaguar, one and the ultimate factor is the habitat destruction of primary forest, I'd say. Secondly is basically hunting. I'd say that in areas that you could even think there could be jaguars because the habitat exists, in some cases there aren't because of hunting pressure. If a hunter sees a jaguar, even if he's looking for something else, I think in most cases they'll shoot it. On the other hand, even in areas that don't have optimum or primary forest habitats, such as cattle country, cattle areas, I think in some cases the jaguar could exist. However man doesn't allow it. So it's these two factors basically, hunting not so much for commercial purposes now; hunting and habitat destruction, which together are drastically reducing the number of jaguars in Costa Rica.

Q. Is habitat loss still occurring? Are they still deforesting? Is deforestation still an ongoing process in the country?

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• Vaughan. I calculated for 1983 that the jaguar had about 12 % of its original forest habitat in Costa Rica. And that is assuming that the jaguar was found at one time from sea level up to three thousand meters. In fact they have been reported in Páramo regions which are above three thousand meters, but that occupies a very small part of the country. So, I think there is fairly control over 15 % of the habitat remaining in it's primary stage in Costa Rica.

Q. Do you have any information on the number of jaguars that are killed each year, for any purpose, by any type of hunter?

• Vaughan. I know that the Ministry of Agriculture receives requests or complaints from, especially cattle-men, who find that their cattle are being killed by jaguars I'm not exactly sure of the number but it probably runs from three to ten a year. In some cases permits have been issued by the wildlife service to a professional hunter to eliminate the damaging animal. Probably also there are ... I wouldn't know how many, but probably at least a dozen jaguars that are killed each year by hunters.

Q. These are taken illegally, then?

• Vaughan. Oh, yes.

Q. So there are laws that prohibit the taking of jaguar under any system except that permit system when they are taking livestock?

• Vaughan. Right, the jaguar is considered an endangered species in Costa Rica and is legally protected throughout the year.

Q. And Costa Rica has signed the CITES treaty?

• Vaughan. Right, and López is the administrative authority for Latin America.

Q. López-Pizarro?

• Vaughan. Right.

Q. He's the sub-secretary of the wildlife department.

• Vaughan. Right, wildlife service in Costa Rica.

Q. Chris, there are laws, as you've said that prohibit the taking of jaguar in Costa Rica. Are these laws being enforced in the country?

• Vaughan. I guess it depends on how we define enforcement, I think most Costa Ricans know that it's illegal to shoot jaguars, or basically other cats. I don't think that people respect the law if they find an animal while they're hunting.

Q. Are there very many game wardens or conservation officers in the country?

• Vaughan. I don't remember exactly how many there are. There may be one for each province. There may be as many as eight or nine in the country. But, and there are some that are very good, they are very strict, the problem is that it is very difficult to find someone who has killed an animal without knowing exactly where he's going to be at a certain time. So within the national

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parks occasionally they will catch a poacher. But I think that the effort, in general, that has to be put into actually catching this person is much greater than the return usually is.

Q. Do you think that there is still any illegal trade, commercial trade, in skins of jaguar in your country?

• Vaughan. I think the war in Nicaragua probably shut off part of the trade. And I mean let's say, 5, 6, 7 years ago. I have no idea if there is trade going into Panama at the present time. Probably occasionally if animals are taken, people, for instance people who come on boats, on sail boats or whatever, just passing through, would purchase some of these products. I don't think anything is going out of the country, let's say, through the airport and through the major ports.

Q. You think CITES has had a real good effect then?

• Vaughan. Oh, definitely.

Q. Are there any factors, other than loss of habitat and hunting, that may have put some limits on jaguar populations? Do you know of anything like parasites or diseases or any unusual circumstance that might be affecting their numbers?

• Vaughan. I don't think there is enough information known about them to be able to say whether one of those factors has affected populations or not.

Q. Do you have information on published data, scientifically enforced, that might be useful in this survey?

• Vaughan. Yes, in fact, I'm going to give you this one study that I did three or four years ago on habitat destruction of jaguars and other wildlife species, which is, at the same time, based on density estimates that I obtained from other studies such as Schaller's study in Brazil. I estimated in the major islands of vegetation that were left in the country that would be jaguar habitat, what population sizes could be for jaguars in there. Basically it was a range of population sizes.

Q. Well, from these projections, do you have some estimate of numbers, or a range of numbers which you might expect jaguars to occur in all of Costa Rica?

• Vaughan. Yes, one of the first questions you asked me was if I had any idea of numbers, of density. The truth is it's just a guess. But, yes, this would be assuming probably a similar density to that reported, let's say, low by some of the literature and high in the literature. So my estimates would be very general in the major islands of vegetation that are left. Then you can add them up to get an idea of how many jaguars there might be in Costa Rica. But as I said before, if hunting is going on you could have no jaguars even in these islands of vegetation.

Q. Since CITES has been signed and since the Nicaragua war stops all the illegal trade across the border, and even though in the face of declining habitat, do you think jaguar numbers are static, or are they going down, or are they increasing ...?

• Vaughan. I don't think anyone really knows but I think that probably some of the potential

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habitat areas are probably almost without jaguars. I think that an increase in the last four or five years of reports of damage or depredation on cattle is probably an indicator that the animals may be getting crowded into submarginal habitats, or they've just decided that they are going to make a go of it out in destroyed and deforested areas, even in the presence of man, which I think in general they try to avoid. So I would say in general that probably the problem is continuing and increasing for the species.

Q. It's that the problems are increasing?

• Vaughan. Yes.

Q. But not the jaguar.

• Vaughan. No, I don't think jaguar numbers are increasing at all.

Q. So, you would be in favor of maintaining its status as an endangered species?

• Vaughan. Yes, I think there is no doubt, and most biologists or people who have been out in the field in Costa Rica, believe that the jaguar is, the largest predator in the country, and it definitely needs absolute protection.

Q. One last question, if some economic value could be attached to the jaguar, such as an object of sport hunting, which would give it some protection, or as a valuable product, do you think that might cause the conservation community and the rural people to give it more protection than it's got now?

• Vaughan. First of all, Costa Rica is very conservative, conservation speaking, and I think public opinion ... people would be outraged at the idea of sport hunting of a species which is probably very much on the decline. Secondly I don't think there is anywhere in the country, at the present time, unless you're talking about some large private farm where hunting would be allowed. Most of the areas with jaguars on are national parks protected in some wildlands unit. Third, I think in general the jaguar populations are so low throughout Central America that we can't afford to lose them and their gene pool. So I think every jaguar probably has it's limitless value, and it's priceless. I think we need all of them. If there are problems they should be captured and they should be taken to some new site or they should be kept in a zoo, and we should determine their genetic variability. For management the first thing we have to do within a wildland area where there is a jaguar population is to try to catch them and determine how inbred they are, and what their genetic variability is in general, and then decide if we're going to have to do some sort of management. Which could be, as I've proposed in some meetings ... which could even include insemination. It could include moving jaguars from one site to the next. Although we lack a lot of information in this area of biogeography and genetic theory, we are fastly approaching the day when there are going to be so few jaguars within wildland areas because the areas are too small and the populations of the animals are getting low, that we're going to have fathers breeding with daughters, or mothers

COSTA RICA - VAUGHAN

breeding with sons, or brothers and sisters interbreeding. I think for any population, that's not a very sane, or not a very healthy situation. So we definitely have to do research on the animals, and I don't think that under the present circumstances you should even discuss sport hunting of the species.

Q. Well thank you very much, Chris.

Interview by Dr. Wendell Swank with Sr. Santiago Billy Gatard, Ecologist, with assistance of Sr. Edgard Adando Ecator Ortiz (translator). Instituto Nacional forestal, ciudad de Guatemala, Guatemala. Phone: 720746. Date: July 31, 1986.

Portion of the country covered by the respondent:

Mainly the Petén Department, northern Guatemala.

* Swank. Does your country (or area of country) have wild jaguar populations?

• Billy. Yes, there are jaguars in Guatemala, mainly towards the north of the country, in Petén.

* Swank. Are jaguars in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Billy. There has been a stable population for the last 5 years, I would say. The population has been maintained because of the political situation. This has avoided an increase in human pressure. Today the pressure is less than what it used to be and skin prices have gone down. Today a skin will cost between 100 and 150 quetzals, which is not very high.

* Swank. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Billy. We cannot say that at the present time the jaguar is an endangered species. It is threatened. But in approximately five years it will be in danger of extinction, if adequate measures are not taken.

** Ecator. That is, that at the present the jaguar is not an endangered species, it is a threatened one.

• Billy. Yes, threatened.

* Swank. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat?

• Billy. Well, habitat destruction ... always.

* Swank. What type of destruction, or modification or curtailment of habitat is taking place?

• Billy. Well, cutting and burning of forests in order to plant beans and corn.

** Ecator. Also timber exploitation.

* Swank. Where is this occurring?

• Billy. North of Petén.

GUATEMALA - BILLY

* Swank. In what area of the jaguar's distribution?

• Billy. In the southern part of it's habitat. The north is still well conserved. But each year, from south to north, the habitat is being destroyed, and the jaguar moves further north each time. And also the presence of Mexicans in the north who come in and hunt jaguars.

* Swank. Is there over utilization for commercial purposes?

•• Ecator. That is, when we talk of over utilization, that means that a species is not only used for internal consumption, but is over hunted for commercial or other purposes. Do you believe there is something like that?

• Billy. Yes, for commercial purposes.

•• Ecator. But is there over utilization or not?

• Billy. Well, we cannot say that ... No.

•• Ecator. You do not consider the jaguar to be over exploited in Guatemala?

• Billy. No.

•• Ecator. That is, it is under normal hunting pressure?

• Billy. For commercial purposes.

•• Ecator. But not quantitative.

• Billy. I don't think they have reached this point (over exploited) yet.

* Swank. What is your estimate for the off take of jaguars for all purposes for the years 1980 - 1985?

• Billy. I don't know, but, it is all commercial.

•• Ecator. One hundred percent commercial.

* Swank. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

•• Ecator. Yes, the law "ocho setenta" (8-70, a hunting law), that totally prohibits hunting and traffic of jaguars. But this law is not respected.

* Swank. Are these limitations by season, numbers, areas, etc.?

•• Ecator. There is total protection. Taking jaguars is prohibited all year round.

* Swank. Are these laws effective?

•• Ecator. No. They are not effective, because there are not enough authorities and personnel for control.

* Swank. Upon what data are the limitations of harvest based (population estimates, past harvest numbers, age/sex ratios)?

• Billy. No. There is nothing of that sort.

•• Ecator. That is, nothing like that exists.

* Swank. Is there an effective system to limit or restrict the export of jaguar skins in your

GUATEMALA - BILLY

country?

- Billy. Yes and no. We have the CITES, it has been decreed a law, the law 73-79 .
- Ecator. It is a law that provides for the CITES treaty.

- Billy. But this law is not effective.

* Swank. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

- Billy. No. There is nothing like that.

* Swank. Is an approval from the country of import required prior to the issue of an export permit?

- Billy. Yes.

* Swank. Is there any evidence that legal taking of jaguars for export is facilitating or encouraging illegal taking?

- Billy. No.

* Swank. Is your country a member of CITES?

- Billy. Yes.

* Swank. Does Guatemala have in place an effective management authority and scientific authority?

- Billy. Yes.

• Ecator. At this moment Guatemala has two members, a scientific authority and a management authority. The scientific authority is the boss of national parks, and the administrative authority is the general manager of INAFOR.

* Swank. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

- Billy. I know one that is called comoyote (?) . It's a worm that gets under the skin and produces infections. It is possible that it could limit populations a bit, but it would be minimal. However it does exist, I've seen jaguars with tumors, infections. It exists, but in what proportion does it limit populations?, I don't know.

* Swank. Are there any published or unpublished reports on these problems?

- Billy. No.

* Swank. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

- Billy. Inadequate.

* Swank. The laws are adequate, the enforcement ... inadequate?

- Billy. Yes, correct.

* Swank. Is the law adequate, but it is not enforced?. In other words, if the law was

GUATEMALA - BILLY

enforced...?

•• Ector. This law, at this moment, is not effective for the control of taking of jaguars, and other animals. This law is very bad.

• Billy. Laws are inadequate.

* Swank. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

• Billy. Habitat destruction, is the main factor that limits jaguar distribution, but contraband hunting is another important factor.

* Swank. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base your conclusions?

• Billy. Yes, but they have not been published. I wrote them and I will give you a copy, these are points of view on the jaguar's situation and what could be done to save it or maintain a stable population.

•• Ector. At this time Billy wrote several reports on jaguar populations. Last month he wrote about the wild jaguar populations in Petén, this is the only place in Guatemala where there are good jaguar populations. The area is sub-tropical forest which is a very good habitat, very good feeding for jaguars. But at this moment the illegal traffic with Mexico and Belize is a problem for wild jaguar populations.

* Swank. People from Campeche ...?

•• Ector. Yes, Campeche, Tabasco,

* Swank. People in Mexico say that jaguars are very abundant in the north of Guatemala (Petén), and many of the live jaguars that move into Mexico come up out of Petén.

•• Ector. Yes, there also is the illegal commerce, with Campeche. Tabasco and Chiapas, and also with Belize, ... however with Belize very little

• Billy. No, with Belize there is no traffic.

•• Ector. Because the population of jaguars in Belize is good, Campeche no, Tabasco no, and Chiapas I don't know.

•• Ector. Yes.

• Billy. Now the populations are good in Guatemala: Laguna del Tigre, the San Pedro river basin up to "Río Azul", sierra La Condor. In southern Guatemala the population is decimated, so it is now in danger of extinction. It is also endangered in Alta Vera Paz (?), north of Quiche. Along the Pacific coast there are only a few individuals. Some five to ten individuals more or less.

* Swank. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for it's protection and management?

GUATEMALA - BILLY

• Billy. Yes, definitely, yes. We could permit controlled legal hunting which would render enough funds for a long term management, that is, a synergetic management; which would allow a possibility for conservation. Legal hunting does not exist at the present, but it would be good to legalize it, and each year allow ten jaguars to be hunted, which in turn would bring the possibility of money for protection.

•• Ecator. For example in the United States you pay 100, 200 or 300 dollars for hunting. The Petan is good for establishing such an area for hunting the jaguar.

* Swank. How many square kilometers does this area have?

• Billy. About twenty thousand square kilometers.

* Swank. Is this hunting going to be for the whole Petén, or just this reserve?

•• Ecator. No. At this moment this area is not a reserve. Only a small portion of the Petant is national park. But at this moment no reserve has been established, but this place is very good for establishing a refuge for jaguar protection.

* Swank. In Mexico in 1986 twenty permits for hunting jaguars were issued, And they charge two thousand U.S. dollars per permit, for non-residents.

•• Ecator. Here everybody is hunting without a license, that is the problem.

•• Ecator. What possibility is there of receiving help from your institution to establish a refuge for the jaguar?

•• Ecator. Here the problem number one is there is no price for hunting, the problem number two is that at this moment the people are not conscious for the protection of jaguars, and the problem number three is the law, no hunting prohibitions.

* Swank. Are populations of jaguars in your country maintaining themselves or expanding?

• Billy. They are maintaining themselves.

* Swank. What are the sizes of areas occupied by such populations?

• Billy. About twenty thousand square kilometers.

* Swank. Do you have an estimate of the populations, either numbers or density?

• Billy. I believe there are approximately about five hundred left.

* Swank. 500 jaguars in the country?

• Billy. Yes, I think so, more or less.

• Billy. In Petén there is a little town (In Carmelitas) where last year (1985) a hundred jaguars were killed.

* Swank. In the one village they shot one hundred.

• Billy. Yes, last year.

* Swank. Then you estimate five hundred in Petén. What about the central portion?

• Billy. In all central Guatemala there may be a hundred, more or less.

GUATEMALA - BILLY

* Swank. One hundred in the central part of the country; and the southern part, in the Sierras?

• Billy. On the coast there is nothing. Only here, where there is a bit of mountains, maybe only ten jaguars. These numbers are the minimum estimates. I believe there might be more, but I don't know, I hope so.

* Swank. What is the basis for this estimate?

• Billy. The estimate is based on hunting, and in the field studies, on tracks.

* Swank. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

• Billy. No.

* Swank. Do you know of other studies on the status of the jaguar that have produced information that you consider scientifically sound and reliable?

• Billy. No.

* Swank. Who conducted this study in Guatemala?

• Billy. Well, only myself, because I have had experience in the field.

* Swank. When was the study conducted, and over what period of time?

• Billy. Well, I have been here five years, but not working specifically on the jaguar all the time.

* Swank. Do you have names and addresses of resident scientists or naturalists who could provide additional information on the jaguar?

• Billy. No.

* Swank. End of the interview.

GUATEMALA - IBERRA

Interview by Dr. Wendell Swank with Jorge Ibarra, Director of the National Museum. National Museum, Guatemala City, Guatemala. Date: July 30, 1986.

* Q. So your grand grand father said that 60 years ago there were jaguars all over Guatemala.

• Ibarra. There were jaguars in the departments of Escuintla, Retalhuleu on the coast, but in the jungles; especially in Escuintla jaguars were very common, but that was the situation of the jaguar in those years. But people began to kill and it is an endangered species.

* Q. What about Central Guatemala?

• Ibarra. We don't have any information about the situation, or I mean, about the existence of the jaguar in that area. The only information we had was in Petén and also the very few places of department of Izabal in the north east.

* Q. Are there clearings of the forest, or other habitat modifications going on that affect the jaguar?

• Ibarra. I don't know about that really, because the people that have that information are associated with some of the institutions of agriculture. What we do in the museum is give ideas, to make suggestions in the newspapers, in the magazines and also in the museum.

* Q. Do they have any wildlife programs in the schools that they teach the children about wildlife?

• Ibarra. No. I don't think so, there is nothing like that. There was a journal, the journal I had, that was distributed to many schools really. Unfortunately I was not able to continue with that work.

* Q. Do they teach wildlife here in the universities?

• Ibarra. Well I understand that there is a university that is specialized in biology, and I understand that when they teach biology they are interested in ecology and the protection of wildlife, in one university, I don't know if the others are doing the same.

Interview by Dr. Wendell Swank with Lic. Luis Villar, Biologist, Centro de Estudio Conservacionista Universidad de San Carlos, Ave. de La Reforma 0-63 zona 10, Guatemala. Phone: 310904. Date: July 31, 1996.

Portion of the country covered by the respondent:

North. El Petén - Izabal.

Q. Does your country (or area of country) have wild jaguar populations?

• Villar. Yes, but small.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Villar. Less abundant.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Villar. Endangered.

Q. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat?

• Villar. Yes, all of them.

Q. What type of destruction, or modification or curtailment of habitat is taking place?

• Villar. Deforestation, crop development, contamination.

Q. Where is this occurring?

• Villar. In the whole region.

Q. Over what portion of the jaguar's range is this occurring?

• Villar. Over all of it.

Q. Is there an over utilization of jaguars?

• Villar. Yes. Hunters are taking them, primarily to sell the skins, for commercial purposes.

Q. What is your estimate for the annual average off-take of jaguars for the years 1980-1985?

• Villar. I don't have the data.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Villar. Yes, to limit the take.

GUATEMALA - VILLAR

Q. Are these limitations by season, numbers, areas, etc.?

• Villar. They are total. Jaguars are protected.

Q. Are these laws effective?

• Villar. No.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Villar. No.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

• Villar. No.

Q. Is an approval from the country of import required prior to the issue of an export permit?

• Villar. I'm not sure.

Q. Is there any evidence that the legal taking of jaguar for export is facilitating or encouraging illegal taking?

• Villar. No.

Q. Is the country a member of CITES?

• Villar. Yes.

Q. If so, does it have in place an effective management authority and scientific authority?

• Villar. Yes.

Q. Do you know of any diseases or parasite conditions that limits or has limited jaguar populations?

• Villar. No.

Q. Are there any published or unpublished reports on these problems?

• Villar. For Guatemala, I don't know.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Villar. Somewhat adequate.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat adequate, or inadequate?

• Villar. Inadequate.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

• Villar. Yes. Specially illegal trade, contraband and furtive hunting.

Q. From the information you have, or from personal experience, what would you rate as to

GUATEMALA - VILLAR

the first important, second important and third important cause in depressing the jaguar population in your country or area?

• Villar. In their order: destruction of habitat, over utilization and ineffective enforcement of laws.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Villar. No.

Q. Do you have an estimate of the populations, either numbers or density?

• Villar. No, I don't. But I believe the density is very low.

Q. What is the basis of this estimate?

• Villar. On field data obtained through interviews with local people (campesinos).

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

• Villar. No, I don't know.

Q. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base any of your conclusions on the jaguar?

• Villar. I don't have reports.

Q. Do you know of other studies on the status of the jaguar that have produced information that you consider scientifically sound and reliable?

• Villar. No, I don't.

**Interview (written response) by Wendell Swank with Mr.. Rodney W. Saubers,
Chief of Project, Defense Mapping Agency, Inter American Geodetic Survey,
Honduras Project. 30 June, 1987**

- Q. Does your country have jaguars?
- Saubers. In Honduras, yes. Jaguars do exist.
- Q. Are jaguars, in your opinion, more abundant, less abundant, or about the same as they were five years ago?
- Saubers. Less abundant.
- Q. What is the basis of this opinion?
- Saubers. There are incursions into the habitat of the jaguar on a continuing basis, hence I can only assume that the population is on the decrease.
- Q. Do you consider the species "endangered", "threatened", or neither, under the definition of the Endangered Species Act?
- Saubers. At present, threatened.
- Q. What are the major causes for the present status of the jaguar?
- Saubers. I would consider the commercialization of skins as the most important factor. People who live in and near jaguar habitat look towards revenue from skins as a source of subsistence. It is difficult to say how many are taken each year. I am not at present in the vicinity of jaguar haunts, but if the practice is as it was ten years ago, I would guess about 150 skins annually. Destruction of habitat is the second factor. Cutting of the forest for cultivation occurs on a continuing basis. A cleared area, planted and harvested, will produce crops only one or two years, after which the farmer must move on to a new forested area and repeat the process. Over the broad leaved forest about ten percent of the habitat is gone. This is likely to continue indefinitely, until little habitat for the jaguar exists.
- Q. Are there regulations or laws to limit or restrict the taking of jaguars in Honduras.
- Saubers. Yes, but just how effective enforcement of these laws are is difficult to say. I do feel that the restrictions against selling of hides has had a most beneficial effect. However, if one wants a jaguar skin and knows a local authority with a few monetary units he can provide a skin within a few days. . . which is the extent of the enforcement of regulations.
- Q. Is there an effective system to limit or restrict the export of skins out of Honduras?
- Saubers. I understand that there is a reciprocal agreement in effect to confiscate skins that are shipped into other countries, such as the United States, but I do not know if such is enforced in neighboring countries in Central America.
- Q. Is there an effective tagging or marking system to control the export of jaguar skins out of Honduras?

HONDURAS - SAUBERS

• Saubers. None that I am aware of.

Q. Is Honduras a member of CITES?

• Saubers. I don't know.

Q. Do you know of any diseases or parasites that limits jaguar populations?

• Saubers. I am not aware of any.

Q. Would you consider the regulations in Honduras to be adequate?

• Saubers. The regulations are adequate, the enforcement, I would consider as not adequate.

Q. Are there other manmade or natural factors which would cause the jaguar to become endangered or threatened?

• Saubers. Although not yet done, roads traversing the habitat areas are going to be made. When that comes to pass we can look upon an accelerated decrease in jaguar populations.

Q. Based on your knowledge, could you rate the causes in depressing the jaguar population in Honduras?

• Saubers. At present the immediate cause is commercialization. If a dollar is to be gained, the hide will go. In the long term, invasion of the habitat for agricultural purposes, invasion of roads into eastern Honduras.

Q. Would legal hunting supply sufficient monetary return to government and local people to provide an incentive for protection and management of the jaguar.

• Saubers. You have to be kidding! Honduras is not a country well-disposed towards disciplinary control or enforcement of game regulations. Government has neither the trained personnel nor resources to execute regulatory practices.

Q. Are there jaguar populations in Honduras that are increasing or maintaining themselves?

• Saubers. I think they are decreasing, and at a rapid rate.

Q. Do you have an estimate of population densities?

• Saubers. No.

Interview by Dr. Wendell Swank with Dr. Antonio Landázuri, Director de Flora y Fauna Silvestres (Flora and Fauna Wildlife Director) and Staff, (Staff present and assisting in interview were: Antonio Martínez Guerrero, Antonio Vargas, Miguel Angel Hernández, José Mario Reyes, Fernando Vseovanini R., Vicente Velázquez Noguerors, Jorge Mendoza, and Roberto Arteaga.). Rid Elba No. 20, pliso 8. Mexico D.F. 06500. México. Phone: 2869353. Date: July 21,1986.

Portion of the country covered by the respondent:

The whole country, in general, but particularly southern Sinaloa, Nayarit, Jalisco, Oaxaca, Chiapas, south Tamaulipas, Veracruz, Tabasco, Campeche and Quintana Roo.

Q. Does your country (or area of country) have wild jaguar populations?

• Landazuri. Yes.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Landazuri. Less abundant.

Areas in which the jaguar population has remained stable in the last 5 years are Quintana Roo, northwestern Yucatan, most of Campeche, and Chiapas. Areas where they are moderately reduced include Tabasco, Oaxaca, Veracruz, northwestern Guerra, western Michocan, most of Jalisco and southern Sinaloa. Areas where they are very reduced include areas along the border of northwestern Yucatan and northeastern Campeche, central Veracruz, Michocan and central Guerrero.

Q. What is the basis for this opinion?

• Landazuri. This is based on the observations of our field staff, their contacts with local people, ranchers, reports of biologists and scientists.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Landazuri. Threatened.

Q. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat? If so, what type of destruction, or modification or curtailment of habitat is taking place?

• Landazuri. Increased cattle production activities and clearing of land for agriculture.

MEXICO - LANDAZURI

Q. Where is this occurring?

• Landazuri. In all of the country where the jaguar occurs, but particularly in Campeche and Quintana Roo.

Q. Over what portion of the jaguar's range is this occurring?

• Landazuri. Mainly in the southeastern part of Mexico.

Q. How long is this type of change likely to continue?

• Landazuri. Probably will continue indefinitely, and likely to increase.

Q. Are there comparable changes that are expected to begin within the next several years?

• Landazuri. No drastic changes but a gradual increase. In some areas oil exploration has increased access.

Q. Is over utilization of the jaguar occurring?

• Landazuri. Guided illegal hunting is probably the primary reason for over utilization, but commercial utilization by local people, that is to sell the skins, is probably a close second.

Q. What is your estimate for the annual average off-take of jaguars for the years 1980-1985?

• Landazuri. In the last 5 years in Mexico 66 jaguars have been legally taken and it is estimated that the annual total illegal take is 200 animals.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Landazuri. Yes. A hunting season exists and quotas are set for various areas. Any other taking is illegal, however permits may be issued by the Department of Natural Resources to take cattle killing jaguars.

Q. Are these limitations by season, numbers, areas, etc.?

• Landazuri. Yes. Records show that permits issued have varied from 28 in 1976 to two in 1968. Since 1966 251 permits have been issued, including 1985. In 1985 20 permits were issued. Eight people reported kills, four reported no kill and eight did not report back. (Records were unavailable for 1982 and 1984).

Q. Are laws regulating the take of jaguars effective?

• Landazuri. Only partially. We do not have sufficient personnel to control illegal taking of jaguars.

Q. Upon what data are the limitations on harvest based?

• Landazuri. Legal quotas are set by this Department and are based on past harvest data and estimated existing population levels. Prior to setting quotas meetings are held with biologists, local associations of cattle raisers, and others interested in the resource.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

MEXICO - LANDAZURI

• Landazuri. Yes. Sale for export is prohibited. Permits are issued for animals legally taken by hunters. Permits are checked by customs officers. There are some skins smuggled out of the country.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

• Landazuri. The skins are not marked. The export document is a paper certificate issued to the hunter.

Q. Is an approval from the country of import required prior to the issue of an export permit?

• Landazuri. No.

Q. Is there any evidence that the legal taking of jaguar for export is facilitating or encouraging illegal taking?

• Landazuri. No. There is evidence that some persons are soliciting hunters who hunt without permits.

Q. Is the country a member of CITES?

• Landazuri. No. Consideration is now being given for Mexico to become a member.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

• Landazuri. No.

Q. Are there any published or unpublished reports on these problems?

• Landazuri. No.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Landazuri. Adequate.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat adequate, or inadequate?

• Landazuri. Adequate. However there is evidence that jaguars are being killed, skins are sold, and smuggled out of the country.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

• Landazuri. No. The major problems are clearing for cattle ranching and agriculture activities.

Q. From the information you have, or from personal experience, could you rate three of the above as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

• Landazuri. 1st. Destruction of habitat, 2nd. over utilization due to illegal hunting, and 3rd. some taking due to depredation on domestic livestock.

MEXICO - LANDAZURI

Q. Would you briefly describe reasons for order in which ranked.

• Landazuri. 1. Clearing of land for ranching and other agriculture activities is widespread and accelerating.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Landazuri. Potentially yes. This could provide a considerable amount of revenue, however those who make laws and policies for government would have to allocate those funds for the protection and management of wildlife for such a program to become effective.

Q. Are the populations of jaguars in your country maintaining themselves or expanding?

• Landazuri. I have described the status previously when we discussed distribution.

Q. Do you have an estimate of the populations, either numbers or density?

• Landazuri. Only in Campeche, and only rough estimates. We estimate 1 jaguar per 400 sq. km there.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

• Landazuri. No.

Q. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base any of your conclusions on the jaguar?

• Landazuri. I will provide you information on the number of hunting permits issued for the last 20 years. And a copy of the Mexico Federal Hunting Law.

Q. Do you know of other studies on the status of the jaguar that have produced information that you consider scientifically sound and reliable?

• Landazuri. No.

Q. What are the names and addresses of resident scientists or naturalists who could provide additional information on the jaguar?

• Landazuri. Prof. Miguel Alvarez del Toro.

Instituto de Historia Natural de Chiapas.

Tuxtla Gutierrez, Chiapas.

Interview by Dr. Wendell Swank with Daniel Navarro, Biologist, Center of Investigations for Quintana Roo. Apdo. postal 886, Cancun, Quintana Roo, Mexico 77500. Phone: 99235790. Date: July 27, 1986.

Portion of the country covered by the respondent:

State of Quintana Roo.

Q. Does your country (or area of country) have wild jaguar populations?

• Navarro. Yes.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Navarro. No information.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Navarro. The state of the jaguar in Quintana Roo is threatened. It is not endangered here. It has good habitat in Quintana Roo.

Q. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat?

• Navarro. This is the most important factor influencing the jaguar population. Protection of critical habitat is extremely important.

Q. What type of destruction, or modification or curtailment of habitat is taking place?

• Navarro. Slash and burn agriculture is detrimental, but clearing for cattle is worse.

Q. Where is this occurring?

• Navarro. This is occurring throughout Quintana Roo.

Q. How long is this type of change likely to continue?

• Navarro. For some time. Government is encouraging cattle development.

Q. Are there comparable changes that are expected to begin within the next several years?

• Navarro. The rate of clearing will increase.

Note: Daniel Navarro felt that cattle development is more detrimental to the jaguar than slash and burn agriculture. His basis for this conclusion was based on the quick recovery of the habitat once the area cleared for crops was abandoned, whereas an area cleared for cattle ranching was

MEXICO - NAVARRO

maintained in a grassy state. Also large areas were cleared for cattle as carrying capacity is low, and a lot of area per cow is required. Also there is frequent conflict because jaguars do take cattle.

Q. Is part of overutilization due to commercial hunting?

• Navarro. There is over utilization. The number taken is exceeding production. The killing of jaguars is done as opportunity is presented. This is primarily for sale of skins. Many people carry 16 g. shotguns. This is not illegal.

Q. What is your estimate for the annual average off-take of jaguars for the years 1980-1985?

• Navarro. No idea.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Navarro. Jaguars can be only taken with a permit. The normal practice is to kill a jaguar if it is taking cattle without a permit.

Q. Are these limitations by season, numbers, areas, etc.?

• Navarro. Yes. I have no idea about how many permits are issued for Quintana Roo.

Q. Are these laws effective?

• Navarro. We have good laws, but enforcement is not effective. There are persons in Quintana Roo who guide hunters and trap and sell live cats.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Navarro. I don't know. I know an export permit is required, but I also believe skins are smuggled across the border.

Q. Is the country a member of CITES?

• Navarro. No.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

• Navarro. No.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Navarro. I don't know.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

• Navarro. Accidental road kills.

Q. Can you cite evidence?

• Navarro. I have records of road kills of jaguars in Quintana Roo.

Q. From the information you have, or from personal experience, could you rate three important causes in depressing the jaguar population in your country or area?

• Navarro. 1st. Is habitat destruction, no doubt about it !.

MEXICO - NAVARRO

2 nd. Over utilization.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Navarro. No. I don't think so. We need a strategy of management for the jaguar, which we do not have. We need more studies, and a change in attitude. People kill jaguar because they want money for food.

Q. Are there populations of jaguars in your country maintaining themselves or expanding?

• Navarro. I don't know about expanding, but we do have populations that are maintaining themselves.

We are setting aside 500,000 hectares in the southern part of the state, and an area of similar size around Tulum. We have good populations of jaguars in Quintana Roo, and we have time to make plans and develop programs to manage the jaguar. In Quintana Roo we are planning for more tourism, but the activities of our tourists are concentrated along the beaches. We just need more consideration for the jaguar and other wildlife, and the people are becoming more aware of the value of wildlife.

Q. What are the sizes of areas occupied by such populations?

• Navarro. These areas are of good size, both in the southern part of the state, and also close to Belize.

Q. Do you have an estimate of the populations, either numbers or density?

• Navarro. No.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

• Navarro. Yes. Shalor's, Quigley's and Rabonowich's studies; but you have that information.

Interview by Dr. Wendell Swank with Dr. Bernardo Villa R., Professor of Biology, Instituto de Biología, National Autonomous University of Mexico. Apdo. Postal 70233, Mexico, D.F., Mexico. Phone: 011525 ext. 4908. Date: July 23, 1986.

Portion of the country covered by the respondent:

All of Mexico.

Q. Does your country (or area of country) have wild jaguar populations?

• Villa. Yes. Formerly our country had jaguar populations in big numbers. At one time there were good populations in Sonora, Chihuahua, and Tampico. Those populations are now gone.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Villa. Less abundant, definitely. The population has been reduced all over Mexico.

Q. What is the basis for this opinion?

• Villa. I have been working with mammals in areas where jaguars were formerly abundant, particularly in Vera Cruz, Chiapas and Yucatan, and my observations have been disappointing. I also have students working in the field, and have talked with people living in rural areas who work in the field and forests and they all say the population is going down.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Villa. In some areas, particularly northern Mexico the species is endangered. In the southern part, Lacandron area, Chiapas, Guerrero and Campeche, they are threatened.

Q. If you believe the jaguar to be either endangered or threatened what is the major cause?

• Villa. Destruction of habitat.

Q. What type of destruction, or modification or curtailment of habitat is taking place?

• Villa. Clearing for farming and ranching, opening of roads, all are factors.

Q. Where is this occurring?

• Villa. Pretty much through out the range of the jaguar.

Q. Over what portion of the jaguar's range is this occurring?

• Villa. This is going on in Campeche, Quintana Roo and Chiapas.

Q. How long is this type of change likely to continue?

MEXICO - VILLA

• Villa. Mexico is changing rapidly, and this is likely to continue.

Q. Are there comparable changes that are expected to begin within the next several years?

• Villa. Yes. The human population in Mexico is increasing at a great rate, and this will require the use of more land.

Q. What about over utilization?

• Villa. This is the second most important cause of population reduction; jaguar skins bring high prices, so there is great pressure by local people to kill jaguars and sell the skins.

Q. What is your estimate for the annual average off-take of jaguars for the years 1980-1985?

• Villa. Very difficult to tell. In the southeast I would estimate 20, all illegal. I have no estimate country wide.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Villa. Yes. We have very good laws.

Q. Are these limitations by season, numbers, areas, etc.?

• Villa. Yes. It is illegal to kill jaguars without permits, and few permits are issued.

Q. Are these laws effective?

• Villa. No. Unfortunately the laws are not effective due to lack of enforcement. The country is big, and we have few people to enforce the laws.

Q. Upon what data are the limitations on harvest based?

• Villa. I do not know.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Villa. Yes. The government is trying to stop smuggling of skins out of the country, especially close to Belize.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

• Villa. I do not know of any.

Q. Is an approval from the country of import required prior to the issue of an export permit?

• Villa. I do not know. An export permit is required to take a skin out of the country.

Q. Is there any evidence that the legal taking of jaguar for export is facilitating or encouraging illegal taking?

• Villa. Perhaps. People get so much money for jaguars that they try to kill them.

Q. Is the country a member of CITES?

• Villa. No.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

• Villa. No.

MEXICO - VILLA

Q. Are there any published or unpublished reports on these problems?

• Villa. None that I know of.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Villa. Regulations are good.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat adequate, or inadequate?

• Villa. The effectiveness of the regulations are inadequate because there is little enforcement.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

• Villa. New roads are going into some areas that were road-less, which increases accessibility and accelerates development. This is taking place particularly in Chiapas.

Q. From the information you have, or from personal experience, could you rate three of the above as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

• Villa. 1 Habitat destruction, 2 over utilization.

Q. What are your reasons for order in which ranked?

• Villa. Habitat destruction is accelerating because of pressure on the land brought about by increase in human population.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Villa. No. There is an insufficient number of people in enforcement, and money coming in from licenses and natural resources in Mexico does not go back into organizations responsible for management. It goes into the general treasury.

Q. Are there populations of jaguars in your country maintaining themselves or expanding?

• Villa. Populations in parts of the state of Chiapas, particularly next to Guatemala, may be maintaining themselves.

Q. What are the sizes of areas occupied by such populations?

• Villa. These are large areas; several thousand square miles.

Q. Do you have an estimate of the populations, either numbers or density?

• Villa. No.

Q. What is the basis of this estimate?

• Villa. My own observations, that of students, ranchers, timber managers and others.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

MEXICO - VILLA

• Villa. No. Such numbers are very difficult to obtain.

Q. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base any of your conclusions on the jaguar?

• Villa. No recent reports.

Q. Do you know of other studies on the status of the jaguar that have produced information that you consider scientifically sound and reliable?

• Villa. I know of the studies being conducted by Marcelo Aranda at San Cristobal de las Casas and Daniel Navarra at Cancún.

Interview by Dr. Wendell Swank with Jaime Marcelo Aranda Sanchez, Biologist, Instituto Nacional de Investigaciones sobre Recursos Biológicos (National Institute of Investigations on Biotic Resources). Calle Real de Guadalupe No. 55. San Cristóbal de las Casas, Chiapas. México. Phone: (967) 82247 and 82302. Date: July 23, 1986.

Portion of the country covered by the respondent: South-East.

Q. Does your country (or area of country) have wild jaguar populations?

• Aranda. Yes. There are wild jaguar populations.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Aranda. In my opinion the jaguar population has diminished in the last five years, mainly due to the fact that the tropical forest areas are being reduced, and that uncontrolled hunting of the animal is still taking place.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Aranda. I consider the jaguar to be endangered.

Q. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat?

• Aranda. Destruction, modification and curtailment of habitat is one of the reasons.

Q. What type of destruction, or modification or curtailment of habitat is taking place?

• Aranda. The tropical forest is being changed into artificial grazing lands and into crop-lands.

Q. Over what portion of the jaguar's range is this occurring?

• Aranda. Mainly over the Center, South and South-East areas of Mexico. That is, from Sinaloa to Chiapas and from Veracruz to Quintana Roo.

Q. Is over utilization of the jaguar, for commercial, recreational or depredation control purposes, occurring?

• Aranda. I do not have precise information, but during the course of my investigation, since the middle of 1984 until the middle of 1986 I have known of six jaguars killed in Chiapas (which of course was not the total number). Of those six, two were killed for commercial purposes, although in casual encounters, and four were killed for depredation control.

MEXICO - ARANDA

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Aranda. There is the Ley Federal de Caza (Federal Hunting Law) and the Calendario Cinegético (Cynegetic Calendar) which appears every year in the Diario Oficial de la Federación (Federal Official Journal).

Q. Are these limitations by season, numbers, areas, etc.?

• Aranda. The limitations are by season, number and area.

Q. Are these laws effective?

• Aranda. I believe they are not effective; on one hand because the laws are obsolete, and on the other, because there is a lack of personnel to enforce them, for which they are practically ignored.

Q. Upon what data are the limitations on harvest based (population estimates, past harvest numbers, age/sex ratios)?

• Aranda. As far as I know, the limitations on harvest do not have any scientific or technical basis.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Aranda. No. In general there is no effective system to limit the exchange of jaguar skins.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

• Aranda. The export of wild animals' skins is prohibited by law.

Q. Is there any evidence that legal taking of jaguar for export is facilitating or encouraging illegal taking?

• Aranda. Not as far as I know. Illegal taking of jaguar exists independently from legal taking.

Q. Is your country a member of CITES?

• Aranda. No. As far as I know.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

• Aranda. No, I don't.

Q. Are there any published or unpublished reports on those problems?

• Aranda. I do not know.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Aranda. I consider them inadequate.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat adequate, or inadequate?

• Aranda. I consider it inadequate.

MEXICO - ARANDA

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

• Aranda. I believe there are no other factors affecting jaguar populations.

Q. From the information you have, or from personal experience, could you rate three of the above, as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

• Aranda. The main causes that are affecting jaguar population in Mexico are: a) destruction, modification and curtailment of habitat; b) inadequate regulations and lack of enforcement of same, and c) excess hunting.

Jaguar has shown its adaptability in being able to live even close to man as long as its habitat is conserved, so this is probably the most important factor. In Mexico, thousands of hectares of tropical forest are cut down every year to turn them into crop and cattle land, even in those cases where the soil may not be adequate for these purposes. On the other hand, wild-life has never been seen as an important resource; therefore, laws are obsolete, they have no technical basis and there is no trained personnel. Because of this, the jaguar is hunted throughout its whole range all year round, with no regard to sex or age. Any person who has a chance to hunt a jaguar will do it without restrictions.

Q. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base any of your conclusions on the jaguar?

• Aranda. I can mention:

Rzedowski, 1978. Vegetación de México. Limusa. México.

Leopold, S., 1965. Fauna silvestre de México. IMERNAP. México.

Alvarez, et. al., 1984. Mamíferos de la Angostura, región central de Chiapas, INAH, México.

Alvarez, M., 1985. Así era Chiapas. UNACH, Chiapas, México.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Aranda. The jaguar is an animal for which a sport hunter would pay a good amount of money. Furthermore, there are some places in Mexico which have relatively important jaguar populations, which well managed could provide an attractive solution for their conservation. In other words, I believe legal hunting could provide sufficient monetary return, but only in some areas of the jaguar's range, and only after serious studies on the matter have been done.

Q. Are there populations of jaguars in your country maintaining themselves or expanding?

• Aranda. In some areas of Mexico the populations of jaguars are maintaining themselves, in others they are diminishing, but they are not expanding in any place in Mexico.

Q. What are the sizes of areas occupied by such populations?

MEXICO - ARANDA

• Aranda. I do not have information on all the country. In the state of Chiapas, the jaguar occupies approximately an area of 10,800 km² (1,080,000 ha.); which is approximately 1/5 (one fifth) of the area it occupied in Chiapas 50 or 60 years ago.

Q. Do you have an estimate of the populations, either numbers or density?

• Aranda. For the state of Chiapas I have estimated a population of around 450 to 750 jaguars.

Q. What is the basis of this estimate?

• Aranda. The study I am presently undertaking on the status of the jaguar in the state of Chiapas.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

• Aranda. I don't know of any that have been done in Mexico.

Q. Do you know of other studies on the status of the jaguar that have produced information that you consider scientifically sound and reliable?

• Aranda. Not that have been done in Mexico.

Q. What are the names and addresses of resident scientists or naturalists who could provide additional information on the jaguar?

• Aranda. Dr. Daniel Navarro. CIQRO. Apartado postal 886. Cancún, Quintana Roo.

**Interview by Dr. Wendell Swank with Miguel Alvarez del Toro, Zoologist,
Instituto de Historia Natural. Apartado postal 6, Tuxtla Gutierrez, Chiapas México.
Phone: 23754 , 29943. Date: July 24, 1986.**

Portion of the country covered by the respondent:

State of Chiapas, Mexico.

Q. Does your country (or area of country) have wild jaguar populations?

• Alvarez. Yes.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Alvarez. Less abundant every year.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Alvarez. Endangered.

Q. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat?

• Alvarez. Habitat curtailment and destruction.

Q. Where is this occurring?

• Alvarez. In the whole state.

Q. For what purposes are jaguars being taken?

• Alvarez. Commercial, recreational and depredation control purposes.

Q. Do you have an estimate for the annual average off-take of jaguars for each of the above for the years 1980-1985?

• Alvarez. No.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Alvarez. Yes. Jaguars are not to be killed.

Q. Are these laws effective?

• Alvarez. No.

Q. Upon what data are the limitations on harvest based (population estimates, past harvest numbers, age/sex ratios)?

• Alvarez. Empirical and calculated.

MEXICO - DEL TORO

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Alvarez. No.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

• Alvarez. No.

Q. Is an approval from the country of import required prior to the issue of an export permit?

• Alvarez. Export permits are not issued.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

• Alvarez. No.

Q. Are there any published or unpublished reports on these problems?

• Alvarez. No.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Alvarez. Inadequate.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat adequate, or inadequate?

• Alvarez. Inadequate.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

• Alvarez. Colonization of wild lands.

Q. From the information you have, or from personal experience, could you rate three of the above as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

• Alvarez. Habitat destruction, first, commercial hunting, second and human invasion of wild areas third.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Alvarez. Yes.

Q. What are the sizes of areas occupied by such populations?

• Alvarez. They are smaller all of the time.

Q. Do you have an estimate of the populations, either numbers or density?

• Alvarez. No.

Q. What is the basis of this estimate?

• Alvarez. Experience in the field.

interview by Dr. James G. Teer with Professor Dimas M. Botello L.,
 Secretaría de la Dirección Nacional de Recursos Naturales Renovables
 (Renewable Natural Resources National Direction). Administrative authority for
 CITES, and who is in charge of applying the Convention rules. Paraíso
 Corregimiento de Ancon. Apdo. 2016. Dirección de Recursos Naturales
 Renovables. Panamá City. Panamá. Phone: Office: 32-4325. Home: 282416. Date:
 August 25, 1986.

• Botello. About the status of Felis onca, the jaguar. Apparently, some time ago the
 Secretaría (Secretaryship) (IUCN) had employed someone to study this; this was in 1984 and the
 person employed was Mr. Melquist. Apparently the results were not as good as expected by the
 Secretaría de la Convención (Convention Secretaryship). And now we have received a note signed
 by Mr. Abdulio Mainly (July 21, 1986) who asks for our cooperation with the WTMU that is, the
 Wildlife Trade Monitoring Unit (from England) who are the ones that apparently are going to
 continue the study started by Melquist.

Q. But did he get the study done?

• Botello. Melquist did a study.

Q. Here in Panamá?

• Botello. Yes. He came and asked us and we sent him the information. But apparently, as I
 understand, he did not finish it, or the results were not as expected, and a new study is being done.
 That is, here it says: "As you know, the report on the Felidae, prepared by Melquist in 1984, is
 incomplete, since it does not take into account the past and present trade in that species "That is,
 he did not take into account what had and is being done in reference to commerce of the species.
 That is why the WTMU has been contracted to complete or finish what he started. Also, a series of
 felids, including 13 of the ones that were being solicited, only four of them exist in Panamá. The
 other species are not found in Panamá; these are Felis pardalis, Felis wiedii, Felis tigrina and
Panthera onca. This is the list of the ones that are found here.

Q. Does your country have wild jaguar populations?

• Botello. Yes, they are quite dispersed in the country, mainly in the area of Darién

Q. Mainly in the area of Darién.

• Botello. Yes, Darién is the area where they are more abundant, and here in the basin area,
 that is, the metropolitan area which includes the provinces of Panamá and Colón, including the
 Soberanía National Park and the Chagre Park. But the the greatest populations of Felis onca is
 found in Darién.

PANAMA - BOTELLO

Q. And on the other side, the western side of Panamá?

• Botello. In some other cases, in Boca del Toro at the province of Chiriquilla (?) next to Costa Rica where the proposed Parque de Amistad lies.

Q. In your opinion are jaguars more abundant, less abundant or about the same as they were five years ago?

• Botello. Well, in Panamá we really don't have exact data because population studies have not been done; at the moment we're trying to get funds for a population study. However, based on experience, on conversations with people of the area and on conversations with hunters, my personal opinion and that of most of the Department, is that it is diminishing. Everyday there are less jaguars due to several reasons, mainly habitat destruction. Deforestation is exhausting the habitats and as habitat is destroyed populations diminish. On the other hand, hunting is also an important factor. Our people see felids not as something to conserve, but as an enemy. These are the main factors that are taking this species towards total extinction.

Q. Hunting then, is for fear of the animal?

• Botello. Yes, it is because of fear.

Q. Not for commercial reasons?

• Botello. It cannot be for commercial reasons because in Panamá the commerce of any species is prohibited by law. In Panamá we do not allow anything to go out for commercial reasons only for scientific purposes. If there was anything commercial, it would have to be it through "zoo criaderos" (breeding facilities), and at this moment there is no company registered for these purposes. Which means that any exportation that has been or is occurring in Panamá. is illegal. Exports have occurred; we have received reports of exports when we did not export anything. It did not come out of our office; it went out illegally but Panamá was registered as the country of origin.

Q. Would you have any data on how many animals are being taken through hunting in a year?

• Botello. Well, since 1984 we do not have the information. But from 1983 back, apparently, according to our estimate of kills, from 40 to 80 were taken annually. This was estimated by the amount of skins confiscated. The skins were confiscated from places where they were sold, and from them we obtained an approximate annual average between 40 and 80 animals killed. However, from 1984 on, we have found very few cases. For example, last year, from hunting activities, only two were caught, and both of them came from Darién. Not too long ago they killed a mother to sell the skin, and they took one of the female cubs. Today that little jaguar is in the Jardín de Somi (?) (Somi Garden (?)) and we're keeping it there to enlarge the gene pool of the species.

Q. Then you are collaborating with Somi?

• Botello. Yes. At Somi there is what we call CEPEPE (Centro de Preparación de Especies

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Panameñas en Peligro de Extinción) (Panamanian Preparation Center for Endangered Species). Felids are in that group; moreover, breeding cages are being built for the reproduction of these cats, mainly for Felis concolor, Felis wiedii and Felis onca. Here in Panamá we have the luck, I would say, right there in Somi, we have an over-population problem.

Q. In captivity?

• Botello. Yes, in captivity. Sometimes we have to separate them because in one cage we have up to 12. In several countries they have not been able to get the animals to reproduce in captivity. Here we even have to separate them. However, this has not been achieved with wiedii nor with pardalis. These have been more troublesome, but with Felis onca we haven't had any trouble. On the contrary, we have over-populated cages.

Q. Haven't you thought of re-introducing them?

• Botello. That is something that we have in mind, but I'm against the way in which it has been thought to be done. I say that to re-introduce a felid species of this type which is domesticated after certain time of captivity and loses its natural fear of people, I think that if they're set free near populated areas they are going to tend to stay near these areas because they are not wild. That is one thing. On the other hand, I say that in order to set free, or re-populate with these animals, first a study of prey abundance should be done, because if we are going to set them free without knowing the abundance of prey available, as they look for food they are going to get close to populations and may hurt the people. So, in the same way as a study of Felis onca is done to re-populate, a parallel program to study it's prey should be done, in this case maybe the neque (?) or the rabbit. And we should breed them too, and set them free at the same time, so that they will have something to eat. Because if we're going to set them free, there is going to be competition between the ones we let go and the ones that are already there.

Q. You said before that you are not confiscating as many skins any more. Do you think it is because of population changes? Or can you tell us if you think the population is threatened or endangered?

• Botello. Well, the population of Felis onca, as I said before, is in danger of extinction. But I also think that the reduction in hunting or in confiscated material is due to the supervision that we are doing. At the present time the Fuerza de Defensa (Defense Force) has established a Dirección de Protección Forestal (Forestral Protection Administration) in all the country. So now there is more cooperation from the Defense Force towards those people who violate the law. Before ten years ago, if you went to the public market you would find all sorts of wild animals for sale. Now that is prohibited by law. So hunters do feel certain fear by hunting without a permit, although at the present hunting is prohibited in Panamá.

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Q. So there are regulations and laws?

• Botello. Yes, there are regulations. There are laws that prohibit hunting..

Q. At the present time?

• Botello. Yes, there are several legal documents that prohibit hunting, for example the decree Nº 23 (January 30, 1967) that prohibits hunting, buying or selling wild animals, for meat or alive, no matter what species. This means that all wild animal trade in Panamá is prohibited. Also the decree law Nº 39 on forest resources, which is commonly known as La Ley Forestal, which also prohibits hunting (Article 64). We have a resolution, 1002 of 1980, which establishes 82 endangered species. Among these 82 species of amphibians, reptiles and mammals, are the six felid species of Panamá. And recently (July 30, 1986) resolution 1003 was published, where again it was emphasized that commerce of all wild vertebrate animals is prohibited in Panamá. Which means that in Panamá hunting is banned by law.

Q. In your opinion would you say that the laws are effective?

• Botello. Well, I am sorry to say that most of the laws are obsolete; moreover, there is one in which the sanctions are minimal compared to the ecological damage that is infringed; you can see that there are some that date from the year 1967. In those days things were very different compared to today, almost 20 years ago. This is why the department is presently re-examining a new law for fauna, which at the present is in its first stages. This law will try to summarize all other laws on the subject, so as to make it easier and faster to execute. In the last four years there have been some changes in law enforcement; however, in spite of all this there are still some flaws.

Q. Changing the subject a bit, could you give an estimate of the populations, or density. Could you say that there is one for every hundred km² in Panamá, or less than one for every hundred km²?

• Botello. Well, that is a question that is very hard to answer. Incidentally, it is a question that we've asked ourselves several times, and it has been the incentive to try to get funds to undertake a population study, at least in some areas, especially in those areas where there is a great variety of wildlife. It is useless to do a study in the degraded areas, for example, in Darién, this part of the canal basin. This is why we want the study to come through, because we're working without a legal document that explains that this is like this for these reasons.

Q. Maybe later you could show us on a map where these studies are going to be done?

• Botello. Yes.

Q. Do you have any information on diseases or parasites that could be affecting these animals' populations?

• Botello. Well, in the Ministerio de Desarrollo Pecuário (Cattle Development Ministry) and in

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what relates to Sanidad Animal y Vegetal (Plant and Animal Health) that is in Cuarentena Agropecuaria (Agriculture and Cattle Quarantine). They have the information. We don't use this kind of data. Also you may talk to Dr. Gale who is the veterinarian of Panamá. Do you know him?

Q. Yes, as a coincidence, we were speaking to him this morning, before coming here.

Q. Are there other man-made or natural factors, not mentioned before, that limit jaguar populations? What other factors are there that could limit jaguar populations? We talked about hunting, deforestation, diseases ... Do you think there might be some other limiting factor that could cause them to be endangered or threatened?

• Botello. Well, yes, I could include another factor: migrations.

Q. Migration...

• Botello. Migration of what we call the settlers (colonos) people that live in the field (campesina), that go to the forested areas looking for better places to live. What they're doing is introducing themselves in these forests which as a consequence brings habitat destruction and more migration of people and of the animals that used to live there. So colonization is another factor.

Q. So in your opinion, the main causes, in order of importance, would be ...?

• Botello. The main cause is habitat destruction, in first place. Second, hunting, either for fear or to try to sell the skins. Exportation is prohibited. A hunter that kills a tiger believes that clandestinely he may receive 20 or 30 dollars for the skin.

Q. Are there centers where you can buy the skins?

• Botello. There shouldn't be because it is prohibited. Many owners of commercial establishments allege that they don't know, although it's general knowledge. So whenever we receive information, or we detect someone is selling skins, we confiscate them. It is here that we realize how many species have been killed but any place you see skins and report them, we go and confiscate them. At the moment we have about ten in there but there were around 80. We already started to burn them because since they are species that are in the Washington Convention (CITES) and are in Appendix I, their commerce is prohibited. So what we do is choose the best and take them to the library informing that what you are seeing is an ecological crime that shouldn't be done and is prohibited by such and such laws. This is done in order to make people conscious that that is prohibited. And presently I have in mind putting together an exhibition for the airports indicating to tourists that this species, or any product or sub-product of the species is prohibited, so that they will not buy it. So I have saved some to make this exhibit, not only of felids but also of all other wildlife that is protected in Panamá. In this way we'll try to avoid the buying of skins by tourists who allege that they don't know. It is possible that in some establishments they may have some of this type of merchandise hidden, and they might buy it. They then have trouble when they return to

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their country because they won't have a certificate that says that that species left the country legally.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Botello. It is prohibited by law. Legal authorization to hunt does not exist, therefore, there can not be an incentive.

Q. Yes but thinking of the future ... if there were, or if there is large enough jaguar populations to allow legal hunting, do you think that here in Panamá there would be a way to create the incentive..?

• Botello. It could not be permitted if Panamá continues being part of the Convention, because jaguars are included in Appendix. I of the Washington Convention. That convention regulates all the species that are included in this appendix. In order to be able to put into commerce an animal that is included in this appendix, it would have to be the product of two generations. No company will want to do this because it takes too long. They want something fast, and with this they would have to wait ten or twelve years. So what we have thought of is of exchanging with zoos, if of course, the zoo that we're thinking of exchanging with is authorized by that country. For example, if Spain asks for a jaguar, a zoo in Spain, its petition must be accompanied by a note of the administrative authority of Spain that says that that jaguar will be used for scientific purposes in a zoo, but not for commercial reasons.

Q. Is there a compensatory program for the campesinos if a jaguar kills one of their animals?

• Botello. No, we haven't thought of that because that would promote the killing. We tell them that hunting is prohibited, and whoever is found hunting is sanctioned.

Q. Can you cite publications or reports or any information on the jaguar in your country?

• Botello. Well, there is a book, I don't know if you know it, it's about the principal mammals of the country written by Dr. ...(?) Mendez. The book is a bit old, but the changes have been few. It was edited in 1970, and it talks about all the main hunted mammals of Panamá.

Q. Does it have anything on the jaguar?

• Botello. Yes, all the felids are in there or most of them. It has a description of their distribution, their teeth, where you can find them, what species it belongs to.

Q. Would it be possible to get a copy of this? Or maybe photocopy the part on the jaguar?

• Botello. Well, you can photocopy it, but I would recommend you speak to Dr. Mendez, who is one of the experts on the matter, and he might have a book to donate or sell.

Q. I tried to phone him but I couldn't reach him.

• Botello. He is one of the most knowledgeable persons on this subject, here in Panamá and this book is very sought after.

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Q. Do you know of any other studies that have been published?

• Botello. No. Here in Panamá?

Q. Yes.

• Botello. No, I did speak with Eduardo López-Pizarro from Costa Rica, and he has a book on felids. I think last year or this year, he went to a seminar on the status of the jaguar. I think it was in Brazil; he was invited...

Q. In Manaus, Brazil?

• Botello. Yes, it was there..

Q. And here in Panamá, do you have the name of some other scientists, other than Dr. Mendez, with whom we could speak?

• Botello. About felids?

Q. Yes, particularly the jaguar.

• Botello. Well, other than Mendez, there is Dr. Gale, whom you also know ... and I'm not sure if at the University there might be someone else ... I don't think so, specifically in felids, I don't think so. Here, the person who knows most on this subject is Dr. Mendez.

Q. Well I think that with this we finish the interview. Thank you very much.

Interview by Dr. James G. Teer with Dr. Nathan B. Gale, D.V.M., United States Army, Department of Defense. Panamá Audubon Society, Scientific Chairman, Centro de Propagación de Especies Panameñas en Vías de Extinción (Center for Propagation of Endangered Panamenian Plant and Animal Species). Panamá Canal Zone. Date: August 25, 1986.

Q. Dr. Gale, does your country have wild populations of jaguars? In the wild, still remaining in the wild?

• Gale. Yes, yes, definitely.

Q. Could you tell us, generally, in what part of the country they occur?

• Gale. Almost certainly the Atlantic watershed, from the continental divide, to the Atlantic coast. Both in eastern and western Panamá there are a few jaguars, I don't know how many. But there are some figures that I can give you.

I suspect that the jaguar on the Pacific slope has been exterminated with the possible exception in the Mount Pirre Tilde the area in eastern Panamá near the Colombian border.

Q. Are they in your opinion more abundant, less abundant or about the same as they were, say, five years ago?

• Gale. Less abundant, I have some information I think that corroborates that.

Q. Do you have printed documents or publications where there have been field studies made of populations, or are these anecdotal observations, or...?

• Gale. They're all anecdotal, I know of no field studies that have been done with the exception of a very brief study that I did in the Fortuna area in western Panamá in the highlands about eight years ago. And that wasn't to ascertain the numbers of jaguars, it was data that we were collecting for the World Bank, and it included mammal population in that particular area.

Q. Was there to have been some development to be done there?

• Gale. There was and has been. That's where they built the Fortuna Dam with the hydroelectric complex.

Q. What is your opinion of the status of the jaguar in Panamá? Endangered, threatened, numerous?

• Gale. None of the above...

Q. None of the above?

• Gale. As I say, most of the information comes from anecdotal data. I know for instance that, I know four or five cattle ranchers, who up until six or seven years ago were reporting that they were losing one or two head of cattle annually until those animals were killed. I still know the same cattle ranchers and we still talk, and they say the jaguar in their area was eliminated. They're not losing

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cattle from the jaguars. And this is mostly in the central Atlantic watershed, in areas contiguous to the former Canal Zone.

Q. If we supply you with some kind of map, could you trace off in a general way where you think the jaguar still occurs and give some relative ideas of numbers?. If you were to use density levels of one per 100 mi² or one per 50 mi² or km², which ever way. Less than one per 500 km². Could you make some estimate on those kind of values?

• Gale. I wouldn't want to attempt to. I think that would be implying information that no one has...

Q. It's not available. I must say, Nate, that everybody that I've asked this question, responds in the same way. They say, well, that's being presumptive. Nobody knows that.

• Gale. I think we could show on a map where there are still some areas where jaguars have been killed in the last couple years.

Q. Okay.

• Gale. That wouldn't be difficult.

Q. I'd very much like to get that kind of information. We're trying to, as best we can, from people who have experience try to trace off where there are still remaining populations of one size or another.

Q. What has been the major cause of loss of jaguars in Panamá? I've listed several things here: hunting, loss of habitat, simply people protecting their livestock from depredations, you know, they have jaguars taking cattle. So what, in your estimation, has been the major cause of loss?

• Gale. Construction of roads.

Q. Roads?

• Gale. That's the first thing that happens. The extension of the Inter-American Highway, and then the lateral roads that take off from that. The construction of a road to build a pipe-line, an oil pipe-line across the Isthmus of Panamá, finished about four years ago, opened up an entire new area that had never been opened prior to that just suddenly. The extension of the Panamerican highway from Chapo. Well, Chapo is nineteen miles east of Panamá City, an extension of that road now another 150 miles in the last four years. It's completely changed the environment. Tremendous change.

Q. I guess this allows people to get in and start agriculture...

• Gale. The first thing, of course, that happens, inevitably, is the logging industry comes in and removes everything that it can. And then the campesino moves right in with them, or behind them, and then in three years it turns into a cattle ranch. And the logging in itself is enough of a turn to chase the big cats out.

Q. It's loss of habitat.

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• Gale. And it's loss of habitat perhaps first, or maybe just disturbance from all the equipment that came in, or both. Or when they build a highway here in Panamá, when they built the Inter-American highway, they cleared forest for, I think, 200 yards on each side. So they cut 400 yards, approximately, right straight down through the jungle to let the ground dry out so they could have a better road bed. But as I say, along with that in came the logging industry and the cattle industry. And logging and cattle industry are incompatible with the big cats. It's quite basic.

Q. So the jaguars are almost obligate to pristine forested areas, and if you destroy a forest you've lost your habitat.

• Gale. You've lost the habitat that the animal needs if it's going to remain not in conflict with the agriculturalist, and then if any cats still remain in that area and you move cattle in, why of course that cat is also lost very quickly.

Q. Are there laws and regulations in Panamá that govern hunting of cats, or jaguar in particular. And also, are there laws that regulate the importation and exportation of animal products?

• Gale. There are no Panamanian laws that protect the large cat if it is in pursuit of domestic animals. Panamá attempts to enforce the Endangered Species Act and also the CITES convention.

Q. They're signatories to CITES?

• Gale. Signatories to the CITES convention. However, up until very, very, recently they had neither vehicles nor personnel to really police the entire country.

Q. That's almost a universal problem in Latin America.

• Gale. Well, U.S. AID gave them vehicles this year, some vehicles. I think fifteen motorcycles and five or six trucks.

The forest personnel, I believe, are being better and better trained. Some of them are very enthusiastic, and there is a potential for something very good to happen here. But civil service employees in a country such as Panamá do not have the same kind of guaranteed protection that civil service employees in the United States would have. And I think many decisions made by RENARE personnel are mitigated by the knowledge that maybe next year they'll have a new boss that might then have a different philosophy.

Q. Let me ask you a question about this matter of taking jaguar for protection of domestic livestock. Do you believe if there was some economic value to, let's say, hunting of jaguar, or for any purpose, that the ranch people would be more predisposed to protect it?

• Gale. No, I don't think so. I don't think that any economic value accrued from something like that would ever filter down to the man who has lost a cow. I see nothing at all that says that a little campesino that only has two or three cows, or a horse, was ever going to get compensated by that, as you suggest, hunting revenue. No, that's not conceivable.

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Q. Is there any kind of traffic or trade in spotted cat skins, or in particular jaguar skins in Panamá? Where the campesino can take a skin and have some market for it?

• Gale. Yes.

Q. Yes.

• Gales. It's not legalized, but still being done. There is also a source of income for them in bringing young animals in for sales. Up, including this year, I've seen an average of two kittens, two jaguar kittens sold here in Panama City each year for probably the last five or six years. Sooner or later I hear of all of them, I'm certain the mother, of course, has been killed. It would be interesting to speculate how many others were killed. Obviously, a good percent of the population of males and the other half females, they're certainly not selective to kill just to bring the babies in. The ones that I see are not siblings so I'm confident that there is a good number of cats, both male and female, that are killed each year. I don't know whether the incentive is the thought that they'll get something from the hide. I suspect that it's sort of a serendipitous thing. They're out hunting and they see a cat and they kill it. If it's a female they bring the babies in too, sooner or later, into a place like El Valle, which is an Indian market place, about 90 miles from here. Or they bring them here because they know that I'm interested in them.

Q. Is there any information or any known traffic where skins are being sold to some central person or organization for shipment out?

• Gale. That has some real political ramifications. There is, out near the airport a hide, a tannery, a tanning company. It's reputed that hides, crocodilian hides, come through there from Colombia. Now, the accusation is that from there the hides probably go into the Free Zone, where they're exempt from any Panamanian regulations. Whether that is true or not, I'm not going to say. That same place tans cat hides, so those cat hides may also be leaving here, again through the Free Zone. This is all, what is the disclaimer you say? If you ask me I said this, I'll deny it. You understand what I'm saying.

Q. I understand, yes.

• Gale. There is also a small tanning company that makes purses and things like that in an area here in Panamá City called Canal Viejo, and that man has had some kind of protection for many years. He operates fairly openly. He tans cat hides and crocodilian hides. He is doing less now than he used to, and he is an old, old gentleman. And I hope that when he goes out of business that he will quit all together, and that perhaps no one else would take it up. But this place is, of course, well known to RENARE. So is the hide facility, hide tanning facility, out near the Ríos Airport. Both of those have some type of protection. The protection is pretty well known, but I don't want to discuss that.

Q. Have there been any studies of scientific value, field studies, on jaguar in Panamá, in the

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last ten years?

• Gale. No.

Q. Simply nothing.

Q. Do you know of any literature that might be useful to us in trying to describe the decrease of jaguar numbers over the last fifty years?

• Gale. Certainly not. There are no such documents.

Q. How do you consider the role of disease, parasites, in jaguar populations?. Is it important in wild populations?

• Gale. No. From the standpoint of veterinarian's knowledge, I wouldn't think so. These cats have adapted very well to their environment for generations, and they're in good symbiotic association with their parasite load. It's only when they get into some kind of a marginal problem, obviously, when they come in captivity, there is some stress, and then we see some parasite problems. But the parasites that I know that the young cats have had when I've seen them should be of no consequence in the wild.

Q. I see. That's the general opinion that I've been getting where ever I've asked that question.

Q. The final question that I have, then you may want to make some comments to anything you've said. Do you consider the present population of jaguar, unknown as it is, to be still declining? Is it still being lost in terms of numbers, distribution?

• Gale. With circumstantial evidence, I'd have to say yes. And that circumstantial evidence is based upon the fact that, as I already stated, roads are being extended into areas that for the last few years had been good jaguar habitat. From what we know of what the cats need in the way of protection and food, and following those roads, as I said, logging and cattle industry moves in. And until that is halted, or even reversed, I can't see any reason at all to be optimistic about jaguars.

Q. Well, thank you very much, Dr. Gale. If you have any other comments you'd like to make about the jaguar, and about this survey, I'd be pleased to have them.

• Gale. Yes, let me give you a little more information, or elaborate upon what we've already said. I know cattle ranchers near the Zone, here, near the central area of Panamá, near the Isthmus. And one man in particular, a veterinarian, who is losing cattle every year to jaguars, up until about five years ago, and he would shoot or poison a cat until the cattle losses that year stopped, and then the following year there would be another one that would move in. I asked him the other day when Carol had called and suggested that maybe this would be the gist of your inquiry. He has had no jaguars bothering his cattle for the last five years. The implication is that he certainly eliminated the cats that were bothering him, and that no new ones are coming in, and they were coming in from his property to the east on the Atlantic coast, in the area where ... Well they were coming in from the area east of

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Colón along the coastal mountain area, the Atlantic coastal mountain area. So I'm convinced and he is too that there have been no jaguars moving in there. A group of Audubon Society members, eight years ago, saw a single cat here in this zone .out on the pipeline road, an area of about 26 thousand hectares ,I think it was. It's now set up as a national park. Hunters, also at that time in that area, reported enough sightings, so I suspect that about eight years ago there may have been three jaguars in the area I know there are certainly two because the sighting that was made by the Audubon group, about two days later, and about 12 miles apart, there was another jaguar, seen be a fellow who was exercising with his Beagle dog. And I know that cats can move quite a bit but I don't think that it's unrealistic to think that there are at least two cats in there. Those cats haven't been reported for about eight years and people still go out on that same road, probably even with greater frequency, and campesinos are moving in peripherally on that property too. I suspect those cats are no longer there. I, two weeks ago, was in western Panamá, on the Atlantic watershed, on a new road that goes into Chirqui Grande and we talked to some Indians in there about cats. They knew that ocelots, margays and another cat called jaguarundi are still fairly common there, and pumas; but they said they saw fewer and fewer jaguars in that area. They're still coming in as young cats as of this year even.

Q. Where is this national park? Is it here in this zone, you say?. Or are you talking about the side?

• Gale. Soberanía National Park, is the one here in this zone. And I've been offered, this is the young cats, I think in the last four years I've been offered two each year. There was also one up at El Valle, the Indian market place I don't know what happened to that one. I never saw that one. It may have been misidentified. It could have been an ocelot. Admittedly some of the figures that people get on jaguars and ocelots, particularly talking about young animals, there is a misidentification of the animal, quite definitely. I've seen that happen quite frequently here. I've seen pugmarks of jaguars in the very end, but that's also eight years ago, in an area that has now been very heavily logged and cattle ranching has been moving into it. So, I think, any place in Panamá where cattle ranching has encroached upon the jaguar, the jaguar has come out second best. I suspect that there still may be some out in the mountainous areas and on Peninsula. We think there are some in Tacacuna Range and Mount Tigre area in eastern Panamá near the Colombian border, and I suspect that there are a few in the Atlantic coast range in western Panamá, again on the Atlantic side. But housing communities are moving into these areas as well, and I think the inevitable outcome is going to be less and less habitat satisfactory for jaguars.

Q. Thank you very much Dr. Gale.

• Gale. You are more than welcome.

Interview by Dr. James G. Teer with Ira Rubinoff, Director, Smithsonian Tropical Research Institute, and James Karr, Deputy Director. APO Miami, 34002.
Date: August 25, 1986.

Dr. Karr is an ornithologist who has been working down on the pipeline road and has had wide experience in tropical ornithology.

* Teer. Jim, let me ask a couple of questions that came up in our conversation, that might be repeated. You were saying that mammals generally and birds, and lots of other vertebrates are increasing since the CITES convention went into effect.

• Karr. No, what I'm saying is that I started working on the pipeline road in 1967, and at that time there was very high hunting pressure from two sources on the pipeline road: Panamanians who came in mostly for meat, and Americans associated with the canal operation who went in for sport and meat. With the passage of the Canal Treaty and the implementation of that treaty in 1979, hunting levels decreased. I have been living on the pipeline road for a couple of weeks a year, twice a year for two years. In the middle and late seventies it was not unusual to hear many gun shots every night. Now in two weeks out there we usually don't even hear one gun shot. So that gives an idea of how much the hunting pressure has declined.

-- Rubinoff. It became a national park in 1970.

• Karr. That's right, the area became a national park. Before, it was a military reserve that was used for jungle training and testing for the U.S. military. Then it was opened when it wasn't needed for those activities, for hunters. It was declared a national park as many of the lands associated with the canal reverted to Panamá in 1979. The Government of Panamá did a reasonably effective job of... well, it certainly did a very effective job of reducing hunting. It's probably impossible to bring it to zero, to stop them hunting out there, but it's very much down. Since 1979, I've seen appreciable increases just in the frequency of sightings of cats and the the frequency of sightings of cat droppings and cat track.

* Teer. Including jaguar?

• Karr. Including jaguar. For the first time ever in the last twenty years, we've had an observation of a mountain lion this year out there. Ocelots and margays and jaguarundis are not uncommon. I know of several sightings of jaguars in the last ten years out there and of a couple of sightings of cats where it's not quite clear whether they were ocelot or jaguar because the people that were making the observations didn't know what to look for or how to tell, and I've kind of been able to interpret them. But things like howler monkeys and white-faced monkeys, coatimundis, peccarys, deer, agouties, rabbits, are distinctly increased, and the animals are distinctly tamer. Ten years ago, if you saw a monkey troop on the pipeline road where I live, as soon as they saw you, they would be in a straight line in the opposite direction. Now they will spend two or three days feeding in

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- Karr. That's the problem.
- * Teer. Not enough personnel out in the rural areas to implement...
- Karr. Just about, really, just about every thing is protected, I think, relatively few things that aren't.
- * Teer. Are there laws that provide for hunting?
- Karr. There aren't seasons, for example, there is no informed development of seasons. Reproductive seasons and things like that.
- Rubinoff. There are laws that restrict the number of birds that can be caught of a certain species.
- Karr. I think maybe the an-tail pigeon in western Panamá, might have some... (?) or may be it has a season, I'm not sure.
- Rubinoff. There is a closed season on iguanas.
- Karr. That's right, there is a closed season on iguanas.
- * Teer. Are there any kind of utilization projects, such as for paca or where they're trying to raise paca or capybaras?
- Karr. Smithsonian has a project supported by the UpJohns Foundation to look after cultivation of both paca and iguana. And the paca project is an effort to bring the paca into semi-domestication so it can be used as a barnyard type, chicken. The iguana project is an effort to increase survivorship to yearling size for a subsequent release into the wild -wild populations and then provide an incentive to local landowners to maintain sort of a habitat to harvest those iguanas.
- Rubinoff. We can talk about that project in Washington. We have some slides over there and we could take a look at it them
- * Teer. I'd like to.
- Karr. The iguana project has found ways of attracting iguanas to lay eggs in artificial chambers, and instead of getting the normal 40 % of hatching success that you get in the wild, there's essentially 95 to 98 % hatching success. Most of those animals, about 95 % of those animals, then reach yearling size and can then be released into the wild with growth rates that are really quite high, harvestable animals in two years if we keep them, and animals, interestingly, that reproduce in a period of two years. In the wild they tend to have to live much longer than that before they get large enough to reproduce.
- * Teer. Do you have any information ... Do you know of any studies, or any kind of reports or documents that relate to jaguar in Panamá?... Nothing under way now?
- Karr. Nothing. Nothing to my knowledge.
- * Teer. Thank you very much.

PANAMA - KARR

the trees around our camp with fifteen or eighteen of us living right there, 24 a day. The frequency of observations of poisonous snakes has increased tremendously. I think that is due to the fact, that if there was a poisonous snake, and it was seen by a hunter, it was dead. Now there aren't any hunters so the populations of poisonous snakes are increasing. Curassows and other large birds, especially the huntable things like quails and quail-doves, have increased in abundance as a result of protection.

* Teer. I see. Are we talking about a particular area that has been designated a national park? How much can we transpose this to other areas of Panamá? Is this generally true throughout Panamá?

• Karr. I think this was probably, if not the most, one of the most heavily hunted forest areas in Panamá until 1979. The concentration of the populations around the Canal area, Panamá City, Colón, from Panamanian citizens and the U.S. people who were stationed there at the canal, put heavy hunting pressure on that area. I don't think there would be any place in the country where the pressure would be as great as it was there. The combination of meat and sport hunting from the two primary groups.

* Teer. Do you have information on the distribution of jaguar in Panamá? Such that you could draw a map or... a range map of the species? Even though we may not know anything about the numbers, something about where it's still known to occur?

• Karr. I would bet it occurs from the Colombian border, and I know there are recent observations in the very end, there are recent observations in the San Blas, western San Blas road, and Barro Colorado island; west of the canal, on the Atlantic coast of Panamá, and given that it's essentially continuous forest all the way from there to the Costa Rican border, so I'm betting there are jaguars. I would guess that on the Pacific coast of Panamá they are very rare, except out in the very end, where there is still some good forest that crosses the full range of the isthmus. One other group that has increased in abundance, (there are more observations of, in recent years, on the pipe line road), are eagles, including both harpy eagle and crested eagles. I've had several observations of crested eagle since 1980, and at least one observation of harpy eagle, and there weren't any in the previous fifteen or twenty years, of any of those species to my knowledge in that area.

* Teer. Are there laws in Panamá to protect wildlife generally? There must be. And to regulate the export of animal products?

• Karr. Yes.

* Teer. How well are they enforced?

• Karr. I can't speak first hand knowledge about that, but I know that there are laws protecting most of the wildlife species.

•• Rubinoff. In fact they have more species on their national endangered list than what would be in the red book. Now enforcement is another issue.

Interview by Dr. James G. Teer with Dr. Eustorgio Méndez, Zoologist, Laboratorio Conmemorativo Gorgas. Apartado 6991, zona 5. Panamá. Phone: 27-4111. Date: October 9, 1986.

Portion of the country covered by the respondent:

The Panamá Isthmus.

Q. Does your country (or area of country) have wild jaguar populations?

• Méndez. Yes, the jaguar belongs to Panamá's wild fauna.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago?

• Méndez. The jaguar population definitely has decreased notoriously during the last decade.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

• Méndez. At the present time, the jaguar is threatened in most of the areas where its presence has been verified. In some places it is not "endangered" because it has already disappeared completely.

Q. If you believe the jaguar to be either endangered or threatened is it because of destruction, modification or curtailment of habitat?. If so, what type of destruction, or modification or curtailment of habitat is taking place?

• Méndez. Habitat destruction due to the felling of forest trees.

Q. Where is this occurring?

• Méndez. In certain areas of the provinces of Panamá, Colón, Dairén, Chiriquí, etc.

Q. Over what portion of the jaguars range is this occurring?

• Méndez. In the forests under great human pressure.

Q. What about over-utilization?

• Méndez. There is no statistics on the matter.

Q. What is your estimate for the annual average off-take of jaguars for the years 1980-1985.

• Méndez. Apparently there is no registered information on jaguar hunting. Very seldom a specimen is captured alive for a zoo, and occasionally it is killed for depredation control or for commercial purposes, as a trophy or to sell the skin.

PANAMA - MENDEZ

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

• Méndez. Officially the jaguar is protected by laws, but hunting activities of it and other animals are not effectively controlled.

Q. Are these limitations by season, numbers, areas, etc.?

• Méndez. There are no defined patterns, but jaguar hunting is prohibited.

Q. Are these laws effective?

• Méndez. Laws are hardly effective when they are not observed and controlled adequately.

Q. Upon what data are the limitations on harvest based?

• Méndez. Presently the commerce of wild feline and other mammals skins is very limited.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Méndez. The system is relatively effective. We don't have records of the utilization of any special marking or tagging system.

Q. Is an approval from the country of import required prior to the issue of an export permit?

• Méndez. There are legal dispositions that rule or limit the export of wild animal skins.

Q. Is there any evidence that the legal taking of jaguar for export is facilitating or encouraging illegal taking?

• Méndez. Fortunately jaguar hunting for commercial purposes is not being stimulated in the country.

Q. Is the country a member of CITES?

• Méndez. Panamá is a member of CITES. The administrative authority in Panamá is Professor Dimas Botello of the R.E.N.A.R.E.

Q. If so, does it have in place an effective management authority and scientific authority?

• Méndez. Most of the responsibility goes to the Dirección Nacional de Recursos Naturales Renovables (Natural Renewable Resources National Direction), but there is no formal plan for the species' management.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

• Méndez. Echinococcus oligarthrus and other parasites have been found on jaguar, but we do not have information on the pathology of this felid. We don't have categoric information on this respect.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Méndez. Laws would be effective if they were carried out properly. Anyhow, at the present time it seems like jaguar skin exploitation is quite controlled.

Q. Would you consider the effectiveness of the regulations to be adequate, somewhat

PANAMA - MENDEZ

adequate, or inadequate?

- Méndez. To a certain point, the effectiveness is adequate.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

• Méndez. Definitely the progressive destruction of the forests is the main cause of reduction in jaguar populations. Furtive hunting, "sport" hunting or even depredation control, are secondary factors in the reduction of jaguar populations.

Q. What are your reasons for order in which ranked?

• Méndez. This judgement is based on an analysis of the situation of the jaguar based on some observed antecedents.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

• Méndez. I do not think it would be wise to encourage jaguar hunting for any purpose. In this country, the protection and management of the species should be based on a scientific strategy combined with an environmental education program.

Q. What are the sizes of areas occupied by jaguar populations?

• Méndez. We can not give any numbers (not even approximations) because the studies have not been made. If we estimate that the jaguar uses a territory of a few kilometers, the populations should also be localized in limited areas.

Q. Do you have an estimate of the populations, either numbers or density?

• Méndez. We do not have that information.

Q. What are the names and addresses of resident scientists or naturalists who could provide additional information on the jaguar?

• Méndez. Dr. Nicholas Smythe
Smithsonian Tropical Research Institute
Apartado 2072, Balboa, Panamá.

Dr. Charles O. Handley, Jr.
Head, Division of Mammals
Washington, D.C. 20560, U.S.A.

PARAGUAY - CARVALLO

Interview by Dr. James G. Teer with Sr. Oscar Carvalho, U.S. Agency for International Development, U.S Embassy, Asunción, Paraguay. Date: July 5, 1986.

Teer visited the U.S. AID office in the U.S. Embassy in Asunción. They have a very small office. Sr Carvalho met me and we discussed the sources of information on the jaguar.

He said there was really nothing available on wildlife in the country. The Biological Inventory Project holds some promise, but has no funds to speak of and is staffed largely by volunteers, American and Paraguayan. They are part of the National Parks, and apparently are the only group doing any kind of field surveys, this being very limited.

When asked about Paraguay's role in shipping contraband animal products, he was emphatic in saying it was true and well known in and out of the country. He said that skins were usually passed through Paraguay "in transit" and thus were not confiscated by customs.

Most are flown into Paraguay in light aircraft and pass on to Europe, Asia and North America.

Sr. Abraham Villalba of the Ministry of Agriculture and Cattle Raising is the only enforcement officer outside of National Parks rangers in the country. He is based in the Ministry in Asunción.

There is a Safari company operating in Asunción for outfitting and organizing hunting safaris for the Chaco, According to Sr. Carvalho. They operate tent safaris similar to those in Africa.

Interview by Dr. James G. Teer with Dan Drennan, Peace Corps Volunteer stationed in Asunción, Paraguay. Asunción Paraguay. Date: July 4, 1986.

Dan Drennan has a Master of Science degree in Vertebrate Zoology from Auburn University. He has worked in Paraguay for two years and is a biologist doing an inventory of fauna of Paraguay. He is attached to the Biological Inventory Project of Paraguay, a government agency.

Drennan is one of very few biologists doing field work in vertebrate fauna. According to him no one is working especially on the jaguar in Paraguay, and the government agencies know little or nothing about its numbers.

Q. This interview is being conducted with Mr. Dan Drennan who is a Peace Corps Volunteer in Asunción, Paraguay. It is being conducted in the Peace Corps Office in Asunción on July 4, 1986. Dan can you tell us a little bit about your background, your training, and what you do in Paraguay?

• Drennan. Sure. I have a Bachelor of Science degree from Birmingham Southern College in Biology and a Master of Science in Vertebrate Zoology from Auburn University. I'm the ichthyologist herpetologist and general catchall for the vertebrates for the Biological inventory of Paraguay which was started in 1980 as a program to survey the flora and fauna of Paraguay to find out what is exactly here. We have a museum, and specimens and ongoing projects.

Q. Although you are stationed in Asunción, you make field excursions or field trip surveys of not only the cold blooded vertebrates but also of mammals and birds, all of the vertebrate species in all of the classes.

We have to get information on the jaguar for the U.S. Fish and Wildlife Service evaluation of the status of the species. Any information you can give on the jaguar, especially any data you might have, and aside from that any information you have learned from you experiences would be most useful.

We know that jaguars do occur in Paraguay. In your opinion, are they now more abundant, less abundant, or about the same number over the years with which you are acquainted?

• Drennan. I'd say they are less abundant to a great degree because of deforestation, specially in the Oriental portion of the country.

Q. Of course, they are classified as an endangered species by several organizations including IUCN, CITES and our own U.S. Government. Do you consider them to be endangered in Paraguay or are they threatened?

• Drennan. I consider them to be endangered. On the other hand, the puma would be classified as threatened. Jaguars are definitely endangered here in Paraguay.

Q. The general information is that the jaguar has declined in numbers for the past several decades and probably is being used in many ways by local peoples and outsiders. What would you

PARAGUAY - DRENNAN

say was the most important source of the decline - the cause of the decline of the jaguar in Paraguay in the past few decades?

• Drennan. In the Oriental, the eastern section of Paraguay, I'd say it was mainly deforestation plus illegal hunting. You can see skins in the stores of Asunción. Campesinos regularly go out to hunt animals of all types, and they kill an abundance of cats.

Q. Are they hunting for commercial reasons, for sale of the skins?

• Drennan. The sale of the skins brings a lot of money. Poor campesinos take advantage of that. Plus there is a fear of large cats by people. They have the idea that they must be killed, and they go out of their way to hunt one down.

Q. Because they are afraid of them?

• Drennan. Yes.

Q. Do they also take them to protect their livestock?

• Drennan. I have not heard of any cases where the jaguar was killing livestock.

Q. Do you know roughly what a campesino would receive for an average pelt?

• Drennan. Going on what they receive on caiman skins, a year ago they were getting about a thousand Guaraníes for a caiman of about one foot. Going by that, thinking of a jaguar skin, I imagine you could get 20 or 30 thousand for it.

Q. A U.S. Dollar is equivalent to 650 Guaraníes.

• Drennan. Now, yes, but a year ago one Dollar was equal to 1000 Guaraníes. It was about 800 - 900 average.

Q. So the main causes of the decline in jaguar in Paraguay was loss of habitat through deforestation and the continuing take by campesinos for sale of skins and simply for fear of the animal.

Are there people who come to hunt into Paraguay either locals or from other countries?

• Drennan. I have not heard of any cases where strangers, foreigners, were coming in. But the military normally goes into the parks, especially the northern park and hunt illegally, or course. There's nothing you can do about it.

Q. Are the parks not patrolled or protected?

• Drennan. There are park guards and they are well maintained at times. This park is 800,000 ha and there is a few park guards. The Department of Agriculture, on the scale of the pecking order compared to the military can't do anything against the military.

Q. When the military wants to hunt they go in and hunt?

• Drennan. Right.

Q. Do you have any estimate, either from data you have gathered in your surveys or simply an educated guess, about how many jaguars are taken in Paraguay each year.

PARAGUAY - DRENNAN

• Drennan. Well all I can say is last year my counterpart and I visited a skin factory. We went into one room, a room about the size of this office, and it was full of various skins, mainly caiman skins but from the floor to the ceiling .

But also in various piles were groups of jaguar, puma, and other small cat skins.

Q. Would there be only one or two or dozens?

• Drennan. There would be a pile of three or four in one area, and maybe another pile that needs more processing - four, five, or six here. Smaller cats, larger cats.

Q. There are laws in Paraguay that prevent or prohibit the take of spotted cats.

• Drennan. Yes, it's illegal. It was mandated by the President. It is illegal to hunt, but being mandated and enforced is something different.

Q. Even though the laws are "on the books", they are not effectively used?

• Drennan. No. We are a member of the CITES treaty and the guy who was head of the Wildlife and Parks in Paraguay is a noted hunter. What would you call him? An illegal possessor of skins and black market seller of skins? He's the TRAFFIC representative also.

Q. Are there laws that govern the importation and exportation of skins, jaguar skins, in Paraguay?

• Drennan. There are good, strong wildlife laws. They are just not being enforced. We get a lot of skins from Brazil that come in here and then go out. A lot of the skins you see on the streets may be Brazilian skins.

Q. Papers published in Oryx and TRAFFIC reports state that Paraguay is a staging point or collecting point for skins from various countries in South America. From Paraguay they are shipped to Europe for processing. Do you have any information about this? Is it something that's done openly with the government's knowledge? Do you know anything about the character or size of such an operation?

• Drennan. I've never seen any illegal trading out front. But Paraguay is known for it's under-the-table maneuverings, its black market things. Only what I've read is from the World Wildlife Fund; it is a staging point. I've never seen truck loads of skins or animals like that. But talking with other scientists throughout Latin America, they seem to say Paraguay is a staging point just from what they say.

Q. Deforestation and overhunting for whatever purpose are the two major reasons for the decline of the jaguar. Are there any other mortality factors such as diseases or parasites or simply the press of settlement that are involved in the decline?

• Drennan. I don't think so. I think its a healthy population. The population has been pressured by man. Parasites are not normally high and there's no other pressure. But I have no data to back this up.

PARAGUAY - DRENNAN

Q. The present laws for taking jaguars are on the books, and they seem to be adequate. Your comment was they are ineffective; they are not carried out or enforced.

• Drennan. They are not enforced at all. You can see that in the national parks. Hunters are in there all the time. The park guards are conscientious and want to prevent hunting but what do you tell a jeep load of generals with machine guns?

Q. If legal hunting of the jaguar was made, would it be an effective source of income for people and the government to want to protect it as a valuable resource? In other words, if jaguars had some monetary value, would that itself be important in its conservation?

• Drennan. If you were to manage for jaguar nationally in this country - try to get a harvestable population - I don't think it would make any difference. There would be hunting out of season, in season, any time. It would not matter if you had a management plan or not.

Q. Do you know of any studies that have been made of the jaguar in Paraguay or Latin America, for that matter? In the past five or ten years?

• Drennan. The only thing in Paraguay is our studies, our tracks, our data records on tracks or cranium and skins. I know of no in-depth study of jaguar in Paraguay at all.

Q. As something to go along with your report, could you provide us with a map with what you know of the general distribution of the jaguar in Paraguay.

• Drennan. I could mail you one. Go through our catalogs, put some points on a map.

Q. Draw some lines even though we know they may be general.

• Drennan. Sure.

Q. Also, Dan, if we gave you four density classes, very broad, like one jaguar per 500 Km²; one jaguar per 100 Km²; one jaguar per 50 Km² and one jaguar per less than 50 Km², could you put in that kind of data even though again, we know there's no scientific studies establishing those density classes? It at least gives us some idea of what might be here. An educated guess.

• Drennan. Sure. Normally when we go out into the field we'll ask the campesinos about the animals here. We'll ask about the "jaguarte" as the name in guantese, jaguarte they'll say, usually, no. We haven't seen that for ten years. And so you get some information. They are very reliable on saying there are monkeys here and there's different snakes. So if there was a jaguar there, if they had seen it or the tracks, they would have said something.

Q. I'll leave some material for you to mail to us. Thanks for the interview.

PARAGUAY - GAUTO

Interview by Dr. James G. Teer with Ing. Raúl Gauto, M.S., Coordinator, Centro de datos para la Conservación, CC. 3303, Asunción, Paraguay. Date: July 6, 1986.

Sr. Gauto has just completed his master's degree in Resource Management at Virginia Tech University. He returned to Paraguay four months ago, and is employed by The Nature Conservancy to head up their new Center in Asunción. The Nature Conservancy has established several such centers in South America and the Caribbean to collect data on conservation needs of the regions, and to lobby for conservation needs.

Sr. Gauto's office does not yet have any data. He thinks the Biological Inventory Project has good potential for developing important data on wildlife and wild lands.

He told me that conservation was not a "real issue in Paraguay." No one seems to care and the government has no interest in it. Laws are not enforced, and Paraguay is involved very heavily in contraband of animal products.

Interview by Dr. James G. Teer with Ms. Gina Gould, Peace Corps Volunteer in Asunción, Paraguay. The Interview was held in Asunción, Paraguay. Date: July 5, 1986.

Gina Gould is one of the very few biologists conducting studies of a vertebrate species in the Chaco of Paraguay. She is working on Catagonus wagneri (taguá), a pig new to science, having been discovered in 1972. She lives in the Chaco, near Philadelphia. She has spent one year living in the Chaco and another year in Asunción and the Chaco. She was and still is associated with the Biological Inventory of Paraguay.

Q. Gina, is the Biological Inventory of Paraguay a government organization?

• Gould. The Biological Inventory was started about six years ago with a contract from the U.S. Fish and Wildlife Service, World Wildlife Fund, Peace Corps and the National Forest Service here in Paraguay. It has been taken out of the National Forest Service since April, and is now under the Technical Cabinet of the Ministry of Agriculture.

Q. Could you tell me a little about your background and what your work consists of in Paraguay at the moment?

• Gould. I have almost an associate degree in Economics, English Literature, and a BS in Zoology that I got from Oswego which is a New York State University, the only University that offers Zoology in New York.

When I was working in the Biological Inventory, basically what I did was try and organize the animal specimens, try to do distribution charts, try to get specimens, etc., etc.

Since then I have received funding from various places: San Diego Zoo; Wildlife Preservation Trust U.S., and Chicago Zoo to start a captive breeding project for the new species of pig (taguá) which is a peccary.

Q. We know that jaguars occur in Paraguay. In your opinion, are they abundant, are they scarce, are they rare, or non-existent in the Chaco?

• Gould. I've been in the Chaco for a year and have seen a jaguar by itself and less than three days ago, I saw another jaguar that was on the paved road and she was with two young.

I've had the experience with seeing tracks, of being followed, but never seeing them. The American missionaries that are down here, the ranch owners, and the Indians tell me that they have become a plague because they are attacking their domestic livestock.

Q. Do you consider them to be more abundant, less abundant, or about the same in the last five years?

PARAGUAY - GOULD

• Gould. I can't really answer that question. From what the missionaries, who have been here ten years, have told me, in the past six years their population has increased and has become a nuisance.

Q. Do you consider them endangered, Which means in danger of extinction, or threatened, which means they are likely to become endangered in the foreseeable future.?

• Gould. Here in Paraguay, I consider them endangered.

Q. Do you know what the causes of their decline in numbers over the past fifty years have been?

• Gould. Hunting. Overhunting them and also the encroachment on their environment.

Q. By deforestation and agriculture?

• Gould. Deforestation and agriculture.

Q. Are jaguars being hunted now by local people?

• Gould. Jaguars are hunted mostly by people, foreigners, that come down here to Paraguay and pay a certain amount of money and they hunt them. Anybody can hunt them. It's felt it's macho if you have a jaguar skin, if you have killed a jaguar.

Q. Is there some commercial hunting by outsiders coming in?

• Gould. Apparently when they stopped, when they changed the law in 1973-74 (I'm not really sure), hunting was cut down because jaguar skins were very difficult to pass. They were very difficult to get out of the country. So, according to the Paraguayans and the Indians, the trading and the hunting of jaguars have really decreased an incredible amount. I don't really believe that because I saw Americans that came down and were hunting jaguars to bring to the United States.

Q. Sport hunting?

• Gould. Yes, sport hunting.

Q. Do the natives hunt them for sale of the skins in organized commerce?

• Gould. The natives hunt them, but they get only about 3,000 to 4,000 Guaraníes (one U.S.\$= 650 Guaraníes), which adds up to about five to six dollars for a skin, which is really absolutely nothing.

Q. Do they hunt them to protect their livestock?

• Gould. The Indians don't because the Indians don't have livestock. The Indians only have crops. The Paraguayans - well, in the Chaco it's not Paraguayans at the Estancias. It's the Mennonites, it's the Germans, and it's the French.

Q. Do they hunt them to protect livestock?

• Gould. Yes they do.

Q. We have been told that the native people, the Indians, hunt them just out of fear? That any time they find a jaguar, they kill it?

PARAGUAY - GOULD

• Gould. Yes. But a lot of them don't have guns. One must remember that.

Q. Do you have an estimate, or any idea from your experience, what would be the offtake of jaguars in your area of experience?

• Gould. Population estimate?

Q. The numbers that are killed.

• Gould. No I really don't.

Q. Are there laws in Paraguay that prohibit hunting?

• Gould. Yes, there is a general law that says that they must not hunt any kind of wildlife.

Q. Any wildlife?

• Gould. Any wildlife, an incredibly general law. The law is not controlled. There is nobody to control it. Nobody cares; nobody enforces it.

Q. These laws also include prohibition on export of animal products.?

• Gould. Exactly. Paraguay in 1973 or 1974 signed CITES.

Q. Paraguay is a member of CITES, having signed it, the treaty?

• Gould. In 1973, I think they signed it.

Q. In your experience in the Chaco, have you run across any kind of diseases or parasites or other mortality factors that could affect populations of jaguar?

• Gould. I don't know.

Q. You haven't had any experiences with any diseases?

• Gould. None whatsoever.

Q. Do you consider the populations of most mammals in your region to be healthy in terms of diseases and parasites.

• Gould. Humans have a lot of parasites here in the Chaco and in Paraguay. I assume they affect the mammal populations. I'm working with peccaries; they affect the peccary population. As far as diseases, I'm not really sure. They have hoof and mouth, they have all sorts of diseases that affect ungulates. As far as big cats, I'm not really sure. I don't know if anybody knows.

Q. Our conversation has been based on your experience or has it been in scientific studies or data that you have gathered, or your impressions?

• Gould. My experience and my impressions. There has been very little done, and I am not working with jaguars. Nobody wants to go to the Chaco.

Q. If hunting was made legal, would it provide a stimulus for conservation of the jaguar, it being given a value to the local people?

• Gould. No. If it was made legal, no. Because the people hunt regardless. You can drive down the trans-Chaco highway where it's paved, and they hunt. It doesn't matter. They hunt anything. A lot of times I find dead giant anteaters along the road that have been killed and their skins are still

PARAGUAY - GOULD

there. They are intact.

Q. They've been shot?

• Gould. Yes. Just for the fun of killing them.

Q. In your opinion, do you think jaguars are maintaining their numbers, or are they declining?

• Gould. I would assume they are maintaining their numbers. The Chaco has a vast amount of forest. Just incredibly vast amount. Yes, it is being developed at a fast rate, but it's still all forest right at this point. They are maintaining themselves.

Q. Some say "Protected by Nature".

• Gould. Exactly.

Q. Do you know of any studies underway or that have been done in the recent past on the ecology, distribution and status of the jaguar in Paraguay?

• Gould. No. I'm the only American up there.

Q. Not only Americans. Are there any Paraguayans?

• Gould. Paraguayans, no. Foreigners, none that I know of. I would assume I would know them because everybody knows me in the Chaco. I'd assume they would get in touch with me.

Q. Would you like to comment on the possibility that Paraguay is involved in illegal trade of skins and other animal products.?

• Gould. Yes. They are involved. It's out of hand.

Q. Is it local, or individuals, organized in such a fashion by government or non government groups?

• Gould. I think it's a little of both. The native people in the Chaco, for example, know where they can sell the skins for a certain amount of money. Yes to a certain extent it's organized because I've received information from TRAFFIC, South America, that they receive 35,000 skins of kurei (collared peccaries). They sent that to me because I'm specifically working with peccary. The amount of skins of jaguars or pumas that leave this country - that amount has got to be incredible.

Q. Articles in Oryx Magazine and TRAFFIC magazine report that as many as 15,000 spotted cat skins go to West Germany each year. And most of them come out of Paraguay.

• Gould. Yes. Most out of Paraguay, and shipped to West Germany and Japan. They hunt terica, they hunt...

Q. What is Terica?

• Gould. Terica is... sorry. It's a small spotted cat. I've forgotten the English name for it.

Q. Is it Geoffrey's cat? Ocelot? Margay?

• Gould. It's the Margay.

Q. Do you have anything to add to our conversation? About the status and use and conservation of the jaguar? About some of the problems that you'd like to have on record?

PARAGUAY - GOULD

• Gould. I don't think that the Indians and I don't think that the Paraguayans, themselves or the Mennonites actively hunt the animals, the jaguar. They do if they come into their corrals and harm their domestic livestock.

But I do know they can sell them, for very little money, but they can sell them. I do know there are organizations which are I'd rather not mention that do sell - export the skins. They export them from quite a few points in the Chaco, some are military based, some are right outside of Philadelphia, some are right on the borders.

Q. Thank you very much for the interview.

Interview by Dr. James G. Teer with Sr. Hilario Moreno, Ing. Agrónomo e Ing. Forestal, Chief, Department of Management of Forests, National Parks and Wildlife, Ministry of Agriculture and Livestock, National Forest Service, Asunción, Paraguay. Date: July 7, 1986.

Q. You are the scientific authority for CITES in Paraguay?

• Moreno. Yes. We have been studying our fauna situation since 1980, through the Biological Inventory Project, and we found some species endangered like Citasados (bears), parrots, macaws, different species of Ara. Another endangered species in Paraguay is the Jacaré (Calman).

Q. Is this the new Pig?

• Moreno. No a crocodile. The government signed a decree prohibiting hunting in 1975. Total prohibition of commercial hunting. Since 1975, the government began to develop the national parks to assist the program. We now have six national parks. One of the latest of the national parks is the Parque Nacional de Defensores del Chaco for protection of the jaguar . It is here in the western part of Paraguay in the Chaco. The park was established in order to protect our wildlife; the principal species is the jaguar . My opinion is that the jaguar has increased by 300% in 8 or 10 years.

Q. Three hundred percent in 8 or 10 years? Increasing?

• Moreno. Yes.

Q. Do you consider it still endangered?

• Moreno. Well, if we begin to practice the hunting activity, maybe. Because the area where they are living now is only in the national parks. The number of jaguar is too many. Too much.

Q. Too many. Do they kill livestock, and the farmers protect their livestock by killing jaguars.?

• Moreno. Yes. They ask every day when we are to open the jaguar season. I consider total protection of the fauna must be continued for awhile because the development of agriculture livestock activity is too much. The habitat is decreasing.

Q. On the long term view, will the jaguar population go down with the decrease in habitat?

• Moreno. Yes there will only be habitat in the national parks.

Q. Hunting is not allowed in the national parks, of course?

• Moreno. No.

Q. If you did have hunting , and wildlife had a commercial value, as an animal of the hunt, would that in itself provide some reason to conserve it? Would the people protect it more and use it because it had a monetary value?

• Moreno. No, That's the reason I think the prohibition must be maintained.

Q. It must be kept as an endangered species?

PARAGUAY - MORENO

• Moreno. Yes.

Q. Is there any information, any data or reports, that I could get from your organization to help in this survey?

• Moreno. Well, we haven't any written reports about that situation we know about.

Q. Are there any studies going on at the moment?

• Moreno. Yes we are continuing our studies of the populations of every species through the Biological Inventory Project.

Q. Do you know of any factors other than hunting and loss of habitat, factors such as disease and parasites, that affect the jaguar .

• Moreno. No, only hunting and decrease in habitat.

Q. Is there any illegal trade, the selling of skins, at the moment in Paraguay?

• Moreno. Well, many people are selling skins in Paraguay. That they are hunted in Paraguay is not true.

Q. They could come from Brazil, Argentina or Bolivia?

• Moreno. Yes.

Q. Do the campesinos hunt them?

• Moreno. Yes.

Q. It's illegal to hunt them and illegal to export the skins?

• Moreno. Yes.

Q. Do you have any other information that would be useful to us in this survey?

• Moreno. Well, I don't know what more. I am sure we are protecting very well our fauna. We can not count the increase in agriculture and cattle activity areas. The only ways to protect these animals is in the national parks.

Q. Thank you very much for the interview.

Note: At at this point Mr. Moreno showed me some correspondence from TRAFFIC, USA., which reported Paraguay as the source of large numbers of contraband plants and animals, mainly caiman, being exported from Argentina. Sr. Moreno vigorously denied that the material originated in Paraguay. He believes most of the material is from other countries, but readily says that the shipments are real, and that most go to the U.S.A., West Germany and Japan.

Interview by Dr. Wendell Swank with Galo López Preciado, Ing. Forestal (Forest Engineer); Consejo Nacional de Ciencia y Tecnología, CONCITEC., Glrón Camillo Carrillo 114, Pliso 10, Lima 11, Perú. Apartado Postal 1984. Phone: 235254. Date: April 6, 1986.

Q. Are there jaguar populations in your country.

• López-Preciado. Yes. Although they have become very scarce.

Q. Are these populations as abundant, more abundant or less abundant than they were five years ago? What would be the basis for your opinion?

• López-Preciado. They are less abundant due to poaching, due to the difficulties involved in official control of the region they inhabit, and to the killing of individuals considered dangerous to livestock in big cattle ranches. The basis is my personal experience. In the Zone of Pucallpa, in central Perú, in the Amazonian Valley, by the Ucayali River, great zones of cattle ranching have replaced the forest. In these places it is easy to understand how the jaguars can come out of the jungle at night and attack the calves. In San Jorge, one of these cattle ranches, in a conversation with some of the cattle rangers they claim to kill one or two each year. They say that five to six animals visit the premises seasonally. They say they often find the jaguars' footprints, the carcasses of animals that have been killed and not eaten entirely, and that when they are satiated they hide them under fallen branches or so.

Q. Do you consider the jaguar an endangered or threatened species in your country?

• López-Preciado. I consider the jaguar an endangered species in those areas I am familiar with in Perú, due to the strong trend in deforestation.

Q. If you think the species is endangered, is it due to destruction of the habitat? What type of modification of the habitat is occurring and where?

• López-Preciado. The past government had an aggressive highway system development policy, in low and high jungle. These projects involve areas of virgin forest habitat. With a larger highway system and the development of oil exploration trends, many opportunities to penetrate the forest are building up each day. I have had recent news of people hunting jaguar in Andoas near the Ecuadorian-Peruvian frontier. In Cepaua, south of Pucallpa, they have hunted jaguar recently.

Q. What is the extent of the jaguar distribution where this is occurring?

• López-Preciado. I have no data.

Q. For how long do you expect this trend to go on?

• López-Preciado. If the necessary measures are not taken... the laws exist, but they have to be enforced.

Q. Do you expect this situation to change in the near future?

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• López-Preciado. We are living a situation of change, but we are not sure what will be the direction of this change. We expect some positive change will take place because the people involved in the administration of the resources are professionals like Marcos Romero in the Dirección General Forestal y de Fauna, Jorge Bueno, a forester, is the head of the Instituto Nacional Forestal y de Fauna; These people know their business and we expect to have a better situation in the years to come.

Q. From the social standpoint, the hunger for new agricultural land areas will grow?

• López-Preciado. The trend in forest destruction will continue. It will take many years for it to diminish. We have about 84 ecological and 17 transitional zones in Perú, a very diverse country. In the High Andean Sierra, the Inca culture was developed and today, the people there, in the highlands, are being demographically pressed out into the adjacent high jungle, where the agricultural knowledge they have is of little use in exploiting the land. They do not have the knowledge and technology. They just go in, cut the forest and start a pattern of shifting cultivation in places where the final result is landslides and erosion. This is a way of destroying the habitat of wildlife.

Q. Do you consider the jaguar to be endangered because of over-utilization for the purpose of commerce, recreation, science, education on depredation control? Do you have any figures for the last five years of jaguars killed for any of the reasons exposed above?

• López-Preciado. I do not have any data with me but I can send them. These, of course, would have to be taken as very raw data.

Q. Are there laws or regulations in your country that limit or restrict the killing of jaguars?

• López-Preciado. The Law of Forestry and Wildlife, the regulations of the Conservation Units and the Political Constitution, which does not mention the jaguar specifically, but does mention the endangered species in general.

Q. Is there any type of limitation on the take of jaguar, seasonally, number, area?

• López-Preciado. It is totally forbidden by law.

Q. Is the law effective?

• López-Preciado. No, because the areas where it lives are so large that it is extremely difficult or impossible to control. We know of illegal traffic through Leticia to Colombia, estimated for a few years. But I could say that in some Conservation Units, like Pacaya Samiria in Iquitos, Loreto, and in Manú National Park, in the south in the Madre de Diós and Cuzco Departments we have estimated but not yet censused good populations by footprints and other signs. In these two places the populations are somewhat protected.

Q. From what you have said, there are no limits in the take of the species because the hunting of the species is not permitted.

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• López-Preciado. That's right.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country.

• López-Preciado. No.

Q. Is your country a member of CITES?

• López-Preciado. Yes.

Q. Does your country have management and scientific authorities for CITES?

• López-Preciado. Yes, not only for jaguar, but for all wildlife. It is in the hands of the Ministerio de Agricultura, the Dirección General Forestal y Fauna. The Forest Police gives a hand and also the Army sometimes. In the research part is the INFOR, the Instituto Nacional Forestal y de Fauna. The universities collaborate in a lot in research. A study of jaguar is being made in Manú National Park, but it is only an evaluation of its presence by signs as foot prints, and we need to know more.

Q. Do you know of any diseases or parasites that limit the populations of jaguar in Perú?

• López-Preciado. No.

Q. How do you consider the present control regulations on the take and export of jaguar?

Are they adequate, somewhat adequate or inadequate?

• López-Preciado. Inadequate. The laws are all right, but the enforcement is not.

Q. Are there any other natural or manmade factors that affect the populations of jaguars in Perú?

• López-Preciado. Basically habitat destruction and hunting.

Q. Can you rate in order of importance, the following as causes for depressing jaguar populations: Habitat destruction, over utilization, diseases, parasites, inadequate regulation or other causes?

• López-Preciado. Basically habitat destruction, and killing by hunters are the most important.

Q. Do you think legal hunting of jaguar could supply sufficient monetary return to think in the possibility of a management program of the species.

• López-Preciado. The jaguar populations in Perú have not been censused and we do not know how many there are. This makes it difficult to work on a plan for the commercial management of the species in the near future. So we will have to wait.

Q. Are the jaguar populations in Perú maintaining themselves or are they expanding? What are the sizes of the areas where they have good habitat?

• López-Preciado. The ones that are maintaining the best are those in Manú National Park, with 1,532,000 hectares, and about 800,000 hectares of still virgin neighboring lands. This area is in very good condition and isolated enough to keep out hunters. The second important population is in the National Preserve of Pacaya-Samiria, in Loreto, in the north, between the rivers Pacaya and Samiria, which drain into the Amazon, with a surface of 2,000,000 hectares. In this zone there is

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some interest in starting some studies. The only data come from people that study lizards or turtles and they occasionally see or find jaguar footprints.

Q. And in the rest of the country?

• López-Preciado. It is diminishing rapidly, especially in those areas devoted to cattle ranching and oil exploration and exploitation.

Q. Do you have any estimates of the numbers or densities?

• López-Preciado. No.

Q. Do you have any knowledge of any published reports on their numbers or densities?

• López-Preciado. No.

Q. Can you cite published or unpublished reports on which you base the information you have provided?

• López-Preciado. A great part of the information is the result of personal communication with numerous people as hunters. Also the information from Manú National Park.

Q. Do you know of any other published studies on the status of jaguar.

• López-Preciado. No.

Q. Which people in your country would be other important source of information about the jaguar.

• López-Preciado. I think you must contact Luís Nuñez, at the Dirección General Forestal y de Fauna, Girón Natalio Sánchez, 220, 9th floor, Lima 11, Perú. I think he can lead you to the person working in Manú.

Q. Thank you very much.

• López-Preciado. You are welcome.

Interview (written response) with S.A.J. Malone, Head of the Suriname Forest Service. Nature Conservation Division, Research Section. Suriname Forest Service. Cornells Jongbawstr. 10, Postbox 436. Paramaribo. Suriname. Phone: 75845 or 79431. Date: November 10, 1986.

Q. Does your country (or area of country) have wild jaguar populations?

* Malone. Yes.

Q. Are jaguars in your opinion, more abundant, less abundant or about the same as they were five years ago?

* Malone. Jaguars should be more abundant, but at the least they are about the same as they were five years ago.

We think so because:

a. Most hunters don't hunt jaguars, but concentrate on other game animals. b. It is forbidden to hunt jaguars by:

"De Jachtwet" (Game-Law) G.B. 1954 No. 25.

"Het Jachtbesluit" (Game-Resolution) G.B. 1970 No. 104.

"De Natuurbeschermingswet" (Nature Conservation Law) G.B. 1954 No. 26.

c. For the past few years our game-wardens have not caught hunters with jaguars.

Q. Under the Endangered Species Act a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definitions, would you consider the jaguar to be either endangered or threatened in your country or in areas with which you are familiar?

* Malone. Suriname is covered with tropical rain forest for over 80 % of its area, so in this part of the country jaguars can't be threatened or endangered. They may be threatened in agricultural areas in the northern parts of the country where they cause damage to cattle.

With permission of the Suriname Forest Service or the Police Officer who is responsible for that certain area, these jaguars can be legally killed.

Q. If you believe the jaguar to be either endangered or threatened, what is the major cause?

* Malone. Mostly in the coastal area, destruction, modification and curtailment of habitat take place because of the expansion of urban and agricultural areas.

Q. How long is this type of change likely to continue?

* Malone. As long as the population increases and agricultural development is necessary, but declaring the estuarine zone as a special management area (proposed since 1976) and having some

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nature reserves in this area will give wildlife and also jaguars a good chance.

Q. Are there comparable changes that are expected to begin within the next several years?

* Malone. Yes, continuously.

Q. What is your estimate for the annual average off-take of jaguars for the years 1980-1985?

* Malone. Negligible.

Q. Are there regulations or laws in your country to limit or restrict the taking of jaguars?

* Malone. Yes, see 2.b.

Q. Are these limitations by season, numbers, areas, etc.?

* Malone. By areas .

Q. Are these laws effective?

* Malone. Yes, during control we do not catch people with jaguars or parts of them.

Q. Upon what data are the limitations on harvest based?

* Malone. Harvest is not allowed (total protection).

Q. Is there an effective system to limit or restrict the export of jaguars in your country?

* Malone. Export is not allowed.

Q. Is there an effective marking or tagging system to control the number of jaguars taken and skins exported?

* Malone. No.

Q. Is an approval from the country of import required prior to the issue of an export permit?

* Malone. If an exception is made for export (e.g. for educational or scientific reasons) then the rules of the CITES are put into practice, which means that an approval from the country of import is required.

Q. Is there any evidence that legal taking of the jaguar for export is facilitating or encouraging illegal taking?

* Malone. No.

Q. Is the country a member of CITES?

* Malone. Yes.

Q. If so, does it have in place an effective management authority and scientific authority?

* Malone. Yes.

Q. Do you know of any diseases or parasite conditions that limit or have limited jaguar populations?

* Malone. No.

Q. Are there any published or unpublished reports on those problems?

* Malone. No.

Q. Would you consider the present regulations to control the take and export of jaguar skins in

SURINAME-MALONE

your country to be adequate, somewhat adequate, or inadequate?. And how would you consider the effectiveness of these regulations?

* Malone. The total protection is effective and adequate.

Q. Are there other man made or natural factors not covered above that limit jaguar populations that could cause them to be endangered or threatened?

* Malone. No.

Q. From the information you have, or from personal experience, could you rate three of the above as to the first important, second important and third important cause in depressing the jaguar population in your country or area?

* Malone. Only in the coastal area do human activities occur that cause destruction, modification or curtailment of habitat.

Q. Would legal hunting of the jaguar in your country supply sufficient monetary return to government and to people in local areas to provide an incentive for its protection and management?

* Malone. Yes, it would supply sufficient monetary return to government and to people, but the consequences of such a step would be disastrous to the jaguar populations.

Q. Are there populations of jaguars in your country maintaining themselves or expanding?

* Malone. Yes, because over 80 % ($\pm 130,400 \text{ Km}^2$) of Suriname is covered with virgin tropical rain forest.

Q. Do you have an estimate of the populations, either numbers or density?

* Malone. Research hasn't been done.

Q. Do you have or know of any other studies that have estimated population densities of jaguars; that is jaguars per unit area?

* Malone. No.

Q. Can you cite published reports, or can you provide us copies of unpublished reports upon which you base any of your conclusions on the jaguar?

* Malone. No.

Q. Do you know of other studies on the status of the jaguar that have produced information that you consider scientifically sound and reliable?

* Malone. No.

Q. What are the names and addresses of resident scientists or naturalists who could provide additional information on the jaguar?

* Malone. Not applicable.

Interview (written response) with Joep M. Moonen, former Director, Paramaribo Zoo; now Consultant of Herptefawn, Ft. Myers, P. O. Box 50127, Ft. Myers, FL. 33905-0127, U.S.A.

Q. Does your country (or area of country) have wild jaguar populations?

• Moonen. Yes.

Q. Are jaguars, in your opinion, more abundant, less abundant or about the same as they were five years ago.

• Moonen. About the same.

Q. What is the basis of your opinion?

• Moonen. I think so because there has not been much habitat destruction, there has been little development in the area, and sport hunting has declined. It is not longer safe to travel in the interior because of the Suriname Army's presence there.

Q. Under the Endangered Species Act a species is "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definition, would you consider the jaguar to be either endangered or threatened in your country?

• Moonen. Neither of the above. As long as Suriname develops at the same rate as it has in the last five years the jaguar habitat is relatively safe. One can say that the jaguar is threatened in the coastal agricultural area, but this area will only expand when Dutch aid to Suriname starts again. This will happen only after a structural political change occurs, which does not seem near.

Q. What is your estimate of the annual average off-take of jaguars in Suriname for the past five years?

• Moonen. Probably 2 to 10 per year. This might decline due to the lack of the availability of shells for hunting, because of bad economic conditions in Suriname.

Q. Are there laws in your country to limit or restrict the taking of jaguars?

• Moonen. Yes. The laws protect all wild cats the whole year around.

Q. Are these laws effective?

• Moonen. Yes. The Game Wardens take their jobs very seriously. They are, however, handicapped by the lack of vehicles to patrol the extensive roads in the interior.

Q. Is there an effective system to limit or restrict the export of jaguar skins in your country?

• Moonen. Yes. The Customs officers in Suriname are very strict, and they know the law very well.

Q. Is there an effective marking or tagging system to control the number of skins taken out of the country?

SURINAME - MOONEN

• Moonen. No skins are exported commercially.

Q. Is Suriname a member of CITES?

• Moonen. Yes.

Q. Does Suriname have in place an effective management authority and scientific authority?

• Moonen. To the best of my knowledge the CITES regulations are followed strictly in Suriname.

Q. Do you know of any diseases or parasites that limits or has limited jaguar populations.

• Moonen. No.

Q. Would you consider the regulations to control the take of jaguar skins in your country to be adequate, somewhat adequate, or inadequate.

• Moonen. Adequate, but it is impossible to eliminate the few hides that are smuggled out in the baggage of airline passengers.

Q. Are there other manmade or natural factors that limits jaguar populations that could cause them to become endangered or threatened?

• Moonen. No.

Q. Would legal hunting of jaguars in your country supply sufficient monetary return to government and to the people in local areas to provide an incentive for its protection and management?

• Moonen. I do not think so. Fortunately the people in Suriname do not know how to tan hides of wildlife.

Q. Are there populations of jaguars in your country maintaining themselves or expanding?

• Moonen. I think the population is stable in the whole country.

Q. Can you cite published reports, or unpublished reports upon which you base your conclusions on the jaguar?

• Moonen. My conclusions are based on 14 years of living in Suriname, and working extensively in the interior on wildlife, and working with the people concerned with wildlife.

Interview by Dr. James G. Teer with Sr. Juan Villalba, Director, Traffic, South America. Date: July 2, 1986.

Q. What is your impression of the general status of the jaguar throughout its range in South America?

A. Over a great part of its distribution, it is certainly endangered. And in others, it is threatened.

Q. Are there any area in South America that populations are of such sizes that they could be reclassified from endangered to threatened?

A. Evidently the areas that are most endangered are Argentina with a population with less than 50.

Q. So it would be very much endangered. What about the Pantanal region of Mata Grosso in Brazil?

A. The data I have on Pantanal you already know - that of Schaller and Crawshaw.

Q. What about Belize?

A. We only have jurisdiction in South America. I have no data on other areas.

Q. In your opinion, do you think we should keep the jaguar on endangered status throughout its range at the present time?

A. Yes, I think we should. Because this has reduced commerce in skins. We have seen that skins that used to be sold for \$500 to \$600 years ago now are sold for \$40 or \$50. This is the result of the prohibition.

Q. Do you think that in those areas where they are taking livestock there should be some provision made for control?

A. I'm very skeptical about the real damage that jaguars may cause to livestock. Because, as I said in Manaus, in Uruguay it was an abundant species that came up all the way to Montevideo 100 years ago. And cattle was introduced in the 1800's and were distributed throughout the country. So if the species that was so abundant had really damaged livestock, cattle breeding would never have existed.

Q. I know that there are few records of illegal kill, illegal take, and commercial use of jaguar skins. Do you have any idea, or any kind of educated guess about how many skins are taken for the commercial trade at the present time from year to year? In South America, generally.

A. I have no idea.

Q. Are there jaguars in Uruguay?

A. No. It was extirpated in Uruguay at the beginning of the century. Uruguay is a small country and it's covered by roads. There are no forests. They represent only 3% of the territory.

URUGUAY - VILLALBA

- Q. Do you have any information, or any published reports, that would be useful in our study?
- A. The ones you already know - Schaller's and Crawshaw's.
- Q. Rabinowitz - who worked in Belize?
- A. No. I don't know that one. And then, Walker's.
- Q. Thank you very much.
- A. I'm sorry I could not help you more. We really don't have much information.

**Interview by Dr. Wendell Swank with Rafael Hoogesteijn, Veterinarian.
Aptdo. N^o 3083, El Trigo, Valencia, Edo. Carabobo, Venezuela. Date: April 6,
1986.**

Dr. Rafael Hoogesteijn is trained as a veterinarian and is presently employed by a ranch with very large holdings in Venezuela. He oversees the artificial insemination of cattle for the several ranches, and has been interested in conservation and especially the jaguar for many years. He and Dr. Edgardo Mondolfi, Mammalogist with the Universidad Central of Venezuela, authored a paper, entitled "Biology and Status of the Jaguar in Venezuela" for presentation at the International Cat Symposium at Texas A&I University in October 1982. Dr. Hoogesteijn has had extensive experience with the species and its habits and has worked with hunters and others engaged in control of the species on ranches where it was depredating on livestock.

The interview was conducted in Manaus, Brazil on April 5, 1986, at the Symposium on "Conservation Status of the Jaguar; Wildlife Management in Neotropical Moist Forest" sponsored by the Conseil International de la Chasse.

Q. Rafael, what part of the country of Venezuela do you have familiarity with in respect to the jaguar?

• Hoogesteijn. Mostly in the flooded plains in the States of Apure, Cojedes, Guárico, and Barinas. Some slight experience also in southern Venezuela, in the States of Bolívar and in the Territorio Federal Amazonas. In the rest of the country I have mostly information from interviews of friends, sport hunters and other people.

Q. Are jaguars, in your opinion, more abundant, less abundant, or about the same as they were, say, five years ago?

• Hoogesteijn. That depends solely on the area of Venezuela you are considering. In the central area, and in the eastern and western point of the land they are nearly extinct from their former ranges, the big part of it, because of the clearing of land, deforestation. In the flooded plains, especially in the State of Barinas, the southern area of Guárico, Cojedes, and the northwestern part of Apure, they are now more abundant. There is no more illegal hunting because there is not so much demand for skins, and because sport hunting has ceased. It is less than it was before. So in this area, there are more jaguars than there were five years ago when they were about pushed out because of hunting. And in the southern area of Venezuela, the population has remained more or less stable in the intricate jungles that are not reached by man.

Q. When you speak of the southern area, could you give me a line in Venezuela that you'd say south of?

VENEZUELA - HOOGESTEIJN

• Hoogesteijn. Yes, south of the Orinoco River in the States of Bolívar and the Territorio Federal Amazonas.

Q. What is the basis for this opinion? In other words, knowledge?

• Hoogesteijn. From my personal visits to the area of the flooded plain. I've been tracking jaguars there with sport hunters to get information, and in the southern part of Venezuela, I also have done the same. In my work with beef cattle, I work with artificial insemination on many farms in Venezuela, on farms where there are jaguars which permits me to assess the situation.

Q. Under our Endangered Species Act, a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. At this time, considering the above definition, would you consider the jaguar to be either endangered or threatened in your country?

• Hoogesteijn. Well, it's again a matter of the place you are considering, depending on the population. North of the Orinoco in the central area of land, the jaguar is threatened. Its presence is very sporadic. In the flooded plains, it's very vulnerable because with again with some sport hunting or with hunting for pelts, it could be wiped very quickly. But in the southern area, south of the Orinoco, there is a quite a good population that maintains itself in these areas that are not developed now, and also there is not that much change of land use. There are big tracts of forest that are not used with only the northern fringe being deforested.

Q. Would you say that this endangerment or threatened status is due primarily to destruction, modification, or curtailment of habitat?

• Hoogesteijn. Well, before 1970's, the biggest cause for their decline was hunting -hunting for the international fur trade and for sport hunting. Today the biggest threat to the jaguar is caused by the clearing, by the loss of habitat, because of clearing -deforestation.

Q. Over what portion of the jaguar's range in your country is this occurring?

• Hoogesteijn. Well, it's very difficult to assess. The northwestern plains are being deforested. In 15 years, they have lost -this western area has over 45 % of forests - from 1950 to 1975, 15 % of this 45 % was cleared. And from the rest of the land, I don't have data to asses. The clearing of land is going on very, very heavily.

Q. How long do you think this change is likely to continue?

• Hoogesteijn. It's likely to continue now in the short future at a higher rate than before because with oil prices going down, Venezuela didn't put very much interest into the agriculture development of the land. It got all its revenues from oil. But now with oil prices going down, and also you have demographic explosion; you have a lot of people who not only are more numerous but they want to live better. About 50 to 60 percent of what Venezuela eats is imported with very

VENEZUELA - HOOGESTEIJN

high costs in dollars. This trend will put a lot more land into use and an intensification of the use of the land already under cultivation. So this trend will be very much aggravated in the near future.

Q. Are there other places in Venezuela where this change is likely to occur?

• Hoogesteijn. Yes, one of the principal frontiers where it's occurring now is where all the miners are going into the States of Bolívar and Amazonas. There is a lot of clearing occurring over all this northern area of Bolívar State and also in the big part of the northwestern plains as I already said. It's a process of -it has its social and political roots and it's very difficult to control because everyone is doing it. It's shifting cultivation, clearing of land, establishment of double purpose agriculture with cattle and very quick crops like rice and sorghum.

Q. Do you think that over-utilization of the jaguar is occurring now, that is, actual killing of the jaguar?

• Hoogesteijn. No, not right now. No, I would say that some jaguars are killed because they are cattle killers and sometimes hunters go out to get meat and see a jaguar and shoot it, but it's not like it was 10 years ago. Before that the jaguars were very much sought after. Then a normal worker of a farm would get 1-2 years of salary per jaguar pelt. This thing is more or less under control but that's not the problem now.

Q. Could you give me an estimate, say over the past five years, of what the average, annual offtake for jaguars for all purposes has been?

• Hoogesteijn. I could give you an estimate by some states I visited. I would say, for example, in the States of Cojedes and the Barinas, the off-take of jaguars has been more or less 40 in each of those states in the last 2 years. For the rest of Venezuela I don't have any data because it's a very difficult thing to assess. From the fur trade data we have from the 70's, the quantity of pelts shown exported directly from Venezuela are very, very low but you cannot trust these data because a lot of pelts are smuggled through Colombia and through Brazil. They form a big bulk of the exports of those countries.

Q. Now, that 40 per year, was that a total for the two states or combined?

• Hoogesteijn. No, for each state. I would say 80 jaguars each year for both states. It's a very gross estimate. It's only what I know from sport hunters I know or related with me. I also get information from other people in the area, or ranch hands. It's a very gross estimate but it's the only one we have available.

Q. There are regulations and laws in your country that limit or restrict the taking of jaguars?

• Hoogesteijn. Yes there are many laws. The legal system has a small loophole, but it works. There was a further solution in the 1970's that banned all sport hunting of jaguars and also trapping for their skin. And then in 1979 the jaguar was included in an official list of game animals but since they have not assigned a hunting season or the quotas of hunting, it's virtually protected but it could

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be assigned by this legal system. The government could assign quotas and times of hunting for jaguar, but Venezuela subscribed to CITES and that prevents any commercial use of the skins of jaguars. So it's protected by the system.

Q. There has been no legal hunting of jaguar since that year?

• Hoogesteijn. No legal hunting of jaguar since 1970. In '74 we had a total ban on any hunting on any species of wildlife in Venezuela which was well enforced from 1974 to 1979. That permitted very good reproduction in many species including the jaguar and the other spotted cats.

Q. But the jaguar season is now closed?

• Hoogesteijn. Totally closed. You can't even get a permit to hunt killer animals. We went to the Ministry to ask because we heard something about them giving a license to hunt an animal that's causing problems, but not even for this.

Q. How effective, that is in the field, how effective are these laws in permitting taking of jaguar.

• Hoogesteijn. These laws are enforced only at some post at the side of the road. National Guards stop you when you come from an area, a hunting area, and they inspect your car. They see if you have a shotgun or not, if you are armed or not, and what you have in your car. And if by chance you have a jaguar skin or an animal just recently shot, you are put in jail under investigation but that's it. Real enforcement as far as guards in the field checking, there is no checking. It is not done. Now there is not a demand for skins so hunting is not high. Only a few jaguars are taken.

Q. Do you have an effective system to limit or restrict the export of skins in your country?

• Hoogesteijn. Yes, customs in Venezuela control all exportation. Again the National Guard has control over this exportation. Anything that is exported is thoroughly looked after and there is always some smuggling but it is controlled. There's been one thing -part of the smuggling doesn't go out normal maritime or airport customs. It goes, well our opinion is that a lot of skins go out of Venezuela via Colombia and then reach international markets via Panama. Some of the skins that are taken in the southern area of Venezuela go through Brazil to Paraguay. Nobody has data about how many skins those are.

Q. Well, since there is no legal hunting, you don't have a marking or tagging system to control the numbers or anything like that, I assume.

• Hoogesteijn. No. There is the system that has evolved for an animal like capybara which is hunted at Easter for its meat. It is salted because it's a custom, a tradition from the time of the Spaniards, when there was no refrigeration. This hunting system with the capybara works fairly well so there is some experience with it in Venezuela but not with spotted cats -not with jaguar.

Q. Since there is no export, then there is no need to call for an export permit.

• Hoogesteijn. No.

Q. Is your country a member of CITES?

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• Hoogesteijn. Yes, it has been since 1973, and then there was a new resolution with the publication of the appendices in 1976.

Q. So you have an effective, what you would consider an effective, management authority then, and a scientific authority to carry out the provisions of CITES.

• Hoogesteijn. Yes, the Ministry of Environment through all its offices the whole country. Legally it is not permitted to trade in small cat pelts because Venezuela is subscribed to CITES.

Q. Do you know of any disease or parasites that has limited jaguar populations in your country?

• Hoogesteijn. There are some diseases that affect jaguar such as parasites and sometimes sarcoptic scabies. We have found some animals with big encypted parasites in the liver. I don't remember exactly the name of the parasites but they are not really limiting or causing any damage to the population or limiting its numbers. Its only sporadically present in an animal.

Q. Are there any published reports on these diseases or anything like that?

• Hoogesteijn. I have some data from some animals with these diseases. I have them in my diary and I'm writing them down.

Q. They haven't been published yet?

• Hoogesteijn. No, they are not published yet. There is some information in some small book of some (...unintelligible...) of jaguar in Venezuela and it gives some data about diseases of the jaguar. It's the very same book.

Q. Would you consider the present regulations to control the take and export of jaguar skins in your country to be adequate, somewhat adequate, or inadequate?

• Hoogesteijn. The laws in themselves are adequate. What's not adequate is the enforcement of the laws. You have some conservation-minded ranchers in Venezuela that don't permit any hunting of jaguar on their properties. The middle-class citizen of Venezuela knows about wildlife and has a good conservation ethic, but as I say, the enforcement of laws in the field is almost nil. It consists of sporadic visits of the National Guards making their rounds in the area or control at the sides of roads and they control the contents of cars and buses. By chance they probably find skins, but it's not really good enforcement. The same occurs in the National Parks of Venezuela. The number of forest guards is very low and some poaching has occurred at a very low level.

Q. Are there other man-made or natural factors that we haven't covered that you know about which might limit jaguar populations?

• Hoogesteijn. Yes, especially in some areas of Apure and Barinas there have been some very heavy floods that perhaps have not affected so much the jaguars but they have affected the natural populations of species that the jaguar eats - for example, capybara, peccary and deer. There was a big flood in 1976 that wiped out a big part of the wildlife of Barinas and Apure and, in my

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opinion, the jaguar population didn't recover as fast in the absence of hunting as should have been the case. Many farms that didn't have jaguar hunting for 10 years now have some, but they have not recovered in numbers they had before. Part of this is because of the flooding. I don't know if they can be, I have speculated about it, about the possibility of some Panleucopinia gyres? going around in the wild population but I don't think so. In captivity, jaguars have been affected by this disease and they have died of it, but I think only the flooding in this area of Venezuela could have affected the populations.

Q. How large an area are we talking about?

• Hoogesteijn. Barinas and Apure are 130,000 km² more or less

Q. Of the factors we've talked about, that is, disease and parasites, illegal hunting, or over-utilization for commercial purposes, which of those would you think would be most important?

• Hoogesteijn. Well, at the moment, the most important is the loss of habitat undoubtedly. Ten to fifteen years ago over-exportation for international fur trade and excessive sport hunting were the main reasons. In Venezuela there were never organized safaris with foreign hunters but there were a lot of local hunters, elite groups that use airplanes and packs of trained dogs and they reduced the population of the plains, the flooded plains areas. But today I would say the biggest problem is the loss of habitat -none of the other factors.

Q. Why would you pick out that as the most important one? Give me some of your reasons.

• Hoogesteijn. Well, the clearing of forest where the jaguar lives has been done at a very fast rate in the last years, especially in all the northwestern area of Venezuela. Probably the rise in the population of jaguars in the flooded plains areas can be a result of all the deforestation that they have done in the northern area of Venezuela and they have pushed the jaguars down. You deforest, the animal goes out and you have a steady deforestation progression that probably produces a movement of the population. I don't know, it's also speculation. There is no research about it. But there is almost no trade, apart from a very small local trade of pelts for the adornment of people in Venezuela. The sport hunters are reduced now to practically 2 sport hunters. We know of only 2 sport hunters who keep hunting mostly in the dry season especially in the flooded plains area and in the southern part of Venezuela. So the population should have recovered quickly, because with almost no sport hunting and the fur trade cut down, the population should have recovered. But as I say, there are some maps that show the trend of deforestation in Venezuela. There is a book - The Conservation of the Humid Forest in Venezuela - where you have this map, so you see this regression and the trend has been intensified in the last years and will be more intensified in the years to come. And the jaguar is not an animal that adapts to non-forested areas. The jaguar needs heavy vegetational cover, dense cover to maintain itself.

Q. Would you suggest then that over-utilization or inadequate enforcement of regulations

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might be the second greatest cause?

• Hoogesteijn. Yes, lack of enforcement plays also an important part but more important is the loss of habitat.

Q. Do you think that, should legal hunting become effective in your country, would there be sufficient monetary return to the government and to the people in local areas to provide some incentive for its protection and management?

• Hoogesteijn. Well, that's a very tricky question. The only possibility is the proposition we gave. If you go to the flooded plains area to States like Barinas and Apure, they have cattlemen who protect the jaguars and they have a rise in the population. When this population goes a little too high you have a lot of cattle losses, attributed partly to jaguars, partly to rustlers. Then those conservation-minded cattlemen change their minds and they permit some illegal hunting, some sport hunting and permit people to go in to hunt jaguars. In two farms of 30,000 hectares each they killed about 7-8 jaguars last year. And so the problem was solved. Now they want to close it again and to maintain jaguars again for 5 years until the problem repeats itself.

Q. These are the ranchers themselves who want to close it?

• Hoogesteijn. Yes.

Q. Until it builds up again?

• Hoogesteijn. Yes, the disadvantage of this system is that non-guilty jaguars are killed with the guilty ones for the predation of cattle. And this system is not producing any revenue to anyone. The only revenue is that the man has skins and he sells them to somebody who wants to put it on his wall.

Q. They don't pay the ranchers anything?

• Hoogesteijn. No, the rancher sometimes pays his ranch hands a small bounty, a small quantity of money, if he hunts the jaguar that is causing the problem. If those plans could be put together, enforce strict conservation on their farms, hire private vigilants with vehicles with double traction, motor bikes in the dry season, motor boats in the rainy season, all provided with a radio with a central station to bring about effective protection of the area. Then the sport hunting of the cattle-killing jaguars could and should be done to bring revenue to the cattlemen for the losses. The rest of the jaguars not causing problems in the area are not killed. That could effectively be done with some cattlemen who are probably or could be interested in the idea. The other advantage could be since the rest of the wildlife is also protected, its number could go up and with it a lot of wildlife. The predation of cattle by jaguar is also diminished and you could also take advantage of other species like capybara, spectacled caiman, white-tailed-deer, javalina, and different types of birds that could be interesting also for sport hunting or commercial hunting.

Q. Would you recommend that these people also be required to buy a license so the

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government would then get some income or revenue?

• Hoogesteijn. The only way to do it legally would be by the government. The government should make, let's say, an experimental hunting area with private cattlemen and have one or more technical people sent by the Ministry of Environment to look at the system and get their consent so the sport hunters could take these cattle-killing jaguars legally. It has to be done very, very carefully.

Q. Do you have the administrative setup now to sell licenses, collect...?

• Hoogesteijn. No, not at the moment, no. This has never been done in Venezuela. There is not a tradition of selling licenses for hunting. This tradition has been established only 2 or 3 years ago in which the hunter buys a general license or a special license. With this license he can only hunt different types of birds, including curassows, chachalacas, quail, doves, collared peccary and white lipped peccary. Those are the only species that are hunted under license only two months a year.

Q. Do you have a different rate for resident licenses and non-resident licenses?

• Hoogesteijn. No the only rate is for hunters associated in clubs and hunters not associated in clubs, Venezuelan hunters. Those associated in clubs can get fees that are less expensive. So it is not traditional, foreign hunters in Venezuela -very few.

Q. Are there any populations of jaguars in your country that are maintaining themselves or even expanding?

• Hoogesteijn. Well, I would say in the southern area of Venezuela, the States of Bolívar and Territorio Federal Amazonas and in the inaccessible forest there is a stable population because of the available prey. And in the flooded plains in some areas, there are jaguars now in areas where they were wiped out. That means there is a small recovery in the population. The population has not gotten as low as it was before 1950, so you are seeing jaguars again, we are seeing tracks again and sometimes we see the animal, but never at the same level as they were before 1950. In the northern area and western and east edge of Venezuela they are almost finished. There are no more jaguars left, only very few.

Q. On the basis of your personal experience, do you have any places where you might be able to even give a rough estimate of populations, that is either numbers or density?

• Hoogesteijn. This area south of the Orinoco has 400,000 km² of jungle and we assess this as having one jaguar for every 100 km². We think we have a population of between 3,000 and 4,000 jaguars which is very, very grossly estimated. It does not exactly take into account the area that are highlands that is not jaguar habitat and all the area of savannah where there are also no jaguars. For this estimate we are not counting the jaguars that can exist north of the Orinoco. So I would say that between 3,000 and 4,000 jaguars would be a safe estimate.

Q. What would be your gross estimate. I know it would be rough your gross estimate of

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jaguars in Venezuela.

• Hoogesteijn. The same, I would say the same.

Q. Do you have any or can you cite any published reports or provide any unpublished reports for the jaguar in Venezuela that would help us in our study?

• Hoogesteijn. No, not from Venequela I don't think there are any published reports apart from the work Mondolff and I did and this small work we are presenting now in this meeting (in Manaus, Brazil). There has been no good telemetry studies on jaguars. The only reports that are interesting to consult perhaps are those by some hunters. You can get an idea of the density of jaguars in the area in the 1950's. For example, the Beltini booklet and the reports of Humbolt who traveled Venezuela in 1800 are really, really interesting to read because of records on the abundance of jaguar at that time. He had almost daily encounters with jaguars in the Apure and the Orinoco. Many times he had to put his camp in other places because the jaguar wouldn't let him sleep.

Q. Do you think that's because at the time there were not that many people and the jaguars are not accustomed to people or they were just that much more abundant?

• Hoogesteijn. No, much more abundant. No hunting, only hunting with spears. In the 1950's especially in cattle abandoned farms where there was a lot of feral cattle and a lot of wildlife because there was no human interference, the density of jaguars was incredibly high. You see, for example, one of these sport hunter groups killed 43 jaguars in two months in a farm that had 100,000 ha. If you take into account only the area covered by gallery forest, probably half of it, and this is how they took this big number of jaguars, so that gives you an idea of the density of jaguar that existed in the 1950's there.

Q. 1950's?

• Hoogesteijn. 1950's, yes. That's when the sport hunting in Venezuela with packs of trained dogs and airplanes, etc. really began.

Q. This is when the Lee Brothers came?

• Hoogesteijn. Right, when the Lee Brothers came to hunt.

Q. Thanks for all your help.

**Interview by Dr. Wendell G. Swank with Lic. Gonzalo Medina, Biologist,
Asesor en Manejo de Fauna (Fauna Management Consultant), División de Fauna
Silvestre, DAR-DGSAM, Ministerio del Ambiente y de los Recursos Naturales
Renovables, Torre Sur, Piso 22, Centro Simón Bolívar, Caracas, Venezuela.
Date: May 6, 1986.**

Q. Mr. Medina, What is your information about the status of the Jaguar in Venezuela? Is it an abundant animal, it is widespread in Venezuela?

• Medina. The contrary.

Q. The population is decreasing? For how long?

• Medina. Yes. For many years. Because the cattle ranchers kill all jaguars they see anywhere.

Q. Because they lift the cattle?

• Medina. Yes. The jaguar is their enemy.

Q. So in your opinion they are less abundant now than they have ever been?

• Medina. Oh, Yes.

Q. What is the basis for this opinion. Do you have census data or any studies in the field?

• Medina. No. We have many reports from people in the country.

Q. Has the CITES treaty had any effect in stopping this?

• Medina. No. Because our problem is not the commercial hunting of the species but killing by the farmers. The farmers kill the animals and keep the skins.

Q. Do you have an opinion about what would be the most important reason for the jaguar's demise? Is it overhunting? Is it habitat destruction?

• Medina. It is overhunting.

Q. No question?

• Medina. Sure. It is overhunting. Not habitat destruction. Its habitat is in good condition. Many places in Venezuela. We may go to places and I can show you.

Q. We would like to have a map of the distribution if at all possible. What kind of habitat destruction or clearing is actually going on that in the future would affect the species?

• Medina. Yes. Beyond the Orinoco river, but not in the llanos. There, in the llanos, the habitat is the same as many years ago, savannas, gallery forest. The habitat is the same as before. It is the same as when the species was abundant.

Q. What about south of the Orinoco?

• Medina. The forest has been cut in some parts, but this is still not a problem. Overhunting is the real problem.

Q. Has the overhunting of jaguar been particularly for protection of livestock?

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• Medina. Yes. And some sport hunting without licenses. Illegal.

Q. What would be the profit if the people in farms could hunt legally and charge a price for hunting. Is there a chance to put an economic price on the species. Would the farmer be more prone to protect the animal?

• Medina. Yes, but I think such an idea has to be carefully established. You must consider that the jaguar is signaled as doing an economic damage. If you have to let it eat your livestock in order to get a profit when you allow a hunter to kill it, the money you get has to be more than what the food for the jaguar costs.

I remember a particular case: a landowner paid with the skin and the fat for the work of a local hunter who killed the jaguar that had preyed upon two of his valuable mules.

Q. Do you have any estimate of the individuals taken each year?

• Medina. No.

Q. Do you have any estimates of the number of jaguars there are in Venezuela?

• Medina. No.

Q. Are there any studies being carried out at this time in the field?

• Medina. No.

Q. Are the skins taken sold in international commerce?

• Medina. No. I don't think they would go out of the country. If someone would want to buy one he would go to a jaguar hunter for it.

Q. Are your laws and regulations sufficient to protect the jaguar.

• Medina. Yes, but the problem is the lack of good enforcement. We have the National Guard as an enforcement body, but there is a vast amount of territory without any authority.

Q. Do you know of any causes of natural mortality, such as parasites or diseases, that affect jaguar populations?

• Medina. No.

Q. Do you have any published records or reports of jaguar research?

• Medina. No.

Q. So you say that from all factors that may affect jaguar populations the most important is overhunting?

• Medina. Yes.

Q. And then perhaps habitat destruction?

• Medina. Yes. Second place.

Q. And then just natural mortality?

• Medina. Yes, but not important.

Q. You said that their populations have been declining for many years?

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• Medina. Yes. Since the forties.

Q. Can you show us now in the map the distribution of Jaguar in Venezuela.

• Medina. They are here in Bolivar state, all this land, and Territorio Amazonas, where the best populations are. Here is Apure state and Sierra de Perijá.

Q. Almost all the country.

• Medina. Almost all these territories are jungle.

Q. Are there cattle ranches in here?

• Medina. No. In some places in Bolivar state. There are savannas in most of the northern part of Bolivar State, along the Orinoco.

Q. Are there cattle ranches in there, in Apure?

• Medina. Yes.

Q. What about an estimate for their densities?

• Medina. It is very difficult for me to say. There is an island here in the delta where we saw many footprints about four years ago. There are Indians there, and they had skins. We need research, information.

Q. Well Thank you Sir.

• Medina. You are welcome.

Interview by Dr. James G. Teer with Sr. Armando Michelangelli, President of Terramar Foundation of Caracas, an organization founded for the promotion of basic and applied research in ecology and conservation in the neotropics. Fundación Terramar S.C. Universidad Simón Bolívar. Pabellón 1, Ofc. 26. CABLE UNIBOLIVAR. Date: April 6, 1986.

Teer. Mr. Michelangelli, does your country have wild jaguar populations?

• Michelangelli. Yes, of course.

Teer. Are jaguars in your opinion more abundant, less abundant or about the same as they were 5 years ago?

• Michelangelli. Well, it is difficult to respond exactly to the question, it depends on the area. In the south of the Orinoco area the population is maintained, okay, more or less the same. In the areas of the flooded plains, the population is increasing in much of the area, and in the north and the west part and the east part of the country the population is decreasing very quickly.

Teer. What forms the basis for your opinion?. Is it based on scientific data, or...

• Michelangelli. No, our personal observations in the field. And from opinions of the people that live in the field. We always ask when we go to the field the situation of the different animals, especially the big mammals.

Teer. I, see.

Teer. Under the Endangered Species Act, a species is considered "endangered", if it is in danger of extinction throughout all or a significant portion of its range, whereas a species is considered "threatened" if it is likely to become endangered throughout all or a significant portion of its range within the foreseeable future. Considering these definitions, would you consider the jaguar to be endangered or threatened in your country, or in areas with which you are familiar?

• Michelangelli. Threatened.

Teer. Threatened. So, and for the most part they have maintained themselves, especially in those natural areas?

• Michelangelli. Yes.

Teer. Where they are protected by nature?

• Michelangelli. Yes.

Teer. And what part of Venezuela is that?. You said something about the Orinoco River. Is this south of the Orinoco?

• Michelangelli. South of the Orinoco.

Teer. If you believe the jaguar to be endangered or threatened, what would you say are the causes?

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• Michelangelli. Well, basically it is by the destruction of the habitat.

Teer. And what is causing destruction of the habitat?

• Michelangelli. Well, the urban development is one of the causes that destroys many forests because our cities normally are very close to forests, and this is one reason. Another reason is agriculture, increasing the amount of land for agriculture,

Teer. Is this primarily raw-crop agriculture or is it cattle grazing?

• Michelangelli. Both.

Teer. Both of them.

• Michelangelli. Cattle and agriculture.

Teer. Where is most of this clearing of forests occurring?

• Michelangelli. Well, clearing is occurring mostly in the west part of Venezuela and in the flooded plains, north of the flooded plains.

Teer. And does this consist of a considerable portion of the jaguar's range? Or is it occurring in the jaguar's range?

• Michelangelli. I think that in the flooded plains, probably it's near 50 % of the jaguar range.

Teer. So about half of the jaguar's range in the flooded plains is susceptible to being cleared.

• Michelangelli. Yes.

Teer. How long do you think this type of activity will continue?. Is it something that's going to continue indefinitely. Till it's all gone?

• Michelangelli. Venezuela is changing now to agricultural production very quick, and most of the efforts of the government now is to invest in agricultural production. These areas will be, most of these areas will be in production in the next years. This is very bad for the habitat. Anyway, we have some national parks in the area, big national parks, that can assure some protection for the jaguar, and in some areas, it is possible to maintain other populations through private efforts.

Teer. Do you consider that the jaguar is being utilized for commercial purposes or recreational purposes. Is over-utilization a problem?

• Michelangelli. At this moment there is not over-utilization of the jaguar in Venezuela.

Teer. How about hunting for ... sport hunting?

• Michelangelli. No, it's prohibited.

Teer. Prohibited?

• Michelangelli. It is prohibited. And poaching of the jaguar is very, very uncommon, really. We know, in this year only three cases of jaguar hunting, by reason of cattle kill. In one case two weeks ago, the minister of transport developed a road through a forest and two jaguars were very close to the road and the administrative group killed both jaguars. They say that the jaguars attacked, but we are not sure that this is true. But it is very uncommon.

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Teer. Very few cases of depredation control or very few cases of hunting or anything like that.

• Michelangelli. Yes.

Teer. So what is your estimate of the off-take, the annual off-take in any one year, say for 5 years, for any purpose?. Average?

• Michelangelli. The estimate of the animal average of take off, that is where there are no jaguars now?

Teer. No, the off -take means the numbers that have been taken by any means for any purpose. By hunting or for recreation or for depredations.

• Michelangelli. Oh ...

Teer. Just roughly.

• Michelangelli. Well, roughly, we think about 10 to 15.

Teer. That would be an average over the last 5 years?. Something like that.

• Michelangelli. Yes, yes.

Teer. O.K. Well, you've already alluded to the fact that there are regulations in your country to restrict the off-take, or the taking of jaguars. So what laws are there that restrict them?

• Michelangelli. Laws?

Teer. Yes.

• Michelangelli. Okay, the law protecting wildlife is very strong, the ascription of Venezuela to CITES, and...

Teer. You have signed the CITES treaty?

• Michelangelli. Yes, in 1973. And after that the Minister of Environment Decree Resolution in support of the CITES ascription of Venezuela, placed the jaguar in a list of hunting animals that need special regulation and permits. Hunting the jaguar is absolutely prohibited.

Teer. The hunting of it, that is.

• Michelangelli. For hunting and for any purpose that is not a scientific purpose.

Teer. Do you consider these laws effective..?

• Michelangelli. The laws on paper are effective, yes. But the laws in fact are effective because the hunting groups and the hunting outfitters quit immediately after the CITES ascription to Venezuela. There is no hunting, not for the fur trade, not for sport hunting. We need special support for the guard system, because our guard system is very very bad, because of lack of money.

Teer. But there is a traffic or a trade in spotted cat skins from animals that are killed in Venezuela. And this is primarily because there is no proper or no effective guard system?

• Michelangelli. Well, but I think that the trade, is very, very few.

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Teer. Very few.

• Michelangelli. Very few.

Teer. Do you know of any diseases or parasites, or any unusual sources of mortality that affect the jaguar?

• Michelangelli. No we don't have any data about that. We just don't know.

Teer. Do you consider ... We've asked this question already, about the regulations, you've said that you consider them adequate for controlling the traffic or hunting of jaguars in your country.

• Michelangelli. No, the regulations are adequate. But enforcement of the regulations, we need.

Teer. O.K. Are there other man-made or natural factors, not covered, that limit jaguar populations that could cause them to be endangered or threatened?

• Michelangelli. ...

Teer. We've talked about hunting, we've talked about habitat, laws, and diseases and parasites. Is there anything beyond those three or four things that could be important?

• Michelangelli. We think that the only limit to jaguar populations is the problem of forestry, you know.

Teer. O.K.

Teer. You would say, of the three most important things, habitat, over utilization and natural mortality, like diseases and so on. Which of those three ...?

• Michelangelli. No, habitat.

Teer. Habitat by any measure.

• Michelangelli. Yes.

Teer. Do you think that hunting of jaguar in your country would supply sufficient income or monetary return to government and to the local people to provide some incentive for management and protection of the species?

• Michelangelli. Well, I don't think so. I don't think so for many reasons. When the government collects money in Venezuela, by our system, all the money goes to the national budget, okay ?.

Teer. So it's lost in the national...

• Michelangelli. Yes. It's put in with everything that comes to the national budget. Our legislation doesn't provide for specific assignments to wildlife or even to other ways. No. The national budget is only one by this system, okay ?. Every piece of money that goes to the national budget is in the national budget. The Finance Minister with the Counsel of Ministers decides what is the objective of every piece of the budget, and then it's absolutely impossible, without a change of laws, to do something that can assure that wildlife revenues go to wildlife investigation or reserves or conservation.

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Teer. So there is no guarantee that the local population would ever receive anything.

• Michelangelli. No ... no.

Teer. What are the sizes of areas occupied by your jaguars? Are they throughout the whole of Venezuela? Are there areas where they are more abundant than in other areas? Could you identify those? For example, you said that the country south of the Orinoco is protected by nature, has not been developed by man, and that is a sizeable area and has a relatively good population of jaguars. Would you have any estimate of density? Could you put some kind of figure to that?

• Michelangelli. No. Well, the only estimate we have is the Brazilian estimation of density of jaguars. It's the only ... all our data is empirical, no?. But we can take the Brazilian estimates, south of the Orinoco, because it's the same habitat. Practically the same, with some little differences. Even our knowledge directly about jaguars in the area is that it is more or less the same type of jaguar with the same behavior and probably occupy the same area ...

Teer. Is it the same sort of country as the Pantanal?

• Michelangelli. No, south of the Orinoco is like Amazonia.

Teer. I see, that country would have, as I recall hearing someone say...

• Michelangelli. The Pantanal is the flooded plains,

Teer. Right.

• Michelangelli. That density was something on the order of... Well, we heard one estimate from Antonio Almeida, one jaguar to eight km² at it's most dense, and up to one jaguar to sixty km² on the average. But in that Matto Grosso country generally we hear something like a hundred to a hundred and sixty km² per each jaguar.

• Michelangelli. Well, before hearing the Almeida opinion, Rafael Hoogesteijn and myself, I think from 5 years ago more or less, that normally the jaguar occupies more or less the same area in Venezuela, even when we don't know anything about Almeida's opinion, no? We think that by tracks and by everything

Teer. Every evidence?

• Michelangelli. Yes, that jaguar occupy, normally the males about ten thousand ha, more or less.

Teer. Ten thousand ha?

• Michelangelli. Ten thousand ha, more or less, each one, in a semi-deciduous forest, o.k.?, not in the humid forest. In the humid forest it probably occupies a little bit more.

Teer. Ten thousand ha would be ten km², wouldn't it?

Teer Yes.

• Michelangelli. One hundred square kilometers.

Teer. A hundred km².

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• Michelangelli. Yes, it's more or less the same as Almeida's opinion ... Independently of the Almeida opinion.

Teer. One thing we may want to do is to send you a map and let you draw what you think some density areas are. We know these will be impressions and perhaps educated impressions from your own experience, but it will be useful for us to do that, so in the mail you may receive a map, and you can...

• Michelangelli. No, tomorrow in Venezuela we can give you maps.

Teer. We don't have maps with us, though.

• Michelangelli. No, but we have.

Teer. O.K

• Michelangelli. O.K.

Teer. Do you know of any other studies or any other experiences where densities of jaguars have been estimated, besides those that you've referred to in Brazil or those of Rabinowitz in Belize?

• Michelangelli. No. In Venezuela, unfortunately, we are now trying to obtain funds for study of the jaguar. For a full study of the biology, status, behavior, territoriality, density, etc. Rafael and myself, we are trying just now.

Teer. To get started.

• Michelangelli. Yes.

Teer. So there is no other studies that you know about that have been conducted and you want to start some things now.

• Michelangelli. No, some reports in magazines and that one of Peluttini (?). But scientific, nothing.

Teer. Are there other scientists in Venezuela that have a scientific interest in jaguar, that would be interested in making studies or that have a ...

• Michelangelli. Probably yes,

Teer. Certainly.

• Michelangelli. Yes. Probably yes, especially the group of the Instituto de Zoología, the Central University, they are very interested in the studies. Not only on the jaguar, they have a project for the tapir that is very important in the jaguar study and some other studies of big animals, of big mammals.

Teer. O.k., there is one other question, that I guess is a leading question. We've referred to it off and on in this discussion. Do you think that there should be some utilization of jaguars for their own sake, or for the benefit of the people, or protection of livestock or for simply recreation? Is there some reason to do this? Do you think there should be this in the future? Under what conditions?

• Michelangelli. Okay, in the future it is possible. I am not against hunting. No, I know very

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well the African experience. It is good in many ways. In some ways it is possible. We think that conditions here are not good at present.

Teer. The conditions that are related to the structure, or the populations of animals, or the habitat. What conditions are you referring to?

• Michelangelli. No, the conditions that we refer to is that we don't know exactly, with scientific data, what the real jaguar population situation is, o.k? Where in the area south of the Orinoco is hunting jaguars almost impossible, o.k?; or at least very, very difficult? You can go to the forest for a week and you can see five jaguars in a week, but you can go for two months and you don't see any jaguars, no?. Probably many tracks, but in two months you will not see any jaguars. Then you can't guarantee to anybody that you will take a jaguar, and it's really very expensive to hunt jaguars in the forest. In the flooded plains it would be good if we can know exactly what is the population of the jaguar and if we can set aside some absolutely protected areas, African type, for example Serengeti National Park, something like it. And surrounding the areas we can set aside game reserves, both on government-owned or privately owned land. Probably it's better with private properties. And it would be possible, no?. We are not absolutely against this idea and even it could be very good for the protection of the jaguar if it's well managed, o.k?. But this is the problem. We need a very big area absolutely protected, with patches...

Teer. Well regulated by the people...

• Michelangelli. No, regulated by the government, with National Parks for instance, o.k?. And the properties surrounding the area you can turn some properties into game ranch no ... game reserve.

Edgardo Mondolff and Rafael Hoogesteljn. Fundacion para la Defensa de la Naturaleza (FUDENA), Caracas, Venezuela.

In view of the highly critical status of the jaguar in Venezuela, where it has been exterminated in a very large part of its former range and greatly reduced in numbers in many areas where it was once relatively abundant, there is an urgent need to afford adequate protection to remaining populations and their habitat. These measures are necessary to ensure the survival of this magnificent animal, the largest of the neotropical cats and a unique element of the tropical lowland forest ecosystem as well as a wildlife heritage of the country that is being sadly squandered.

As we have already stated, the threats to jaguar survival are overkilling and habitat loss. The intensive hunting pressure to control problem jaguars as well as the illegal trading of skins for fur industries abroad, are the prime factors for the decline in population.

Another important factor is the large-scale destruction of forest habitat by clearing of woodlands for agricultural purposes and/or to establish pastures for cattle grazing. This has been done extensively in the llanos region, the piedmont valleys of the Coastal Mountain range, the Lake Maracaibo basin and in the State of Bolivar in the southeastern part of the country.

Suggested measures for a conservation strategy for the jaguar are:

1. Research - Little is known about the jaguar population size and dynamics. Also, more thorough studies of other aspects of its ecology and behavior are needed to provide basic information and guidelines for establishing adequate management of the remaining populations of this large cat in officially protected areas (national parks, fauna reserves, forestry reserves), as well as in some privately owned lands such as cattle ranches where few jaguars remain and the owners are willing to preserve the wildlife resources on their properties. A research program could be on the following lines:

a) Assessment of population size: It is quite difficult to obtain estimates of jaguar numbers and densities because this cat is highly secretive, largely nocturnal and frequents dense cover. One method that could render some information is estimating the number of jaguars on the basis of spoor. Tracks of individual animals identified by measurements, drawings, photographs and casts could give an estimate of the number of jaguars living in the locality. It should be borne in mind that sometimes jaguar and puma are sympatric, so care should be exercised to distinguish their tracks. In a habitat of a cattle ranch in the Pantanal region of Brazil, Schaller and Crawshaw (1980) found that the size and shape of jaguars and puma tracks, coupled with radio tracking of one individual from each species, provided a reliable figure of population size. Radio-telemetry also provides information on

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the cat's movements, home ranges and activity patterns. Studies of the jaguar population dynamics await the development of techniques for the accurate estimate of population structures applicable to both living and dead animals. An excellent guide for studying predators is the Handbook of Techniques by Bertram (1979).

b) Habitat evaluation: Habitat characteristics (vegetation type, cover, phenology, water availability) should be studied as well as the prey biomass including seasonal changes in food abundance which could be assessed by making a census of the populations of animals preyed upon by jaguars, as done by Schaller (1983). In addition to the above information, it is necessary to give due consideration to the size of the home range and density of jaguars in the area when planning jaguar reserves.

2. Control of Hunting - The killing of "problem jaguars" and hunting for sport of this cat should be permitted under careful regulations and strict official control. When a jaguar has turned to killing livestock, making it necessary to eliminate it, the ranch owner should notify the Government Wildlife Service of the problem in advance in order to obtain approval to kill it and ensure that such killing would be documented and controlled by the Government agency. The Wildlife Service should send a biologist to the locality to assess the damage caused by the predator and be present during the hunt, in order to obtain biological material and information, such as measurements, weights, reproductive tract, skull, stomach contents and other pertinent data. The necessity of killing a "problem jaguar" could afford the opportunity for sport hunting: the ranch owner could invite sportsmen to do so, or charge a fee for the privilege of hunting the cat. A license for hunting jaguar would be issued by the government agency. Calculations of killing quotas for jaguars would require data on population structure and density, not yet available.

Nevertheless, some regulations are needed on numbers, sex and age of the jaguars to be harvested, taking into consideration that the removal of mature resident animals, particularly females, may have a significant effect on the dynamics of jaguar populations. No killing of jaguars should be permitted in habitats where these cats are not preying on livestock.

Killing jaguars for trading their pelts is illegal and must be strictly controlled. In the case of sport hunting, regulations should be established for the possession of trophies, but always in accordance with CITES regulations. In Venezuela, some of the large national parks such as Canaima, Guatopo, El Avila, Henry Pittier, Aguaro-Guariquito, Duida-Marahuaca, Yacapana, Serrania La Neblina, plus at least one of the fauna reserves, Estero de Chiguare, and several forest reserves: Ticoporo Caparo, Imataca, El Caura, La Paragua, Sipapo, contain limited jaguar populations that are more or less

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protected in the national parks but not so in the reserves.

The method of capturing "problem jaguars" using live-traps or other suitable methods with the purpose of releasing them into a suitable wild habitat, should only be used on an experimental basis, as it is quite possible that jaguars turned livestock killers could not be rehabilitated. Releasing jaguars raised in captivity into the wild with the purpose of repopulating a habitat, should be firmly discouraged for its adverse effects. Finally, it should be emphasized that official regulations intended to protect the jaguar must be effectively enforced in the field.

Interview by Dr. James G. Teer with Lic. Mirna Quero, Biologist, Jefe, División de Fauna Silvestre, DAR-DGSAM-Ministerio del Ambiente y de los Recursos Naturales Renovables, Torre Sur, Pliso 22, Centro Simón Bolívar, Caracas, Venezuela. Date: May 6, 1986.

Q. Ms. Quero, We are interested in obtaining from your office information on the protection and regulations for jaguar conservation in Venezuela.

• Quero. At the moment we are requesting a research project on population densities to the Research Division of the Ministerio.

Q. Any information available now?

• Quero. No. Not about densities or populations yet. We do have information on our laws and regulations. We do not allow any kind of commercial utilization of the species.

Q. Did you sign the treaty with CITES?

• Quero. Yes.

Q. Is there any prospect of permits for protection of livestock or of hunting?

• Quero. Felines as the jaguar are not allowed by the law to be hunted for commercial or sport purposes.

Q. Is there any legal hunting?

• Quero. In Venezuela, jaguar hunting is done at a control level for protection of livestock in private lands, but this is not supported by permits from the Ministerio. It is done illegally. All our felines are protected by the law.

Q. Is there any study this department would be doing to understand the ecology of jaguar?

• Quero. This office is an administration office, devoted to the administration of the resource. Wildlife ecology research is carried out by a different department. You see, within the Ministry of the Environment, we have three different tasks that are carried out by three different but coordinate groups of people: Planning, Research and Administration of each natural resource in the country. This office carries out administration duties.

We have received notice that some studies on some felids are about to start as research projects for thesis in biology careers.

Q. What happens to the skins of the jaguars or other spotted cats that are killed by the farmers with the purpose of protecting livestock?

• Quero. Normally they keep them, or send them to museums. But this is completely forbidden. The tanneries have been advised that it is illegal and that it is prohibited to process such skins without an express permit from the Ministerio. We have a ban for an indefinite time.

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Q. Are the jaguar populations in this country decreasing, increasing or staying the same as five years ago?

• Quero. Expert wildlife biologists as Gonzalo Medina, Ojasti and others, who are often in the field, say that felines as the ocelot, for instance, have large populations in Venezuela. There isn't a large depredation on the felines for commercial purposes in most of Venezuela except, probably, in the zones near our borders, where illegal traffic of skins may be carried out. The tanneries in Venezuela are really careful not to process feline skins now because they can be strongly punished. We have good control over them because their interests are in the caiman skins that they are processing now. For this reason they have to be checked very often, and we very often visit them.

Q. Is there any kind of literature or data you could provide for this work?

• Quero. I think you will have to talk to Dr. Gonzalo Medina. He is our expert wildlife advisor and I am sure he could provide more information for you.

Q. We will talk with him, and thank you very much for your help.

• Quero. You are welcome.

Interview by Dr. Wendell Swank with Dr. Carlos Rivero, Private Consultant, Wild-Life Biologist. C.R.B. Consulting Ecologists. Edificio Uno, P.1, Of. 1-2. Calle Chacafto. Sabana Grande, B. Monte. Caracas. 1050. Phone: 712835. Date: May 6, 1986.

Portion of the country covered by the respondent:

Mostly the northern part of Venezuela and the llanos area.

Q. Carlos, does your country or the area of the country that you know, have wild jaguar populations?

• Rivero. Yes.

Q. Are jaguars in your opinion more abundant, less abundant or about the same as they were, say 5 years ago?

• Rivero. I have no field studies to prove this, but I would suppose that they are declining. Along with everything that is declining, maybe due more to the disposing of vegetation, natural vegetation in the areas.

Q. Upon what is this opinion based?

• Rivero. Well, a lot of the land is being cultivated, more and more each time. It's more integrated into human culture, and the jaguar is an animal species that is considered dangerous, and is considered something harmful to populations of cattle, for instance, or people. So that's the reason they might be pursued, first thing. Second, it may happen that new lands that are being used for cutting timber and a side effect of these operations might be killing jaguars or ocelots or any other spotted cats to sell skins illegally.

Q. Under the United States Endangered Species Act, a species is considered "endangered" if it is in danger of extinction throughout all or significant portion of its range. Whereas a species is considered "threatened", if it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Now, at this time, considering the above definitions, would you consider the jaguar to be endangered or threatened in the area of the country with which you are familiar?

• Rivero. Well, there are two types of areas in the country which I would say are under some sort of contrast right now. We have about half the country well populated with people and with cattle and so on, and we have maybe another half of the country, mainly the southern part, rather not populated so much and there is still a lot of forest, so I may say that where people are common, the species is endangered, and probably threatened in those areas which are harder to get to.

Q. Would you say that the Orinoco river kind of divides this country generally?

• Rivero. Yes, I would say so, yes.

Q. If you believe the jaguar to be either endangered or threatened, is it because of destruction,

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modification or curtailment of habitat?

• Rivero. That is probably the main reason. Either taking timber or cutting down the forest to make space for cattle-ranching or agriculture. So that is one thing that is totally cutting down the habitat for the animal. Then even beyond that point, when you have cattle ranches and jaguars may be coming in from adjacent lands, which are still forested, these cats are still being pursued because of the danger they may be posing to the cattle ranching operation. That's one thing but then there still persists a thing, a small amount of very effective hunters which have the means to go to certain places in small planes and actually get to the animals with very high probabilities of success.

Q. Where primarily is this destruction of habitat taking place by forest cutting?

• Rivero. In the llanos, mainly. And in all the northern range of Venezuela, the Andes and all the central and eastern ranges.

Q. This is throughout the whole portion of the jaguars range in the llanos?

• Rivero. Yes. I would say so.

Q. Are there comparable changes that are expected to begin within the next several years in other areas?

• Rivero. I guess so. Yes, because this phenomena will extend as long as people numbers are higher in the country, and you have to take a hold of new land. But on the other side, you can have for comparison the tendency in the last few years to set aside a lot of land also, which right now makes up about 4.5 % of the country. A surface set aside as national parks, alone, just on that legal figure.

Q. You indicate that over-utilization may be a cause. Is over utilization actually affecting the status of the jaguar?

• Rivero. Do you mean over-utilization of the land?

Q. I mean off take of jaguars. That is, are you killing too many in the area?

• Rivero. Well, I don't really know if that is true. I wouldn't be able to say that. I don't have the numbers.

Q. And this taking, would it be primarily due to control of depredation?

• Rivero. Yes.

Q. Of cattle ranches?

• Rivero. Well, that is used as an excuse to actually have people who maybe are sport hunters to come in and kill the jaguars. That is what they always do, find somebody who wants to do it for sport and those people come in and kill the cats. But the excuse is that it is impinging the cattle population, which may not always be true. Like an example I witnessed last year, when finally it was found that it wasn't really the jaguars, but some of the peons that were actually doing the cattle punishing.

Q. So you would say that it is primarily a recreational use. That they are using depredation control as an excuse for taking of the jaguars?

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• Rivero. Yes. Right.

Q. I know this is rough. But what is your estimate for the annual harvest or off-take of jaguars. Say annual off-take, say, for each of the last five years?

• Rivero. I really have no idea. The problem is that, well, since there is a complete ban on the species since a long time ago, nobody has numbers.

Q. Well, let's be very rough, would you say it's 5 to 50, for a year?

• Rivero. Animals killed, do you mean?

Q. Total animals killed?

• Rivero. I'm sure more than 5, in the country. Yes, I'm pretty sure.

Q. More than 50?

• Rivero. Maybe not.

Q. So maybe someplace between 5 to 50?

• Rivero. Yes, I would say.

Q. I know this is rough, but where we can possibly get numbers, we are trying to at least... In other words, not a thousand?

• Rivero. No. Well this same thing happens, I think, with almost all other animals in Venezuela. We have very strong laws since a long time ago, even though we don't have, probably the best wildlife police enforcement. Still it is so difficult to get to harm wildlife, you know, that I think laws like that and the way they are handled are still effective anyway. With all the defects it may have, in terms of enforcement and all.

Q. So, you would say, as an estimate then, that the take may be somewhere between 5 and 50 per year, annually?

• Rivero. Probably, yes.

Q. You indicate that there are regulations or laws which limit and restrict the taking of jaguars; in other words, it's closed ?

• Rivero. Yes, completely. It is a species on which taking is completely banned.

Q. So there are no seasons or, open seasons or anything like that?.

• Rivero. No, no. And, for instance, if an example can be put through, we had a complete ban on caiman for about 10 years, until 3 years ago, and we were able to witness that within those ten years the populations reached a real nice number again. We decided that it was possible to exploit this species again in large numbers; and they're still thriving. So I think there is some effectiveness in these laws anyway, even though we may consider that the enforcement is not as we would like it to be.

Q. Since there is no taking of jaguars in your country then there is no marking or tagging system. And since there is no export there isn't anything like an approval required for exporting

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jaguars. And since there is no legal taking then it's not facilitating or encouraging illegal taking?

• That's right.

Q. Is Venezuela a member of CITES?

• Rivero. Yes. The treaty was signed years ago. Mima Quero will be able to give you more details.

Q. In 1973, they say?

• Rivero. I believe that is right.

Q. Do you know of any place where diseases or parasites of jaguars might be influencing the population?

• Rivero. No. I don't.

Q. What about the inadequate regulations or enforcement of laws. Do you think that this is influencing the populations of jaguars, or the export of jaguar's and skins in your country?

• Rivero. Well, I don't think there is rigorous control. I don't think there was ever something like that. But what I can see in many other cases is that things you used to see before, like places where you could buy skins or places where you could buy live birds, this you can not see any more. So a lot of what the law has done through the years is to not encourage a business on animal skins or live animals in Venezuela. So, in terms of the gross large figure going out from the country, I don't think that is really happening. But I don't have any doubt to believe that a lower number of steady contraband is always taking place anyway.

Q. In the three categories of effectiveness of this law, would you consider them to be adequate, that is the enforcement to be adequate, somewhat adequate or inadequate?

• Rivero. I would say the law is adequate, since laws are always made as best as they can as possible. The effectiveness of it is what may not be...

Q. Would you say is somewhat adequate?

• Rivero. Yes. That's right.

Q. Are there any other factors that you can think of, either man-made or natural, which might be limiting jaguar populations in this country?

• Rivero. Yes. For instance, I wouldn't be surprised if you take animals that may be part of the diet you can be impinging upon the big cat population, if you do some harm on animals that may compose it's diet. For instance, who knows what's happening to jaguars when you take capybaras. That may be one of the things to question somebody about. But then again you think the other way, maybe you can see a lot of capybaras now days because there are not that many jaguars.

The history of the modification of forest vegetation in the llanos is quite old, it started a long time ago when Spaniards started cutting down the trees to use timber and then also to raise cattle. There is some recent history that is very important and I think should be considered here because we

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know that when oil was found, most of the people that used to work in the llanos went to work in the oil fields, and then the llanos cattle farming was abandoned for some time in some places and the "selva" grew back. And right now we're having another phenomena which is we're cutting it back again, but it did grow for about 50 years. I would say that the first 50 years of this century these forests were all the time coming back, and then from the 1950 to this point we're slowly cutting it down again.

Q. As you cut the forest back and this land comes into grass, as I understand it ... Does this create better habitat for the capybara?

• Rivero. It depends, if it's a grassland which can be under water seasonally, it will favor the capybara. Yes I'm sure it will. But the thing is that capybara are more savanna animals, you know, and especially in places which are near water or under water during the rainy season.

Q. So what you are saying is that as they remove the forest you might get more grass and more capybaras, which may have some influence on the jaguar population. That the removal of the forest would actually be decreasing the population of jaguars?

• Rivero. That's right. Well, cutting the forest and having a lot of grassland is not exactly something that favors capybara populations because they need water, and if these lands are above water ... it wouldn't be that good of a place for capybara anyway.

Q. Well, from the information you have, or your personal experience, I'm trying to classify these reasons, what would you say is the most important cause for the decline or the influence on the jaguar, that is, is it destruction of habitat, over utilization, disease, or the inadequate enforcement of regulations?

• Rivero. I would say the destruction of habitat is probably the main thing. Then, over-utilization could be something to consider too. Because if you have very few animals still living there, anything might be considered over-utilization in some cases. The populations may be so low that maybe killing one or two animals in a place you are killing the whole population or a very important part of it. It depends on the situation.

Q. And disease is not important. Then would you say inadequate regulations or other factors, such as clearing the habitat?

• Rivero. Well, regulations, maybe are not the ones to blame, I would probably add something like enforcement,

Q. Inadequate enforcement of regulations?

• Rivero. Yes. Because regulations are usually well written, and they really, you know, go to the point and all that. But maybe enforcement of those regulations is the real weakness in the whole thing.

Q. If Venezuela decided that they would open the country to legal hunting of jaguars by bringing in outside hunters (these hunters would pay license fees and maybe something like a fee

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after they killed the jaguar, and some of this money went to local people), do you think this might provide an incentive for more protection and management of the jaguar?

• Rivero. Not that way. The only way I could see something like that possibly would be to have something that we've been thinking about for a long time. It is something that is really hard to do anyway having a hunting preserve, which is already something that has to be planned like that and has to be run like a hunting preserve. So it has to be something really controlled. But there are hunters here in Venezuela, people who might be interested in something like that and there are people in government offices who have the ideas on doing something like this. It has never really happened yet. But I doubt that anything like that would happen since there is a high demand with only local hunters anyway, and it wouldn't happen like that. I don't think if bringing people from outside would make any difference. I don't think that the monetary incentive would be enough to make the enforcement do something. If you do something like that it would be, I think, too costly, if you want to go to the whole country. Rather probably select an area where you know jaguars are there and you know they can be managed. Then probably the money you put into something like that would be better used.

Q. You mean the money and the management would be concentrated in one area?

• Rivero. Yes, as a preserve or something like that. I know there is somebody that has brought up the idea of a preserve for the jaguar somewhere, I don't have their name ... I don't remember very much; but something like that has been spoken by somebody before, here.

Q. Do you know if there are any populations of jaguars in your country that are maintaining themselves or even expanding?

• Rivero. Yes. I don't know the name of the ranch right now, but it can be found easily. It's near the place I work in Barinas and the people there are very conscious about having jaguars there, and they don't let anybody get in there and kill the jaguars. So they're actually landowners who are protecting the jaguar population in the place. And it's a real case, so it can be pinpointed and can be studied if you want to.

Q. Do you have any data, or any area for which you have an estimate of the population of jaguars, that is the numbers for the whole area or maybe the density, that is the number of jaguars per km²?

• Rivero. Yes, well, a student of mine, Edgard Yarena, did his thesis last year on the management of the biological aspect of Guatopo National Park. And we did a plan for managing plants and animals of the park, park resources. He has some numbers that he wrote down in his thesis. I will get you some copies of his consideration of how many animals are there. I think the basis of his criteria is on generalized studies in Venezuela and his own experience.

Q. Well, that would be appreciated if we could just get either a summary on any area like that.

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• Rivero. Yes, I figure about two pages or three pages of written material.

Q. Do you know of any other studies besides Isenberg's and that of your student, as actual population estimates of densities, I know Schaller did some.

• Rivero. No. Not that I remember, in Venezuela.

Q. Do you know of other studies on the status of the jaguar, that have produced information that you consider scientifically sound and reliable?

• Rivero. No. Maybe not scientifically sound, but I do have maybe two papers or small books that have been written by hunters, about the jaguar in Venezuela which I can furnish copies of, that you may find useful. But these are popular accounts made by hunters. One of them I know, personally, was a good friend of mine a long time ago. I haven't seen him in a few years, but he wrote a small book on his own experience with the jaguars in Venezuela, so there might be some information there. It has to be taken like coming from a hunter, but he wouldn't have any reason to lie or exaggerate.

Q. We would like to at least take a look at those and put them in as citations in our report. As you know there is a lot of information on the jaguar and a lot of it is not based on any real sound studies, but as you say, it is viable to give us some information.

• Rivero. Yes, but for instance, you know, in some of these books you find that there was an expedition to some place and they probably say how many skins they got in two or three days of hunting, and that may give you an idea of how things change in time, you know even if it's not very good data.

Q. Yes, well thank you very much Carlos.

**Interview by Dr. Wendel Swank with Herman Zinng Aeropuerto la Carlota,
Base Francisco de Miranda, Caracas, Venezuela. Phone: 917942 ; 919286. Date:
April 7, 1986.**

Q. What portion of the country have you been in and you have familiarity with?

• Zinng. I know all the country; of Venezuela I know most of the country. I've been hunting and flying and doing business all around.

Q. Where is your ranch?

• Zinng. My ranch is in the Amazonas. State of Amazonas, in Venezuela.

Q. How long have you lived in the country?

• Zinng. I've been living here all my life ... 43 years.

Q. Are jaguars in your opinion more abundant, less abundant or about the same as they were 5 years ago?

• Zinng. No, I think they're more abundant right now than 5 years ago.

Q. And, what do you use as your basis?

• Zinng. My opinion is the same opinion I told you at lunch. Is the, you know, the animals decline, or the people kill the animals for business; most of the business at that time was the skin for the ladies in coats and it was the mode (fashion). And right now nobody likes, or nobody needs the coat of the jaguar, the population is growing in good numbers.

Q. Under our Endangered Species Act, and also under CITES, a species is considered "endangered" if it is in danger of extinction throughout all or a significant portion of its range, whereas under our Endangered Species Act it is considered "threatened" if it is about to be endangered. Now, in Venezuela, under this definition would you consider the jaguar to be either endangered or threatened in your country or area with which you are familiar?

• Zinng. No, I don't think it is endangered for the reason they have too much jungles and land and nobody can hurt it. You know, like in the Amazon, to hunt all the jaguars of the Amazon maybe you have to throw an atomic bomb there. I don't think it's the case. I think in some areas, sometimes are many and the people start hunting and then decline the quantities. Well, I think if you control the animals, like supposed to be controlled, the animal is not in danger for any reason.

Q. Do you think that the jaguar is perhaps threatened because of a modification or curtailment of its habitat, say the jungle, is it being destroyed?

• Zinng. No, no, the jungle here is not destroyed. I think the animals I say to you, they live in the jungle and they live in the savannas and they live in the mountains. The problem is there used to be years ago skin buyers.

Q. So you really think that the jaguar is neither threatened nor endangered, and that the

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clearing of the land hasn't really damaged the jaguar populations to any great extent?

• Zinng. No, well I think the ... One of the main problems for the jaguars can be the people have cattle, and the animals start hunting the cattle or start hunting the pigs and they have to kill it for reason you know, the animals start getting vicious every day more and more and more. And more easy to hunt the same way.

Q. So, they have to be taken off because they are killing the cattle?

• Zinng. Right, or taking off from the place in the cage and putting them in another place.

Q. How many jaguars, on a per year basis do you think are taken, have been taken out of the country, say over the last 5 years?. Just a guess.

• Zinng. Guess, I tell you, maybe 40,

Q. 40 per year?

• Zinng. Or 50.

• Zinng. I mean totally, you know, the cowboys, Indians, hunters,

Q. Because I understand that here in Venezuela the country is completely closed to the taking of jaguars. The laws ...?

• Zinng. Of course.

Q. Do you think this closure is effective in curtailing the numbers of jaguars taken?

• Zinng. No, I think the law is not a good idea for the reason, if I have a ranch and I am a poor guy and I have a little ranch with three pigs, and come a jaguar and kill my three pigs. I have to kill it. And suppose if tomorrow we have a hunting organization and we sell that jaguar, maybe that guy is better to hold the animals waiting for come in a guy to pay more.

Q. In other words, save it for a hunter who is willing to pay an amount of money for a trophy?

• Zinng. Right, right. I think it's a better idea. I think in your country it's the same, no?

Q. Sure,

• Zinng. You have more deer right now, than used to be a long time, I think?

Q. That's true, yes.

Q. Do you think there's an effective system here to restrict the export of jaguar skins to the fur trade and so on?.

• Zinng. I don't think they do any, any ... You know, I don't think the government, any government in the world can control the animals' life . For the reason the governments, most of the people of the government are at desks, in the office they are not in the place. If I am in the place, I know who killed the jaguar, what did he do with that skin. And I can go and say, hey why you do this? why you don't do that?. You know, it's a difference when you have people at a desk. They say, we are prohibiting. But prohibit , and in the field the guy is killing every day the animals.

Q. Your country did, Venezuela did become a member of CITES in 1973, as I understand it?

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• Zinng. I don't know.

Q. Do you know of any place where perhaps diseases or parasites have limited jaguar populations?

• Zinng. No, I only see the only problem have the jaguars is the flies. When the little cubs born, you know sometimes, the females born two or three they get worms in the ... screw worms ... and then they die.

Q. Screw worm in the navel?

• Zinng. Yes. It is the main problem these animals have. For the reason, you know, the female always put too many killed animals near to the cave, or where they have the cubs.

Q. What do you think now in your country is limiting the populations of jaguars? Why aren't they growing faster?

• Zinng. They don't grow faster for the reason I don't think the jaguar is the animal that grows like a rabbit or something like that. Or they don't grow faster for the reason, you know, like I told you, if a female starts killing cows every day to a farmer. The farmer sends a guy with a poison and then they die.

Q. So it's low reproductive potential, because they only have one and a half young per year.

• Zinng. Right.

Q. Do you think the legal hunting of the jaguar in your country would give sufficient monetary return to the government and to the local people to provide some incentive for the protection and management of these jaguars?

• Zinng. I think if you do it the right way. Like used to be in other countries in the world, you doing a very good thing. For the reason you get money for the tourists, the people are making money, and the people are taking care of the animals. For the reason is a resort, is like you're having cows, you're going to sell it in the future, you have to take care of that cow. If the cow is any business.

Q. If it's no value then you don't take care of it?

• Zinng. Nobody take care. You see in the farms they sell the capybaras, and you go to the farm they sell the Capybara and you see millions of Capybaras. Why?. It's a good business. If you sell jaguars you have in your farm and you're taking care, and if you see a little cub or you see a little female you take care of it. Like example, two years ago I had two jaguars, how do you say? ... Profession. I make money , I'm with a friend of mine, they want to kill a jaguar, I say O.K., in my ranch I have a jaguar, O.K. It's different, last year I have a jaguar and he killed like a hundred pigs. I don't kill, for the reason I was waiting for the guy to come to help. And if suppose it's a female, I never going to kill a female and a little cub either. Suppose I don't have that and that female kill me a hundred pigs, I kill it. For the reason how am I going to hold the animals in my farm?

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Q. Do you have any estimate of the populations of jaguars any place? That is on a density basis. Just kind of an estimate of how many jaguars there are for ... how many kilometers per jaguar or anything like that?

• Zinng. No, I never do that. I know in some areas I am hunting I know how many jaguars are around, or how many females are around or how many males are around.

Q. Would you have just a guess, say, how many jaguars you have on your ranch and how big is the ranch?

• Zinng. My ranch is like 7,000 ha. I think maybe there is around ten or eight. And the population moves, you know. In the Amazon the jaguar is not staying in a ranch like it is in Barinas or in Apure. The savanna jaguars are more ... how do you say?, they stay more in the ranch. For the reason they have the food is easier, in the river they have capybaras, deer, this, that. And they have cows and pigs and dogs and everything they find in the road. When in the Amazon the jaguars move more for the hunting is moving. You know it's a big jungle, and the jungles, you know, the animals move a lot and they are behind the animals. Sometimes in my farm get ten in one week and two weeks later they disappear.

Q. On the average would you say that 10 jaguars are on your ranch at any one time?

• Zinng. Yes,

Q. Not just 10 jaguars using your ranch, but 10 jaguars on your ranch and they move but ...?

• Zinng. Right, they are around.

Q. We've talked to quite a few people here in Venezuela, we've talked to Ramón, we've talked to Rafael, and we've talked to Carlos Rivero. Do you know anybody else in Venezuela that would have a lot of information on the jaguar, that we should talk with?

• Zinng. The information most of my friends have, is if they die old, if they die I don't know for any reason they die most of them. I can tell you a guy who knows Rafael Amal, or you can talk with Julio "Chucho" de las Casas, he's an old guy who hunts normally..

Q. Are those people still alive?

• Zinng. Yes.

