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Abstract: For each of the Latin American countries, the description of the habitats and the Felidae and Lutrinae species present is provided. The information for the single species includes: distribution (including map), status and survival as well as a suggestions for conservation measures.

College of Forestry, Wildlife and Range Sciences

STATUS SURVEY OF OTTERS (LUTRINAE) AND SPOTTED CATS (FELIDAE) IN LATIN AMERICA

by Wayne E. Melquist

Forest, Wildlife and Range Experiment Station

University of Idaho

A Completion Report

Contract No. 9006, IUCN

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ARGENTINA

Argentina occupies most of the southern third of the South American continent, covering an area of about 2,807,500 km^2. The western frontier extends along the crest of the Andes Mountains, a somewhat formidable barrier between Argentina and Chile. The country is highly variable in both land features and climate, which range from the intense heat of the Chaco through the pleasant climate of the central pampas to the sub-antarctic cold of southern Patagonia.

Ojeda and Mares (1982) list 8 major biomes for Argentina, which account for the high degree of species diversity (Olrog and Lucero 1981). These biomes include the Chaco, the Transitional Forest, the Subtropical Moist Forest, the Monte Desert, the Puna, the Pampas, Patagonia, and the Southern Coniferous Forest.

The Chaco, or thorn scrub, extends over much of north-central Argentina (see map, page 506 of Ojeda and Mares 1982). The region is noted for its harsh environment (a 6-month winter drought and temperatures as high as 50° C) and sparse human population. Soils are poor and trees in the thorn forest are generally under 10 m in height. Nevertheless, the government encourages colonization and wood and food production.

The Transition Forest is restricted to northwestern Argentina where winters are dry and seasons pronounced. In this rather densely populated region, logging and land-clearing are much in evidence.

The Subtropical Moist Forest of Argentina is located in two areas separated by the Chaco; a northwest portion in the Provinces of Jujuy, Salta, and Tucuman, and a northeast portion in Misiones Province. These areas receive from 800-2,000 mm of precipitation per year. Epiphytes are abundant and trees grow to heights of 30 m. Except for areas within park boundaries, most of the northeastern moist forest has been logged. There is considerable pressure from loggers, ranchers, and farmers to exploit the western forests.

The Monte Desert extends nearly 2,000 km through west-central Argentina. It is a warm desert consisting primarily of xerophytes.

The Puna is an extensive cold desert stretching N-S along the Andean and pre-Andean mountains at elevations above 3,500 m. Vegetation is sparse, ranging from a low shrub-herb-grass combination to open slopes of scattered Polilepis trees. Although sheep and goats are grazed on the Puna, it is the habitat least affected by man.

The Pampas, or grasslands, comprise approximately 500,000 km^2 of central and east-central Argentina. These vast plains are probably the largest area of fertile soils in South America. Most of the orginal grasslands have been replaced as a result of intensive grazing.

Patagonia, an area of about 780,000 km^2 extending south from the Rio Negro, is a region of arid, wind-swept plateaus cut by ravines. Mean temperature is about 15° C. Grazing of

industries, rising unemployment and under-employment, and continued inflation. This type of economic picture, coupled with a huge foreign debt, will undoubtedly result in increased efforts to stimulate the economy, thus resulting in a negative impact on the natural resources. Ojeda and Mares (1982) indicated that an economic philosophy persists at all levels of the Latin American society, with the belief that, "If a particular patch of habitat yields no monetary return to men, then it has no measurable worth." To perceive the natural resources only from an economic viewpoint will likely prove to be counter-productive later. Government officials and natural resource managers, not just in Latin America, but throughout the world, must adopt a "use but don't abuse" philosophy, rather than look only at the immediate financial gains without regard for the long-term welfare of the resource.

Commercialization of wildlife is big business, providing a billion dollars or more in profit each year (Ojeda and Mares 1982). Commercial use of wildlife species in Argentina without consideration for the biological effects of possible overexploitation has continued until recently. The otters and spotted cats have been protected by law No. 22421 in Argentina since 1981, with CITES ratification occurring the same year (Appendix A). Resolution No. 144 was signed in March 1983, which adds to the current law on the conservation of fauna. In this Resolution, all otters, Panthera onca, Felis pardalis, and F. tigrina are considered in danger of extinction; F. guigna, F. jacobita, F. wiedii and F. colocolo (Pampas cat) are listed

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as vulnerable; and F. geoffroyi, F. concolor and F. yagouaroundi are classified as in no danger. According to E. Ruiz (Pers. comm.), Director of the National Wildlife Department and CITES Management Authority for Argentina, the skins of Appendix II species may be imported (provided it is legal to export them from the country of origin), but the products must be exported within a year. If this is the case, there should be no importation of Latin American cats or otters, because none of the Latin American countries allow the harvest of these species in their countries.

These species should benefit, to some extent, from this protection, provided that habitat destruction is controlled and importing countries cooperate. It would seem strange then to see jaguar skin coats and ocelot skins for sale in Buenos Aires. However, there exists a problem in determining if the skins were harvested before or after the date the laws were enacted. Products made from skins taken prior to 8 April 1981 may be legally sold. This dilemma exists in other Latin American countries as well.

Ojeda and Mares (1982) provided some figures on the export of various wildlife species in Argentina. Exportation of pelts increased from 1972 to 1979 (the last year data were evaluated). Three percent of the total number of pelts legally exported (21,918,098) were cats. No data were reported on the otters, although Lutra longicaudis is commercially harvested even now. The 3 cat species reported on include the Geoffroy's cat, Pampas cat, and puma. Between 1972 and 1979, the pelts of

481,333 Geoffroy's cats, 82,195 Pampas cats, and 2,571 puma were reported as legally exported. The authors believe that the illegal trade may well be 10 times or more the legally-exported values. Although the fur of Pampas cats is generally of poor quality with highly variable patterns of spots, the large number of skins sold may indicate its use as an alternative to coats made from more expensive spotted cats. The port value for Geoffroy's cats and Pampas cats exported from Argentina in 1979 was $3,918,748 ($51 per pelt) and $875,033 ($37 per pelt), respectively, (Ojeda and Mares 1982). The ban on harvesting spotted cats and otters should clearly benefit the different species, provided the clandestine operations can be controlled. On the contrary, loss of revenue from wildlife products will certainly not add money to the coffer for use in managing the natural resources.

Argentina has 2,691,551 ha under protection in the form of parks, reserves, sanctuaries and monuments (IUCN 1982b). There are confirmed reports of otters and spotted cats inhabiting portions of many of these protected areas. Although unconfirmed, 1 or more species may occur in all of the protected areas (based on habitat characteristics). However, there are 2 major problems that undermine the effectiveness of the system of protected areas throughout all of Latin America. First, many of the designated areas exist only on paper, with virtually no infrastructure. Second, park guards are scarce, not exceptionally well-trained, underpaid, and generally unable to provide adequate protection of the natural resources. The

problem is perhaps less severe in Argentina where they have a school on Victoria Island, Lake Nahuel Huapi National Park, for training park guards. But the pay scale for park guards is quite low, approximately $120 per month with lodging, according to a guard at Lake Nahuel Huapi National Park. Nevertheless, protected areas in Argentina are becoming increasingly important to the spotted cats and otters for at least short-term survival.

Panthera onca

Distribution

By 1940, the jaguar's range in Argentina had been restricted to the northern provinces (Cabrera and Yepes 1940). In 1957, Cabrera (1957) reported the jaguar as occurring north from the provinces of Chaco and Corrientes. Ojeda and Mares (1982) described the jaguar as being restricted to portions of the provinces of Salta, Jujuy, and Misiones, although the distribution map indicates the jaguar occurs in east-central Santiago del Estero province as well. On a distribution map of Argentina, Olrog and Lucero (1981) showed the jaguar occurring in portions of Salta, Formosa, Chaco, and Misiones provinces, and up to elevations of 2,700 m.

The presence of jaguars has recently been confirmed (either by tracks or actual observations of the animal) in Baritu, Calilegua, El Palmar, El Rey, Iguazu, and Rio Pilcomayo National Parks (Chebez et al. 1981, Crespo 1982, IUCN 1982b, Chebez 1983, Canevari pers. comm.). Jaguar are occasionally seen in Iguazu National Park (Tarak pers. comm.), where Crespo

estimated the population at 10 individuals (Canevari pers. comm.). A jaguar was seen in 1979 in the Urugua-i River area, a proposed provincial reserve adjoining Iguazu Park (Chebez et al. 1981). Based on these data, I estimate the present distribution of jaguar in Argentina to include portions of the provinces of Salta, Tucuman, Formosa, Chaco, Misiones, Corrientes, and Entre Rios (Fig. 1). Remaining isolated populations are found in Subtropical Moist Forest, Chaco or thorn scrub, and Savanna habitat types.

Status and survival

All indications suggest that the jaguar's status and prospects for long-term survival in Argentina are not good. Destruction of critical habitat appears to be continuing in much of the remaining areas where the big cat is found. Protected areas will likely be the critical factor in their survival. Jaguar have been reported in 6 national parks and reserves, encompassing an area of approximately 312,100 ha. Based on a telemetry study, Schaller and Crawshaw (1980) estimated a jaguar density of 1 animal per 25 km^2 (2,500 ha) on 2 small ranches in the Pantanal of Mato Grosso, Brazil. Using this figure, the only reliable one available, there could be 125-126 jaguar in the 6 protected areas of Argentina, with additional animals in adjacent areas. Tarak (Pers. comm.) contends that there are probably less than 100 jaguar presently in the entire country. Indeed, neither figure represents a very substantial population. Further, El Palmar National Park

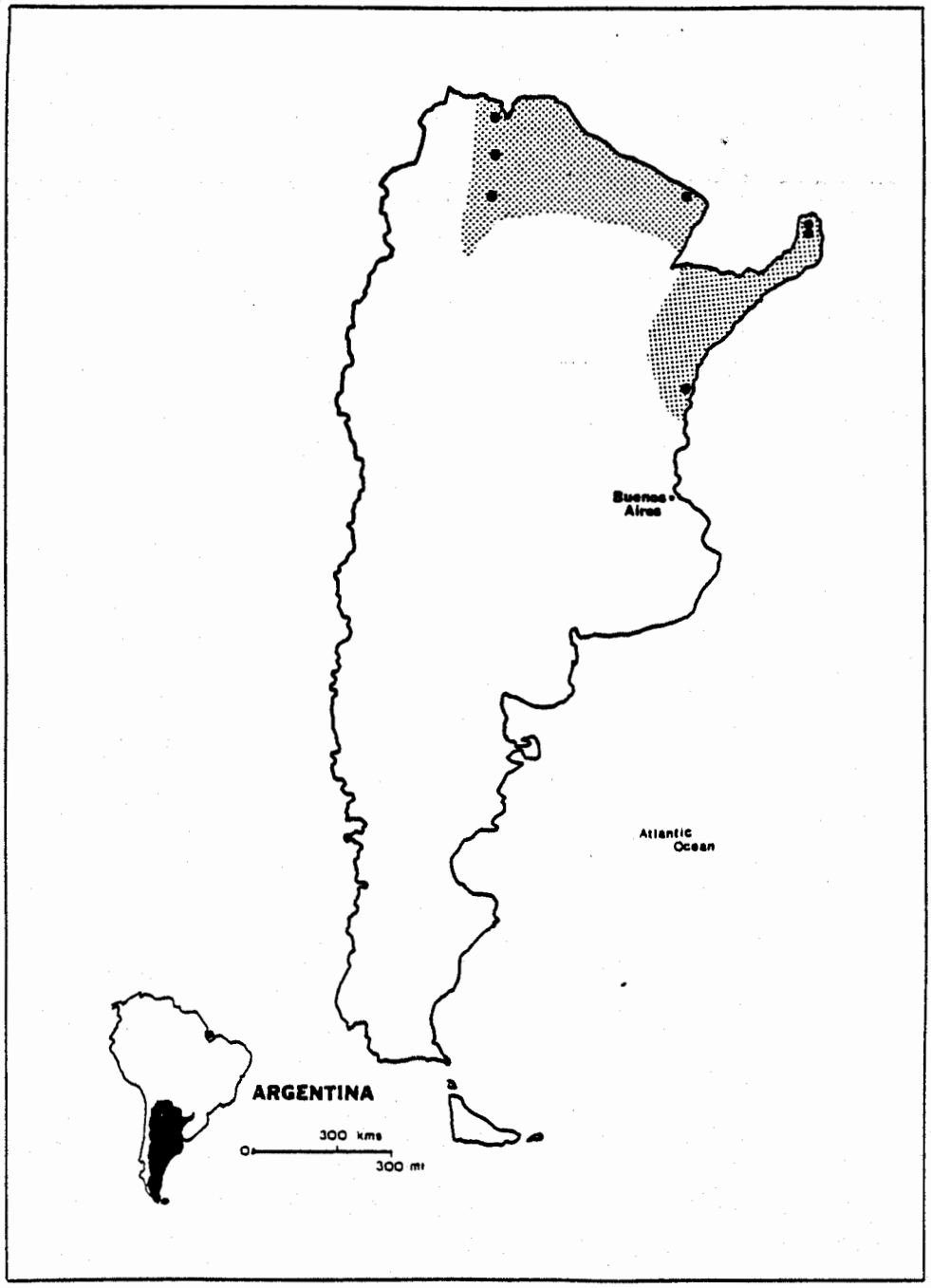

Fig. 1. Approximate distribution of the jaguar (Panthera onca) in Argentina. Recent records of occurrence are indicated by solid circles.

and reserve is only 16,000 ha in size, certainly not sufficient enough to alone sustain a reproductively healthy population.

Conservation measures

Conservation problems differ between the jaguar and the smaller spotted cats for several reasons. Because of its much larger size, the jaguar requires a considerably larger area to sustain itself. Males in the Pantanal of Brazil use twice the area of females, almost 90 km^2 (Schaller and Crawshaw 1980). Densities are, in turn, much lower than the densities of small cats, and by covering such an extensive area, the likelihood of such a large carnivore exposing itself to danger increases. These inherent problems are compounded by the fact that jaguar prey on domestic livestock. Although Pantanal jaguar subsist on a variety of animals, Schaller and Crawshaw (1980) found that cattle were the most important prey in terms of available biomass. Depredation problems exist throughout the jaguar's range where cattle ranches are found.

The jaguar is presently afforded total protection in Argentina. The above characteristics and conflicts justify the need for continued total protection. Depredation problems need to be dealt with in a manner that will not jeopardize existing populations. The government should be encouraged to preserve jaguar habitat by eliminating destructive activities within the boundaries of designated protected areas and minimizing habitat alteration and use in surrounding buffer zones. Resource management and land-use practices in other areas favorable to

the jaguar should be designed to minimize the impact on native fauna and flora.

Felis pardalis, F. tigrina, F. wiedii

Distribution

Cabrera (1957) described these species in northern Argentina as occurring from the provinces of Misiones and Corrientes to Tucuman (ocelot), Misiones to Tucuman (margay), and Misiones to Chaco salteno (tiger cat). Olrog and Lucero (1981) indicated 3 separate ocelot populations (Tucuman, northern Salta and Formosa, and Misiones), 2 margay populations (Salta and Misiones/Corrientes), and 2 tiger cat populations (Salta and Misiones). Their occurrence has been recorded in 3 protected areas (IUCN 1982b), although they may occur in 6 areas. Tarak (Pers. comm.) recently saw a female tiger cat with 2 young in Iguazu National Park. All 3 species have recently been recorded by J. Crespo and E. Massoia in the Urugua-i River area, Misiones province (Chebez et al. 1981). Based on these data, the present distribution of the ocelot in Argentina probably coincides with that of the jaguar (Fig. 2). The distribution of the margay and tiger cat may be divided by the Chaco or scrub forest (Figs. 3 and 4).

Status and survival

Gathering information on the status of the ocelot, margay, and tiger cat is especially difficult because they are largely nocturnal and secretive, they occur in dense cover with similar distributions, and they are similar in appearance. To compound this problem, people other than biologists often refer to them

Fig. 2. Approximate distribution of the ocelot (Felis pardalis) in Argentina. Recent confirmed (•) and unconfirmed (◦) records of occurrence are indicated at the appropriate locations.

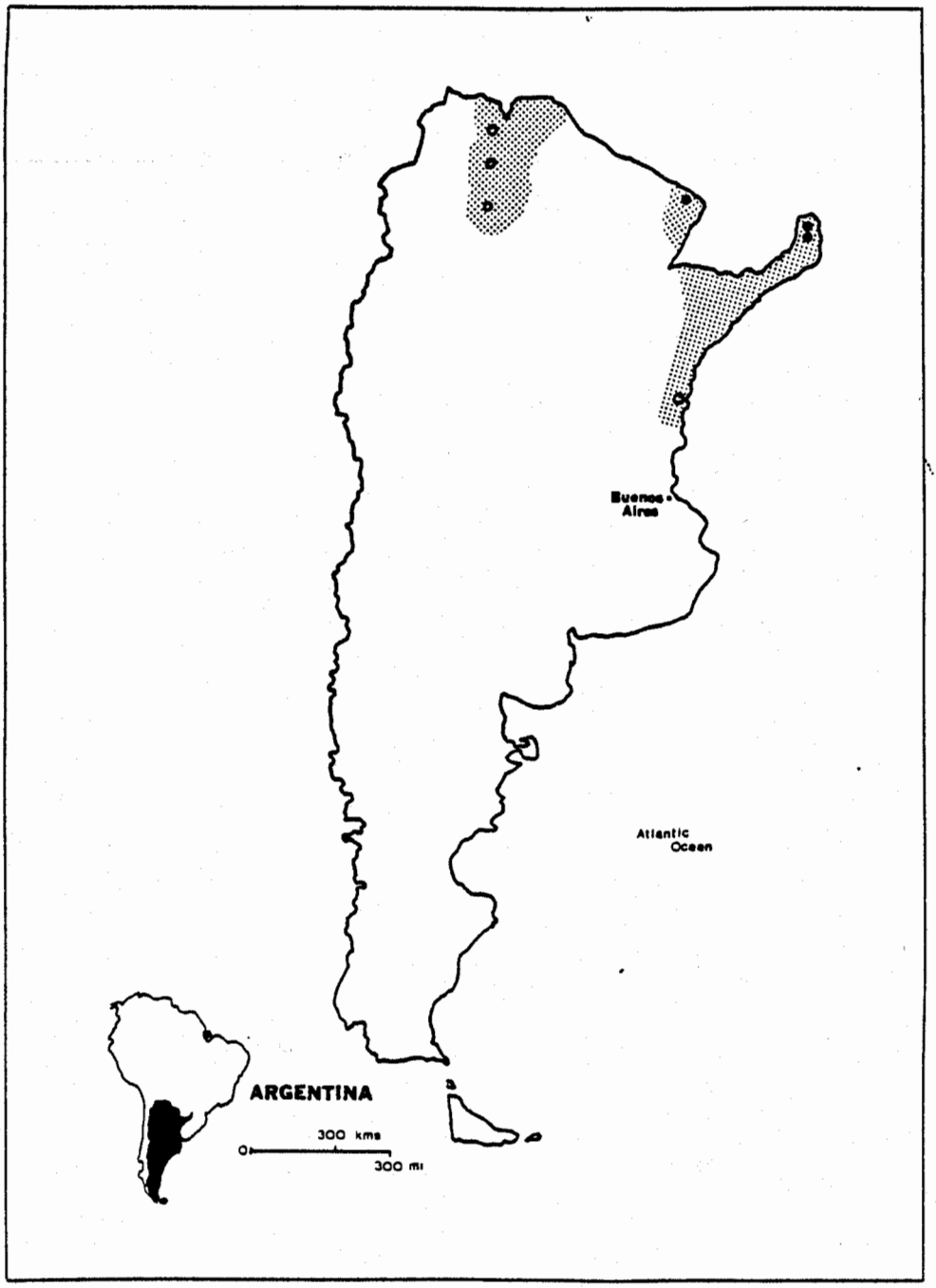

Fig. 3. Approximate distribution of the margay (Felis wiedii) in Argentina. Recent confirmed (•) and unconfirmed (○) records of occurrence are indicated at the appropriate locations.

Fig. 4. Approximate distribution of the tiger cat (Felis tigrina) in Argentina. Recent confirmed (•) and unconfirmed (○) records of occurrence are indicated at the appropriate locations.

by the same name (see Appendix B). Resolution No. 144 lists the ocelot and tiger cat as endangered, and the margay as vulnerable in Argentina. Because the margay is more nocturnal and arboreal than the ocelot (Koford 1973), it is probably more restricted in its range and affected by deforestation. Consequently, the margay is probably no less endangered than the ocelot.

The outlook for these species is better than for the jaguar, primarily because their minimum requirements are considerably less and they are not in conflict with cattle ranchers. However, in terms of living space, loss of habitat will likely continue to reduce the range of these species to protected areas and regions of moderately altered habitat. The demands for the resources of tropical and subtropical rainforests are simply too great to expect extensive regions of habitat to be left intact. These species do, however, occur in several of the national parks and reserves (IUCN 1982b). Unfortunately, these areas alone may not be sufficient in size to sustain viable populations. The largest protected areas in Argentina occur in the Southern Coniferous Forest biome--habitat unsuitable for these cat species.

Conservation measures

I found little evidence of commercial trade involving these species in Argentina. If, in fact, covert activities existed, I was not privy to the operations. In October 1982, C. Chehebar photographed several ocelot skins in a store in Buenos Aires that were later removed because of their illegal

origin. In contrast, M. Hornocker (Pers. comm.) witnessed huge piles of cat skins at several warehouses in Buenos Aires in 1970. Current protection laws are undoubtedly of benefit to these species. However, these gains may be offset by the continuing decline of favorable habitat. Because the ocelot appears to be more adaptable than the margay and tiger cat, it may be able to tolerate a greater amount of habitat alteration, but obviously not habitat elimination. Land-use practices must be compatible with the basic needs of these species or they may disappear from all but isolated pockets of undisturbed habitat and protected areas. The probable long-term effects of such isolation are not encouraging.

A harvest of any sort is considered "absolutely out of the question" by authorities in Argentina. Too little information is available about these species to be able to justify a harvest as biologically sound and in line with good wildlife management.

Felis geoffroyi

Distribution

The distribution of the Geoffroy's cat (Fig. 5) was based primarily on published data (Cabrera 1957; Ximenez 1973, 1975; Olrog and Lucero 1981). This species has the widest distribution of the spotted cats in Argentina. It can be found in the dry scrub desert of Patagonia in the south to grasslands, savannas, and the thorn scrub Chaco to the north. The Geoffroy's cat appears to be absent from the subtropical rainforest and southern coniferous forest. I inspected the

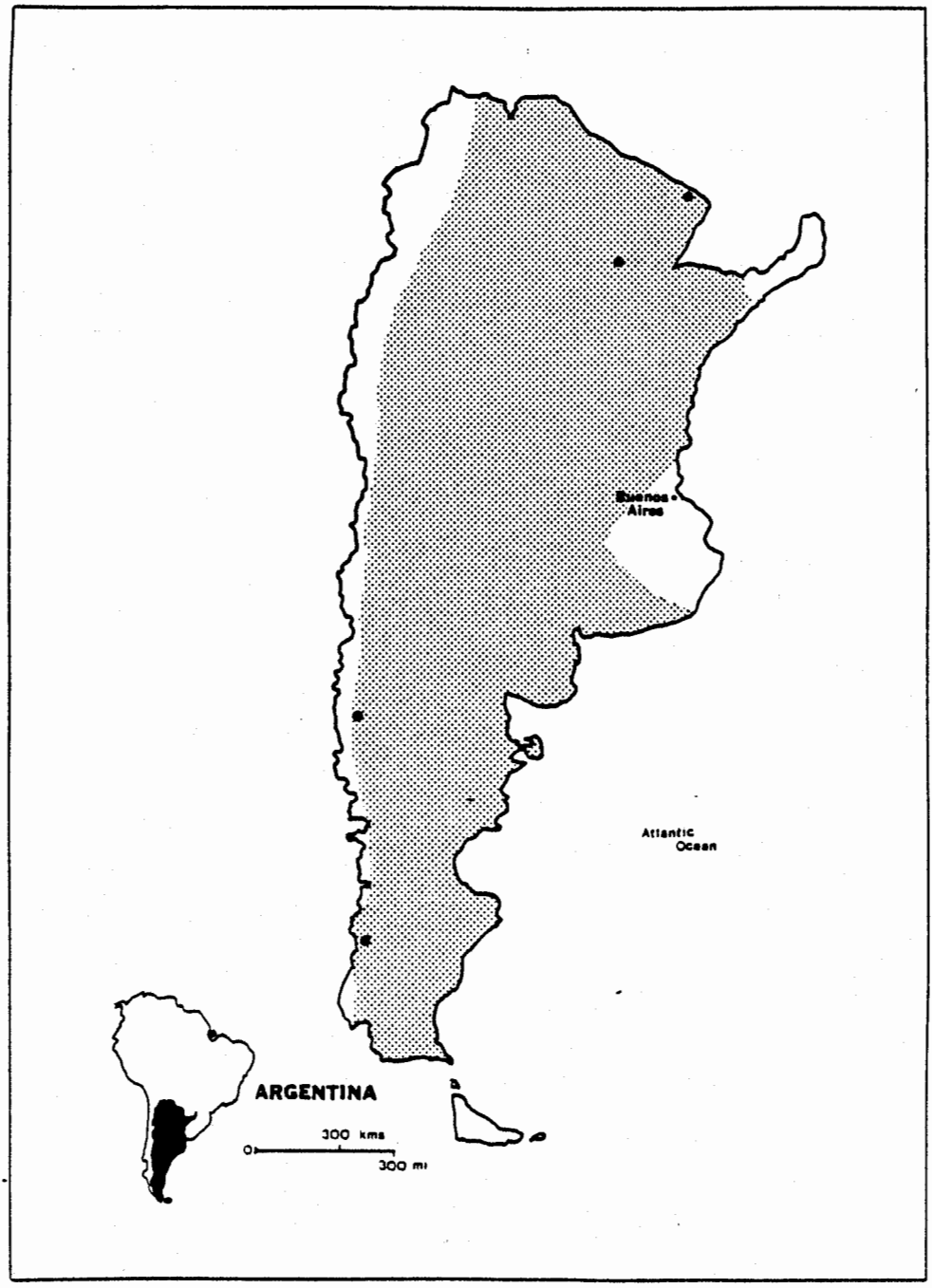

Fig. 5. Approximate distribution of the Geoffroy's cat (Felis geoffroyi) in Argentina. Recent records of occurrence that assisted in determining distribution are indicated by solid circles.

skin of a specimen killed just east of Bariloche. In this region, the Geoffroy's cat ranges to the foot of the Andes, but apparently does not occupy the coniferous forests, where it is replaced by Felis guigna. The Geoffroy's cat has been recorded in 3 protected areas of Argentina (IUCN 1982b), but likely occurs in as many as 9 others.

Status and survival

Even though it has been heavily harvested in the past, the Geoffroy's cat is still considered common in Argentina (Chehebar pers. comm.). Koford (1973) did not consider a need for strong conservation measures to protect this species in 1973. And, Resolution No. 144, pertaining to conservation of fauna in Argentina, lists the Geoffroy's cat as in no danger. Following a 1972 survey, Berrie (1978) felt that the population of Geoffroy's cats in the Gran Chaco region of South America may be quite high.

Prospects for survival appear good for the Geoffroy's cat, primarily because it has a wide distribution and occupies a variety of habitats, many of which are in areas with sparse human populations. Additionally, the cats appear able to tolerate a moderate amount of deforestation and human activity. Geoffroy's cats have been seen within the city limits of Montevideo, Uruguay (Villalba-Macias pers. comm.).

Conservation measures

The Geoffroy's cat is currently protected in Argentina. However, it was not uncommon to see fur coats made from this species for sale (often legally) in Buenos Aires. At a store

where I inquired about the price, a long coat that extended below the waist sold for $3,000, and a short coat for $1,500. Several gift stores advertised cattail belts and neck warmers for about $4 each.

The CITES Management Authority for Argentina expressed his belief that a limited harvest of Geoffroy's cats may be feasible, but that it would require the cooperation of all nations within the species' range. He felt that the Latin American countries must coordinate their wildlife management efforts, a situation that does not currently exist. In a plan for the rational management of wildlife in Rio Negro province, Oporto (1981) pointed out the economic importance of Geoffroy's cats and other wildlife.

In view of current economic conditions, it would behoove both consumptive and nonconsumptive users of the natural resources to seriously examine how renewable resources with economic value can be used to their advantage, without jeopardizing the resource. A properly managed harvest of Geoffroy's cats need not endanger the species and could provide biological data and needed revenue to both the people and their government. Of the 7 species of spotted cats found in Argentina, the Geoffroy's cat is the only 1 in which a harvest may be justifiable.

Felis guigna

Distribution

In Argentina, the kodkod is confined to a strip of moist southern coniferous forest in the Lake District region on the

east slope of the Andes. Cabrera (1957) included the provinces of Chubut and Santa Cruz for its distribution, but the kodkod also occurs in Rio Negro and Neuquen provinces as well. As recently as 1981, personnel from Los Alerces National Park were occasionally capturing kodkods in livetraps set for mink (Chehebar pers. comm.). Kodkods have been recorded in 3 of Argentina's larger protected areas. Based on admittedly scanty information, the distribution of the kodkod in Argentina would approximate that shown in Fig. 6.

Status and survival

The kodkod clearly has a restricted range and thus could be considerably more vulnerable than widely distributed species such as the Geoffroy's cat. However, the prospects for its survival are probably quite good because it is found in an area of generally sparse human populations, and it is found in at least 3 protected areas that encompass a total of more than 1.3 million ha.

Conservation measures

The kodkod is currently protected by law in Argentina. Because it has a limited distribution and would contribute insignificantly to the economy, there is no real justification for commercially harvesting this species.

Felis jacobita

Distribution

The Andean cat is one of the least known of the world's cats. Cabrera (1957) described its distribution as the arid and semi-arid zones of the high Andes in northeastern Chile,

Fig. 6. Approximate distribution of the kodkod (Felis guigna) in Argentina.

southern Peru, southwestern Bolivia, and northwestern Argentina. Medem (Pers. comm.) reported seeing 2 possible Andean cat skins in 1973 that came from the mountains near Salta. Other than this, I was unable to obtain any information about the species in Argentina. The distribution map of Olrog and Lucero (1981) shows the Andean cat occurring in the high Andes from approximately La Rioja province north, including an isolated population in the Tucuman area. Knowledge of the occurrence of this species in Tucuman province probably reflects greater familiarity with this area by the authors. A 1977 record of the Andean cat in the area of 32° S Lat. in Chile (Rottmann pers. comm.), would suggest that the cat may also occur at approximately the same latitude in Argentina (San Juan province). Based on this information, the Andean cat may have the approximate distribution shown in Fig. 7. I have shown the range to be continuous rather than disjunct, as indicated by Olrog and Lucero (1981). However, I do not know whether or not the Tucuman population is clearly isolated.

Status and survival

High population densities would not be expected because carrying capacities are low in the harsh Andean environment in which the cat lives. Therefore, the Andean cat has probably never been abundant. Overgrazing of the already depauperate vegetation by domestic livestock (goats, sheep, and the camelids) is perhaps the greatest threat to the cat because it reduces prey (rodent) population densities. However, there is little alteration of the overall habitat in which the cats

Fig. 7. Approximate distribution of the Andean cat (Felis jacobita) in Argentina.

live. The Andean cat is not listed in any of the protected areas of Argentina (IUCN 1982b), although it may possibly occur in the San Guillermo Biosphere Reserve (981,000 ha) and in the area of Laguna de Pozuelos National Monument. In general, populations will probably continue to remain stable.

Conservation measures

The Andean cat is currently protected by law in Argentina, and should continue to remain so. Its pelt does not appear to be in demand and I found no evidence of commercial exploitation in any country in which it occurs.

Few specimens of Felis jacobita are available in museums, and this has been a concern of Dr. S. Anderson of the American Museum of Natural History. Any research on the species would be helpful. If nothing is done, perhaps Dr. J. Eisenberg's statement (Mares and Genoways 1982:536) that, "Andean endemics, such as Felis jacobita. . . will probably pass on into extinction with only the most superficial natural history data accumulated", will be correct.

Pteronura brasiliensis

Distribution

In recent years the giant otter occurred in the Parana and Uruguay Rivers and their tributaries (Cabrera 1957). According to the distribution map of Olrog and Lucero (1981), they continue to occupy the same general area. The giant otter has been recorded within the past 2 years by park personnel in Iguazu National Park, Misiones province (Canevari pers. comm.), and by J. Crespo and E. Massoia in the Urugua-i River area just

to the south (Chebez et al. 1981). The IUCN's Directory of Neotropical Protected Areas (1982b) listed the giant otter in the Formosa Nature Reserve, but questioned whether or not it still exists there. It may also occur in the Rio Pilcomayo National Park, Formosa province, and in the vicinity of El Palmar National Park and Reserve, Entre Rios province. Current giant otter distribution in Argentina would likely include only isolated, undisturbed areas of subtropical lowland rainforest, swampy savannas, and transitional zones between these 2 habitats and the thorn scrub vegetation of the Gran Chaco (Fig. 8).

Status and survival

The status of the giant otter in Argentina is not clearly known, but it is undoubtedly precarious. Because the otters are diurnal, vocal, and social, they are extremely vulnerable. Habitat destruction (e.g., the Salto Grande dam on the Uruguay River bordering Argentina and Uruguay) has reduced the amount of available living space. Protected areas will likely provide a last retreat for this species in Argentina, but for how long is uncertain.

Conservation measures

The species is afforded full legal protection in Argentina, with continued protection highly recommended. All otter species are listed in Resolution No. 144 as in danger of extinction. Posters, television programs, and the educational system should be used to inform the general public about this

Fig. 8. Approximate distribution of the giant otter (Pteronura brasiliensis) in Argentina. Recent records of occurrence are indicated by solid circles.

interesting creature. An intensive effort should be made to locate and insure protection for remaining populations.

Lutra longicaudis

Distribution

Because I was unable to obtain much new information on this species, the estimated present distribution (Fig. 9) closely follows Olrog and Lucero (1981). Basically, the key requirements for Lutra longicaudis are ample riparian vegetation along permanent streams and lakes, and a readily available year-round food source (primarily fish and crustaceans). With this in mind, we could expect the best populations to occur in the vast network of streams in the provinces of Santa Fe, Corrientes, Entre Rios, Misiones, east Chaco, and Formosa. The swampy savannas and subtropical rainforests of the Paraguay/Parana and Uruguay River drainages provide excellent habitat for this species. Conditions become less favorable in the drier regions of the Chaco, foothills of the Andes, and the Pampas grasslands. Lutra longicaudis has been recorded in at least 5 protected areas, may occur in 2 others, and has been found in the Urugua-i River area, a future provincial reserve (Chebez et al. 1981).

Status and survival

To accurately determine the status of shy, secretive, largely nocturnal and solitary creatures such as the Lutra group, would take more time in any single country than I had for 11 species in all of Latin America. However, my experience with Lutra canadensis , the North American river otter

Fig. 9. Approximate distribution of Lutra longicaudis in Argentina.

(Melquist and Hornocker 1983), leads me to believe that the status of L. longicaudis is probably not as dismal as many people suspect. Indeed, L. longicaudis , including the subspecies annectens , enudris , and platensis , is probably less endangered than L. canadensis. I believe the prospects for survival are good, provided that riparian vegetation is preserved, a sufficient prey base remains available, and the animals are not continually persecuted. The river otters (except for the giant river otter) are an adaptable group, and it is not surprising to see them living in close proximity to man and his dwellings.

Conservation measures

Lutra longicaudis is protected by law in Argentina. However, as with most of the furbearers, they are still harvested commercially, but at what level I do not know. I saw Lutra pelts in Montevideo, Uruguay, that may have originated in Argentina. The 22 March 1983 issue of the Buenos Aires Herald newspaper ran an article about the unfortunate consequences of flooding along the Parana River (Tweedale 1983). Along with a photograph showing 3 otter skins, the article described many of the evacuees as "delta people", who live directly off the river by fishing and trapping otters for their pelts. These people have undoubtedly subsisted, in part, from the sale of pelts of otters, nutrias (Myocastor coypus), and other furbearers for as long as there has been a market, and will continue to do so.

There are currently 2 surveys being conducted on Lutra longicaudis in the Parana River delta and lower Pilcomayo River

area (Christie pers. comm.). Pending the results of these surveys, Argentine authorities may wish to evaluate the feasibility of a management plan incorporating a limited, controlled harvest.

Lutra felina

Distribution

Cabrera (1957) described the marine otter as occurring along the Pacific coast from Peru south and then east to the Estrecho de Le Maire and surrounding islands. The only Argentine portion of this range is eastern Tierra del Fuego and Isla de los Estados (Statten Island). In 1982, Chebez (Pers. comm.) observed at least 2 marine otters along Statten Island. Another probable sighting was made near Puerto Harberton on the south side of Tierra del Fuego within the past 3 years (Goodall pers. comm.).

The distribution given by Olrog and Lucero (1981) for the marine otter in Argentina included the northeastern coast of Tierra del Fuego and the Malvinas (Falkland) Islands. However, Sielfeld (Pers. comm.) recently surveyed the east coast of Tierra del Fuego from Puerto Viamonte (54° S Lat.) north and the Strait of Magellan and did not find evidence of otters. He contends that the Atlantic coast to the north from at least Viamonte is inadequate for otters because of poor habitat. The marine otter is found, perhaps exclusively, along rocky coasts exposed to heavy wave action. Consequently, there is very little favorable habitat for the marine otter in Argentina. I have no information regarding the status of marine otters on

the Malvinas (Falkland) Islands, but Massoia (1976) did not indicate they occur there.

Status and survival

The marine otter is extremely rare in Argentina, and will continue to remain so because of limited favorable habitat. It is likely, however, that scattered individuals will continue to be found at isolated locations within Argentina's territory.

Conservation measures

Because it is so rare there, the marine otter should continue to be fully protected in Argentina. Coastal surveys between Viamonte and Ushuaia, including surrounding islands, should be conducted to determine the amount of available habitat and presence of otters.

Lutra provocax

Distribution

The southern river otter in Argentina occurs primarily in the freshwater lakes and streams of the Lake District (Chehebar pers. comm.). The present distribution extends south along the Andes from approximately 39° S Lat. in Neuquen province to Isla de los Estados (Pine et al. 1978), east of Tierra del Fuego, and the Cape Horn islands to the south at 56° S Lat. (Fig. 10). In 1950, it was considered more common around the islands of Cape Horn than Lutra felina (Harris 1968). Van Zyll de Jong (1972) examined a skin from an animal collected near the mouth of the Negro River and Massoia (1976) indicated records from Lake Colhue Huapi and the Senguerr and Chubut Rivers, all in Patagonia scrub desert habitat. Biologists are

Fig. 10. Approximate distribution of the southern river otter (Lutra provocax) in Argentina.

presently determining whether or not otters still occupy these areas in the Patagonian steppe (Chehebar pers. comm.).

I inspected portions of the Limay River, which drains Lake Nahuel Huapi and eventually enters the Negro River, and, like most streams in the Lake District, it is generally shallow, clear, and rocky, with sparse riparian vegetation. Melquist and Hornocker (1983) found this type of stream to be less favorable to otters than slow, meandering streams. Chehebar (1983) checked the Limay River at several locations and did not find evidence of otters. Although otters likely occur in the upper portion of the Limay River near Lake Nahuel Huapi, it is doubtful they occur further downstream, where unfavorable habitat conditions become a barrier to their dispersal in that direction.

While traveling between Rio Grande and Ushuaia, I observed numerous places that appeared to be favorable otter habitat. Beaver (Castor canadensis) dams were common in areas where the Nothofagus forest is cut by freshwater steams, presenting a picture not unlike favorable otter habitat in North America. The presence of beavers enhances an area for otters by providing ponds to forage in and dens for resting (Melquist and Hornocker 1983). Provided there is sufficient prey (I was unable to obtain information on the fisheries of the area), many areas of Tierra del Fuego could probably support the southern river otter. Massoia (1976) recorded the otter in Fagnano Lake, but additional information is unavailable.

Status and survival

The southern river otter is rare or nonexistent today in areas where it was common 30-40 years ago (Chehebar pers. comm.). People in the fur industry indicate that few skins enter the market today because the animal is legally protected and difficult to find. Isolated populations do exist in the Lake District, however (Chehebar pers. comm.). Otters have been recorded in 4 of the protected areas in the Andean-Patagonian region, and they may occur in others as well. Although completion of the survey work by Chehebar will tell us more about the present range, the species clearly needs assistance if it is to survive in Argentina.

Conservation measures

Total protection for the southern river otter should continue. Current research by Chehebar should be supported, as the data will be useful in developing management guidelines in freshwater ecosystems. Protected areas will likely play a key role in protecting certain populations.

BOLIVIA

Bolivia is comprised of 3 major ecological areas, which include the Andean Altiplano in the west, the Yungas (valleys) northeast of La Paz, and the Llanos (grasslands and palm savannas) to the east (Lowenstein 1968). The Altiplano is a treeless, windswept plateau, much of which is 4,000 m above sea level. It covers nearly 10% of the country, has a rather severe climate, and is used primarily for livestock grazing. The rich, tropical Yungas valleys are drained by the Beni River and its tributaries and is important to the production of cash crops. The lowland tropics, stretching from the foothills of the Eastern Cordillera to the frontiers with Brazil, Paraguay, and Argentina, cover 70% of the total area of Bolivia. In the north and east the Oriente has dense tropical forests. Further south is the Llanos or open grasslands and palm savannas, where cattle grazing predominates. The extreme southern and southeastern part of Bolivia is flat and dry, with typical Chaco or thorn scrub vegetation.

Increased colonization is occurring in the vicinity of Sapecho (east of Lake Titicaca); Trinidad, Todos Santos, and Santa Cruz (central Bolivia); and Boyuibe (south). Much of this activity follows the construction of roads into areas previously roadless. There are numerous large estancias in the vicinity of Trinidad, where native vegetation is continually cleared and burned to create additional pasture for cattle. Stepped-up oil-related activities have coincided with

colonization in the area around Boyuibe and the frontier with Argentina.

In 1967-68, the Bolivian government closed the season on cats for a period of 5 years (Bejarano pers. comm.). However, the government concluded that this accomplished very little; a considerable amount of revenue was lost and cat populations apparently continued to decline. Presently, Bolivian laws coincide with CITES (see Appendix A), with trade in Appendix II species allowed. However, according to Bejarano, the CITES Scientific Authority, all cats (Appendix I and II species) are exported illegally because dealers don't bother obtaining export permits. Dealers consider securing a permit an unnecessary inconvenience which would only draw the attention of authorities to their clandestine activities.

Virtually all of the pelts harvested in and around Bolivia are exported to Paraguay, where they are tailored and sent to Europe (Bejarano pers. comm.). Bejarano claims that approximately 8-10 jaguar and 100 ocelot and small spotted cat skins are illegally exported from Bolivia each month. Cochabamba and Santa Cruz have been identified as centers for the illegal fur trade (Menghi pers. comm.). These 2 cities are considered "clearing houses" for illegal skins from the interior because they are linked to the Mamore River by good roads and to outside locations by excellent airports. Illegal trade in wildlife is quite prevalent in Bolivia (Kempff pers. comm.), with 4 small frontier towns (Guayaramerin, Remanso, San

Martias, and Puerto Suarez) serving as links for goods smuggled in from Brazil.

There is a considerable amount of distrust among various natural resource authorities in Bolivia. Accusations of corruption abound. The National Parks Office has been accused of being interested only in "filling their pockets with money" and exploiting any wildlife that has monetary value. The zoo in Santa Cruz was accused of being a front for the sale of wildlife. Bejarano has been accused of selling blank export permits for $200 each and of making a considerable amount of money from his position as CITES Authority. Although I saw several falsified export documents, most of the accusations were not substantiated.

Bolivia has more than 4 million hectares under protection as parks, reserves, and refuges (IUCN 1982b). Several of the areas will help to protect populations of the spotted cats and otters, provided that the areas are adequately protected. Apparently Indians have taken over 2 of the 10 National Parks currently in existence (Bejarano pers. comm.).

Panthera onca, *Felis geoffroyi*, *F. jacobita*, *F. pardalis*, *F. tigrina*, *F. wiedii*

Due to the paucity of detailed information about each species in many Latin American countries, and in order to avoid unnecessary repetition, I have lumped the species from each group together when possible.

Distribution

I was unable to obtain much information about the spotted cats in Bolivia. The few Bolivians familiar with the different species of cats know almost nothing about distribution and status. Surprisingly, the tiger cat has never been confirmed as a resident of Bolivia, although it undoubtedly occurs there.

Distribution of the jaguar and ocelot (Fig. 11) was based primarily on the assumption that these species should occur in the tropical forests, Llanos, and Chaco found east of the Altiplano and Puna. The distribution of the margay should be somewhat similar but more scattered in the south and south-central. The tiger cat should occur in the tropical moist forests of the Beni.

The Geoffroy's cat occupies the drier thorn scrub forests of the south (Fig. 12). It has been recorded as far north as Tiraque, Department of Cochabamba, at elevations of up to 3,300 m (Cabrera 1957).

The Andean cat occupies the treeless Altiplano in the western part of the country (Fig. 13). It's range likely extends from snowline down to approximately 3,500 m in elevation in the east. Little is known about the Andean cat in Bolivia. Bejarano (Pers. comm.) obtained the skin of an animal that was killed by an Indian somehwere in the Altiplano. B. Christiansen, a Danish Health Program employee, spent 3 years in the Altiplano without seeing any evidence of the Andean cat.

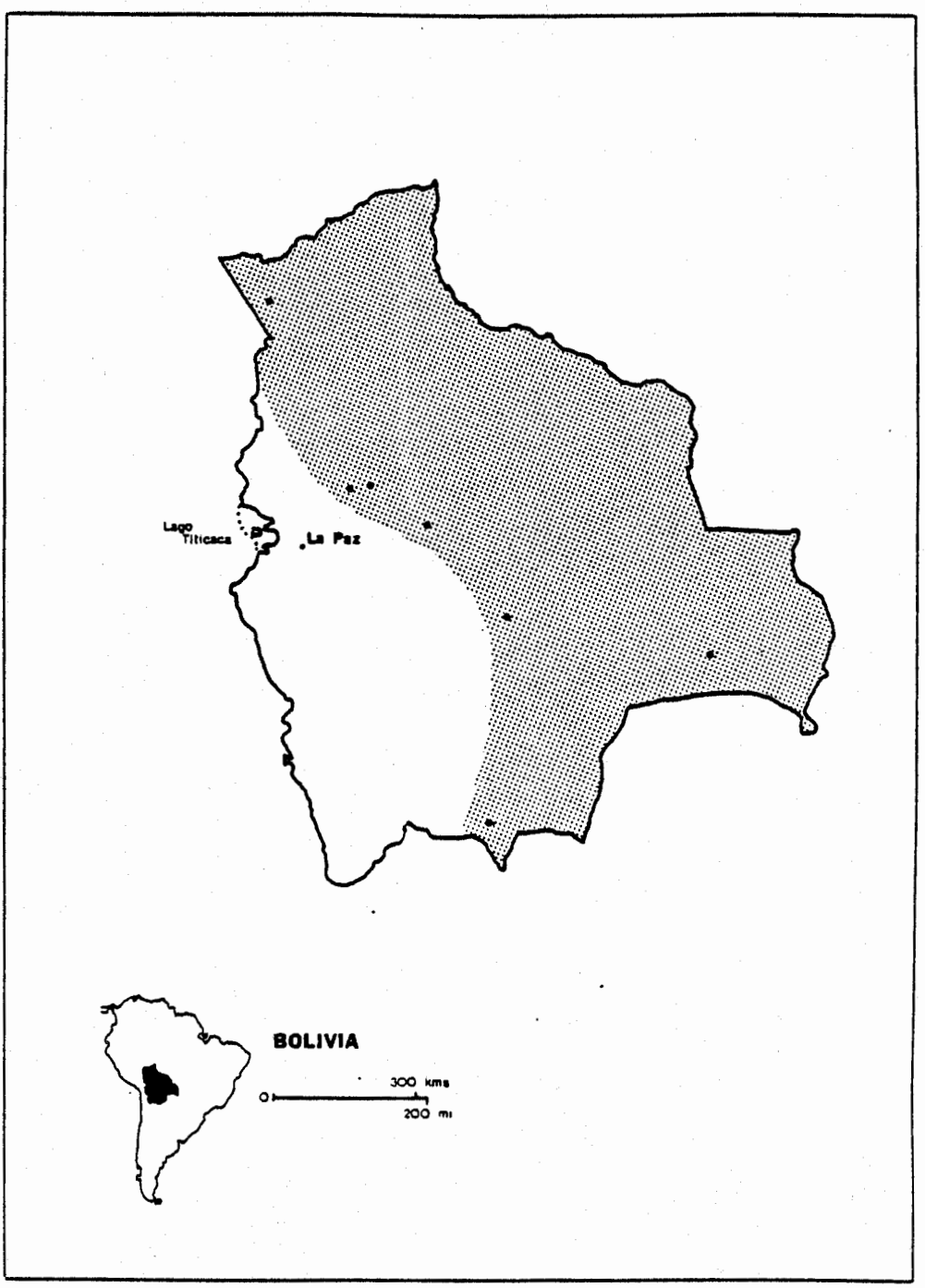

Fig. 11. Approximate distribution of the jaguar (Panthera onca) and ocelot (Felis pardalis) in Bolivia. Protected areas potentially important to the spotted cats are indicated by solid circles.

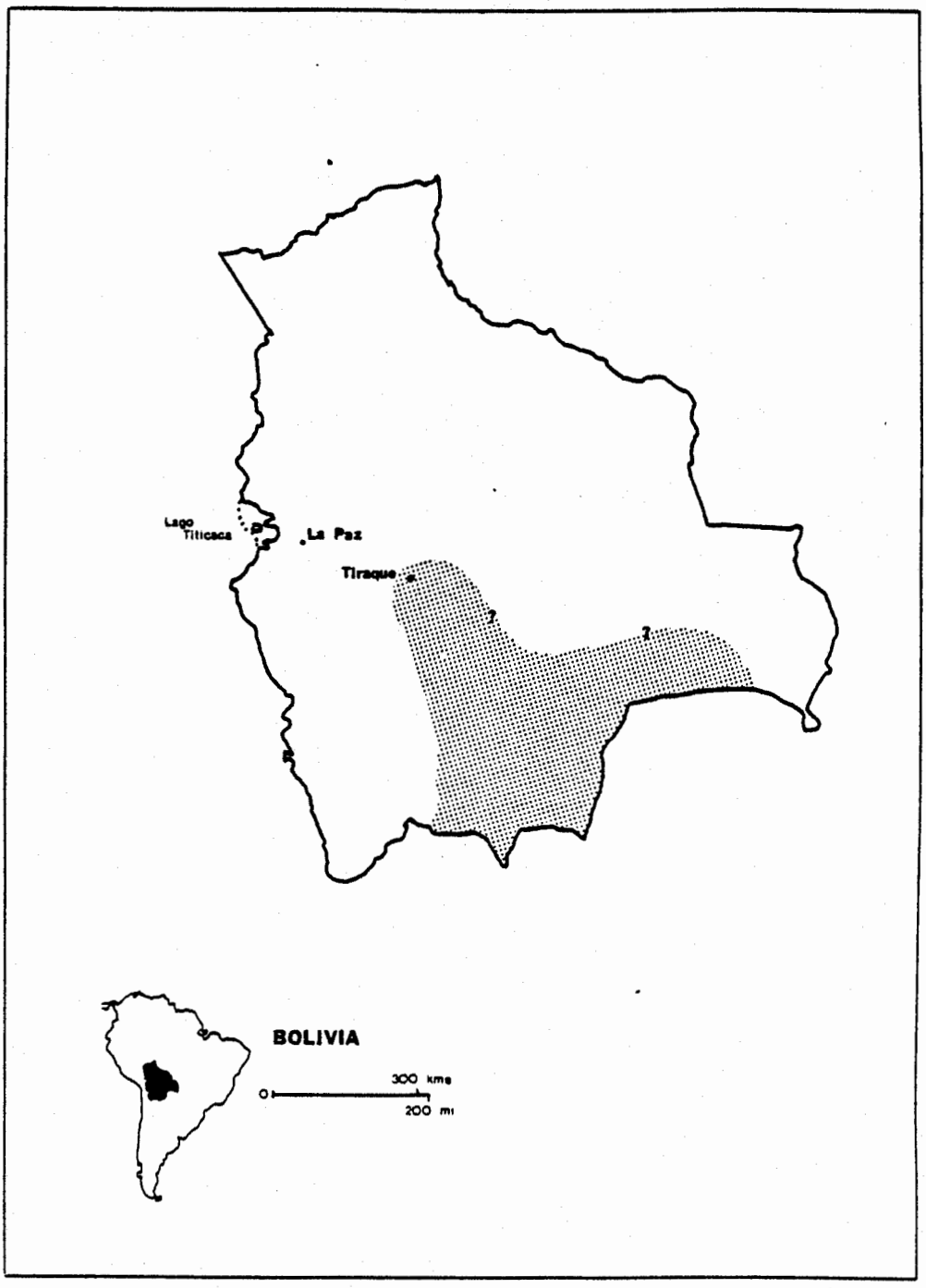

Fig. 12. Approximate distribution of the Geoffroy's cat (Felis geoffroyi) in Bolivia. Question marks indicate the uncertainty of range limits. Cabrera (1957) reported the Geoffroy's cat near Tiraque, Department of Cochabamba, and at elevations of up to 3,300 m.

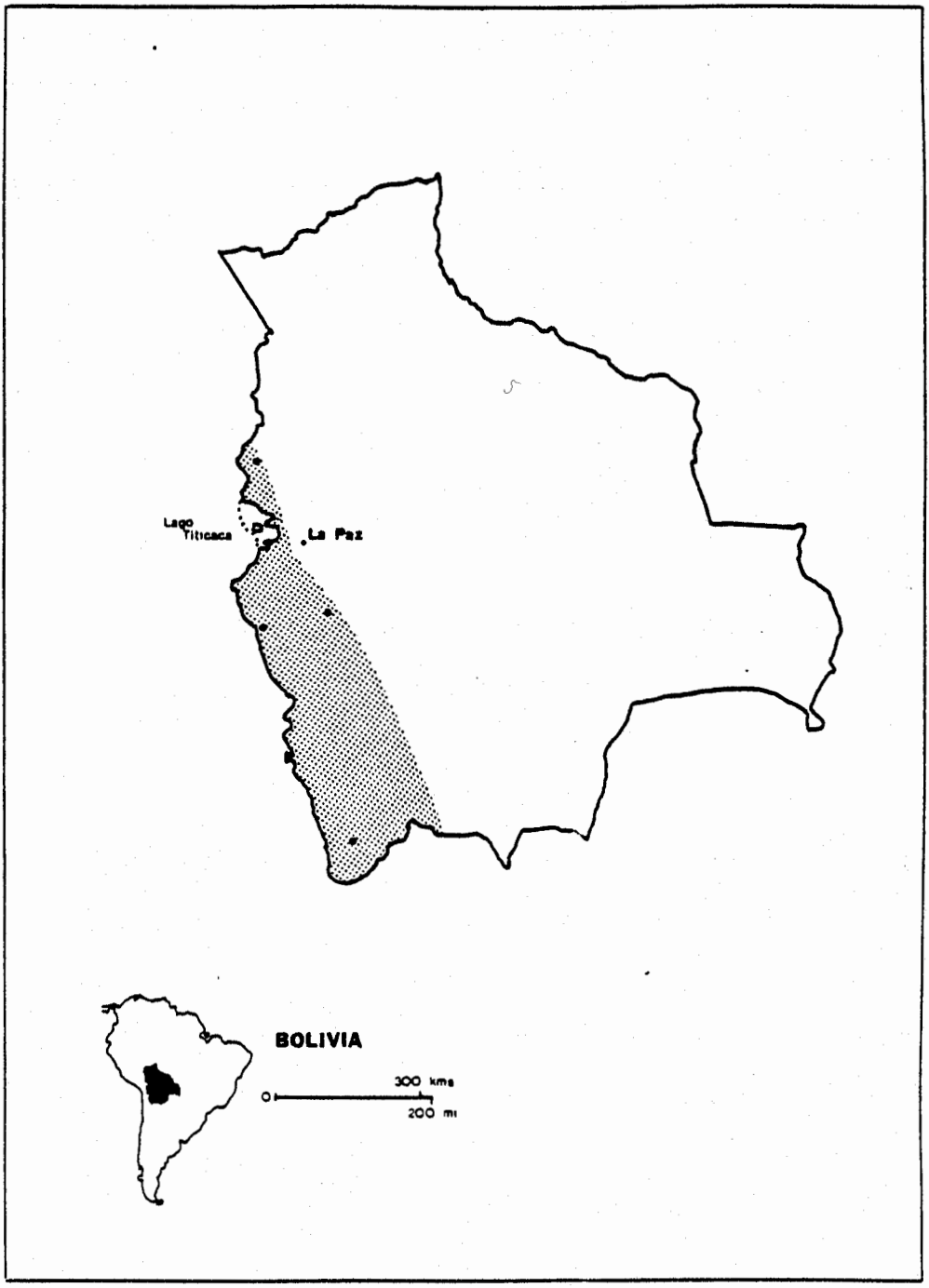

Fig. 13. Approximate distribution of the Andean cat (Felis jacobita) in Bolivia. Protected areas considered potentially important to Andean cats are indicated by solid circles.

Status and survival

The status of the spotted cats in Bolivia is unknown and based largely on speculation. However, if the illegal activities continue as reported, and colonization and habitat destruction increase, populations will continue to decline. Andean cat populations will probably not change appreciably, however. Small pieces of Andean cat skin (and other cat species as well) are occasionally included in the offerings sold at the "witches market" in La Paz. But there is no demand for the Andean cat by the fur industry.

Conservation measures

Although jaguar populations in Bolivia are probably not in any serious danger at the moment, in the future they will require greater conservation efforts than the small spotted cats. Complaints of jaguar killing cattle are on the increase (Kempff pers. comm.). Trophy hunting for jaguar has apparently shifted from Brazil to Bolivia because Bolivia is more accommodating to the outfitters (Almeida 1983). And, like the small spotted cats, there remains a demand for jaguar pelts on the national and international markets.

Authorities will need to properly resolve depredation complaints and enforce existing wildlife laws. Parks and reserves will require adequate protection to ensure the preservation of floral and faunal components. Officials must work together for the common goal of ensuring the welfare of Bolivia's native wildlife. The present atmosphere of distrust is counter-productive to this goal.

Lutra longicaudis and Pteronura brasiliensis

Distribution

I was unable to find anyone capable of providing me with any information about the otters in Bolivia. The distribution maps for the giant otter (Fig. 14). and Lutra otter (Fig. 15). are based solely on my interpretation of habitat types in Bolivia and the likelihood of these species occurring in them. Consequently, the extent of their range in some areas is questionable and needs to be substantiated from the field.

Status and survival

The status of both species is unknown, however, it can be assumed that populations have continued to decline over the years. Giant otter populations in Bolivia, as is the case in most countries where they occur, have probably suffered considerable reductions. Survival will depend on strict protection of the animals and their habitat. The prospects for Lutra longicaudis will remain good so long as riparian habitat is not destroyed and the animals are adequately protected.

Conservation measures

The overall benefits of preserving and protecting riparian vegetation have been discussed previously. Efforts should be made to locate and protect remaining giant otter populations.

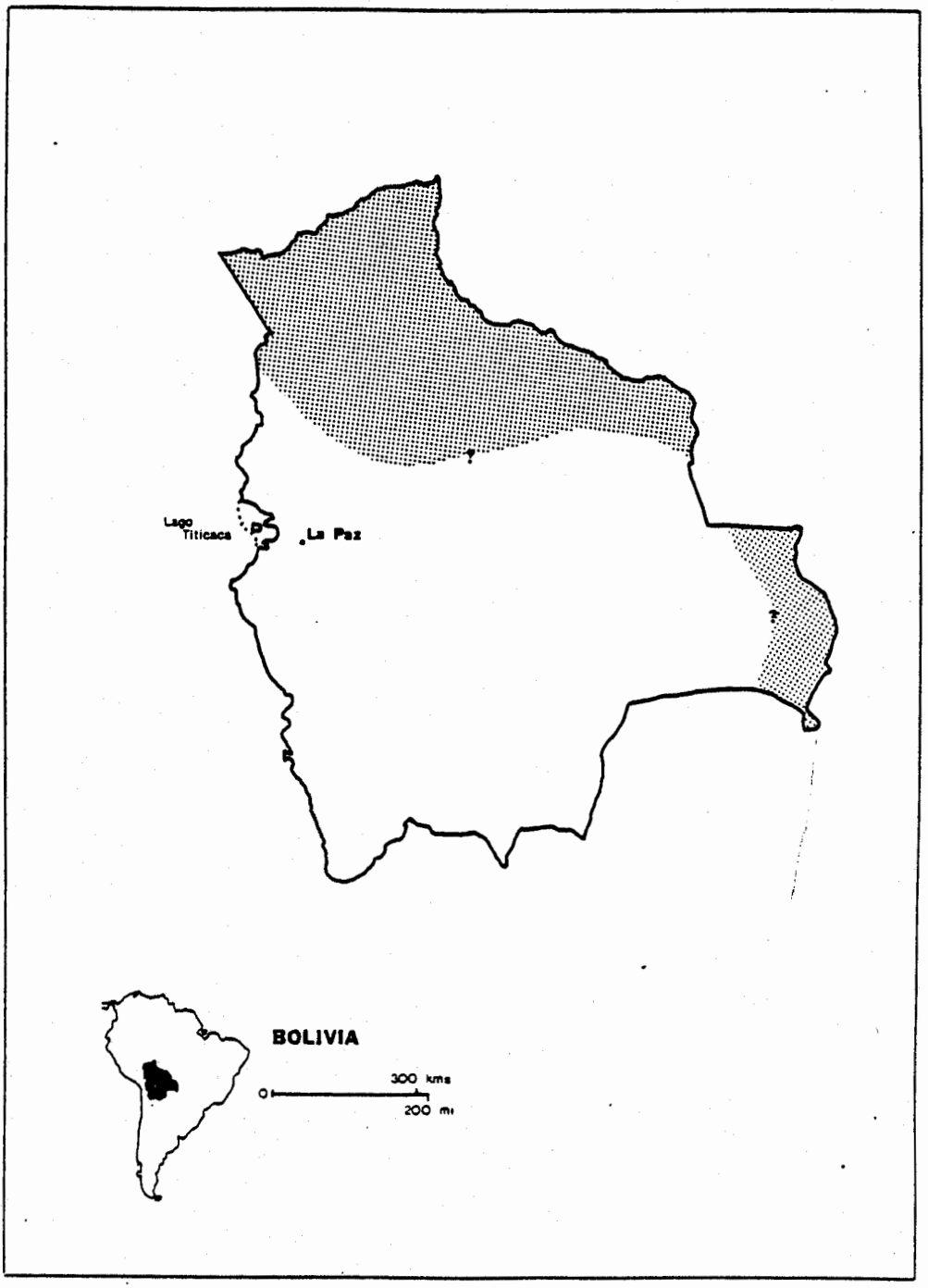

Fig. 14. Approximate distribution of the giant otter (Pteronura brasiliensis) in Bolivia. Question marks indicate the uncertainty of range limits.

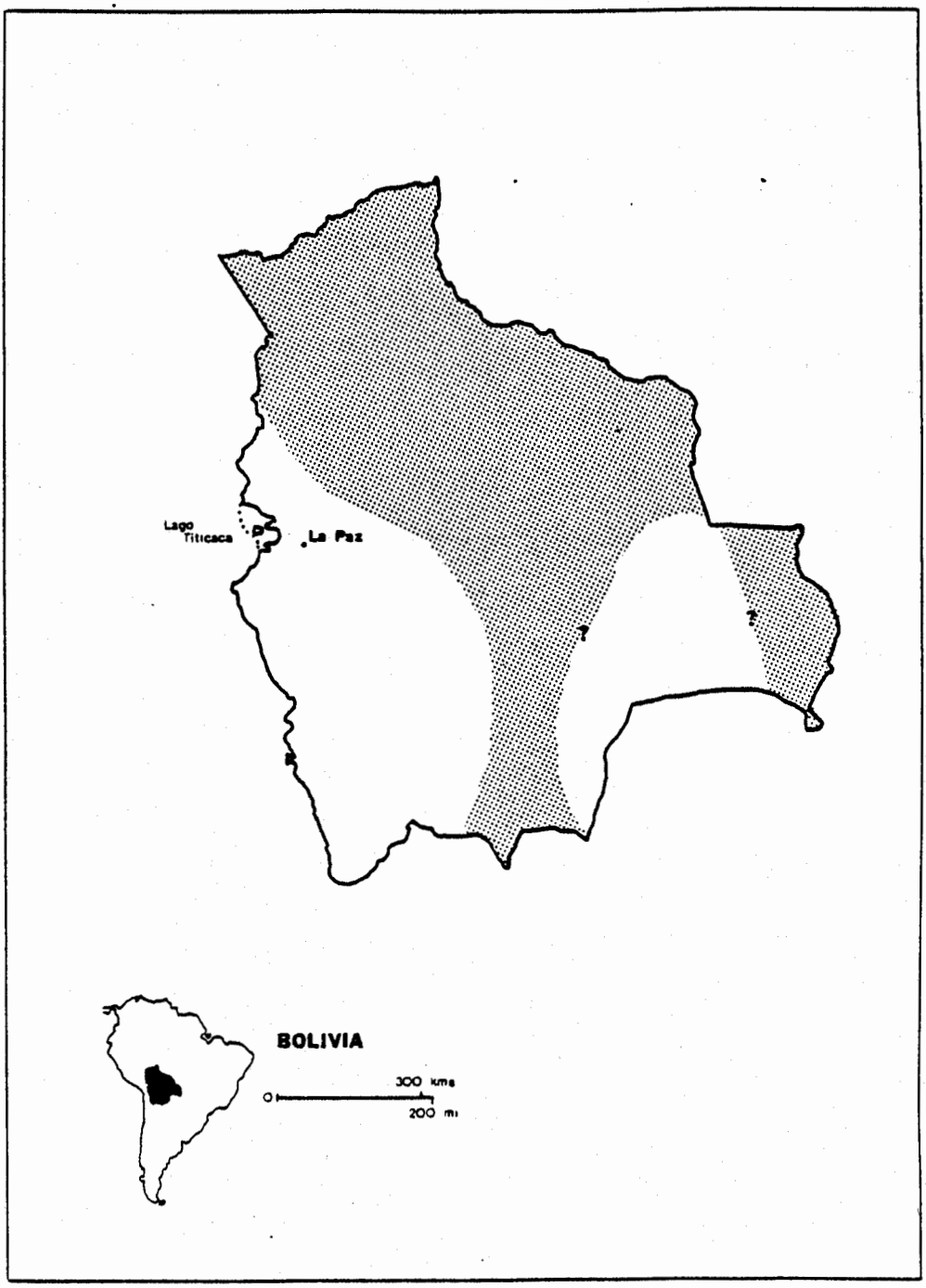

Fig. 15. Approximate distribution of Lutra longicaudis in Bolivia. Question marks indicate the uncertainty of range limits in the southeast.

BRAZIL

Brazil, encompassing 8,511,965 km^2 , is nearly half of the South American continent. Enormous distances and varied habitats add logistical difficulties to investigating the status of wildlife in Brazil. The country's topography varies greatly but may be divided roughly into 5 major zones: the Amazon Basin; the River Plate Basin; the Guiana Highlands, north of the Amazon; the Brazilian Highlands to the south of the Amazon; and, the coastal strip.

The general vegetation transition in Brazil is rainforest, deciduous dry forest, and savannas. Gallery forests, narrow strips of forest which exist along the slopes and bottoms of ravines and along rivers, are extensions of the larger continuous forests. The major ecological provinces of Brazil include a wide variety of distinct habitats. Alho (1983) described 16 major vegetational complexes for Brazil (see the original paper for a synopsis of each habitat type). The vast plain of the Amazon, comprising 60% of the total area (Lowenstein 1968), includes the largest tropical moise forest in existence today (Myers 1980).

Much has been written about general threats to the Amazon ecosystem, with suggestions on mitigation (see Goodland and Irwin 1975; several papers in Prance and Elias 1977; Myers 1979, 1980; Smith 1982). Concern for national security has prompted Brazil and other governments to accelerate settlement of underdeveloped regions of the Amazon and Orinoco Basins. The Transamazon highway was constructed in the 1970's to

increase colonization of the region (Smith 1982). However, the settlement scheme has proven costly with colonization rates much lower than anticipated. Thus far, the Transamazon has not provoked any major ecological disaster, and the government is beginning to see that some of these areas are best left undisturbed.

Trade in spotted cat skins increased markedly in the 1960's (Doughty and Myers 1971, Smith 1976), while the giant otter harvest progressively declined between 1957-1969 (Smith 1976). Smith (1976) estimated that as many as 15,000 jaguars and 80,000 ocelots were shot in the Brazilian Amazon every year in the late 1960's. In 1967, the Brazilian government passed law No. 5197 (Appendix A) which prohibited the commercial exploitation of all wildlife. However, skin dealers were allowed several grace periods to liquidate existing stocks. Dealers took advantage of this grace period by reporting grossly exaggerated inventories, thus enabling them to continue purchasing skins (Smith 1976). When the last grace period finally ended in 1974, authorities confiscated large numbers of skins from dealers. I observed a storage building full of confiscated skins at the Brazilian Forestry Development Institute (IBDF) complex in Manaus. Protection of spotted cats and otters on an international level was established in 1975 with ratification of CITES.

Similar to other Latin American countries, enforcement of existing wildlife laws in Brazil is extremely difficult, especially when there is a viable overseas market. In 1981,

authorities confiscated 7,379 skins of cats, otters, and other wildlife species that were destined for Europe (Anonymous 1981). During a flight from Brasilia to Manaus on 25 February 1983, I spoke with a person from Rio Branco, located in the State of Acre, who deals in exporting various goods, including skins. I questioned him about acquiring cat and otter skins. In roughly 1 month, he could supply me with approximately 100 jaguar skins, 300-400 ocelots, 400 margay/tiger cat, 200 small otters (Lutra longicaudis) , and possibly 10 giant otter. He claimed that the skins are obtained from the Amazon region around Rio Branco, including areas in Peru, Bolivia, and Brazil. Flights are made in a small aircraft to Benjamin Constant, so skins are likely purchased from Colombia via Leticia. The goods are flown to Paraguay by way of Mato Grosso do Sul, Brazil. Based on this and other experiences, it is apparent to me that there are many people out there ready and willing to supply the illicit skin trade.

The problem of poaching is difficult to control. Questionnaire respondents indicated that considerable poaching exists with almost no protection through law enforcement. Unfortunately, there are no data available to quantify the impact of hunting pressure on cats and otters because the activities are covert. Territorial boundaries are extremely remote, making it virtually impossible to control the traffic of contraband. In the entire State of Amazonas, most of which is roadless, there are only 22 game wardens, 1 for each 7 million hectares of forest (Best pers. comm.). The wardens are

paid minimum salary (less than $1,000 annually) and have little incentive to apprehend violators. Arresting the "wrong" person, i.e., someone with political connections, only spells trouble for the warden. Because incentives are lacking, wardens are often easily corrupted. According to Mares (Mares and Genoways 1982:523), "The single major action that could be taken to aid the cause of wildlife conservation in South America is strict and widespread enforcement of current faunal protection legislation. Such action would buy time for scientists to initiate and complete the taxonomic, ecological, behavioral, and faunal survey work that is required on the continent."

Protected areas will become increasingly important in the long-term survival of most cats and otters. In 1972, there were 16 national parks and 4 biological reserves in Brazil, totalling 1.4 million hectares (Padua and Quintas 1982). However, there were no protected areas in the Amazon region. Since that time, the government has made a conscientious and commendable effort to protect areas in the Amazon region. By 1982, the Brazilian government had established 24 national parks and 10 biological reserves totalling more than 10 million hectares, or about 1.2% of the national territory (Padua and Quintas 1982). Most of the new areas are in the Amazon Basin. Nine of these areas are greater than 250,000 ha, hopefully large enough to insure the survival of spotted cat and otter populations. The government intends to eventually preserve a minimum of 18.5 million ha in the Amazon region alone.

Many of the parks and reserves are unstaffed and exist only as "paper parks." However, Wetterberg et al. (1981) pointed out that this is to be expected initially when new areas are established by any country. The director of the National Parks Department of IBDF, R. Leal (Pers. comm), emphasized the need for at least a minimal infrastructure in these protected areas. Presently, without the protection of guards, people go into designated parks and reserves and exploit the resources at will. He pointed out that native Indians and protected areas do not coexist. The natives retreat into the areas to escape encroachment by civilization, then proceed to exploit the park's resources.

Panthera onca

Distribution

The jaguar is probably still widely distributed throughout Brazil and has been recorded in at least 20 protected areas during the past 20 years (Fig. 16). However, the southern and eastern limits of the jaguar's distribution in Brazil are uncertain. It is possible that they have been eliminated entirely from the coastal strip, an area of high human population density. Jaguar populations are still widespread within the Amazon Basin, but this situation is changing as a result of extensive development and habitat alteration (Fig. 17). Populations outside of the Amazon Basin are few and isolated.

Fig. 16. Approximate distribution of the jaguar (Panthera onca), ocelot (Felis pardalis), margay (F. wiedii), and tiger cat (F. tigrina) in Brazil. Some protected areas, mostly outside of the Amazon Basin, where jaguars (J), ocelots (O), and margays (M) have been recorded are included. The location where a tiger cat (T) was collected by R. Pine in 1968 is indicated. This map does not take into account the obvious absence of cats in and around major urban areas.

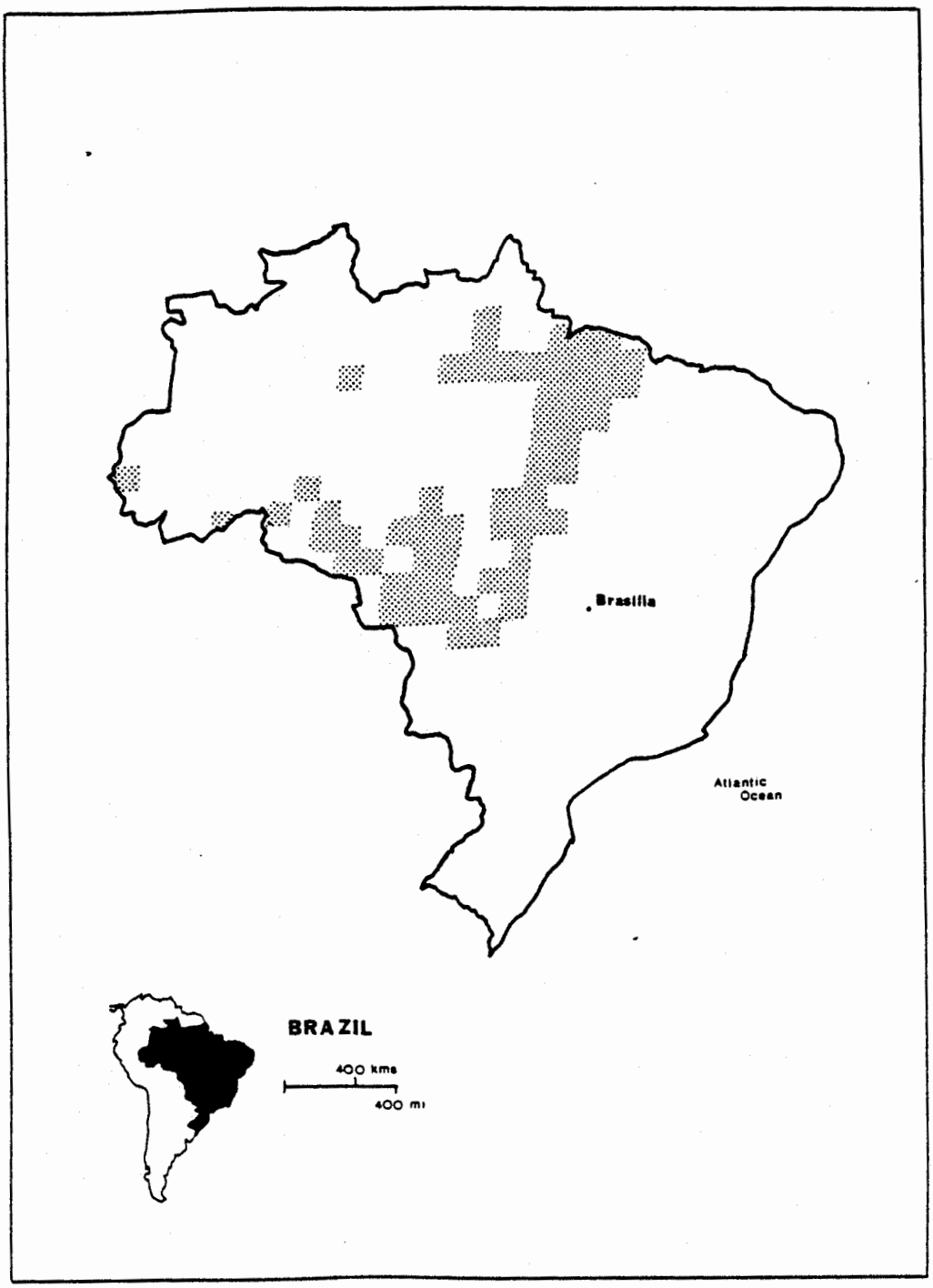

Fig. 17. Areas of extensive development and habitat alteration in Brazilian Amazonia based on LANDSAT images. Adapted from Tardin, A. T. et al. 1979, 1980. Subprojeto Desmatamento, Convenio IBDF/CNPq-INPE, Relatorio No. INPE-1649-RPE/103.

Status and survival

Jaguars are considered rare in all areas outside of the Amazon Basin but still common in isolated, undisturbed areas. Most populations are probably continuing to decline, even though jaguars have been legally protected since 1967.

Cattle ranchers have continued to kill jaguars found on their lands. During a 12-year period, 1 hunter killed 37 jaguars on a single ranch in the Pantanal of Mato Grosso, while another hunter killed 68 on a second ranch in an 8-year period (Schaller 1979). Trophy hunting has persisted, with some operations shifting only recently to Bolivia as a result of law enforcement (Almeida 1983). With poor economic conditions and the world's largest foreign debt, Brazil can only be expected to increase development and exploitation of the natural resources, a situation unfavorable to the cats and otters. LANDSAT images reveal areas of extensive development and habitat alteration in the Amazon Basin (Fig. 17). Fragmentation of habitat causes population isolation, which, in the long-term, may be as detrimental to the jaguar as total destruction. Conversely, the cats could benefit from selective cutting of commercial timber, the primary harvest technique. Opening up the dense forect canopy stimulates growth of the understory and enhances the habitat for prey populations. However, total clearing of land for agriculture and cattle grazing is not compatible with the needs of any of the cats. Cattle-ranching operations have been a leading cause of deforestation in the Amazon region. This activity has a 2-fold

negative effect on jaguars; habitat is destroyed to create pasture and the cats are killed for occasionally preying on the cattle.

Conservation measures

The future status of the jaguar (and all cats and otters) in Brazil will be directly linked to habitat trends. Inevitably, protected areas will be the key to their survival. Brazil has developed an excellent system of protected areas, with plans for creating additional parks and reserves (Padua and Quintao 1982). Jaguars are presently found in the 3 largest parks (each more than 1 million hectares in size). These and other protected areas should help insure the survival of the jaguar in Brazil. However, IBDF will have to develop adequate infrastructures in these areas to protect the resources.

Total protection of the jaguar and effective enforcement of existing laws are necessary. The traffic of contraband could be reduced by better enforcement along principal travel routes (highways and rivers). Enforcement agencies from neighboring countries should make greater efforts to collaborate at international borders. The Amazon Pact is 1 example of existing international cooperation.

Felis pardalis, F. tigrina, F. wiedii

Distribution

As is the case in most Latin American countries, the small tropical spotted cats are generally not differentiated. Although I have indicated 1 distribution for all 3 species

(Fig. 16), I have almost no information about the tiger cat in Brazil. In 1968, Pine (Pine et al. 1970) collected a single specimen from Mato Grosso (see Fig. 16). Likewise, almost no data are available on the distribution of the margay. The distribution map is probably most accurate for the ocelot, because it appears more adaptable than the margay and tiger cat. However, populations of all 3 species are not actually continuous, as indicated on the map.

Status and survival

These species are generally rare in central, eastern, and southern Brazil, with isolated populations located primarily in protected areas. Respondents of the questionnaire considered these species to be considerably more common and widely distributed in the Amazon region. Even with total protection, populations are probably continuing to decline in most areas of Brazil as a result of habitat loss and poaching. However, in more isolated areas, including the larger parks and reserves, populations are likely to be stable or even increasing.

Conservation measures

For the present, total protection of these species should continue in Brazil. See the section on jaguars for additional conservation measures. Adequate protection of parks and reserves, effective law enforcement, and a well-designed management plan need to be established before future harvests are considered. Minimum size restrictions would help protect the tiger cat, which will likely require more extended protection that the other 2 species.

Felis geoffroyi

Distribution

Very little data are available on the Geoffroy's cat in Brazil. Ximenez (1975) indicated on a map that it's range extends to about 23 ° S Lat. in Brazil, which includes most of Rio Grande do Sul State and the western part of Santa Catarina and Parana States. Cabrera (1957) indicated only the south of Rio Grande do Sul State for the Geoffroy's cat. However, the species extends throughout the Gran Chaco in Paraguay and may possibly occur in Mato Grosso do Sul, Brazil, as well.

Status and survival

The status of the Geoffroy's cat in Brazil is unknown. Threats to survival are similar to those for the other small spotted cats. Gallery forests are probably critical in Rio Grande do Sul.

Conservation measures

Same as for the other small spotted cats in Brazil.

Pteronura brasiliensis

Distribution

Based on my own discussions with several people and on an inquiry made by personnel from the National Institute for Amazonian Research (INPA), giant otters appear to be widely distributed in the Amazon Basin (Fig. 18). However, these populations appear to be very small and isolated in the headwaters of various streams. Few sightings are made in eastern and southern Brazil, indicating that the giant otter is now poorly represented there. Park guards reported recent

Fig. 18. General location (•) of some giant otter (Pteronura brasiliensis) sightings made within the past 5 years. Locations with favorable habitat where giant otters likely occur are indicated (o). Existing and proposed hydroelectric dams in the Amazon Basin are also indicated (-). These data are incomplete and do not reflect a survey over the entire country.

observations of giant otters on the Doce River in Minas Gerais (Rebelo pers. comm.). Souza (Pers. comm.) indicated that the giant otter can still be found near Brasilia; perhaps Brasilia National Park. However, Schaller and Carvalho (1976) indicated that there was no evidence of the giant otter in the park.

If we combine this information with data on harvest distribution (Fig. 19), the present distribution of giant otters in Brazil may appear as shown in Fig. 20. Most sightings in central and eastern parks and reserves were made nearly 10 years ago (IUCN 1982b). Therefore, the present-day distribution of the giant otter in southeastern Brazil has likely been reduced.

Status and survival

Most people familiar with the giant otter in Brazil consider it to be rare, with remaining populations becoming increasingly isolated, especially in central and southeastern Brazil. A former otter hunter estimated that populations northwest of Manaus, where he normally hunted, had decreased by as much as 80% during the past 20 years. Reported harvest rates for giant otters in Brazil during the final 8 years it was legal to hunt then averaged 5,083 (Table 5). Although closure of the season undoubtedly helped the species in general, most people still feel that populations are declining throughout most of the otter's range. This trend is attributed to previous overharvest combined with habitat disturbance and human interference. In 1982, INPA personnel working on the Uatuma River northeast of Manuas noted a person with the skin

Fig. 19. Distribution of the giant otter (Pteronura brasiliensis) harvest according to data reported for each state (also see Table 5). The figures reflect the mean number of pelts reported during an 8-year period (1960-1967). Harvest statistics for Mato Grosso do Sul and Sao Paulo are unknown (?), but may have been recorded with an adjacent state.

Fig. 20. Approximate distribution of the giant otter (Pteronura brasiliensis) in Brazil. Protected areas where giant otters have been recorded within the past 10 years are indicated by solid circles.

Table 5. Reported harvest rates for giant otter (Pteronura brasiliensis) in Brazil during an 8-year period (1960-1967). Data are from the Fundacao Instituto Brasileiro de Geografia e Statistica.

State	Year								$\bar{X}$ (n=8)
	1960	1961	1962	1963	1964	1965	1966	1967	
Rondonia	29	28	31	21	40	16	15	394	72
Acre	87	421	426	499	296	269	42	28	259
Amazonas	272	205	455	673	269	1,186	387	277	466
Roraima	209	35	35	3	150	7	29	29	62
Para	715	612	571	773	873	643	464	722	672
Amapa	343	293	260	435	387	280	280	250	316
Maranhao	686	470	298	393	237	255	202	218	345
Bahia	49	74	94	92	144	159	143	159	114
Minas Gerais	126	255	221	1,159	1,007	829	571	622	599
Parana	42	50	70	-	-	-	-	-	20
Santa Catarina	17	19	17	26	18	16	15	11	17
Mato Grosso	1,514	1,008	1,764	1,431	1,207	1,651	1,428	930	1,367
Goias	840	501	737	723	868	788	791	954	775
TOTALS	4,929	3,971	4,979	6,228	5,496	6,099	4,367	4,594	5,083

of a recently-killed giant otter. A hydroelectric dam has since been constructed in this area, thus further jeopardizing the remaining populations.

There are no data assessing the impact of hydroelectric dams on giant otters, however, we can speculate on what might happen following construction of a dam on a river inhabited by giant otters. Resident otters not displaced during the construction phase would be when the area behind the dam is inundated. A small population on the Curna Una River near Santarem used only a free-flowing section of stream above the dam's reservoir; no giant otters have ever been recorded using the reservoir's short distance below (Souza pers. comm.). Therefore, it is probable that large hydroelectric dams effectively displace otters from the area of the reservoir and create a barrier to normal dispersal. Several existing and proposed hydroelectric dams in the Amazon Basin are on rivers inhabited by giant otters (Fig. 18), and will increase the likelihood that these populations will become isolated. The Brazilian government also hopes to build 9 or 10 dams on the Xingu River (Caufield 1982), a drainage considered favorable for giant otters (Souza pers. comm.).

One of a group of 4 giant otters under observation by an INPA biologist on the Curua Una River was shot in 1982 (Souza pers. comm.). The remaining 3 animals subsequently disappeared from the area. We do not know what effect this disruption of a social unit has on the remaining members of a group. The group may abandon the area, especially if a breeding adult has been

killed. The survivors are confronted with unknown danger when they travel through unfamiliar territory. Finally, the loss of a breeding adult can be critical for isolated and small populations if a suitable replacement is not available.

Conservation measures

Total protection of the giant otter should continue indefinitely. The preservation of riparian vegetation will be vital to otter populations, as will protection of the upper sections of streams. Adequate protection within the boundaries of parks and reserves will also be necessary. Also, see conservation measures for the giant otter in Argentina.

Lutra longicaudis

Distribution

This species is found virtually throughout the entire country. It is divided into 2 subspecies: enudris in the Amazon Basin and platensis in the south.

Status and survival

The status of these 2 subspecies is quite different because habitat conditions in their respective ranges differ considerably. Based on the questionnaires, populations of the enudris subspecies, found throughout the Amazon Basin, are probably in much better condition than those of platensis , which occupies the southern region. Habitat in the south has been largely altered for agriculture and cattle grazing. Otters in Rio de Janeiro State inhabit rivers, lakes, and coastal lagoons (brackish and freshwater) near the ocean and in mountainous areas (Maciel pers. comm.). Although many of the

factors affecting giant otter populations apply to this species as well, the status of Lutra longicaudis is considered much more favorable. The secretive and more solitary nature of the Lutra group is largely responsible for this situation.

Conservation measures

Preservation of riparian habitats and stream quality are of utmost importance. Law enforcement is important for this species because it is difficult to distinguish from Lutra canadensis , which is harvested. This factor should be considered in future management programs. Considerations for future harvests should be based on habitat trends, the effectiveness of law enforcement, and the ability of authorities to manage a controlled harvest. Any type of harvest would require full international cooperation.

CHILE

Chile, with an area of approximately 757,000 km^2 stretches out along a narrow southern Pacific coastal zone for 4,200 km from 18- 56 ° S Lat. With such an extended territory, climatic areas range from tropical in the north to cold antarctic in the extreme south. The coastal zone and Andean mountains are the 2 major ecological zones. However, Mann (1960) divided Chile into 6 large biotopes: desert, brush formation, savannas, forests, steppes, and high mountains. According to C. Weber (Pers. comm.), approximately 67% of Chile's land mass is high mountains, desert, and icefields; 26% consists of potential commercial forests and grazing lands; and only 7% is tillable.

The original wildlife protection law, No. 4601, became effective in 1929 (Appendix A). However, Decreto No. 40 (1972) and Decreto No. 354 (1981) provided specific protection for the otters and cats, respectively (Torres pers. comm.). The otters and cats became further protected by CITES in 1975.

Most of the people I interviewed felt that ratification of CITES and the recent amendments to the national law have been of benefit to the otters and cats. However, most people still felt that illegal commercial activities prevailed in the south, and that control was not possible under present circumstances. One person, who preferred to remain anonymous, claimed that military personnel were frequently involved in hunting and commercial activities involving wildlife. I found very little evidence of commercial activities in Chile. While visiting

several fur stores in Santiago, I found only 1 with a coat made from spotted cat skins (probably Felis guigna).

Chile has at least 31 national parks, reserves, monuments, and biosphere reserves, for a total of 3,084,588 ha under protection (IUCN 1982b). Many of these protected areas are in strategic locations and will become increasingly important to several species of cats and otters.

Felis geoffroyi

Distribution

I was unable to obtain much reliable information about the status of the Geoffroy's cat in Chile. Pefaur (1969) indicated that its presence had been confirmed in most provinces south from Atacama (26-29° S Lat.), while Yanez (Pers. comm.) claims there is only 1 record of geoffroyi in Chile. Miller and Rottmann (1977) indicated its presence in Aisen (46-47° S Lat.), while Mann (1957) described the species as occurring in the vicinity of the Cordillera del Payne (51° S Lat.), where it has been recorded in Torres del Paine National Park (IUCN 1982b). The distribution map of Ximenez (1975) showed the Geoffroy's cat as occurring in southern Chile from 41° S Lat., including the Valdivian forest region. However, there is no evidence that the Geoffroy's cat and Felis guigna are sympatric. The Andes to the north and the moist coniferous (Valdivian) forests to the south probably act as a barrier to the Geoffroy's cat, reducing its distribution in Chile to isolated locations between 47-49° S Lat. and from 51-30° S. Lat. (Torres del Paine National Park), south to the Strait of

Magellan (Fig. 21). Additional on-the-ground observations are needed.

Status and survival

In the past, the Geoffroy's cat was heavily persecuted in the south and sold at peleterias in Punta Arenas (Mann 1957), resulting in its disappearance from much of that area. The Geoffroy's cat is widely distributed, however Chile has only a fraction of the favorable habitat. Nevertheless, provided the species is given reasonable protection, it should continue to occupy the available habitat.

Conservation measures

Management plans should be developed in conjunction with Argentina and other countries within the range of the Geoffroy's cat. Continued protection is recommended until at least 1 good biological study is conducted and adequate inventories are completed.

Felis guigna

Distribution

Cabrera (1957) indicated that Caritin province (30° S Lat.) was the northern limit of the kodkod in Chile. However, Greer (1965a) indicated they were locally abundant in Malleco province to the (north.) Rottmann (Pers. comm.) said the kodkod's range extends from the area north of Portillo (32-33° S Lat.), south to approximately Wellington Island (49° S Lat.). They tend to occur in forested and associated semi-open areas below approximately 2,500 m (below treeline). On Chiloe Island, I found tracks in the dense forest of Chiloe National

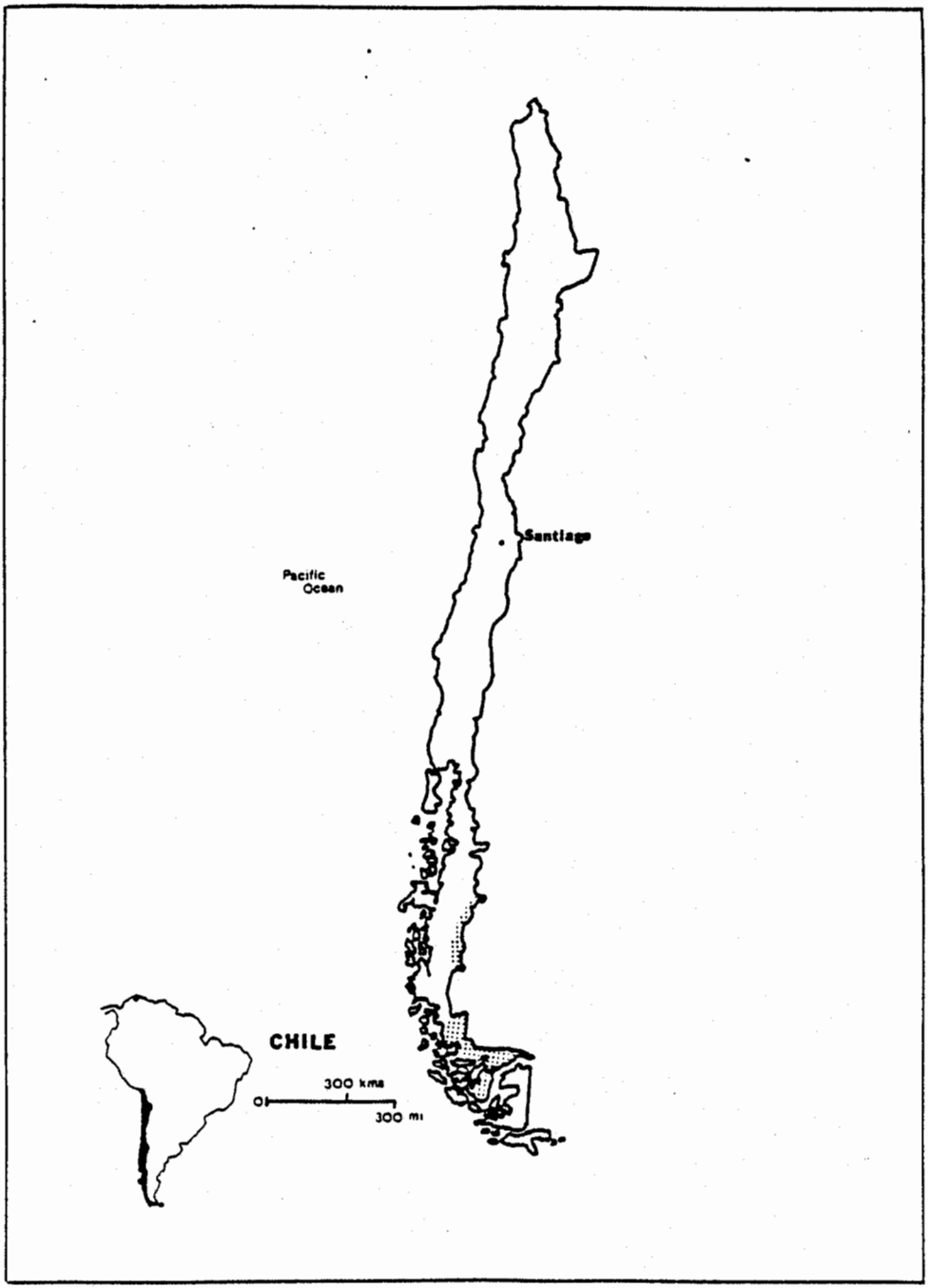

Fig. 21. Approximate distribution of the Geoffroy's cat (Felis geoffroyi) in Chile.

Park, while at the same time, farmers in cut-over areas occasionally shoot kodkods found raiding their chicken houses. Based on the above information, the kodkod's range would extend south from approximately 33° S Lat. to at least Taitao peninsula (47° S Lat.), with a more southerly distribution possibly limited by glacial ice and insufficient cover (Fig. 22).

Status and survival

Rottmann (Pers. comm.) considers the kodkod more common in the southern portion of its range. Loss of habitat in the agricultural region north of Puerto Montt has undoubtedly caused a decline in cat numbers. However, populations of the rodent Octodon lunatus have increased as a result of the almost 1 million ha of monterey pine (Pinus radiata) plantations south of Santiago, and Rottmann (Pers. comm.) believes that the kodkod may benefit from this increase in prey.

In the northern part of its range, the kodkod likely occurs in all 4 national parks in the Lake District (IUCN 1982b), as well as 2 further north. In the south, the kodkod can probably be found in Isla Guambin National Park and Laguna San Rafael National Park and Biosphere Reserve. Protected areas may be important in preserving kodkod populations in the north, but less so in the more remote south where they do not appear to be threatened.

Conservation measures

I recommend continued total protection of this species in Chile. The extent of commercial activities involving kodkod

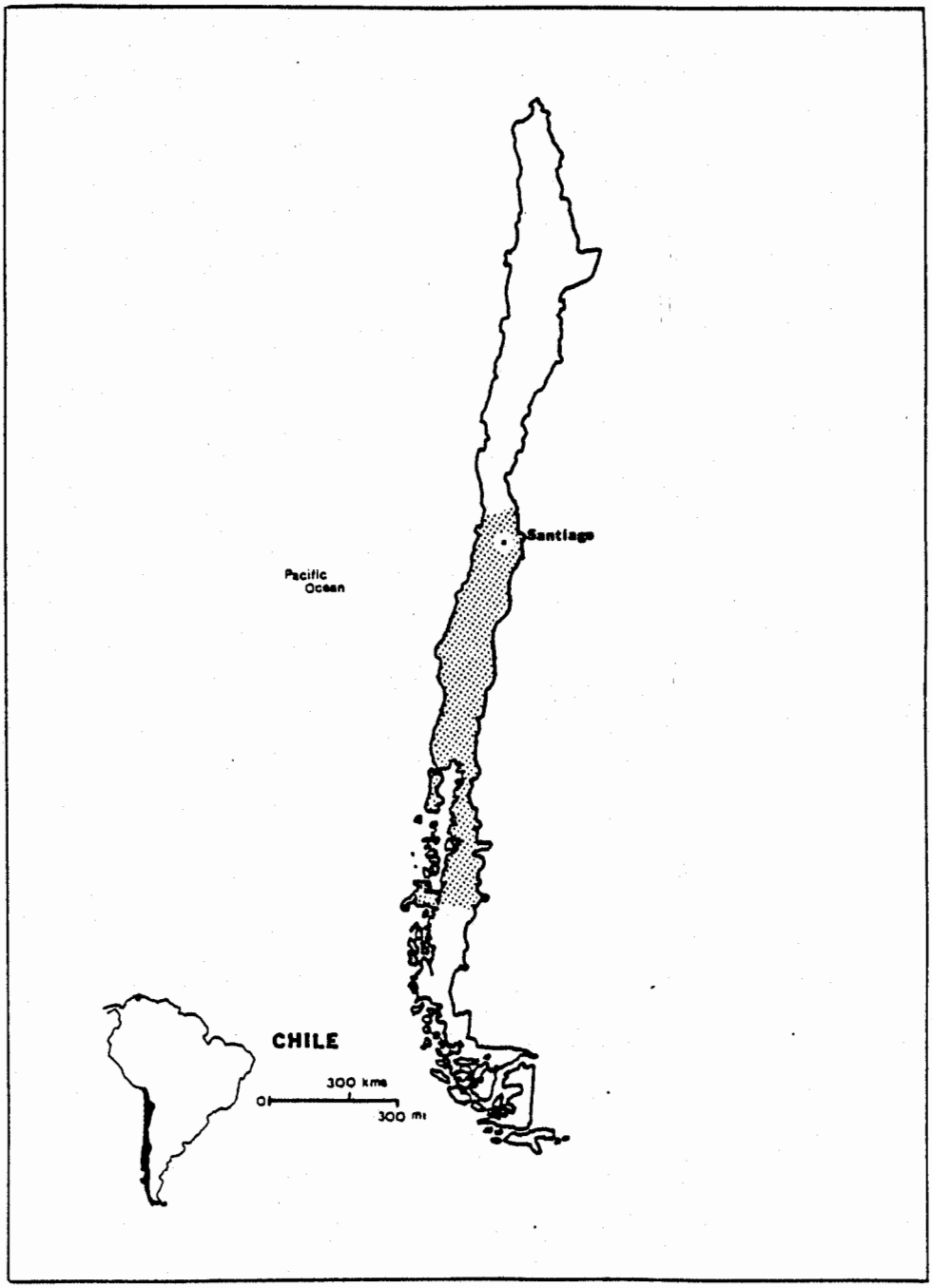

Fig. 22. Approximate distribution of the kodkod (Felis guigna) in Chile. Distribution is limited to those areas under 2,500 m in elevation.

skins remains unknown. I saw only 1 coat in Santiago that appeared to be made from kodkod skins. Research is needed to define minimum requirements, tolerance to habitat alteration, and other ecological characteristics. Any decisions to implement a controlled harvest should be based on solid biological data, which are clearly lacking at this time.

Felis jacobita

Distribution

The Andean cat in Chile is confined to the treeless, rocky, semi-arid and arid portions of the Andes above approximately 3,000 m from Choapa province (32° S Lat.), north to the Peruvian border (Fig. 23). Specimens have been recorded from near Putre (Pine et al. 1979) and east of Arica near the Peruvian border (Mann 1945, Greer 1965b). Near the southern extent of its range, Pefaur (1969) indicated that the Andean cat occurs in the Coquimbo region, and Rottmann (Pers. comm.) said the type specimen was collected northeast of Santiago. Rottmann (Pers. comm.) conveyed the following records to me, which are plotted on the distribution map (Fig. 23): In 1977, hunters reportedly shot an Andean cat southeast of Illapel (32° S Lat.) at the headwaters of the Tillimari River. In 1982, a cat was shot just south of Putre (18° 15' S Lat.); Rottmann has a photograph of the skin. Finally, the day I met with Rottmann (15 April 1983), he received 2 reports from campesinos of the Andean cat in the Cordillera Los Condores, an extension of the Andes, east of La Serena (30° S Lat.). The 1977 and 1983

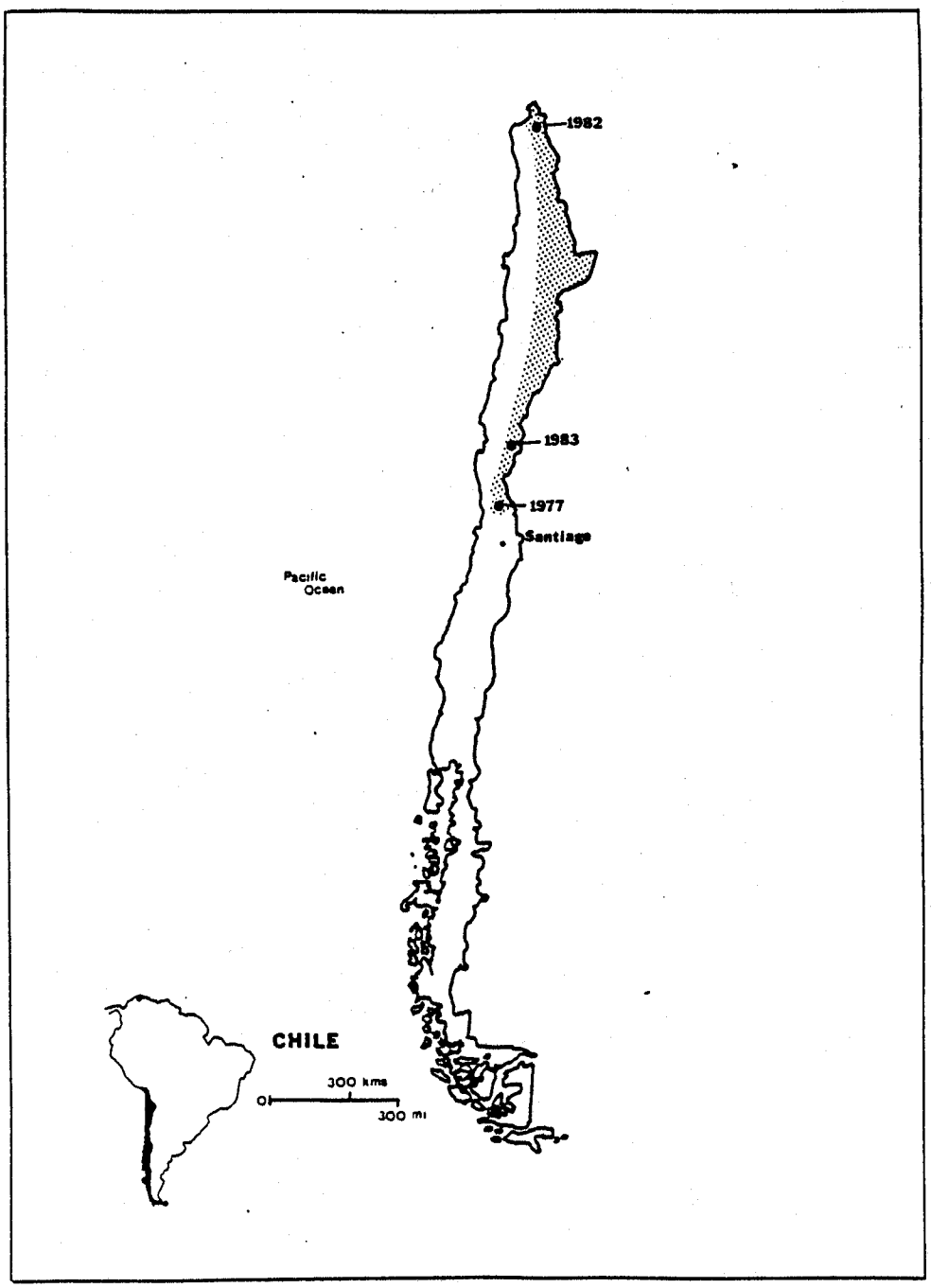

Fig. 23. Approximate distribution of the Andean cat (Felis jacobita) in Chile. Recent unpublished records (according to year) are indicated by solid circles. See text for explanation. Distribution is limited to those areas generally above 3,000 m in elevation.

reports were in areas above 2,000 m in elevation, while the 1982 record came from an area above 3,000 m.

Status and survival

Rottmann (Pers. comm.) claims the habitat in the Putre area (near the Peruvian border) is excellent for the Andean cat. Based on live-trapping efforts, there appears to be an abundance of rodents. In many other areas, especially near the southern part of the cat's range, overgrazing by domestic goats has destroyed the vegetation and reduced prey populations.

There are 2 parks in northern Chile, Lauga and Isluga, where the Andean cat is likely to be found (Benoit pers. comm.). Another high Andes park is currently being proposed near the southwest border of Bolivia within the range of the Andean cat. If properly managed, these parks should help provide protection for this species and insure its survival.

Conservation measures

Legal protection should continue for the Andean cat. I found no evidence of commercialization of this species. Given the type of habitat it occupies, population densities have probably always been low (i.e., the animal has never been common). There appears to be little or no demand for the fur at this time, a situation that is likely to continue. Consequently, there is neither economic justification nor biological evidence to support a harvest. Grazing in the high Andes should be controlled to avoid over-utilization and damage to the fragile biotic environment.

Lutra felina

Distribution

The marine otter occurs along the entire coast of Chile--from the Peruvian border to the Cape Horn islands (see IUCN 1982a for specific references). Populations in northern and central Chile (north of Chiloe Island) are small and isolated (see Fig. 24 for the locations of several recent sightings in these areas) because of the limited availability of adequate habitat (Castilla and Bahamondes 1979). Adequate habitat includes isolated areas of exposed rocky coast with continuous wave action and largely undisturbed riparian vegetation (Cabello 1978, Castilla and Bahamondes 1979). According to Gay (1874, cited in Castilla and Bahamondes 1979) these areas were probably always marginal for the marine otter. The best habitat and highest concentration of marine otters occur to the south from Chiloe Island. Cabello (1978) estimated there are 10 otters per km along the west coast of Chiloe Island, or 2,500 individuals. Sielfeld (Pers. comm.) estimates there is 25,000 km of adequate otter (Lutra felina and L. provocax) habitat south of 48 ° S Lat., with a density of 1 active den per km. However, he did not indicate what percentage of this 25,000 km was favorable for each species. CONAF (1979) estimated a density of 0.5-4 otters per km of coast in the province of Aysen (Archipelago de los Chonos), south of Chiloe Island. At a study site in central Chile, Castilla and Bahamondes (1979) observed 10 otters along 4 km of coast, a density of 2.5 otters per km. Castilla (Pers. comm.)

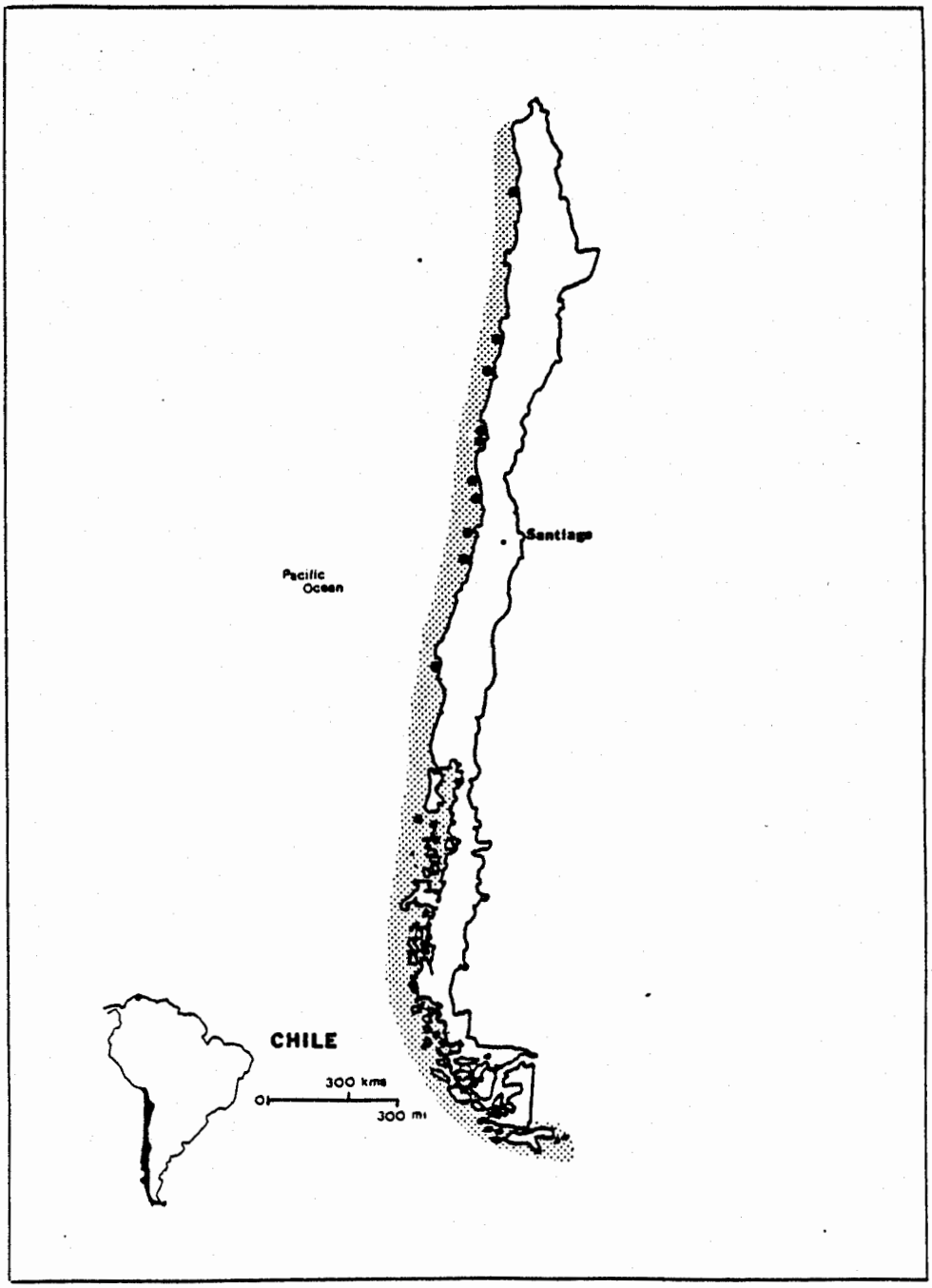

Fig. 24. Approximate distribution of the marine otter (Lutra felina) in Chile. Recent sightings north of Chiloe Island are indicated by solid circles.

surveyed 6 other localities, ranging from 2-25 km in length, and found a density of 0.04-1.5 otters per km. The lowest density was in the Beagle Channel area (Picton, Lennox, and Nueva Islands), near the southeastern extent of the marine otter's range. Few otter sightings have been reported in this area in recent years. Limited availability of suitable habitat north of Chiloe Island may account for higher densities being found by Castilla at favorable sites in these areas.

Status and survival

Marine otters were heavily harvested 40 years ago (Benoit pers. comm.). Cabello (1978) contended that, even though the otters are legally protected, clandestine activities continue with several ports acting as clearing houses for skins (Fig. 25). Although I was unable to substantiate whether or not skins are still being traded at these ports, Sielfeld (Pers. comm.) says a fur buyer in Puerto Natales pays up to $50 for skins of L. felina and L. provocax. However, most skins are of provocax because felina is smaller and generally does not meet the minimum size requirements. He believes the fur buyer's contact is from Buenos Aires. Torres et al. (1979) and Torres (Pers. comm.), as well as several other biologists, indicated to me that illegal activities were more prevalent in the southern part of Chile because the remotenessmakes control difficult. Wildlife inspectors in the south are often threatened by people who feel their source of income may be jeopardized by the inspector's actions.

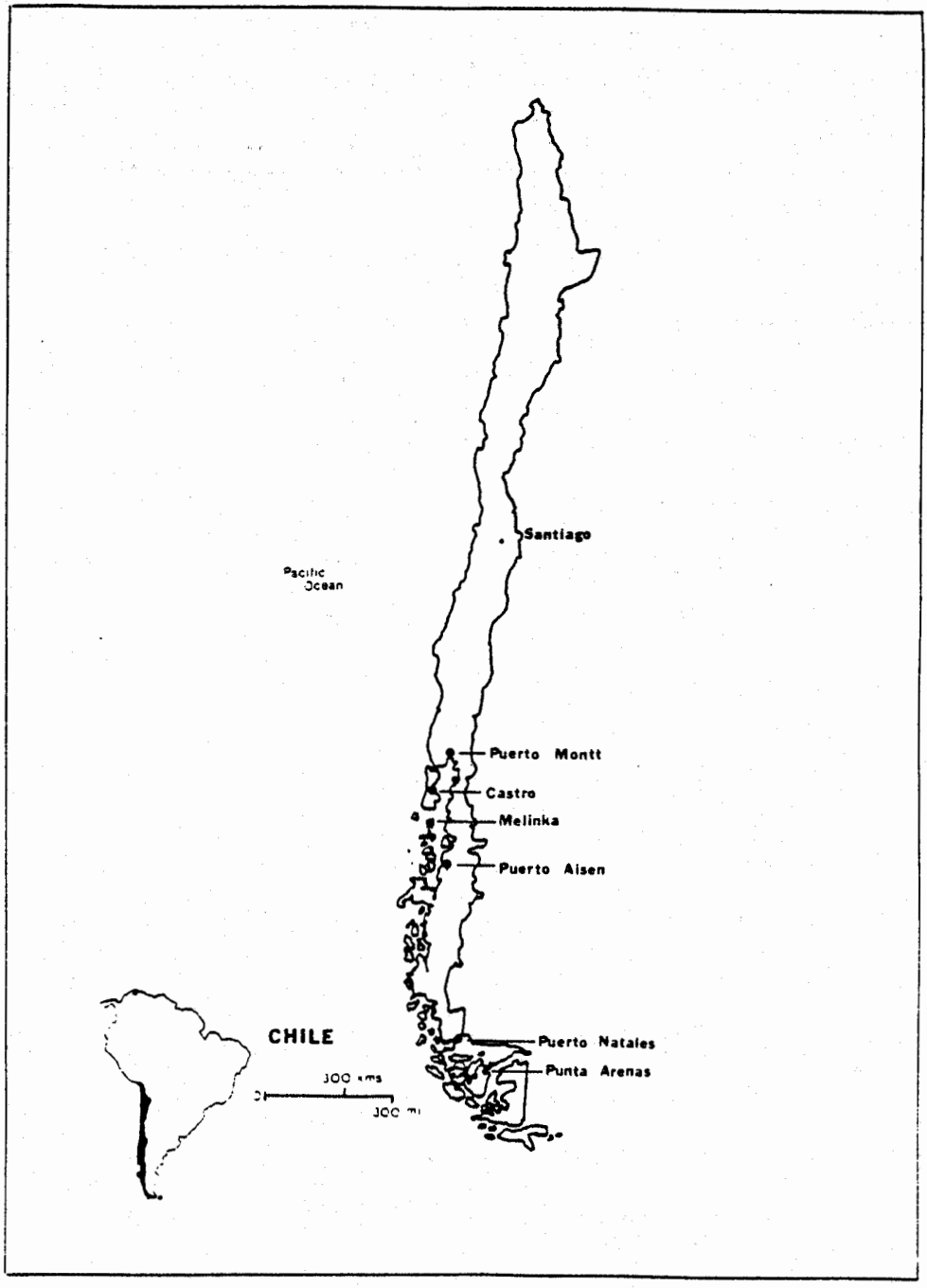

Fig. 25. Locations of ports where skins of Lutra felina are marketed. Adapted from Cabello (1978), except for Puerto Natales.

Loss of habitat has probably had little to do with the decline in marine otter populations. Habitat conditions and availability will likely remain the same for some time, at least south of 42° S Lat., where there are several large parks (IUCN 1982b). Consequently, provided that the illegal harvest can be controlled, prospects should be favorable for the marine otter. The small, isolated populations north of Chiloe Island are obviously more vulnerable, and will therefore require closer monitoring and protection.

Conservation measures

I recommend continued total protection of this species at least until such time that thorough coastal surveys and research can provide reasonably accurate distribution and density estimates. Based on the figures reported earlier, total population density could be quite high; far above the "less than 1,000" indicated in a 1976 FAO report (Anon. 1976). In Chile, where the unemployment rate has recently been 30% or more, there will undoubtedly be pressure to harvest commercially valuable species. If the previously described density estimates are substantiated, a limited harvest, if it could be properly controlled, may be justifiable.

Chile has shown its concern for the marine otter by recently establishing Chiloe National Park on Chiloe Island. While visiting the park with Dr. C. Cabello in April 1983, I had an opportunity to observe several marine otters along the coast. The marine otter will certainly benefit from the protection afforded by the park, as well as by the research

presently being conducted by Dr. Cabello. I strongly support the work of Dr. Cabello, who is collecting much-needed ecological data on the marine otter and attempting to develop a practical method of accurately surveying the coast. Reintroduction of animals to northern sites (Cabello 1983) would not be advisable until good ecological data are available to properly evaluate the feasibility.

Lutra provocax

Distribution

The southern river otter has been reported as far north as approximately 34° S Lat. (100 km south of Santiago) in Chile by Osgood (1943) and Cabrera (1957), 35° S Lat. by Tamayo and Frassinetti (1980), and between 35-36° S Lat. by Pefaur (1969). Miller and Rottmann (1976) indicated the province of Cantin (38-39° S Lat.), where a sighting was apparently made recently on the Folten River, as a present-day northern limit. Greer (1965a) indicated the otter may have been extirpated from its former range in Malleco province (38° S Lat.) in the early 1960's.

Several isolated records have recently been reported from freshwater lakes and streams in the Lake District of Chile (39-42° S Lat.) near the northern limit of the otter's range (Fig. 26). In this area, the coast is too exposed to provide adequate habitat for the otters (Sielfeld pers. comm.). The species appears to be most common in the archipelago between Chiloe Island and Cape Horn, where it occurs in both marine and freshwater environments. Glacial ice likely prevents the

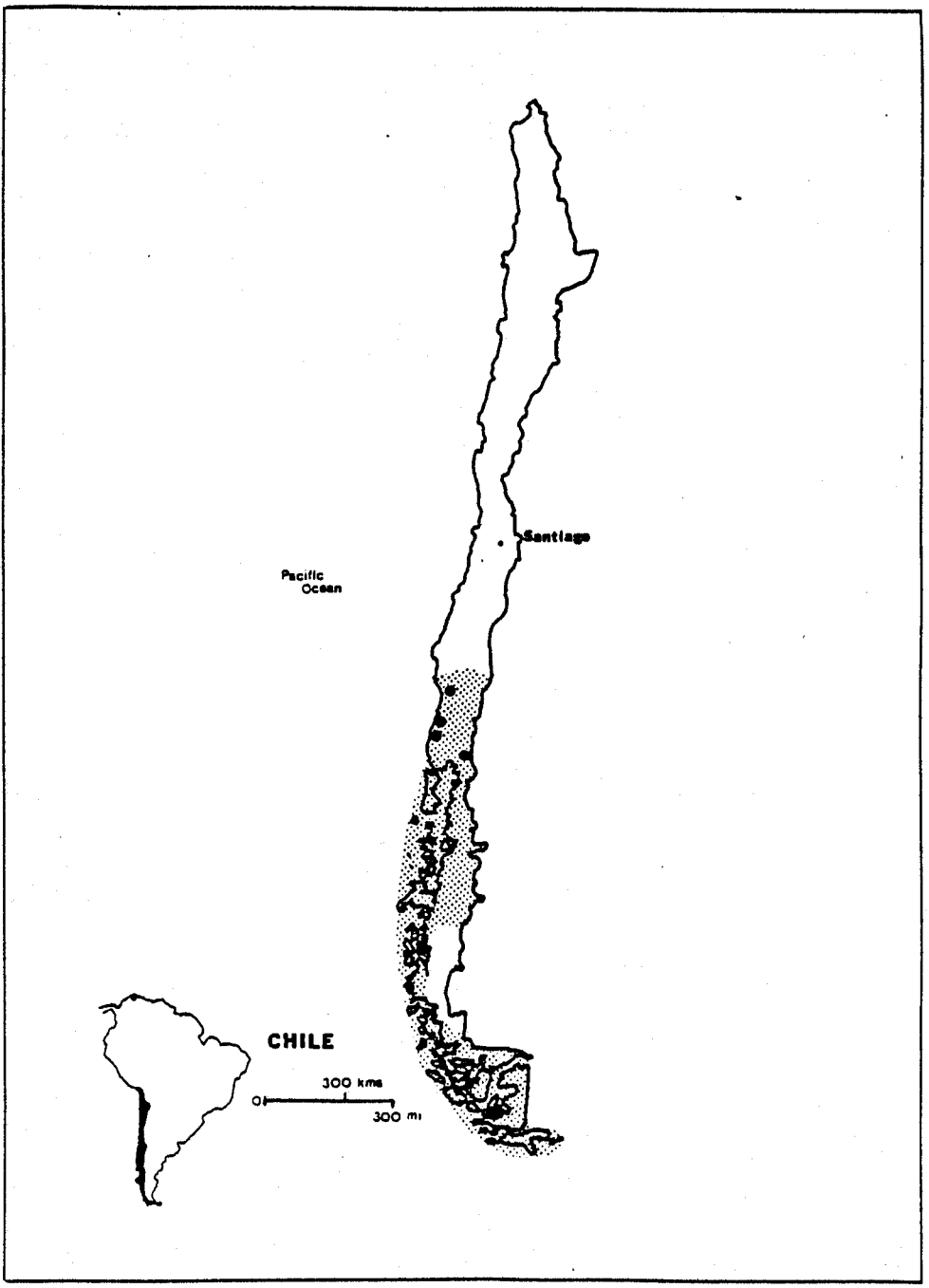

Fig. 26. Approximate distribution of the southern river otter (Lutra provocax) in Chile. Recent sightings near the northern range limit are indicated by solid circles.

occurrence of otters in freshwater habitats between 48-51° S Lat. (Fig. 26).

Status and survival

Otters apparently occur in very low numbers in the freshwater habitats north of Chiloe Island. Vicente Perez Rosales National Park (220,000 ha) may be a sanctuary for the otter in this region. The Park has 14 independent water systems that drain primarily into Lake Todos los Santos (IUCN 1982b), and otters have been seen recently at the south end of the lake (Benoit pers. comm.). The rivers south of approximately 37° S Lat. (near Concepcion) appeared to offer favorable habitat for otters, while those to the north did not.

The southern river otter is considerably more common to the south of 42° S Lat., where it occurs in protected, rocky coasts. Hauke (1979) conducted an 18-month field study in Chile and concluded that the southern river otter was common in the area of Aisen province (44-46° S Lat.). He reported signs at numerous places on the peninsula of Faitao and surrounding areas, including near Puerto Aguirre. Sielfeld (Pers. comm.) has collected data on habitat preferences and feeding habits of Lutra provocax and L. felina from 41 sample stations along the southern coast of Chile. He estimates that to the south of 48° S Lat., there is approximately 25,000 km of coast with adequate otter habitat (see preceding section on L. felina). In view of the sparse human population and inaccessibility of the Patagonian archipelago, southern river otter populations should remain stable there, but will probably continue to decline in

freshwater habitats to the north of 42° S Lat. as a result of habitat degradation.

Conservation measures

The southern river otter is protected by law in Chile in accordance with CITES. Although otters were heavily harvested 40 years ago (Benoit pers. comm.), international laws appear to have helped reduce this harvest. Surveys should be conducted throughout the Lake District to obtain a more accurate determination of the actual distribution and status there. The research of Sielfeld out of the Instituto de la Patagonia and Cabello on Chiloe Island should be encouraged and supported, as the results will undoubtedly prove valuable in determining future management directions. Until more information is obtained to permit the proper evaluation of the status of this species, the southern river otter should be afforded total protection throughout its range in Argentina and Chile.

COLOMBIA

Colombia may be divided into several natural regions, including the coastal lowlands of the Pacific Ocean and Caribbean Sea; 3 ranges of the Andes mountains extending north-south through the country; the Llanos, which cover the entire northeastern lowlands; and the Amazon forests to the southeast. The tropical moist forests and eastern plains, where the climate is hot and humid, cover approximately 65% of the country but are largely uninhabited. Approximately 75% of the people live in the highlands.

Similar to other developing nations of Latin America, Colombia has failed to escape the environmental problems that threaten biological diversity. The accelerated growth of Colombia's population has resulted in increased industrial development and hasty exploitation of natural resources. Forests are cleared, swamps are drained, and grasslands are burned in an effort to grow more crops and graze more cattle. Mountain slopes are either overgrazed or transformed into coffee plantations (approximately 10% of the land). Due to a lack of park guards, human settlements frequently become established in areas of parks and natural reserves. These problems appear even greater when coupled with a poor economic forecast.

In 1973, the Colombian government passed Resolution No. 848, which prohibited all hunting and commercial trade in native cats. This was an important piece of legislation, as Colombia was previously a major exporter of ocelot and jaguar

skins (Koford 1974). In 1970 alone, the spotted cats and otters accounted for 35% of the value of legally harvested animal skins exported from the country (Lemke 1981). Leticia, a remote frontier town along the Amazon River, once served as an important fur trade center for skins originating in Peru, Brazil, and other parts of the Amazon Basin. In 1972, approximately 24,500 small spotted cat skins (ocelot, margay, and tiger cat) and nearly 13,000 otter (Lutra longicaudis) skins were exported from Leticia (Foote and Scheuerman 1973). Leticia apparently has shifted its emphasis from the fur trade to the drug trade (Donadio pers. comm.). According to F. Medem (Pers. comm.), the cocaine trade is now more lucrative and has taken the pressure off of cat and otter populations.

Colombia signed CITES at the Washington Conference in 1973, but by not ratifying the Convention until 1981 (Appendix A), it became the last country in South America to do so. Although domestic legislation is stricter than CITES, the Convention does nonetheless help strengthen legal and enforcement efforts. Despite these measures, Colombia continues to be plagued with skin smuggling scandals that have involved officials of the Institute of Renewable Natural Resources (INDERENA). TRAFFIC (1982) addressed these issues in a special report dealing with Colombia's struggle to protect its wildlife.

INDERENA is responsible for the management of more than 30 protected areas, which total almost 4 million hectares, or about 3.3% of the country (Barriga and Byers 1982, IUCN 1982b).

However, as is the case elsewhere, many of these areas are inadequately protected because of a lack of funds and a shortage of trained personnel. Some conservationists in Bogota feel these "paper parks" mislead the people into thinking that the park program has adequately protected natural areas when it is not true. They feel that existing parks and reserves should be adequately protected before new areas are added to the system. Sierra de la Macarena (501,350 ha), Colombia's first national park, is becoming a "disaster" as colonization spreads throughout the eastern section (Cadena pers. comm.). Yet, this is a park which contains giant otters (observed on the Duda River along the western border), jaguar, ocelot, and probably margay and tiger cats.

Panthera onca, Felis pardalis, F. tigrina, F. wiedii Distribution

The jaguar can still be found throughout the lowlands of Colombia and the slopes of the Andes to 1,500 m or more (Fig. 27). The southern distribution of the jaguar up the Magdalena River drainage is not clear, however. There are at least 2 corridors where the jaguar and other spotted cats could disperse east and west over the Andes (Hernandez-Camacho pers. comm.). The corridors are located northeast of Neiva (approximately 3° N Lat.) and northwest of Cucuta (approximately 9°N Lat.).

Jaguars have also been recorded in mountainous areas above 1,500 m in elevation (Hernandez-Camacho pers. comm.). In 1965, a pair was discovered in the interandean mountain area north of

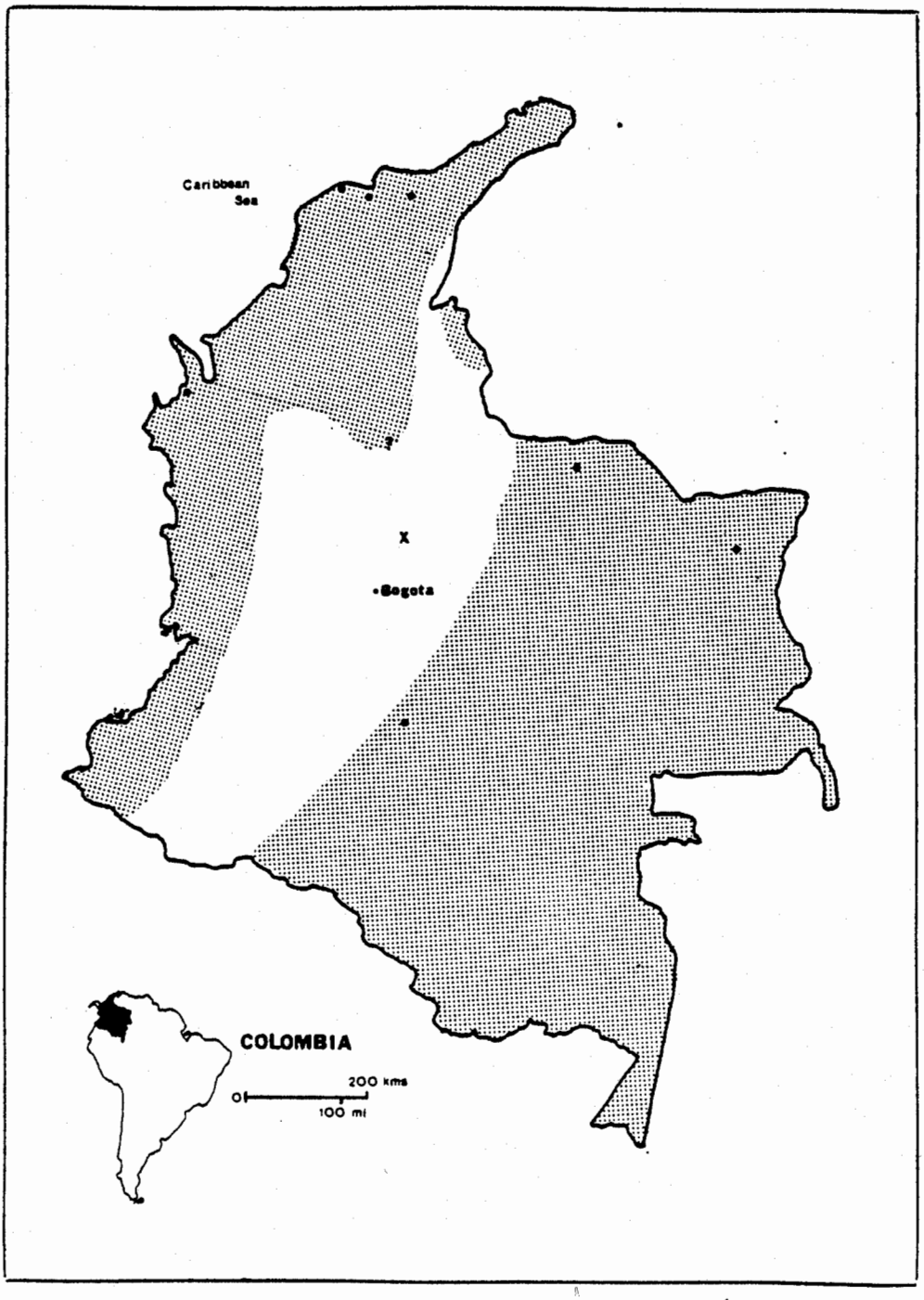

Fig. 27. Approximate distribution of the jaguar (Panthera onca), and probably the ocelot (Felis pardalis) and margay (F. wiedii), in Colombia. Protected areas where jaguars have been reported are indicated by solid circles. A question mark indicates the uncertainty of the range limit in the interandean area. However, a female jaguar was killed in the interandean Department of Cundinamarca (X) at an elevation of 3,000 m in 1966.

Bogota at an elevation of approximately 3,000 m. A female was killed just north of this location in 1966 (see Fig. 27).

The ocelot and margay probably have a distribution similar to the jaguar, occurring at elevations of 2,000 m or more where adequate habitat is available. According to Hernandez-Camacho (Pers. comm.), the tiger cat is restricted to the montane and cloud forests of the 3 Andean ranges at elevations above 1,500 m. It has been recorded at elevations up to 4,500 m, which is approximately snowline in Colombia. Because the tiger cat occupies lowland tropical forests in Panama and other part of the Orinoco and Amazon Basins (IUCN 1982b), it follows that the cat should occur in the tropical moist forests and gallery forests of Colombia.

Status and survival

Koford (1974) wrote that the jaguar had declined considerably during the previous 20 years in the eastern Llanos of Colombia. This large lowland zone of seasonally dry savannas dissected by narrow gallery forests bordering tributaries of the Orinoco River is excellent habitat for the jaguar and ocelot. Although roads and development are continually expanding east from the Andes, the gallery forests of the Llanos and tropical forests of the Amazon drainage remain available to the spotted cats. Additionally, the tropical lowlands along the Pacific coast and swamps of the intermountain area east of Monteria remain undisturbed (Hildebrand pers. comm.), thus providing good habitat for the cats.

Dr. F. Medem (Pers. comm.) believes that cat and otter populations are increasing. He attributes this to several things, including wildlife protection laws, a more lucrative cocaine trade (i.e., people are growing coca instead of hunting furbearers), and guerrilla activity, which has resulted in strict control of ammunition for everyone.

If, indeed, tiger cat populations are largely confined to the montane and cloud forests of the Andean slopes, the status of this species may be somewhat precarious. Habitat destruction is greatest in these areas. The forested slopes are converted into coffee and tree plantations and pasture for cattle.

Conservation measures

Emphasis should be placed on effective enforcement of existing laws, protection of park and reserve boundaries, protection and preservation of gallery forests and the large lowland tropical moist forests of the Pacific coast and Amazon Basin. The success of these activities will clearly dictate the long-term survival of the spotted cats and otters.

Lutra longicaudis and Pteronura brasiliensis

Distribution

The distribution of Lutra longicaudis in Colombia approximates that of the jaguar (see Fig. 27), with some minor differences. The species probably occurs much farther up into the Magdalena River drainage of the intermountain region. Otters are apparently common in the swampy areas between Barranquilla and Santa Marta (Hildebrand pers. comm.), and

although they occur in the Fundacion and Frio Rivers along the west slope of the Sierra Nevada de Santa Maria in northeastern Colombia, it is unlikely that they occur further northeast.

Giant otter populations are still found in isolated pockets throughout the Llanos and lowland tropical forests east of the Andes (Fig. 28). Animals have been reported in El Tuparro (548,000 ha) and Sierra de la Macarena (501,350 ha) National Parks (IUCN 1982b), the 2 largest parks in Colombia, in the Arauca Sanctuary (90,000 ha), and in the Miritiparana River (Hildebrand pers. comm.). In September 1976, Hildebrand boated the upper stretches of the Miritiparana River and counted 24 giant otters (maximum group size of 7). Because hunting is prohibited and few people inhabit this stretch of the river (rapids make access difficult), Hildebrand feels this population is secure. In 1980-82, Delfer (1983) observed giant otters 49 times while surveying sections of the Tomo, Tuparrito, and Tupano Rivers of El Tuparro National Park in eastern Colombia. During several trips, Delfer (n.d.) observed 156 individuals in 28 groups on the 3 rivers, a number he estimated as approximately 50% of the population. These data are very encouraging, suggesting that several healthy populations probably exist in the more remote areas of eastern Colombia and probably adjoining Venezuela.

Status and survival

The status of Lutra longicaudis in the sparsely inhabited lowlands of Colombia are probably quite good. Traditionally, handbags were made from Lutra skins, but cowhide is used now

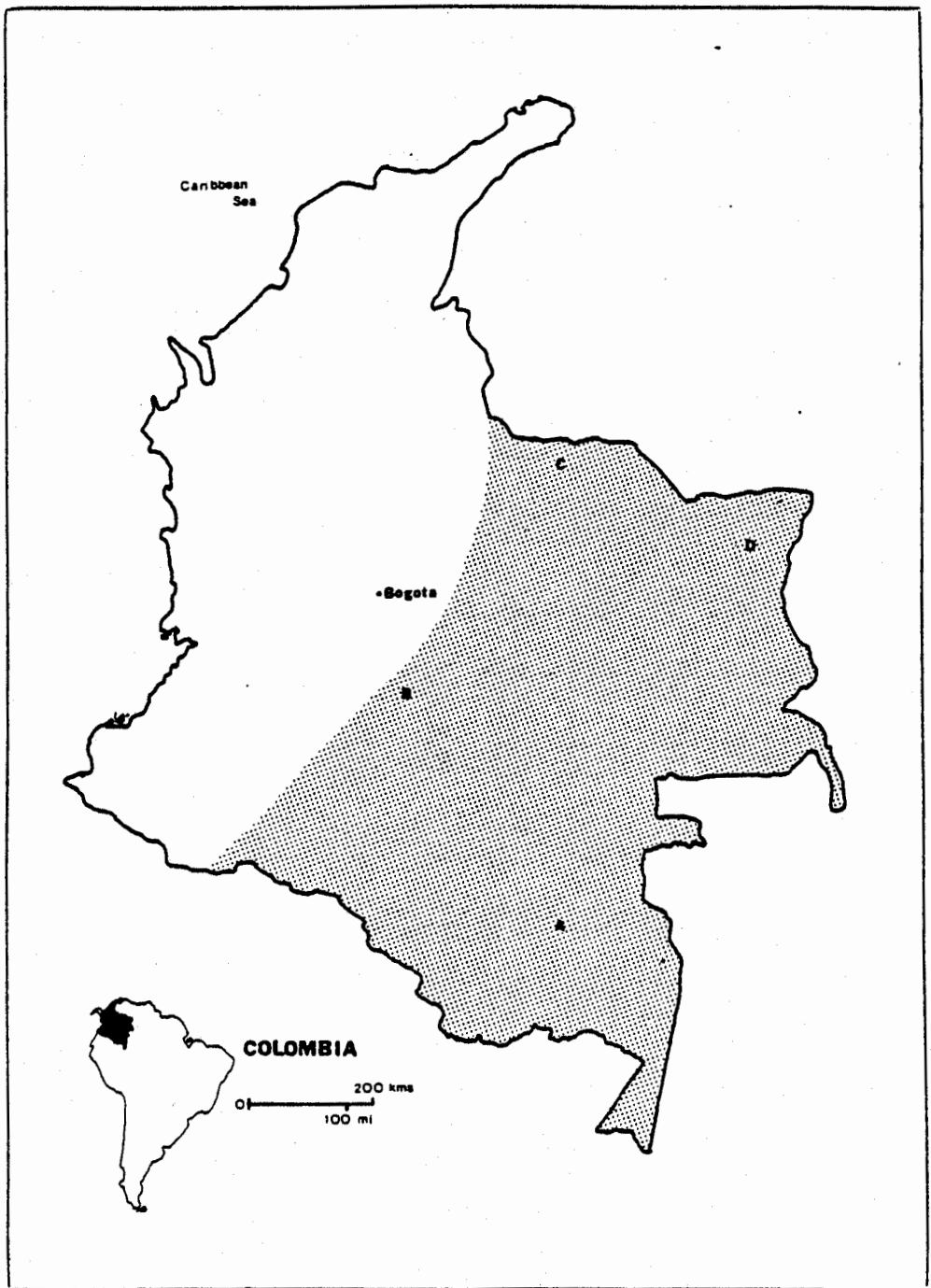

Fig. 28. Approximate distribution of the giant otter (Pteronura brasiliensis) in Colombia. Recent giant otter sightings have been reported for the Miritiparana River (A), the Duda River in Sierra de la Macarena National Park (B), the Arauca Sanctuary (C), and 3 rivers in El Tuparro National Park (D).

(Hernandez-Camacho pers. comm.). Otter eyes are also used by the Indians for therapeutic purposes. These uses do not appear to have any significant impact on otter populations, however. The overall status of the giant otter, while encouraging, will probably remain less favorable because of the reasons given elsewhere. The prospects for long-term survival of Lutra longicaudis are very good; less so for the giant otter. However, if the conservation measures described for the cats are accomplished, these 2 species should remain a part of Colombia's fauna for some time to come.

Conservation measures

See conservation measures for the cats in this section and for otters in previous sections.

ECUADOR

Similar to Colombia, Ecuador has 3 general ecological zones: the hot, humid, low coastal zone (Costa); the cool and relatively dry Andean highlands (Sierra); and the sparsely inhabited tropical moist forest area to the east (Oriente). Approximately 45% of the people inhabit the Costa region, and 51% in the Andean Sierra, where the vegetation has been heavily modified or destroyed (Gentry 1977). Vegetation of the Amazonian lowlands in the Oriente has remained relatively well preserved, while the forests of the Costa region are being destroyed at an increasing rate.

General land-use practices vary among the 3 regions. Approximately 90% of the world's balsa wood comes from trees grown in the Costa region, an area where agriculture is increasing. The Andean Sierra is used primarily for agriculture and livestock grazing, although pine plantations are being established for the development of forest products. Oil from the northern part of the Oriente makes Ecuador a major South American exporter of petroleum. Native vegetation in the upper Napo River area is being replaced by African palm plantations for the production of palm oil (Balslev pers. comm.).

The otters and spotted cats are protected by Ecuadorian law and CITES (Appendix A), although these laws are by no means strictly enforced and obeyed. The open manner in which cat skins are occasionally displayed suggests that store owners have little fear of being prosecuted. I observed small numbers

of skins of the jaguar, ocelot, margay, and Lutra otter for sale in stores in Quito, Cotacachi, and Santo Domingo de los Colorados. It is not uncommon to see cat skins for sale in the stores of various Costa and Oriente towns (Brenner and Giesses pers. comm.). During the weekends, there is a man that frequently sells ocelot skins at the central plaza in Santo Domingo de los Colorados (Hicks pers. comm.). Local sales to tourists, such as these, probably have little impact on the cat and otter populations. The extent of large-scale commercial activities and how enforcement officials view them are unknown. CITES authorities have, however, discovered recent illegal German imports of ocelot and margay skins from Ecuador (Duplaix pers. comm.).

Panthera onca, Felis pardalis, F. tigrina, F. wiedii

Distribution

The jaguar, ocelot, margay, and tiger cat are found both east and west of the Andes in Ecuador (Fig. 29). The jaguar has been nearly extirpate from the Costa region (Ortiz-Crespo pers. comm.). Although Baker (1974) provided records of jaguar for Esmeraldas Province in the northwest, there are few recent distribution data available. In 1981, Dr. L. Albuja (Pers. comm.) saw a female jaguar accompanied by a juvenile in the Cordillera de Colonche northwest of Guayaquil (see Fig. 29).

Status and Survival

All the spotted cats were considered rare by respondents of the questionnaire and by Patzelt (1978). Future prospects for the jaguar in the Costa region are poor. However, there

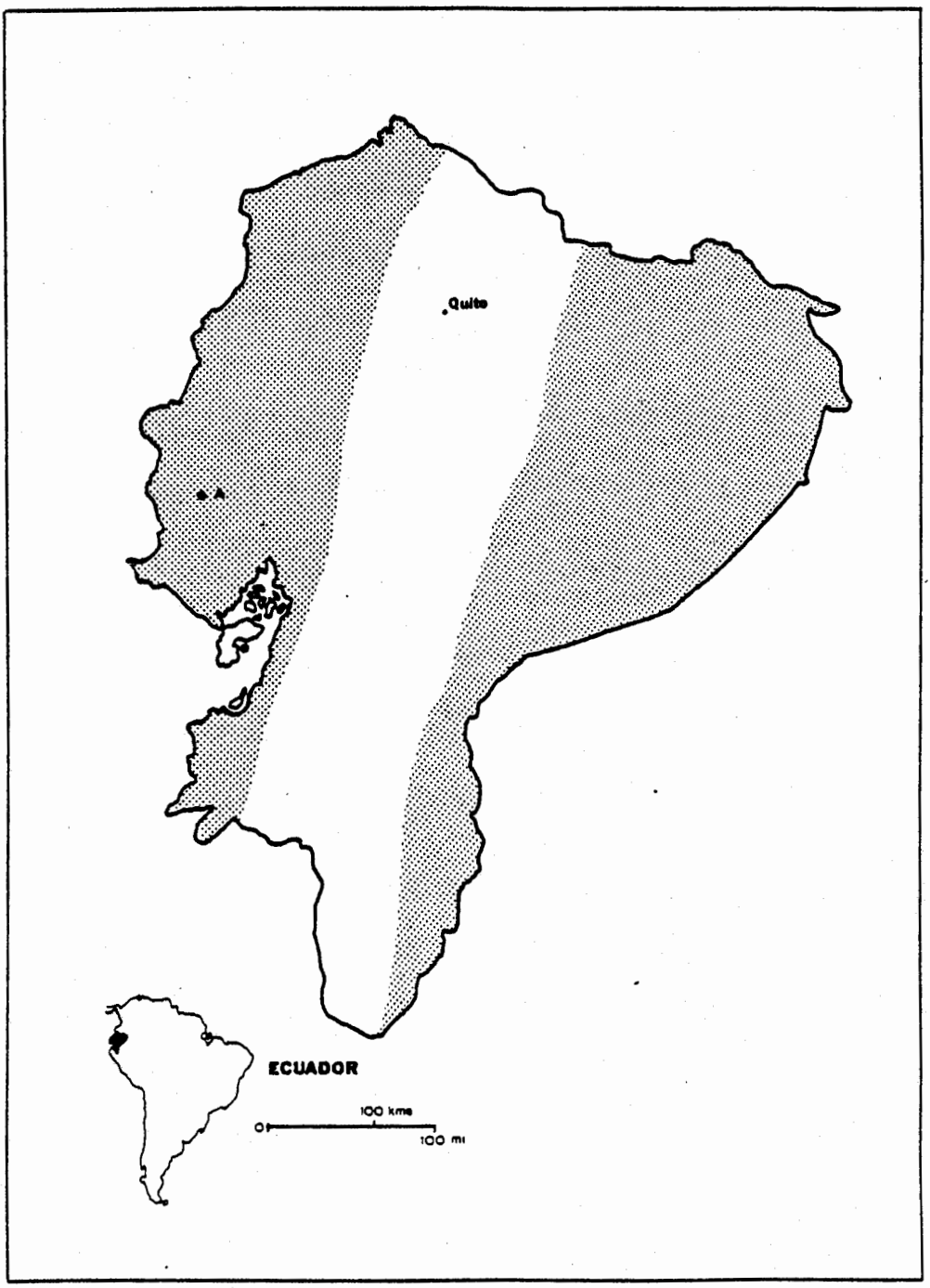

Fig. 29. Approximate distribution of the jaguar (Panthera onca), ocelot (Felis pardalis), margay (F. wiedii), and tiger cat (F. tigrina) in Ecuador. In 1981, a female jaguar and her single offspring were seen in the Cordillera de Colonche (A).

are a few remote areas in the northwest, including Cotacachi-Cayapas Ecological Reserve, where the small spotted cats will be able to survive. Sangay National Park (370,000 ha) should help to protect the cats and Lutra longicaudis on the east slope of the Andes. The tropical forests of the Oriente should provide adequate protection for the cats and otters for some time yet. Cuyabeno Faunal Reserve (30,000 ha) and Yasumi National Park (400,000 ha), if adequately protected, should help to ensure long-term survival of these species.

Conservation measures

Similar to those proposed for other Latin American countries.

Lutra longicaudis and Pteronura brasiliensis

Distribution

Lutra longicaudis is distributed throughout the entire country, including the Andean highlands, although few probably reside in the Paramo zone (above 3,000 m in elevation). D. Gorriques (Pers. comm.), a Peace Corps Fisheries Extension biologist, has seen otters in the Nangaritza, Yacuambi, and Zamora Rivers in the Andean highlands of southern Ecuador.

The giant otter is found only in parts of the lowland tropical forests of eastern Ecuador (Fig. 30). A young biologist, E. Asanza (Pers. comm.), has recently seen giant otters in several small, black-water streams in the Oriente (Fig. 30). These streams are tributaries of the Aguarico, Pastaza, and Putumayo Rivers.

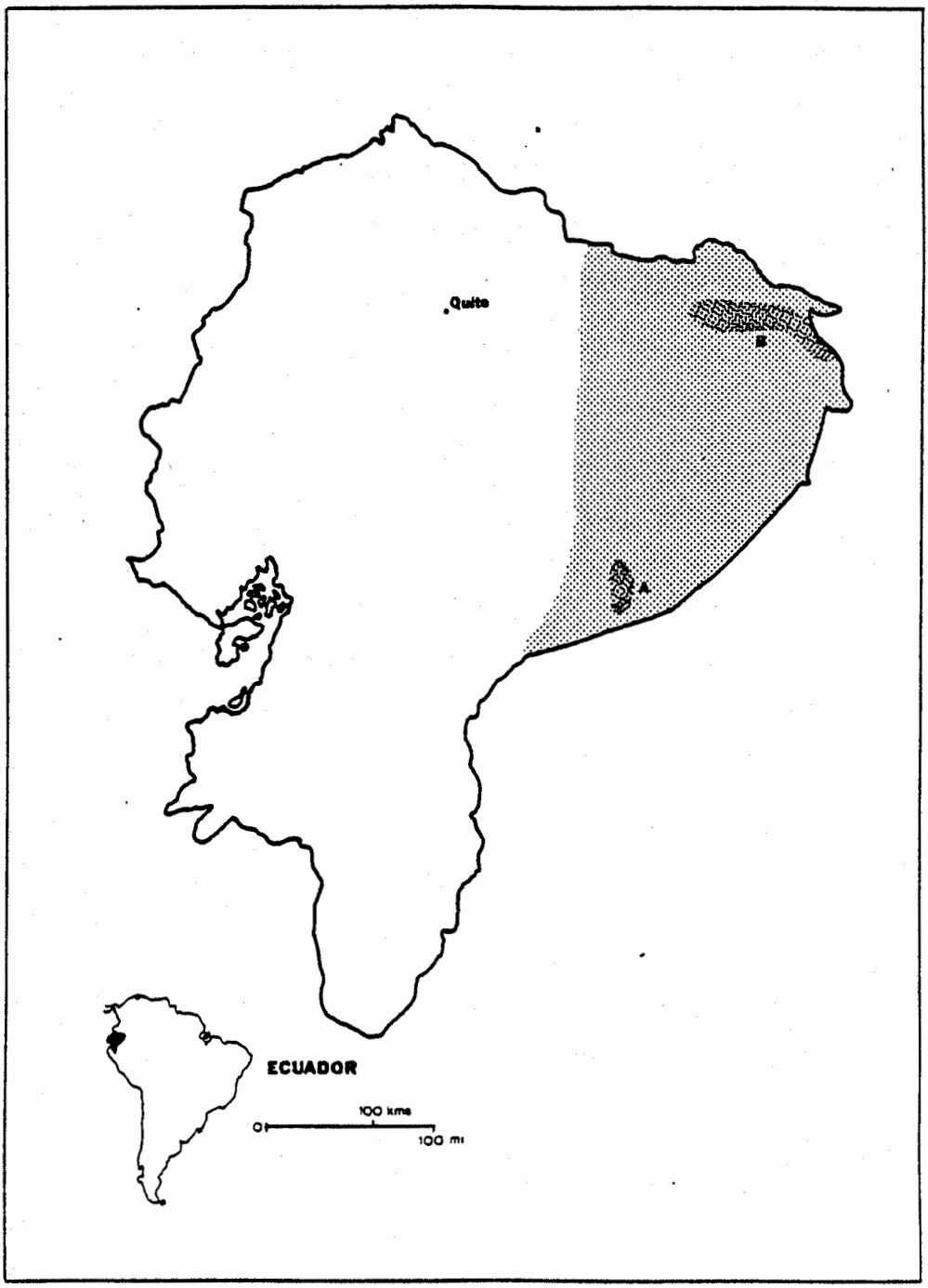

Fig. 30. Approximate distribution of the giant otter (Pteronura brasiliensis) in Ecuador. Since 1980, giant otters have been sighted on the Bobonaza and Ishpingo rivers near the eastern frontier (A), and in the Cuyabeno, Guepi, Lagarto Cocha, and Tarapuy rivers in the northeast (B).

Status and survival

Lutra longicaudis is probably still fairly common in the Oriente, where disturbance has been minimal, and perhaps parts of the northwest. However, in the Sierra, very little riparian habitat has been preserved, even though laws prohibit the destruction of streamside vegetation (Winfield pers. comm.). Unless there is adequate riparian vegetation, otters will not use these streams.

The giant otter probably survives in only a few isolated locations in eastern Ecuador. At least 1 of the streams where Asanza has seen giant otters is within the Cuyabeno Faunal Reserve. Otters may still be found in Yansuni National Park as well. Protection of these locations may help to ensure the survival of giant otters in Ecuador.

Conservation measures

Both species would benefit from protection and restoration of riparian habitat. Efforts should be made to locate and adequately protect remaining giant otter populations.

THE GUIANAS

The Guianas, including from west to east, Guyana, Suriname, and French Guiana, are discussed together because of their similarity. The Guianas lie in the basins of streams which empty into the Atlantic Ocean between the Amazon and Orinoco drainages. The physiography of all 3 countries is similar. There is a narrow coastal belt of flat, marshy land containing nearly all of the crops (primarily rice and sugar) and most of the population. Agriculture in the low, coastal belt can be maintained only by a system of dikes and canals. The landscape further inland consists of heavily forested uplands and Guiana Highlands, with occasional dry savannas. Frequent falls and rapids make most rivers unnavigable beyond the coastal lowlands.

According to L. Bobb (Pers. comm.), CITES Administrative Authority in Guyana, there is no specific law protecting mammals. Instead, they have a list of strictly protected wildlife that includes the giant otter. However, neither Lutra longicaudis nor any of the cats are included on the list. Protection is only provided by CITES, which was ratified and entered into force in 1977 (Appendix A). Nevertheless, there seems to be little commercial interest in the cats and otters, and none were seen for sale in Georgetown or Paramaribo. Strict control of firearms, limited access into the interior, and governmental control of access help to protect wildlife and reduce illegal activities.

In Suriname, a Game Ordinance was passed in 1954 that provided protection to various nongame species (Genoways et al. 1982) and the giant otter (Duplaix 1980a). The jaguar became officially protected in 1983 by special decree (Reichart pers. comm.). CITES was entered into force in February 1981, thus providing protection to all cats and otters on an international level. Similar to Guyana, there appears to be little pressure to harvest the cats and otters on a commercial level in Suriname (Reichart pers. comm.).

French Guiana is an Overseas Department of France. I did not visit French Guiana; nor was I able to obtain any information regarding wildlife laws. However, I believe they coincide with those in France.

Suriname's excellent system of protected areas consists of 8 nature reserves and 1 nature park, ranging in size from 4,000 ha to 220,000 ha (IUCN 1982b). The otters and spotted cats are found in several of these areas. French Guiana has 2 coastal parks (25,000 ha and 35,000 ha) and an island park (4 ha). Only the 2 national parks along the coast are of any consequence to either the cats or otters. Guyana has 1 national park (11,655 ha), where at least the jaguar and ocelot are found (IUCN 1982b). Because exploitation of the interior forests appear negligible at the present time and will probably not change in the foreseeable future (Myers 1980), the system of protected areas in French Guiana and Guyana will have time to expand before their importance becomes critical to cat and otter populations.

Panthera onca, Felis pardalis, F. tigrina, F. wiedii

Distribution

Except for scattered agricultural and metropolitan areas in the coastal belt, the jaguar, ocelot, and probably tiger cat are widely distributed throughout the Guianas. This feeling was also conveyed to me by people knowledgeable of wildlife in Guyana and Suriname. Several airplane flights over Suriname's interior in 1980 revealed the presence of extensive tracts of excellent cat habitat.

Status and Survival

According to H. Reichart (Pers. comm.), former Director of the Foundation for Nature Preservation in Suriname (STINASU), the jaguar, ocelot, and margay are still quite common. Few observations have been made of the tiger cat, suggesting that it is rarer than the others, more secretive, or both. The status of these cats is probably similar in Guyana and French Guiana.

A lack of current commercial interest in the cats, combined with large areas of undisturbed habitat throughout the Guianas, are encouraging indicators for future survival prospects. However, more protected areas need to be established in Guyana and French Guiana, because all areas cannot realistically remain unexploited. Jaguar are occasionally killed by hunters and cattle ranchers in Suriname (Reichart pers. comm.) and Guyana (Singh pers. comm.).

Conservation measures

Establish more clearly defined laws in Guyana and perhaps French Guiana for the conservation of cats, otters, and all wildlife. Develop and expand the system of protected areas in Guyana and French Guiana.

Lutra longicaudis and Pteronura brasiliensis

Distribution

The small river otter is widely distributed throughout the Guianas. It is capable of occupying smaller streams at higher elevations within the Guiana Highlands than the giant otter. The giant otter, although widely distributed as well, is probably more concentrated at fewer sites. Both species occur in the agricultural canal systems of the coastal belt in Guyana (Fig. 31; Laidler pers. comm.), Suriname (Fig. 32; Duplaix 1980b; Pers. obs.), and presumably French Guiana. Duplaix (1980b) found that the 2 species are sympatric on at least 5 of the 6 major river systems in Suriname (Fig. 32).

Status and survival

Due to the lack of habitat disturbance throughout much of the Guianas, and no apparent commercial interest in either species, most otter populations are probably quite stable. Use of semi-artificial reservoirs, canals, and other artificial sites by otters in Guyana (Laidler 1982) and Suriname (Duplaix 1980b, Pers. obs.) is an example of tolerance by both species to limited habitat alterations. However, adequate habitat and food must remain available and human interference minimized.

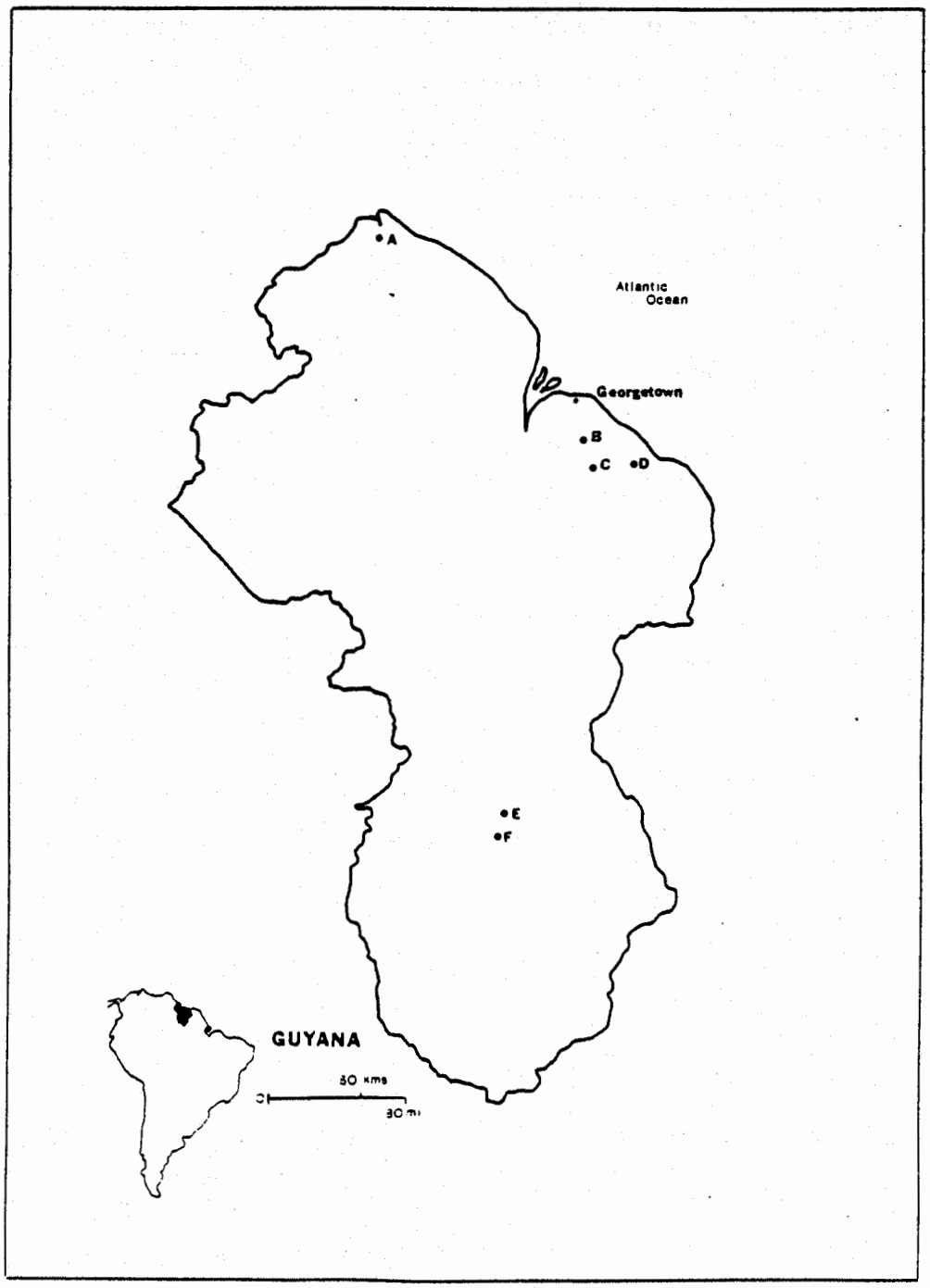

Fig. 31. Recent records of giant otters (Pteronura brasiliensis) in Guyana. A dealer from Morawhanna (A) recently purchased a giant otter pelt that had been collected nearby. E. Laidler (1982) studied 4 groups of otters on Russel Lake and Lama and Maduni creeks (B). In 1983, Amerindians turned in to the Guyana Museum the carcasses of 3 young otters that had been collected on the Mahaica River approximately 60 km from the coast (C). Military personnel have reported otters on the Abary River (D). Finally, both Pteronura and Lutra have been observed on the Mashiveau River (E) and Morewau River (F) in the interior.

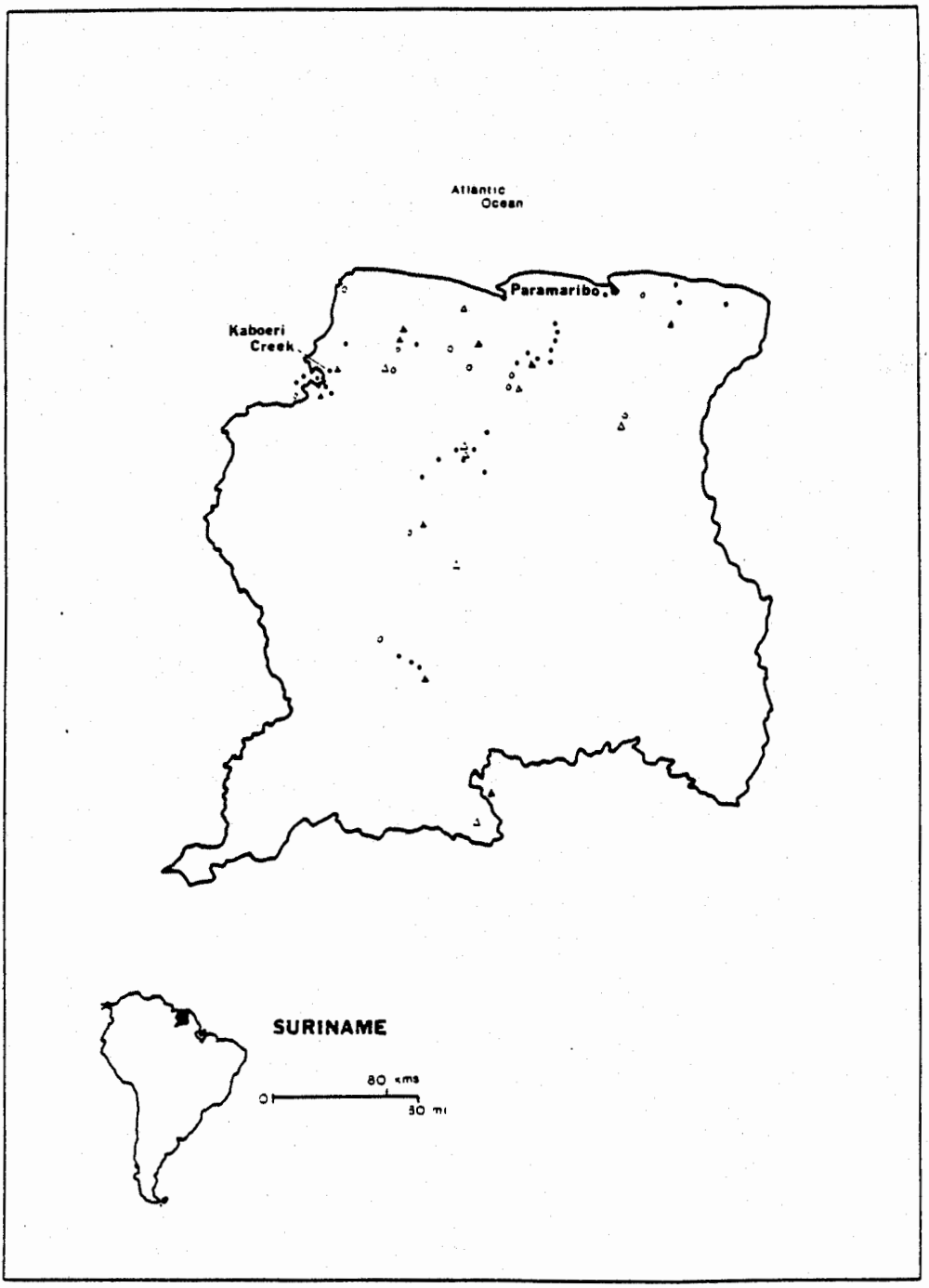

Fig. 32. Recorded locations of Pteronura (● sightings; o evidence) and Lutra (▲ sightings; △ evidence) in Suriname based on a survey by Duplaix (1980b) in 1976-1978.

During her general survey of streams in Suriname, Duplaix (1980b) sighted 102 giant otters. On Kaboeri Creek (see Fig. 32 for location), Duplaix (1980b) studied 23 resident giant otters. During 1 week in November 1980, Duplaix and I observed a maximum of 15 different otters each day on Kaboeri Creek. These otters are largely protected by conservation officers, who control access up the stream from their headquarters at the entrance. Although fishermen occasionally kill giant otters, protection efforts, such as those on Kaboeri Creek, should help to ensure the survival of both species for some time. The Guianas are 1 of the few remaining areas with healthy giant otter populations.

Conservation measures

Surveys, such as the one by Duplaix in Suriname, should be conducted in Guyana and French Guiana to locate existing giant otter populations. Sites with healthy populations should be identified and adequately arotected by either establishing preserves or controlling access.

PARAGUAY

The Paraguay River divides the country of Paraguay into 2 distinct areas: the Chaco and the Eastern Region. The Chaco vegetation is a mosaic of thorn forest, woodlands, savannas, and grasslands situated on a flat allevial plain. Most of the area is covered by semiarid xerophytic woodland and thorn forest, however. The Paraguay River is bordered by marshes and palm savannas (pantanal) with occasional areas of dense gallery forest and shrub woodland. The Chaco contains large cattle ranches (estancias), occasional military posts, and is sparsely inhabited. It is traversed by the Trans-Chaco highway that begins near Asuncion and extends in a northwest direction to the Bolivian border.

The Eastern Region is made up of 3 distinct areas (Myers 1982). Unlike the arid Chaco, eastern Paraguay consists of tropical or subtropical evergreen or semideciduous forests, gently rolling wooded hills, and fertile grassy plains. Most of the population is located in this area. In the east, forests are being rapidly cleared by the slash and burn method to make way for agriculture (Wagner and Earhart 1981). According to an FAO study (Simeone pers. comm.), 78% of Paraguay's forests were still intact in 1965, with 4% of the forests remaining today. At the present rate, the native forests will disappear by the year 2000. In a discussion with 2 Forestry Extensionists, aerial photographs apparently reveal that an average of 100,000 ha of forest is cleared each year. They believe 150,000-175,000 ha would be a more realistic

figure. A Ministry of Agriculture official told me the colonization programs involving local residents and immigrants from Japan and Germany are inadvertently destroying cat and otter habitat. According to P. Calabrese (Pers. comm.), Director of Paraguay's National Forest Service, timber is selectively harvested, with little or no consideration for wildlife. He indicated that Chaco wildlife will be safe for some time yet, as there is little demand for the types of timber found there. R. Eaton (Pers. comm.), owner of the estancia Juan de Zalazar, indicated that there is an increase in shrub-type vegetation in the Chaco, largely due to the invasion of mesquite (Prosopis spp.). Additionally, with the price of cattle down, there is no incentive to clear additional land for grazing.

Wildlife became legally protected in Paraguay in 1975 (Appendix A), with additional protection provided by CITES implementation in 1977. Prior to these laws, "skin stores" were abundant throughout Paraguay. Numerous stores sold skins in the main business district of Asuncion. Guides frequently took clients up the Trans-Chaco highway to shoot jaguars (Sowls pers. comm.). H. Moreno (Pers. comm.), Paraguay's CITES Scientific Authority, estimated that as many as 3,000 professional cat hunters operated in the country. Now, there are few organized cat hunters, with most cats harvested incidentally. Trophy hunting has gone underground, and only a few stores openly sell cat skins.

The laws have probably reduced the harvest of cats and otters considerably, although there is no way of making an accurate evaluation. However, they have also forced the fur trade into a covert operation. Smuggling is an integral part of Paraguay's economy (Young 1982), and it would be foolish to think that these activities would cease, so long as there is a viable market. Enforcement of wildlife laws appears sporadic and inconsistent. In just 1 day along the Trans-Chaco highway, I observed hunters skinning a freshly-killed deer (Mazama spp.) and another group of waterfowl hunters. While in Filadelfia, we were invited to have dinner with government employees who had killed a deer earlier in the day. Conversely, at a military check-point along the Trans-Chaco highway, guards confiscated 2 puma skins from a passenger on our bus. Ranking military officers are reported to have hunting camps in the Chaco serviced by small airstrips.

Several stores and private citizens continue to sell skins to tourists and urban residents. However, this activity probably has little impact on the resource. Several jaguar offered for sale were cats killed on estancias. Virtually all estancia owners continue to deal with cattle depredation problems by offering a bonus to employees for killing jaguar and puma on their land (Eaton pers. comm.). Larger commercial activities still operate in various parts of the country as well, even though the CITES Scientific Authority insisted that these operation are "now totally shut down." A Peace Corps volunteer visited the warehouse of a hide dealer in Bella Vista

during March, 1983. He informed me that there were 2 rooms full of skins, including at least 4 giant otter pelts, 25-30 Lutra pelts, and pelts of jaguar, ocelot, margay, and tiger cats. The dealer explained that most of the pelts came from the Pantanal of Brazil.

In Asuncion, D. Norman, a Peace Corps volunteer, and I inquired as to where we might purchase cat and otter skins. Most stores no longer sold skins, however, we were directed to 2 that did. The first store had nothing until the following week. The second store was difficult to locate because there were no signs or advertisements in front. Inside the building, we noticed the skins of 3 jaguar (1 was purchased by a Paraguayan while we were there), several ocelot, 1 tiger cat, and an assortment of other furbearers in 1 room. In another room was a pile of Geoffroy's cat skins. A third room had a variety of spotted cat skins and at least 1 Lutra and 3 giant otter pelts (which were becoming increasingly difficult to obtain). Most of these pelts were on a shelf and for sale at various prices. An employee explained that this was the sales office; there were many more skins at the nearby tannery where a German is employed in the tailoring of garments for export to Germany.

Prior to 1975, Filadelfia, located near the center of the Paraguay Chaco, was a major fur rendezvous site (Duarte pers. comm.). Major transactions involving pelts from neighboring countries were made in Filadelfia, Mariscal Estigarribia, and Loma Plata by dealers from Asuncion (Irraxabal-Sosa pers.

comm.). These operations have generally ceased, although a room in Filadelfia's General Store is frequently piled with cat skins (Norman pers. comm.); and while I was there, a local resident displayed 4 jaguar skins that he had for sale.

In addition to the preceding information, there are several examples of why Paraguay is a likely hub for the illegal wildlife trade. A multi-million dollar operation involving the export of skins from Paraguay to West Germany was discovered by CITES in recent years (Lamb 1980). Recently, an employee of the Ministry of Agriculture lost his job when it was discovered that he had been altering papers to allow the export of skins to Europe (Villamayor pers. comm.). And, to make it worse, the effectiveness of controlling import and export activities is reduced because the responsibilities are delegated among 4 Ministries (Glowen pers. comm.).

With poor economic conditions in Paraguay, it is not surprising that the government makes little effort to control illicit activities. The government needs industry to generate revenue within the country. The U.S. Consulate Office and Paraguay's Ministry of Agriculture estimate that the fur industry in Paraguay is worth approximately $15 million annually (Glowen pers. comm.). Paraguay generates revenue by allowing commercialization of species in transit. According to A. Villalba, CITES Management Authority, the government currently issues transit permits for Appendix II species. Skins permitted into the country for tanning and tailoring are then re-exported. However, many of the Appendix II species

imported into Paraguay are protected in the country of origin, including the cats.

Spotted cats have been recorded, or likely occur, in most of the 11 protected areas of Paraguay (IUCN 1982b). However, only Defensores del Chaco (780,000 ha), Tinfunque (280,000 ha), and Teniente Encisco (40,000 ha) are large enough to be of any consequence, and these parks are all located in the Chaco. In the eastern half of Paraguay, where habitat destruction is greatest, all protected areas are too small to adequately protect either the cats or otters.

In March 1980, the Paraguay Forest Service, in collaboration with the U.S. Peace Corps, initiated a much-needed biological inventory of the country. Although the 2 Paraguayan CITES authorities consider most species of cats and otters to be common and increasing, Peace Corps volunteers conducting the field inventory tend to disagree, contending that the lack of law enforcement and the illegal fur trade have not allowed populations to recover since protection laws came into effect in 1975 and 1977.

Panthera onca, *Felis geoffroyi*, *F. pardalis* *F. tigrina*, *F. wiedii*

Distribution

The jaguar and ocelot occur in the various habitats throughout all of Paraguay. Inquiries by Peace Corps volunteers have provided some information on felid occurrences in the east (Fig. 33), however, few people distinguish between the small spotted cats, making it difficult to learn much about

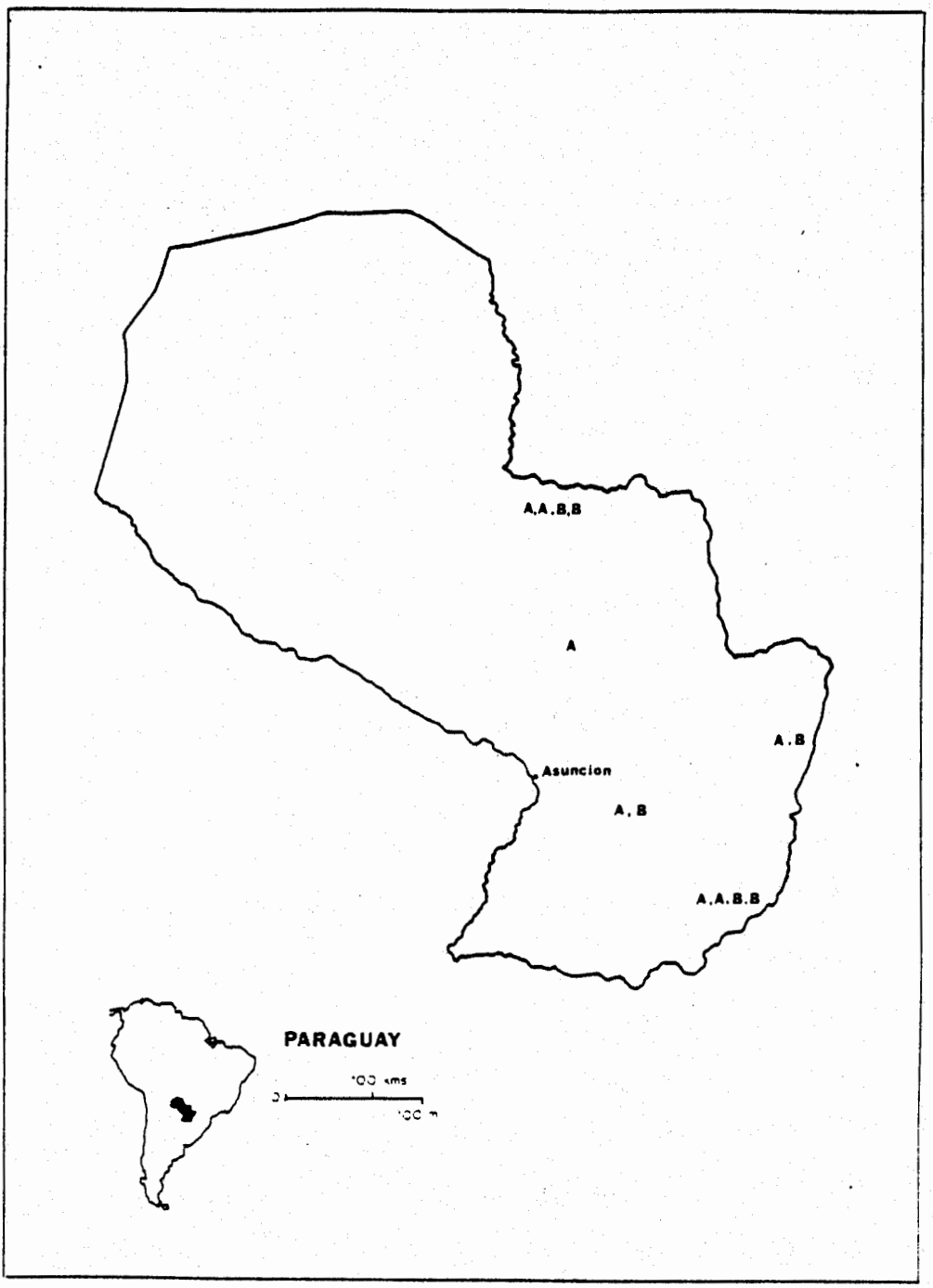

Fig. 33. General areas of recent reports of jaguars (A) and small spotted cats (B) in eastern Paraguay by U.S. Peace Corps volunteers. The data were based on 15 completed questionnaires distributed in 1982 to volunteers working in various Departments of Paraguay. The data are incomplete and do not reflect total distribution.

the margay and tiger cat. Although both species are probably widely distributed in Paraguay, the arboreal nature of at least the margay would suggest an affinity primarily for the forested regions of the east and portions of the Chaco. It is less likely that the margay and tiger cat would be found in the central strip of marshes and palm savannas (pantanal) bordering the Paraguay River. The Geoffroy's cat is clearly found throughout the Chaco and probably extends its range into the palm savannas of central Paraguay (Fig. 34). However, I have no data to suggest that this species occurs in the forests of eastern Paraguay, which would be marginal habitat.

Status and survival

Due to the harshness of the Chaco environment, this area remains an important refuge for the spotted cats. The Geoffroy's cat is the most common spotted cat found throughout the Chaco, with populations possibly "quite high" (Berrie 1978). Because of the obvious reduction in hunting pressure over the past 8 years, populations of most species of cats have probably increased. However, the magnitude of this increase remains unknown.

In eastern Paraguay, where the majority of the people live, the status of spotted cat populations is considerably less favorable. Colonization projects, deforestation, and increased use of the land for agricultural production will continue to reduce the amount of available habitat for the cats and increase human-wildlife conflicts. The greatest impact

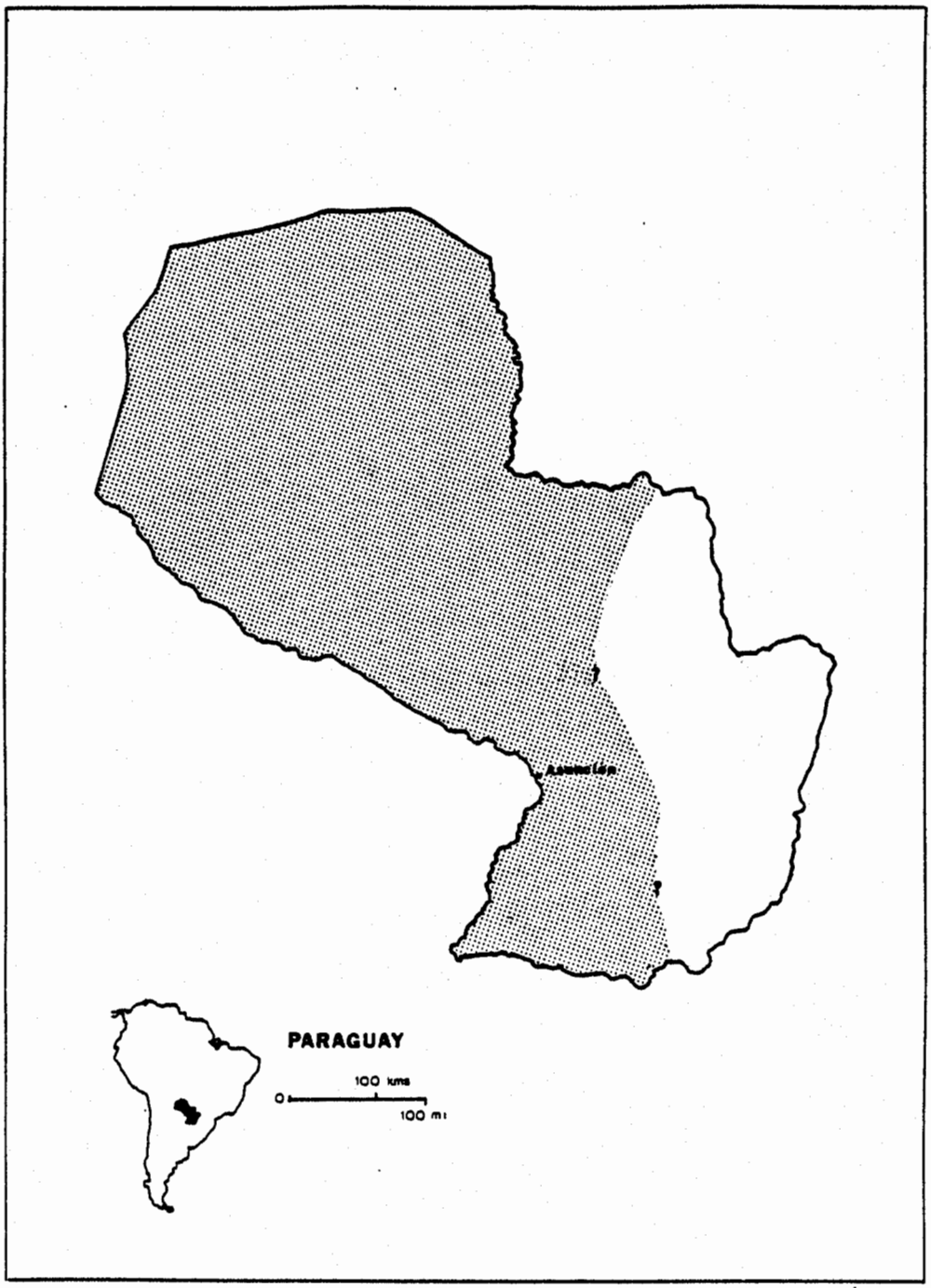

Fig. 34. Approximate distribution of the Geoffroy's cat (Felis geoffroyi) in Paraguay. Question marks indicate the uncertainty of range limits in the east.

will be on jaguar populations. Prospects for long-term survival of the jaguar in eastern Paraguay are poor.

Conservation measures

Protected areas in the east need to be enlarged as they are currently too small to adequately protect cat populations. Due to the likelihood of continued habitat destruction, additional protected areas need to be established in the east to provide a network of refuges for the predators and their prey.

An effective liaison needs to be established between government officials and ranch (estancia) owners to properly deal with real and potential depredation problems involving the jaguar. Large cattle ranches need not be detrimental to wildlife. In the Chaco, stock ponds benefit wildlife by providing necessary water during the dry season. Action plans need to be established to assist ranchers in dealing with wildlife-related problems. To alienate large estancia owners, such as R. Eaton, who are genuinely concerned with wildlife, is counter-productive.

Lutra longicaudis and Pteronura brasiliensis

Distribution

Lutra Longicaudis is found primarily in the smaller streams of eastern Paraguay and the marsh areas and tributaries of the Pilcomayo and Paraguay Rivers (Fig. 35). The Departments of Concepcion and Amambay in the northeast and Neembucu, Misiones, and Itapua in the south have been identified as having healthy otter populations.

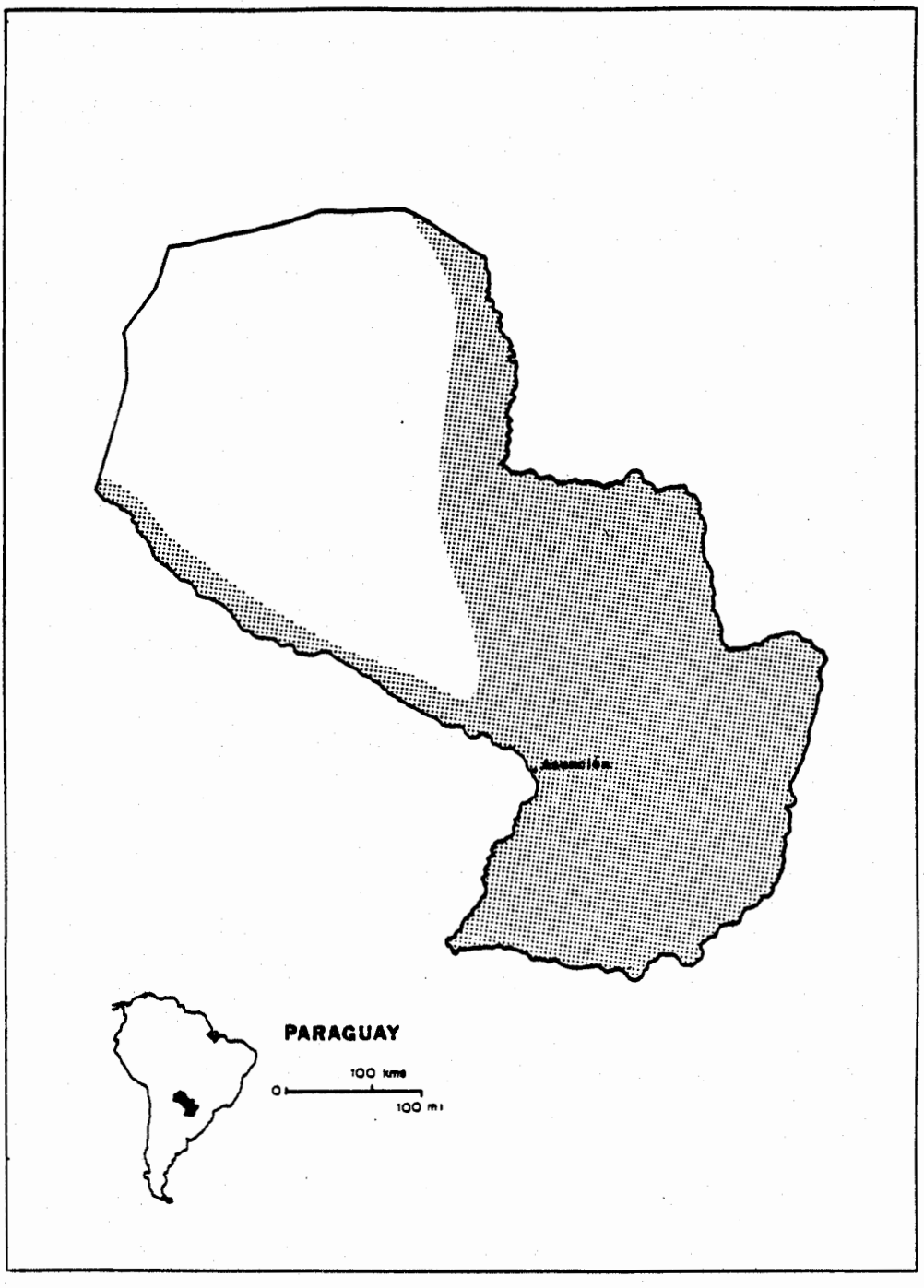

Fig. 35. Approximate distribution of Lutra longicaudis in Paraguay.

There is almost no information upon which to base the distribution of the giant otter in Paraguay. Remaining populations appear to be located on tributaries of the Paraguay and Parana Rivers in areas of existing subtropical moist forests (Fig. 36). Remnant populations may exist in the marshes and savannas adjacent to the Pilcomayo River and Paraguay River in the south, but there are no data to support this contention. Ludlow (1982) included the giant otter in a list of mammals occurring in the Chaco. The only reasonable location giant otters may occur in the Chaco is the swampy areas adjacent to the Paraguay River. Approximately 20 years ago R. Eaton (Pers. comm.) saw a group of giant otters in a small stream northwest of Concepcion. Indians killed 3 of the animals and the survivors subsequently disappeared. In the same general area, Wetzel (1980) indicated that giant otters may occur in the Verde River. Giant otters still occur on parts of the Ypane River in the Department of Amambay (Norman pers. comm.); and Moreno (Pers. comm.) indicated that occasional sightings are made in tributaries of the Parana River along the eastern frontier (Fig. 36).

Status and survival

Populations of Lutra longicaudis are probably stable and perhaps increasing in some areas due to wildlife protection laws. However, because of habitat loss and poaching, it is unlikely that the much more visible giant otter has benefitted from these laws. With the introduction of cattle, swamps were drained and vegetation cleared to the edge of streams (Moreno

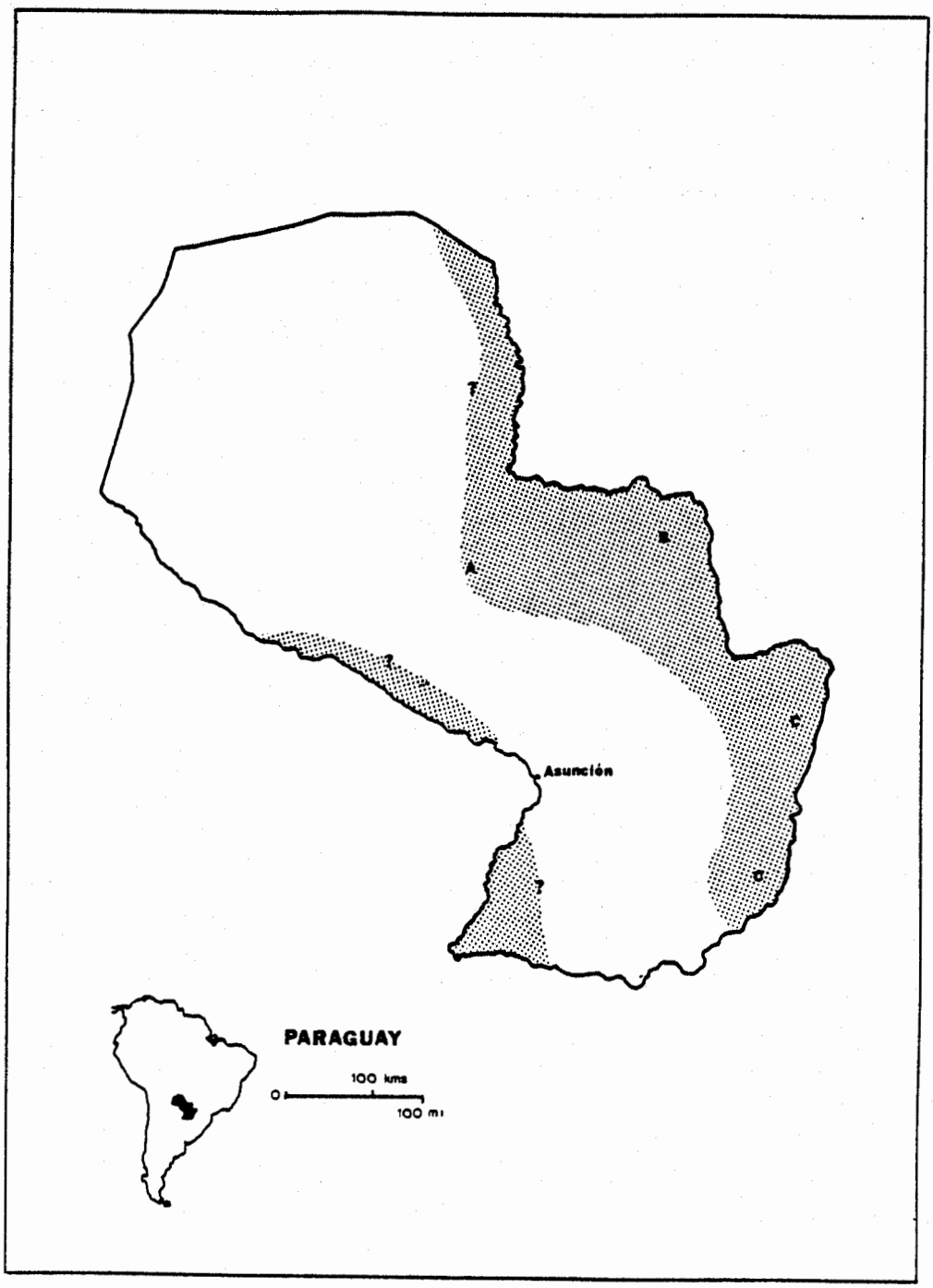

Fig. 36. Approximate distribution of the giant otter (Pteronura brasiliensis) in Paraguay. Unconfirmed giant otter sightings have been made on the Verde River (A), Ypane River (B), and unspecified tributaries of the Parana River (C). Question marks indicate the uncertainty of range limits in the southwest.

pers. comm.). While traveling in western Paraguay, however, I crossed many small streams with good riparian vegetation. According to Bob and Terry Simeone, Forestry Extension Specialists, riparian vegetation remains intact along many streams where swampy conditions prevent access.

Existing and proposed hydroelectric dams on the Parana River will reduce available otter habitat. More importantly, especially for the giant otter, they will force resident populations further up the headwaters of tributaries and effectively isolate these populations.

Conservation measures

In addition to providing adequate protection from poaching, every effort should be made to ensure the protection of riparian habitat. Existing giant otter populations should be located and protected indefinitely. Any future harvest of Lutra longicaudis will depend upon adequate preservation and protection of riparian habitat and protection of the animals from poaching.

PERU

Peru, the third largest country in South America, has an area of approximately 1,285,000 km^2. The country has 3 general ecological zones (Lowenstein 1968). The coastal area (12% of the country) is a narrow strip of desert with a moderately warm climate that extends 2,250 km from Ecuador to Chile. The Sierra of the Andes, at an average altitude of 3,000 m, is cool and dry and comprises 28% of the country. The Montana, or Selva, the forested eastern slopes of the Andes and tropical moist forest beyond, is 60% of the country's area and has a hot, humid climate.

Oil and minerals dominate the export-oriented economy, with manufacturing being the fastest growing sector of the economy (Arden 1982). However, agriculture remains the chief occupation, with sugar cane and cotton produced in the coastal area, coffee in the uplands, and grazing of domestic stock wherever possible.

The cats and otters have been protected in Peru by national law since 1973, and by CITES since 1975 (Appendix A). Most people I spoke with contended that illegal commercial activities involving cats and otters persist, with Iquitos, Pucallpa, and Puerto Maldonado serving as centers for clandestine operations. Dourojeanni (Pers. comm.) claimed that Peruvian skins are smuggled to neighboring countries, especially Paraguay, with Europe as their final destination, but the magnitude has dropped since the prohibition of commercial trade. According to Benavides (Pers. comm.),

officials recently uncovered a German operation where cat and otter skins were being smuggled inside bundles of alpaca skins. In September 1983, Luscombe (Pers. comm.) informed me of a Catholic priest who was recently apprehended in Shintuya (near Manu) for trafficking in spotted cat pelts, and that animals are traded quite openly in Puerto Maldonado. C. Malaga (Pers. comm.) indicated that Colombians cross the Putumayo River into Peruvian territory and illegally harvest many wildlife species. This border area is considerably less accessible to Peruvian authorities.

I only had an opportunity to visit Iquitos, so I do not have any first-hand information on commercial activities in Pucallpa and Puerto Maldonado. On 12 December 1982, I met a Peruvian in Iquitos who offered to sell me cat and otter skins, and wanted to represent me in further transactions. After checking with his source, he said that within 3 days he could provide me with 200-300 "nutrias" (Lutra longicaudis) and the same number of "gatos chico" (small spotted cats such as ocelot and margay), but could not promise a specific quantity of "gatos grande" (jaguars). The cost of these skins was $14 per otter, $22 per small cat, and $67 per jaguar; less if I were to purchase a larger quantity. The skins he could supply within 3 days were obviously in storage. Additional pelts would probably have to be freshly obtained. He said that giant otters were very difficult to find.

I interviewed P. Soini, a biologist who has spent many years in the Amazon region around Iquitos. He said that the

government was initially very good about enforcing the wildlife laws, confiscating pelts from most commercial establishments. However, Soini indicated that the presence of cat and otter pelts in stores in Iquitos is becoming more obvious. I saw the pelts of several ocelot and 1 giant otter hanging in Iquitos stores, a quantity which did not seem unusual. Store merchants were generally willing to sell these pelts, probably replacing them as they are sold. C. Freese (Pers. comm.) indicated that a restaurant employee in Iquitos offered to sell him several ocelot skins on 10 December 1982.

The above scenario indicates that at least a small amount of commercial trading in cat and otter pelts exists, but unfortunately, the extent is unknown. However, provided there is a market, a willingness and the potential to supply that market clearly exists.

Panthera onca, Felis pardalis, F. tigrina, F. wiedii Distribution

These species are found primarily in the lowland tropical moist forests of the Amazon Basin in eastern Peru, but they occur in the foothills of the Andes up to approximately 1,000 m as well (Fig. 37). The best distributional information is provided by Grimwood (1969). Although he had no direct evidence that tigrina occurs in Peru, there is no reason why it should not. Patton et al. (1982) reported the jaguar, ocelot, and margay in the lower Cenepa River drainage, "a region of high topographic relief, with sharp ridges and precipitous slopes of eastern Andean outlying mountain chains". On the

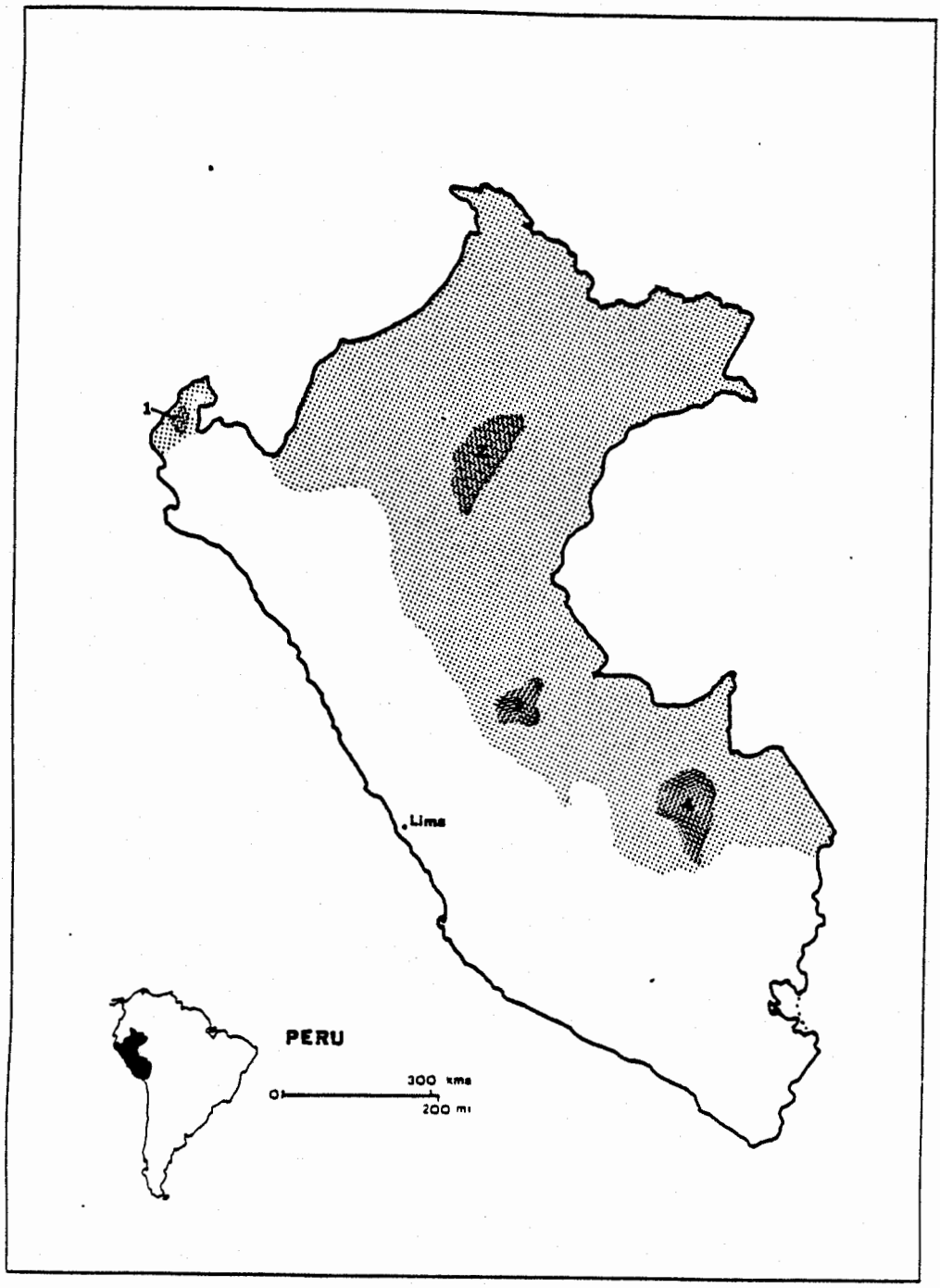

Figure 37. Approximate distribution of the jaguar (Panthera onca), ocelot (Felis pardalis), margay (F. wiedii), and probably tiger cat (F. tigrina) in Peru. Key areas identified as important to the protection of these species include Cerros de Amotape National Park (1); Pacaya Samiria National Reserve (2); Pichis-Palcazu (3), an area being established as 2 large national parks; and Manu National Park and Biosphere Reserve (4).

west side of the Andes, the jaguar and ocelot have been reported in Cerros de Amotape National Park (IUCN 1982b), with the jaguar reported as far south as 6° 30' S Lat. (Grimwood 1969).

Status and survival

Grimwood (1969) considered these species as either uncommon or rare in Peru, and provided harvest statistics that he felt could not be sustained. Several employees of petroleum companies told me the spotted cats were common in the area where they were working near the Ecuadorian border. They claimed to occasionally ship pelts back to the United States labeled as "household items". Grimwood (1969) stated that the ocelot, "is undoubtedly one of the most successful forms of mammalian life in the Amazon region". Although the spotted cats may be locally common in isolated areas, habitat loss and past intensive harvest pressure have probably not allowed the cats to recover numerically in most areas.

Intensive oil exploration is currently being carried out in 3 major areas of Peru (Fig. 38). Roads built by oil companies to provide access to exploration and drilling sites in these areas are then used by settlers to penetrate previously undisturbed areas (Brack pers. comm.). The end result is increased destruction of habitat. According to Brack, the government emphasizes the construction of new roads into unsettled areas rather than spend money to repair existing ones. These activities could have a serious impact on all populations of commercially valuable species previously

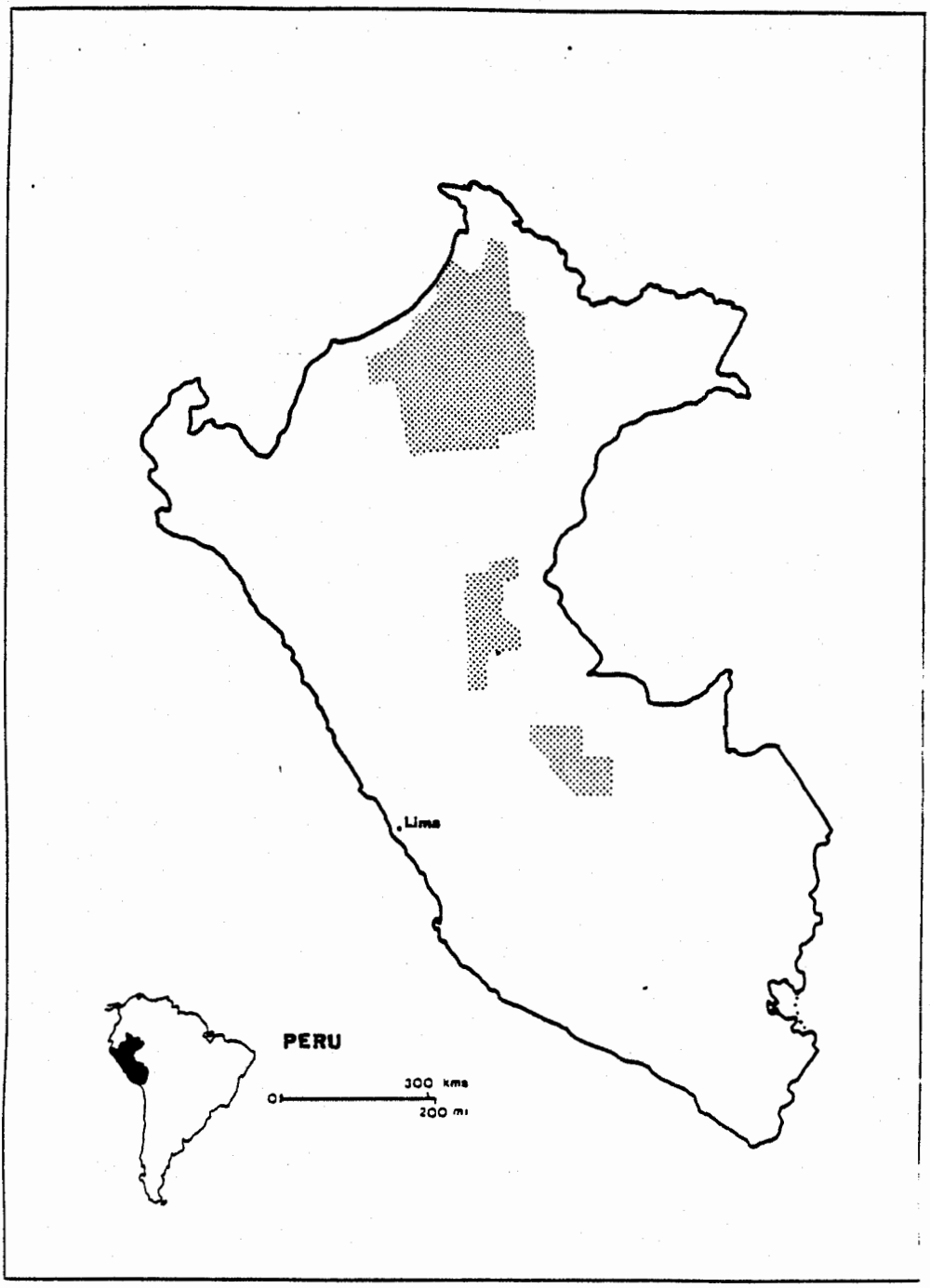

Fig. 38. Three major areas in Peru where oil exploration is currently being conducted by at least 6 national and international companies. Adapted from Anon. (1982).

protected by virtue of their remoteness. As a result, the protected areas indicated in Fig. 37 will become increasingly important in preserving cat (and otter) populations. Soini (Pers. comm.) has seen as many as 4 jaguars near his camp in the Pacaya Reserve, but contends that oil exploration is occurring in the Samiria Region.

Conservation measures

One biologist from Peru felt that all commercial trade in spotted cats and otters should cease because effective management cannot be achieved through harvesting. Another biologist believed that the habitat would have to be properly protected and managed before commercial harvesting could resume, however, there is no indication that the habitat is, or will be, adequately protected. I believe that a harvest scheme for the small tropical cats could eventually be incorporated into an effective management program.

Research in progress on cats and otters in Manu National Park by J. Terborgh (Pers. comm.) and his team of scientists should provide valuable biological data that can be applied to management. This work should receive full cooperation and adequate funding.

Conservation measures should include total protection for the jaguar indefinitely (see section on Argentina for explanation) and total protection for the small cats at least until such time when habitat conditions stabilize and management capabilities improve to the point where a controlled harvest could be properly implemented without jeopardizing

existing populations. A concerted effort must also be made to enforce existing laws, especially in the remote towns where illicit activities appear to prevail.

Felis jacobita

Distribution

Similar to the situation in other countries, little is known about the Andean cat in Peru. In a survey of Peruvian mammals, Grimwood (1969) was unable to obtain any distributional data on this species, except for a single sighting at 4,300 m near Azangaro in the Department of Puno. Some years ago, C.Koford apparently collected an Andean cat near the border with Chile (Rottmann pers. comm.). Pearson (1957) reported on a male that was trapped in 1952 approximately 92 km northeast of Arequipa at an elevation of 4,724 m.

I was unable to obtain much information about the Andean cat during my visit to Peru. While at Pampa Galeras National Reserve (elevation 3,950-4,500 m), I inspected 2 museum skins that had been collected in the Reserve area. At the La Raya Research Station, northwest of Puno, I photographed an employee holding the skin of what appeared to be Felis jacobita. The animal had been killed in the La Raya area (elevation 4,200 m). J. Sumac (Pers. comm.), a veterinarian from La Raya, said these cats are rare, but occasionally seen between La Raya and Puno. One was accidentally hit and killed as it crossed the road in frontof their vehicle. Another cat was shot after it had killed several domestic ducks.

Dr. S. Anderson, American Museum of Natural History, kindly examined photographs of the skins from Pampa Galeras and La Raya, and concluded that they were probably F. jacobita rather than F. colocolo. Among other things, the tail of jacobita is much longer, in proportion to the body, and more conspicuously ringed than colocolo. Unfortunately, the tails were missing from these skins. Pearson (1957) indicated that jacobita probably prefers higher elevations than colocolo in southern Peru. The above specimens were all collected in areas above approximately 4,000 m in elevation, areas where jacobita would be more likely to occur. Nevertheless, confusion of jacobita with colocolo has long persisted, making the determination of distribution and status even more difficult.

Based on these data, the present distribution of jacobita is probably similar to that shown in Figure 39. The northern extent of its range is probably in the area of 14° S Lat., as indicated in the Red Data Book (IUCN 1982a).

Status and survival

See Argentina and Chile, as the situation is probably similar.

Conservation measures

See conservation measures proposed for this species in Argentina and Chile.

Lutra felina

Distribution

Peru is the northern limit of the marine otter's range. Brack (1978) reported that the otter formerly occurred up to 6°

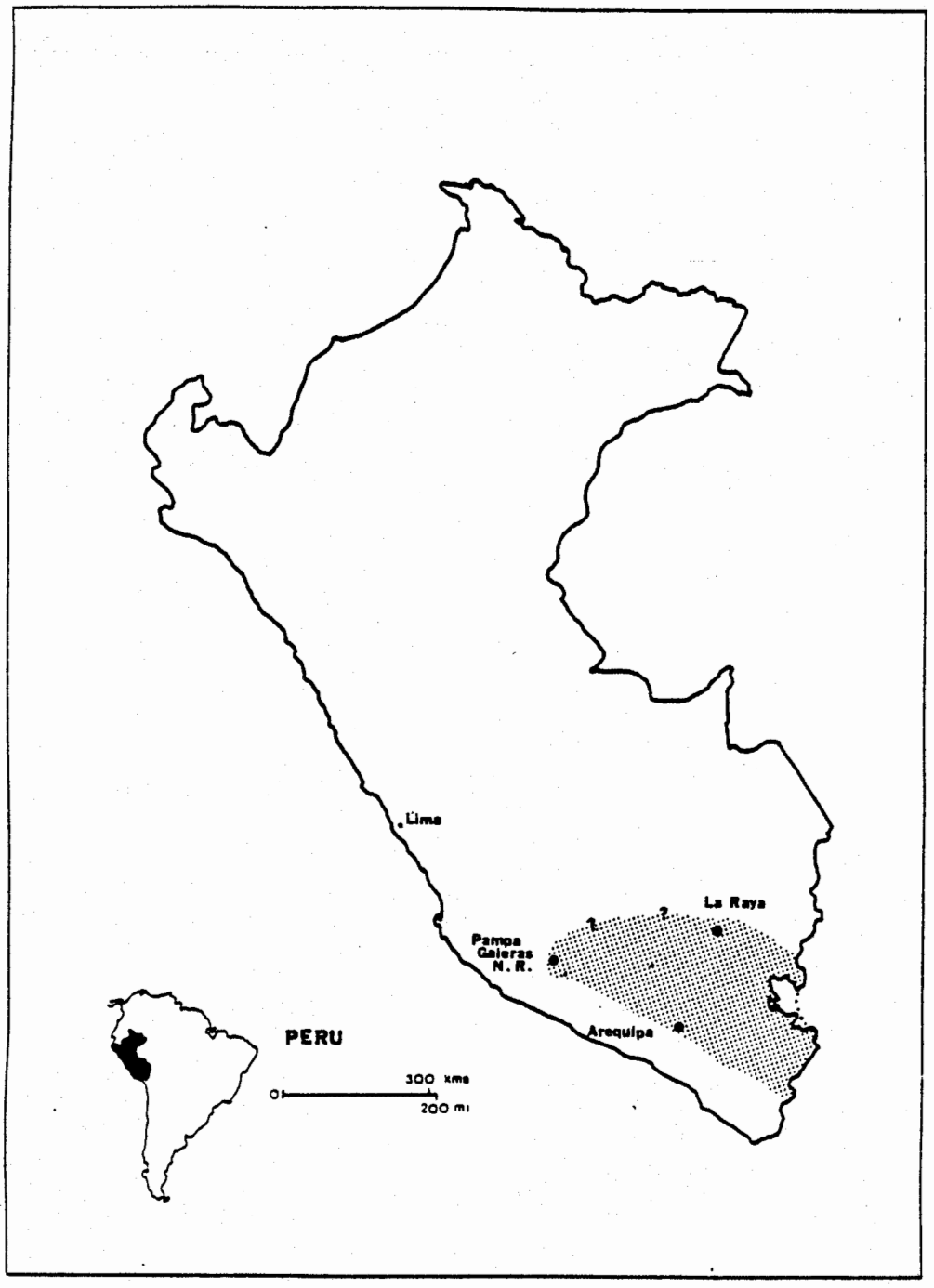

Fig. 39. Approximate distribution of the Andean cat (Felis jacobita) in Peru. Question marks indicate the uncertainty of range limits in the north.

S Lat., with confirmation up to 9° S Lat. Brownell (1978) indicated that Chimbote (9° S Lat.) was the northern extent. Recent observations indicate that the marine otter is found primarily in pockets of favorable habitat along the Peruvian coast, and perhaps still as far north as 6° S Lat. (Fig. 40). The following observations (a-f on Fig. 40) were provided by A. Luscombe (Pers. comm.): Personal observation of a single animal at Moro de Suma (a) near Tacna in November 1975; a 1983 report of an otter at Chala (b); several sightings by a fisherman at El Moro (1), Laguna Grande (2), Barlovento (1), and Carhuas (1), all apparently either within or adjacent to the Paracas National Reserve (c), and at Naplo and Paraiso (d); several previous reports from the Ancon area (d); and Luscombe inspected a hide of a marine otter from approximately 6° 30' S Lat. (f). In 1981, biologist C. Hays' (Pers. comm.) assistant found an otter skull along the coast at 10° S Lat. (e).

While conducting research along the coast of central and southern Peru, Hays (Pers. comm.) observed 21 otters during a 4-month period (Jan-Apr) in 1983. Otters were most frequently observed along islands near the coast, perhaps where there was less human disturbance. Hays did not see any evidence of commercial activities involving the marine otter, but indicated that fishermen occasionally kill and stuff otters for display in their homes.

Park personnel at Paracas National Reserve generally conduct monthly coastal surveys of marine wildlife. A park

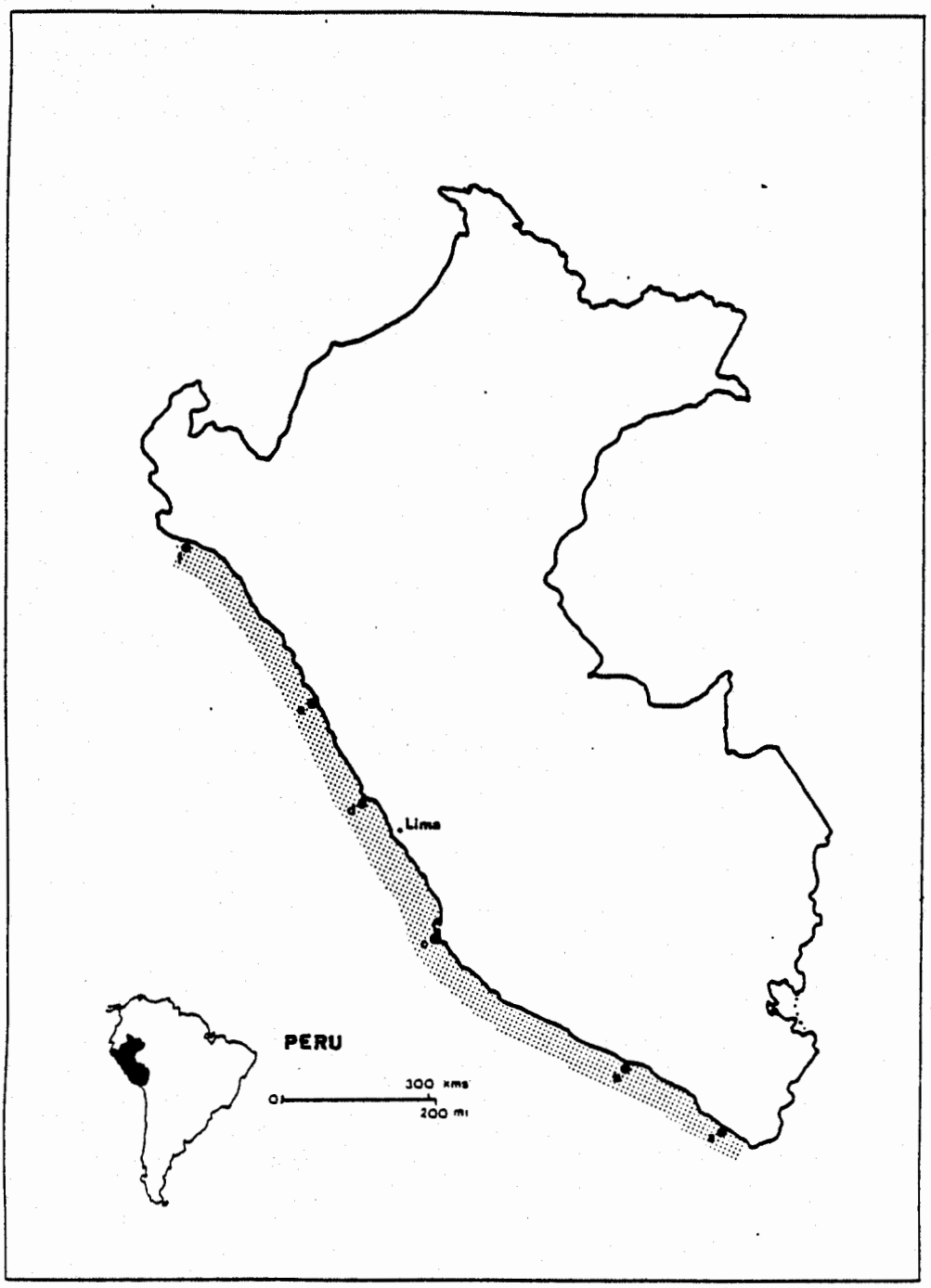

Fig. 40. Approximate distribution of the marine otter (Lutra felina) in Peru. Recent records of occurrence (a-f) are indicated by solid circles. See text for site-description.

employee claimed they frequently see marine otters during this survey, especially in the area of La Catedral (2-3 animals each month) and Morro Quemado. Grimwood (1969) described the marine otter as being seen occasionally by the "guardians of guano bird colonies" stationed at 8 locations along the coast south from Lima (12° S Lat.).

Status and survival

Until complete surveys are conducted along the coast, the status of the marine otter in Peru will remain largely unknown. It is apparent, however, that favorable habitat is discontinuous along the coast and limited. Consequently, populations will likely remain small and isolated. Due to the marginal nature of the habitat, it is doubtful that adequate densities will ever be achieved to justify a commercial harvest.

Conservation measures

Continue total protection of the marine otter in Peru. Conduct coastal surveys to determine the extent of favorable habitat, distribution of the population, and to identify potential areas which need special protection.

Lutra longicaudis and Pteronura brasiliensis

Distribution

Since I was unable to obtain much information about these species, the distribution given by Grimwood (1969) is as accurate as any available. In general, the distribution would approximate that shown for the cats in Fig. 37, except the giant otter does not occur west of the Andes. Lutra

longicaudis is still probably widely distributed in the Amazon region, and has been reported in areas as high as 3,000 m (Grimwood 1969). The giant otter, however, is confined to the low selva, with isolated populations occurring in secluded, undisturbed tributaries of the Amazon.

Status and survival

The situation has probably not improved since Grimwood (1969) reported that the giant otter, "has now disappeared from nearly all of its former haunts." Remaining giant otter populations are probably small and isolated. Giant otters can still be found in Manu National Park (IUCN 1982b), but Soini (Pers. comm.) has been unable to find any sign in the Pacaya Samiria Reserve, although they were reported to be quite common there in the 1940's. I received reliable reports of the giant otter in the Napo River in Ecuador, so they may still occur in the same drainage in northern Peru as well. Short-term prospects for survival will remain good only if sufficient habitat remains available and both the habitat and animals are adequately protected.

Grimwood (1969) reported trade statistics showing that a yearly average of 4,313 pelts of Lutra longicaudis were exported from Iquitos between 1946 and 1966, with a high of 11,349 in 1961. He evaluated this harvest as, "one of progressive extermination radiating from each center of settlement, and such a process can have only one end." However, even in light of these figures, the status of longicaudis is probably quite good. Soini (Pers. comm.)

reported them as common in the Pacaya Samiria Reserve, but difficult to see. Indeed, the secretive and largely nocturnal nature of the Lutra group allows them to live in close proximity to man without being detected. Similar to the situation that often exists with canadensis in North America, longicaudis is probably more common than we realize. Unfortunately, even after numerous studies on canadensis we have not developed a reliable means of censusing populations, especially in roadless areas. Therefore, the results of any survey of longicaudis including this one, are highly speculative.

Conservation measures

The importance of riparian vegetation to all otters cannot be over-emphasized. Every effort should be made to insure its preservation. Giant otters can be surveyed with a reasonable amount of accuracy. Therefore, efforts should be made to conduct on-the-water surveys to locate remaining populations. Steps should then be taken to insure the survival of these populations. Total protection of giant otters should continue indefinitely.

Surveys of longicaudis should be conducted in conjunction with the giant otter to at least determine their presence in the low selva. In areas where roads intersect streams, checks can be made above and below the bridges for tracks and feces. This method has been used effectively to determine distribution and occurrence of Lutra lutra in several European countries with a wide network of roads (Macdonald pers. comm.). Although

longicaudis should remain protected for the present, I believe this species may be able to withstand a limited harvest in the future, provided it is properly conducted.

URUGUAY

Uruguay, the smallest country in South America, has a temperate climate and 2 major ecological zones. The Atlantic coastline is comprised of sandy lowlands and an alluvial flood plain north along the lower Uruguay River. The remainder of the country is mostly grass-covered and used primarily for grazing cattle and sheep. In fact, approximately 90% of the land surface is devoted to stock-raising, 7% to crops, and only 3% remains idle.

The general character of the land is undulating, with the only remaining forested areas found along the numerous streams. The largest tract of forest land I saw was in the Negro River drainage. According to agronomist R. Ferrari (Pers. comm.), there are 600,000 ha of natural forest, 130,000 ha of plantations, and 7,000 ha of palm groves in Uruguay. The Uruguayan government, through law No. 13723, provides tax exemptions to encourage the preservation of riparian vegetation (i.e., natural forests). More recently, it has become illegal to destroy the natural vegetation (Ferrari pers. comm.). However, growing pressure to increase agricultural production and stimulate the economy may jeopardize many of these areas. And, the few existing parks are too small to ensure the preservation of native flora and fauna.

Numerous stores in downtown Montevideo advertised the sale of garments made from various furbearers, including the spotted cats and otter (Table 6). Coats made from the Geoffroy's cat were the most commonly displayed. Peleterias generally tailor

Table 6. List of stores in downtown Montevideo, Uruguay, selling garments made from the pelts of otter and various spotted cats. This list should not be considered all inclusive.

Peleteria (fur/leather store)	Garment material			
	Jaguar	Ocelot	Geoffroy's cat	Otter (*Lutra*)
Holandesa (3 stores)		X	X	X
Martin	X	X	X	
Biarritz			X	
Pendola			X	
Paris-New York	X	X	X	
Cantegril		X	X	X
Revillon			X	
Tommy			X	
Metro		X	X	

their own garments, and can provide a custom-made coat in approximately 6 days. Response to my inquiries about the number of pelts it takes to make a long coat (extends below the waist) include 15 for an otter (Lutra longicaudis) coat, 25 for an ocelot coat, and 30 for a Geoffroy's cat coat. Examples of the cost of various coats from these stores include: jaguar ($1,500), otter ($1,500), ocelot ($800-$1,700), and Geoffroy's coat ($640-$1,600). Prices vary due to quality and length. Jaguar and ocelot coats consisting of leg fur could be purchased for $600. Coats made from pieces of fur from the legs and abdomen of Geoffroy's cats sold for $240.

Based on discussions with several store owners and managers, only the skins of Geoffroy's cats and otters originate in Uruguay. Most of the cats come from the north and northeastern part of the country. Otters (Lutra) are not obtained from any particular region, as they are widely distributed throughout Uruguay's rivers. Managers of stores with jaguar and ocelot coats explained that the pelts of these species, which they contend come from Paraguay, are generally difficult to obtain.

The harvest of otters and spotted cats is prohibited by law in Uruguay (see Appendix A). However, N. Cazzadori and J. Villalba-Macias, Uruguay's CITES Authorities, explained that the import of wildlife is regulated in accordance with CITES, while commercial export of cat and otter skins or products is prohibited. F. Lienra, Coordinator of the Department of Inspection, indicated that illegal traffic of skins from

adaptable than the margay, it seems rather odd that the margay would occur in Uruguay and not the ocelot.

Status and survival

Based on my discussions with various Uruguayans, the Geoffroy's cat is probably still common to uncommon throughout the country where adequate riparian vegetation remains. A brief examination of a stretch of the Arapey River northeast of Salto revealed the tracks of at least 1 cat. Survival of this adaptable and highly tolerant species can be ensured through adequate protection of the animal and riparian habitat. The margay is probably very rare in Uruguay, and it's chances for long-term survival are not encouraging.

Conservation measures

Native upland forests have been replaced with plantations of Eucalyptus spp. and Pinus spp. in Uruguay. These dense, even-aged stands do not permit the growth of an understory, and thus are of little value to the cats. Therefore, the protection of riparian habitat is of extreme importance. General conservation measures described for other countries also apply here.

Lutra longicaudis and Pteronura brasiliensis

Distribution

Lutra longicaudis occurs in most Uruguayan streams with ample riparian vegetation and an adequate supply of food (fish, crustaceans, etc.). However, there is no positive evidence that the giant otter even exists in Uruguay today. The single specimen in the Museum (also reported by Ximenez et al. 1972)

was collected in Sauce Creek, a tributary of the Negro River. Cabrera (1957) reported the giant otter as occurring in the Uruguay River and its tributaries. In 1972, H. Galbarini (Pers. comm.), the director of the Salto Zoo, confirmed giant otter sightings on the Uruguay River upstream from Salto. Then in 1975, Galbarini made a single sighting in Itapebi Creek, a tributary of the Uruguay River northeast of Salto, but he has not seen any animals since. An estancia owner from the Department of Salto has not seen giant otters on his land since about 1975, although Lutra can still be found there. The Salto Grande dam, situated on the Uruguay River, has created a reservoir 140 km long and inundated portions of many tributaries. The impact of this dam on remaining otter populations is unknown.

Giant otters were probably once found in various tributaries of the Negro River drainage in central Uruguay. There are now 3 hydroelectric dams on the Negro River, which have reduced available habitat and likely prevent any dispersal throughout the drainage. However, there have been uncomfirmed reports of giant otters in Salsipuedes Creek (Fig. 42). If otters do indeed occur there, they may also occur in other small tributaries of the Negro River.

Biologists in Uruguay believe that giant otters may still survive in the streams and marshes of the Department of Rocha in the southeast (Fig. 42), but there is little supporting evidence. While consulting in Uruguay in 1979, D. Torres (Pers. comm.) was informed that giant otter skins were

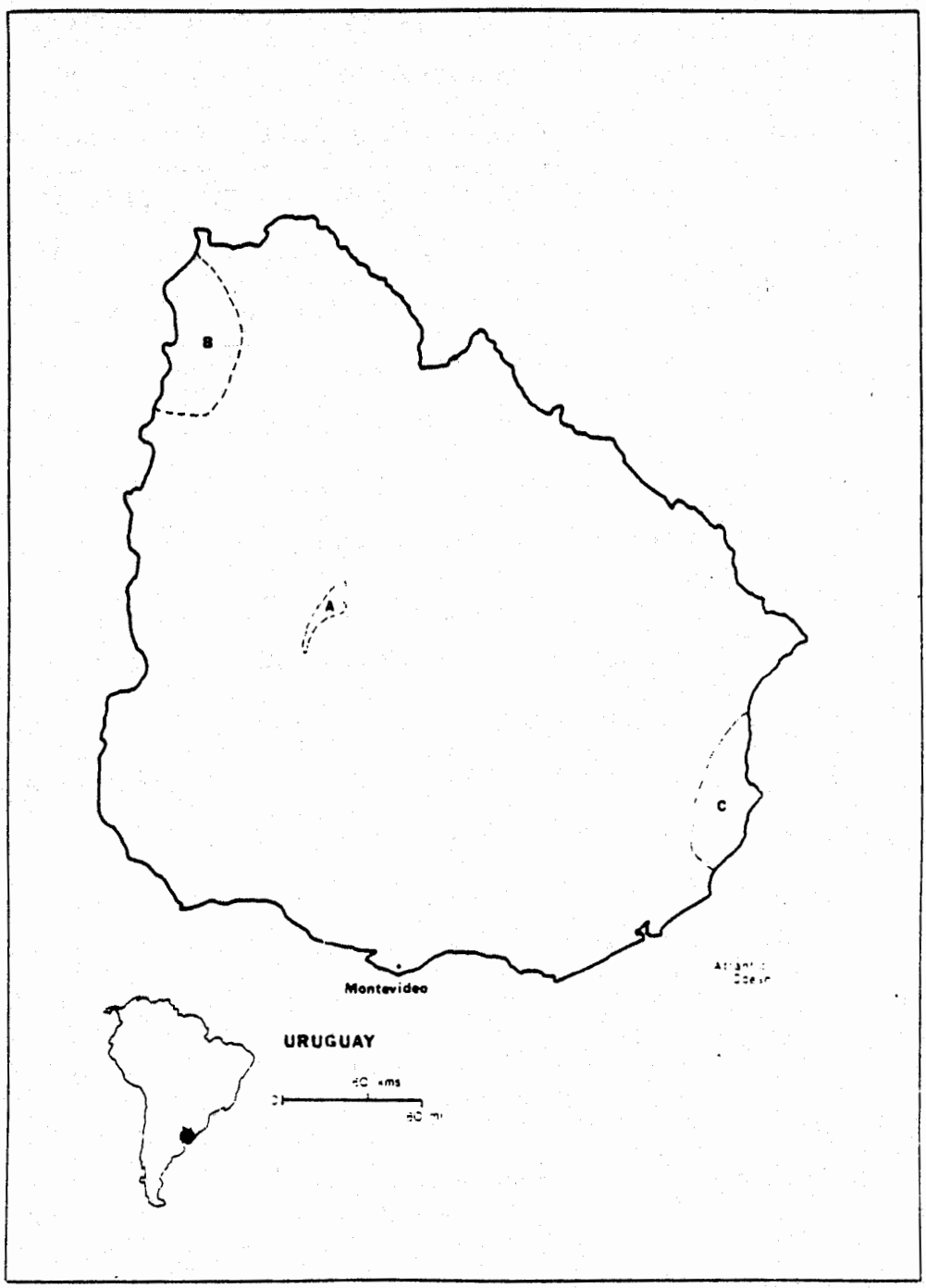

Fig. 42. Three areas where giant otters (Pteronura brasiliensis) may still occur in Uruguay include Salsipuedes Creek (A), tributaries of the Uruguay River north of Salto (B), and the streams and marshes of the Department of Rocha and the Banados del Este Biosphere Reserve (C).

confiscated from hunters in the Department of Rocha in 1977. Banados del Este, a 100,000-ha Biosphere Reserve in eastern Uruguay is listed as having giant otters (IUCN 1982b). Based on the preceding information, there appears to be at least 3 areas where giant otter may still survive in Uruguay (Fig. 42).

Status and survival

The status and prospects for survival are good for Lutra longicaudis and probably critical for the giant otter. Reasons why the situation differs for these species have been previously explained.

Conservation measures

Same as for the cats and for these species in other countries. Loss of habitat has probably not impacted the otters as much as the cats. Provided Lutra longicaudis is allowed to recover and its habitat is adequately protected, a limited, controlled harvest may be justifiable in the future.

VENEZUELA

Although Venezuela has the same 3 general ecological zones as Colombia (Andean chain, lowland tropical rain forests, and plains or Llanos), Eisenberg and Redford (1979) justifiably divided these zones into 7 biogeographic regions based on topography, climate, and vegetation. In this subdivision, the Andes Mountains are split into the Andean region, which extends northeast from Colombia, and the north coast range. Mountains of the north coast range are covered by humid rain forests and true montane cloud forests. The Maracaibo Basin, located in the northwest, consists of humid lowland and seasonally dry tropical forests. The Falcon arid zone, including the entrance to Lake Maracaibo and Falcon State to the east, is extremely dry. The Venezuelan Llanos cover an irregular area of nearly 200,000 km^2 in the central lowlands. These vast grasslands, with gallery forests along the numerous streams, are bordered by the Andes and coastal mountains to the north and west, and the Orinoco River to the south. The area south of the Orinoco River is divided into the Amazon lowlands of tropical moist forests (southwestern half of Amazonas Territory) and the Guyana Highlands (remainder of Amazonas Territory and all of Bolivar State). The Guyana Highlands, dominated by granitic formations from the Guyana Shield, are a mosaic of habitats, including savannas, lowland tropical forests, and a variety of montane forests.

Cattle ranching in the Llanos and oil production are 2 major industries in Venezuela. Agriculture, mining, and

hydroelectric development are on the increase. Steyermark (1977) discussed how these and other activities have impacted native flora and fauna and the factors which will influence the future of threatened and endangered species.

The cats and otters have been protected by Venezuelan law since 1970 and by CITES since 1978 (Appendix A). However, skins were commonly smuggled to Brazil and Colombia for several years after the law of 1970 (Mondolfi pers. comm.). Although protection is limited in the more remote areas, most biologists feel the cats and otters have benefitted from the legal protection.

Venezuela has an excellent system of protected areas, including 26 national parks, 13 natural monuments, and 4 faunal reserves (IUCN 1982b). With nearly 8 million hectares under protection, many of these areas will eventually provide the key to the survival of most cat and otter populations. Additionally, the owners of several large cattle ranches in the Llanos have made efforts to protect wildlife on their land. They accept and tolerate a certain amount of livestock loss to jaguars; something that is inevitable if jaguar are to survive on and around their ranches. Indeed, these ranchers should be applauded for their efforts and willingness to coexist with wildlife.

Panthera onca, Felis pardalis, F. tigrina, F. wiedii

Distribution

Various locations where jaguars have been reported since 1980 indicate that the species is widely distributed throughout the Venezuelan mainland (Fig. 43). They have been reported in virtually all parts of the country with suitable habitat, except perhaps Paraguana Peninsula and other dry parts of the Falcon arid zone. Although populations have dwindled during the past 30 years, especially in the coastal mountains region, appreciable populations still remain in the Llanos States of Apure, Barinas, Cojedes, Guarico, and Portuguesa, and south of the Orinoco River in the Amazon Territory and Bolivar State (Mondolfi and Hoogesteijn, in press). Preferred habitats include the gallery forests of the Llanos and lowland tropical forests with adequate water.

The ocelot is widely distributed throughout Venezuela. But, unlike the jaguar, it has been recorded on Paraguana Peninsula (Ojeda pers. comm.), and Mondolfi (In press) indicated that it occurs on the Islands of Margarita and Trinidad in the northeast. The ocelot is very adaptable, occupying lowland and premontane tropical moist and dry thorn forests, gallery forests of the Llanos, mangroves, pasture land, and upland and swampy (flooded) savannas (Mondolfi, in press). Ocelots have been observed foraging for rodents in rice fields (Medina pers. comm.). In terms of survival, such adaptability will benefit the ocelot considerably.

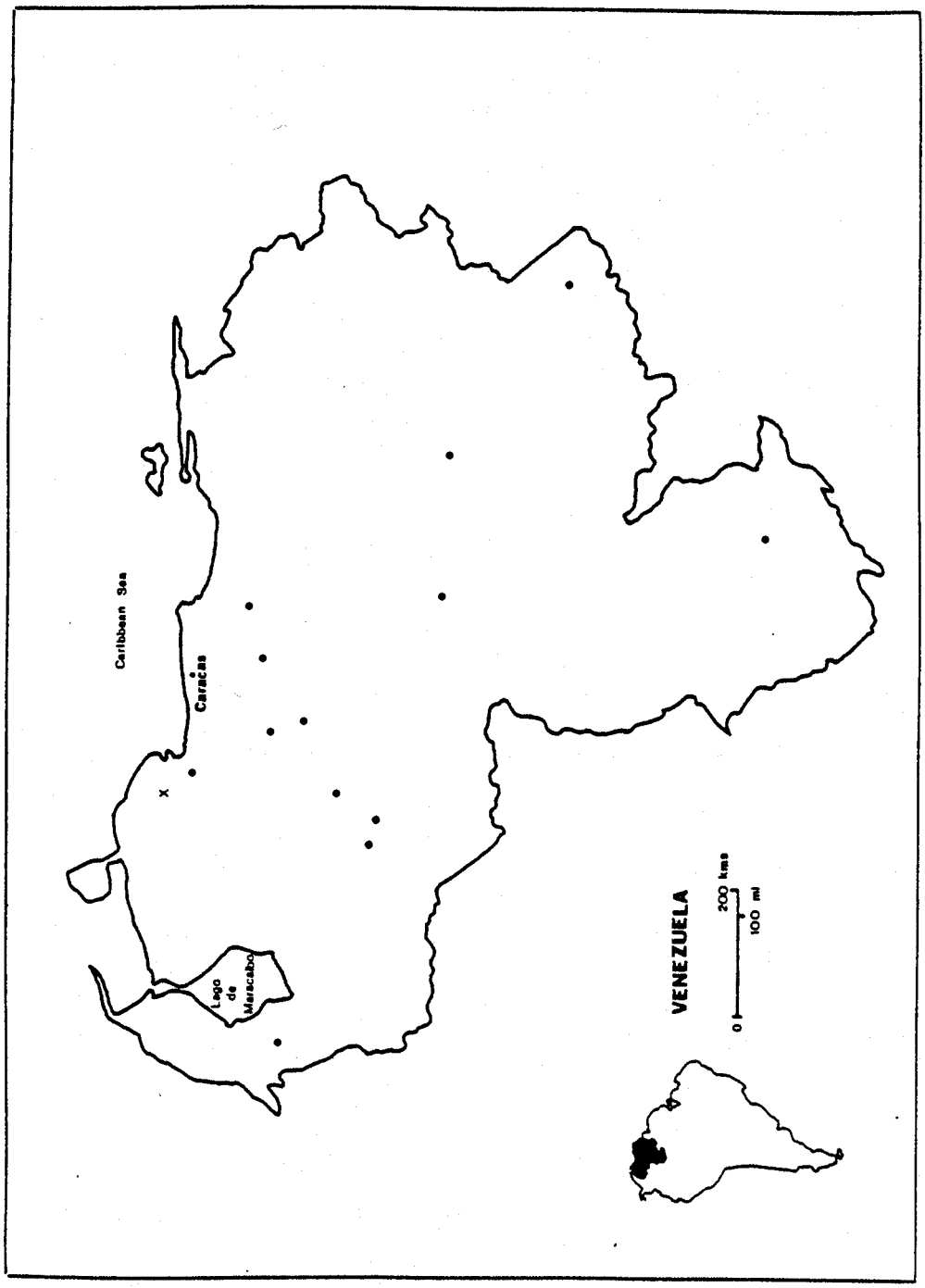

Fig. 43. Various locations (●) where jaguars (Panthera onca) have been reported in Venezuela since 1980. Five jaguars were reported to have been poisoned on a ranch in the northwest (X) in 1983 (Hoogesteijn pers. comm.).

Very little information is available regarding the distribution of the margay, which is generally not distinguished from the ocelot by the natives. Mondolfi (In press) considered it less common than the ocelot, with a more scattered (localized) distribution. Mondolfi (1976) indicated that the margay is found in the tropical forests south of the Orinoco River and the subtropical montane forests of the coastal mountains. Being more arboreal than the ocelot, the margay is probably poorly distributed in the Llanos.

Mondolfi (1976, In press) considered the tiger cat rare and sparsely distributed in Venezuela, with a distribution somewhat similar to the margay. Strictly a forest cat, it seems to prefer moist forests from sea level up to approximately 3,000 m in elevation. Ojasti (Pers. comm.) claims there are only 5 known specimens from Venezuela, 2 of which were reported by Handley (1976). Four of the 5 locations given to me were in the coastal mountains; 2 were of specimens collected near Caracas. The fifth location was of a tiger cat collected along the Negro River near the Colombian border at 2° N Lat.

Status and survival

For all cat species, overharvest and loss of habitat have been identified as the key factors in their decline. Jaguars have been affected more because of their large size, lower density, greater habitat requirements, and conflicts with ranchers. They have been reported in at least 8 national parks, 2 faunal reserves, and 5 forest reserves (Mondolfi and

Hoogesteign, in press). Adequate legal protection (both national and international) and enforcement, combined with the variety of protected areas, especially in the south, should ensure the jaguar's survival for some time yet.

The ocelot is still considered moderately common by several Venezuelan biologists (Mondolfi, Medina, Ojasti, and Nunez pers. comm.). These same people feel that the ocelot, and the small cats in general, have benefitted from legal protection. In some areas, populations are stable and perhaps increasing. According to Mondolfi and Hoogesteijn (In press), the ocelot occurs in suitable habitat in at least half of Venezuela's national parks and faunal reserves, where they may receive some protection. Although vulnerable in the coastal mountains, the small cats are in no immediate danger in the south. Continued destruction of premontane and montane forests in the coastal zone would probably impact the tiger cat the most.

Conservation measures

Minimize habitat destruction to the point where it does not jeopardize existing populations. Jaguars and ocelots show a preference for gallery forests and riparian habitats in general. Therefore, ensure preservation and protection of these habitat types. Except for Aquaro-Guariquito National Park, there is an obvious void of protected areas in the Venezuelan Llanos. Efforts should be made to incorporate more of the gallery forests into the system of protected areas.

Jaguar predation on horses, cattle, and other domestic animals can become destructive and economically damaging (Mondolfi and Hoogesteign, in press). Generally, it is only individual jaguars that have become accustomed to killing livestock. Authorities should make every effort to work with ranchers when these problems arise.

Jaguar-killed cattle are often laced with poison in an effort to kill the cat when it returns to feed (Hoogesteijn pers. comm.). In 1983, 5 jaguar were poisoned on a ranch in the northwest (see Fig. 43 for location). This method of resolving depredation problems should be discouraged because the poisons used are not selective.

Lutra longicaudis and Pteronura brasiliensis

Distribution

Except for portions of the high Andes and dry northwest, Lutra longicaudis is found throughout Venezuela in streams with adequate prey and cover (riparian vegetation). The giant otter occurs in scattered locations south of the Andean and Coastal Mountain zones (Fig. 44). I have no confirmation of its distribution north of the Apure River and Orinoco River downstream from the confluence with the Apure River. However, Mondolfi (1976) included the Llanos from Barinas State, east to Monagas State, and the Orinoco Delta in describing the giant otter's range. Tate (1939) indicated that there was a lack of evidence for the presence of giant otters in the lower reaches of the Orinoco. Distribution throughout the Guiana Highlands is probably limited by less favorable stream characteristics

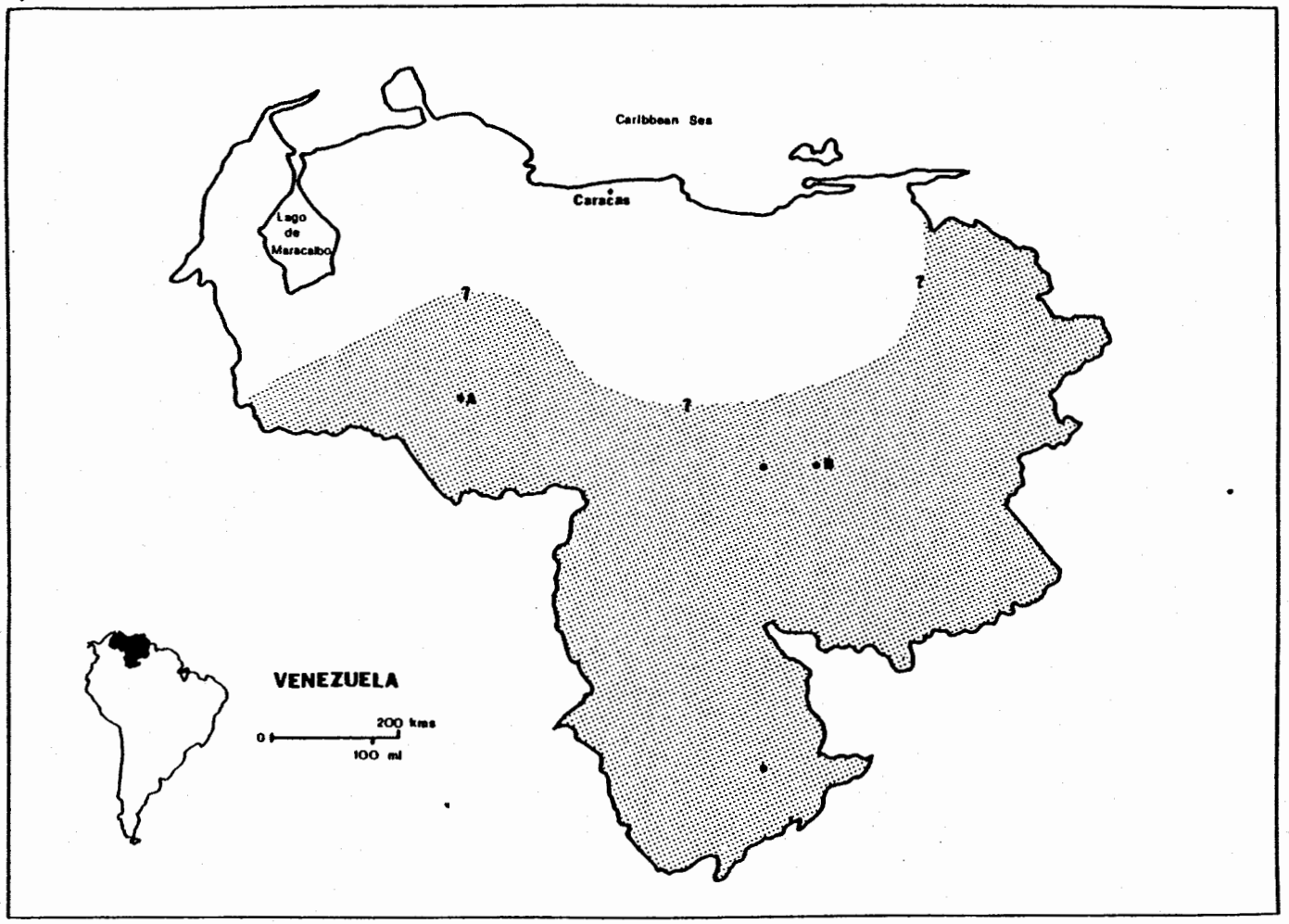

Fig. 44. Approximate distribution of the giant otter (Pteronura brasiliensis) in Venezuela. Recent sightings, including on a 90,000 ha ranch (A) and 180,000 ha ranch (B), are indicated by solid circles. Question marks indicate the uncertainty of range limits in the north.

(small size and steep gradient) and reduced prey availability at the higher elevations.

Status and survival

It is likely that the small river otter (Lutra longicaudis) is considerably more common in the south than in the north, where habitat destruction has been greatest. The giant otter is considered locally common by Castellanos and Mondolfi (Pers. comm.), 2 Venezuelan biologists. Populations have probably stabilized in the more remote areas of the south, but continue to decline in areas of habitat destruction and illegal poaching. Legal protection and the occurrences of both species in several protected areas and large private ranches should help to ensure their survival.

Conservation measures

Increase efforts to protect the gallery forests in the Llanos and all riparian habitat throughout the country. Locate existing giant otter populations and take steps to adequately protect them. Also, see conservation measures for the otters in other Latin American countries.

COSTA RICA

Costa Rica, with an area of 51,100 km^2 , is 1 of the smallest Central American countries. The Pacific and Caribbean lowlands are divided by a thin line of hills near the Nicaraguan border which develop into a rugged mountain chain that extends southeast through the country into Panama. Two-thirds of the population live in a highland basin in the central region.

The moist forests and mangrove swamps of the Nicaraguan lowlands gradually narrow to the south of the San Juan River but extend down the Caribbean coast to Panama. The drier Pacific side is comprised of a mixture of semideciduous forests and savannas in the northwest and tropical moist forests of the Osa Peninsula in the south. Ecological zones in the mountainous region range from mid-elevation cloud forests to high-mountain oak forests and subalpine treeless areas or paramo (Vaughan 1984).

Coffee plantations extending throughout much of the highlands are replaced by cacao and banana plantations at lower elevations. Cattle ranches dominate the northwest, although livestock can be found grazing throughout the country. The greatest destruction of lowland forests in Central America is attributed to the creation of pasture for livestock production (Budowski 1977). The forest is often viewed by peasants as, "a hostile barrier to hopes and needs" (D'Arcy 1977).

Thrupp (1981) examined the attitudes of peasant farmers toward government efforts to halt deforestation. To most

farmers, land was considered too valuable to be used for anything other than growing crops and grazing cattle. They could not comprehend the concept of "untouchable" forest reserves. The author found that, "the values of outdoor recreation, wildlife, and biological diversity. . . are alien to poor farmers struggling for survival." Problems related to achieving conservation in Central America are discussed further by Budowski (1977) and D'Arcy (1977).

The otter and spotted cats are protected by Costa Rican law (Lopez 1982) and by CITES since 1975 (Appendix A). Spotted cats are occasionally killed by peasants to supply the tourist trade and by sport hunters. Although ocelot skins could be purchased from certain tourist shops in San Jose, I found no evidence of largescale commercial activities. Prior to 1981, there were only 4 wildlife inspectors in Costa Rica (Lopez pers. comm.). Presently, approximately 70 government employees have enforcement authority.

Costa Rica has established more than 45 protected areas, most of which encompass spotted cat habitat (Vaughan 1984). The country has a highly regarded system of 20 national parks and reserves, representing approximately 8% of the national territory (Barnard 1982, IUCN 1982b, Carr and Carr 1983). Individually, most protected areas are too small to adequately protect the spotted cats, but the combined size of adjoining areas may be adequate. For example, adjoining parks, forest reserves, and Indian Reservations total 4,179 km^2 in the Talamanca region of southeastern Costa Rica (Vaughan 1983).

Panthera onca, Felis pardalis, F. tigrina, F. wiedii

Vaughan (1983) compared the availability and distribution of dense forest habitat with recent (1975-1979) spotted cat sightings in Costa Rica. The locations of cat sightings were based on interviews conducted by university students with local residents, scientists, and hunters throughout the country. Although the validity of sight records differentiating between the ocelot and margay or margay and tiger cat may often be questionable, this approach provides a simple and cost-effective method of obtaining basic information on distribution and habitat use in relation to land-use practices.

Distribution

The jaguar occupies suitable habitat in both coastal regions of the country from sea level to the top of the Talamanca Range at 3,800 m. Vaughan's (1983) sight location data for jaguar revealed a definite association with primary forests; occasional records in subalpine paramo habitat; and only rare encounters in cultivated or altered areas, presumably due to hunting pressure. A minimum of 5 jaguars has been reported in the Talamanca Range near the Panamanian border (Barborak pers. comm.). In 1980, 2 jaguars from this area were apparently captured and sent to zoos because they were killing cattle. According to Vaughan (1984), Corcovado National Park and adjoining Golfo Dulce Forest Reserve probably contain the largest populations of jaguars in Costa Rica.

Based on the interviews, Vaughan (1983) found that the ocelot occupies a variety of undisturbed and altered habitats

throughout Costa Rica ranging from sea level to 3,800 m. Animals were recorded in sparse to dense forests, dry scrub and moist tropical forests, mangrove swamps, pastures, subalpine paramo, and coffee plantations. A similar distribution was given for the margay and tiger cat, which were not differentiated in the study. Tiger cats and margays (the most arboreal cat) were reported by hunters in semiopen areas and the subalpine paramo region of Chirripo (Vaughan 1983). And, although the tiger cat is thought to inhabit a greater variety of habitats, primarily in southern Costa Rica, the author indicated that confusion exists concerning the actual distribution of each species.

Four of the 5 specimens of the tiger cat, as reported by Gardner (1971), were collected in mountainous cloud forests and subparamo elfin forests (Fig. 45). However, park staff have reported tiger cats in the lowland forests of Barra Honda and Corcovado National Parks (IUCN 1982b).

Status and Survival

The spotted cats are protected by law and considered endangered in Costa Rica (Lopez 1982). Lopez (1982) estimated no more than 100 jaguars for the entire country, while Vaughan's (1983) estimate, using available cat density data from other studies, were several times higher. Lopez (Pers. comm.) estimates that there are 200 ocelots in all of Costa Rica, a figure that seems unrealistically low. Vaughan (1983) provided a rough estimate of 2,000-3,000 ocelots in just the

Fig. 45. Five locations (●) where tiger cats (Felis tigrina) have been collected in Costa Rica. The location data are from Gardner (1971). Park staff have reported tiger cats in Borra Honda National Park (A) and Corcovado National Park (B). Major undisturbed areas considered important to the spotted cats are shaded.

largest areas of dense forest habitats, which does not include variably altered sites.

Dense forest habitat used by the spotted cats has been reduced by 34% between 1940 and 1977 (Vaughan 1983). This deforestation has had a greater negative impact on the jaguar. Vaughan (1983) believes that the jaguar will probably become extinct in Costa Rica if it is not allowed to survive in altered habitats. The small spotted cats are not only capable of adapting to altered habitats, but their presence often goes undetected, thus permitting them to survive in close proximity to man. Nevertheless, their long-term survival, like that of the jaguar, is dependent on protected areas. The most important areas, according to Vaughan (1983), include: Corcovado National Park-Golfo Dulce Forest Reserve complex; Braulio Carrillo National Park-Cordillera Volcanica Central Forest Reserve-La Selva Protected Zone-La Selva Biological Reserve complex; Chirripo National Park-La Amistad International Park-Rio Macho and Los Santos Forest Reserves-Barbilla and Las Tablas Protected Zones-Talamanca, Chirripo, Ujarras, and Tayni-Telire Indian Reservations complex; and Chambacu (not protected), near the Nicaraguan border. In Costa Rica, Vaughan (1983) does not consider any area large enough to sustain a genetically viable jaguar population at the level necessary for long-term species fitness (estimated to be a minimum of 500 individuals); 1-2 areas would be large enough for the small cats.

Conservation measures

One of the most important conclusions arrived at by Vaughan (1983) was that most of Costa Rica's endangered species could probably survive in altered habitats if adequately protected. The spotted cats have exhibited their ability to adapt to habitat alteration, and, if permitted, will show a high degree of resiliency. Management efforts should be directed at reducing total habitat destruction and establishing a greater degree of tolerance for these species in both protected and altered areas.

Lutra longicaudis

Distribution

The otter is found in suitable habitat throughout Costa Rica. I received reports of otter sightings from many parts of the country except the high mountain streams.

Status and survival

Otters are considered common in streams throughout the country (Lopez pers. comm.), and especially in the province of Alajuela and the San Carlos River near the Nicaraguan border (Villalobos pers. comm.). Complaints of otters disrupting fish farming activities are occasionally received by the authorities (Lopez pers. comm.) and biologists (Vaughan pers. comm.). Prospects for survival are very good.

Conservation measures

A road survey (where possible) in conjunction with a boat survey would provide useful information for establishing future management guidelines. Although an ecological study would

provide useful information, especially on predator-prey relationships, the biology of Lutra longicaudis is probably similar to L. canadensis in North America, thus permitting a certain amount of extrapolation from previous research on the latter species. If the Central American otter proves to be as common as reported, a controlled harvest may be biologically acceptable.

Nevertheless, every effort should be made to preserve and protect riparian habitat throughout the country. Most of the streams I visited in both the Pacific and Caribbean regions still had good riparian vegetation.

PANAMA

The s-shaped isthmus of Panama is 80 km at its narrowest and a maximum of 193 km at its widest. Much of the country is uninhabited, with 40% of the people living in Colon and Panama City along the Panama Canal. However, new roads, including the extension of the Inter-American highway into the Darien (within 100 km of Colombia); a pipeline road to the Gulf of San Blas; and a road connecting David with Chiriqui Grande, Almirante, and the railroad in the northwest are opening up new frontiers.

Most of the country is mountainous with shelves of lowland on both crests. The lowlands are traversed by numerous streams flowing from the mountains. Rainfall is generally heavy and temperatures hot, resulting in extensive tropical moist forests along the coast and extending far up the sides or completely covering the low mountain ranges. As a result, approximately 76% of the country is covered with forests. Panama still has large tracts of uncut forest, but removal for subsistence farming, plantations, and pasture is occurring rapidly (D'Arcy 1977).

Most of the rural population live in 6 provinces on the Pacific side, west of the Canal. Less than 20% of the total land area is farmed (pasture and agriculture), with these activities concentrating primarily in the same 6 provinces. The government is encouraging greater timber harvest, which coincides with the establishment of new roads. During a flight from Panama City to the Darien, a swath of cleared forest 6 km wide vividly marked the route of the Inter-American highway.

Both the highway and clearings stopped abruptly in the vicinity of Yaviza, less than 100 km from Colombia. Further construction of the highway has ceased due to a lack of funds. Because of the swampy conditions in both Colombia and Panama, many people feel it is unlikely the highway will ever be completed.

Several people feel that trade involving protected wildlife is permitted at the Colon Free Zone and International Airport near Panama City. Wildlife products are reportedly smuggled up from Colombia to Colon and then shipped to Japan (Smythe pers. comm.). According to Montgomery and Smythe (Pers. comm.), Panama adheres somewhat to the CITES regulations, which became effective in 1978 (Appendix A), but the government does nothing about enforcing domestic laws. These kinds of actions are difficult to document, however. A person with access to the Colon Free Zone admitted that illegal wildlife trade persists there. He offered to obtain permission for me to enter the area, but indicated that I would see nothing. Although jaguar and ocelot skins could occasionally be purchased from souvenir shops in Panama City, I found no clear evidence of illegal commercial activities.

Panama has 8 national parks, 2 of which are islands, but most are not adequately protected and managed (Montgomery pers. comm.). Darien National Park (597,000 ha), located along the Colombian border, is the largest and provides excellent habitat for the spotted cats and otter. Likewise, La Amistad National Park (200,000 ha) is a proposed international park that, along

with the similar-sized Costa Rican park, contains excellent cat and otter habitat. These parks, if adequately protected, should be integral in preserving representative populations of the cats and otter. Nevertheless, Montgomery (Pers. comm.) believes there is little hope for the jaguar in Panama in the long term.

Panthera onca, Felis pardalis, F. tigrina, F. wiedii

Distribution

The range of the jaguar and ocelot extends throughout Panama (Mendez 1970), although the best remaining habitat is found on the Caribbean side west of the Canal and most of the country to the east (Fig. 46). Several jaguar sightings were made in 1980 in Soberania National Park (Boucher pers. comm.), located along the Canal, however.

Mendez (1970) described the margay as occurring in the zone between the lowland tropical forests and high mountains. However, there is no reason to believe that the margay is not found throughout the lowland forests along with the jaguar and ocelot.

Similar to the situation throughout most of its range, almost nothing is known about the tiger cat in Panama. In a discussion of the tiger cat in Costa Rica, Gardner (1971) made the following statement: "Allen's type of caucensis is so similar to the Costa Rican animals that I would hesitate to recognize the Central American population as distinct from the northern South American subspecies were it not for the apparent absence of F. tigrina in the intervening area of Panama." This

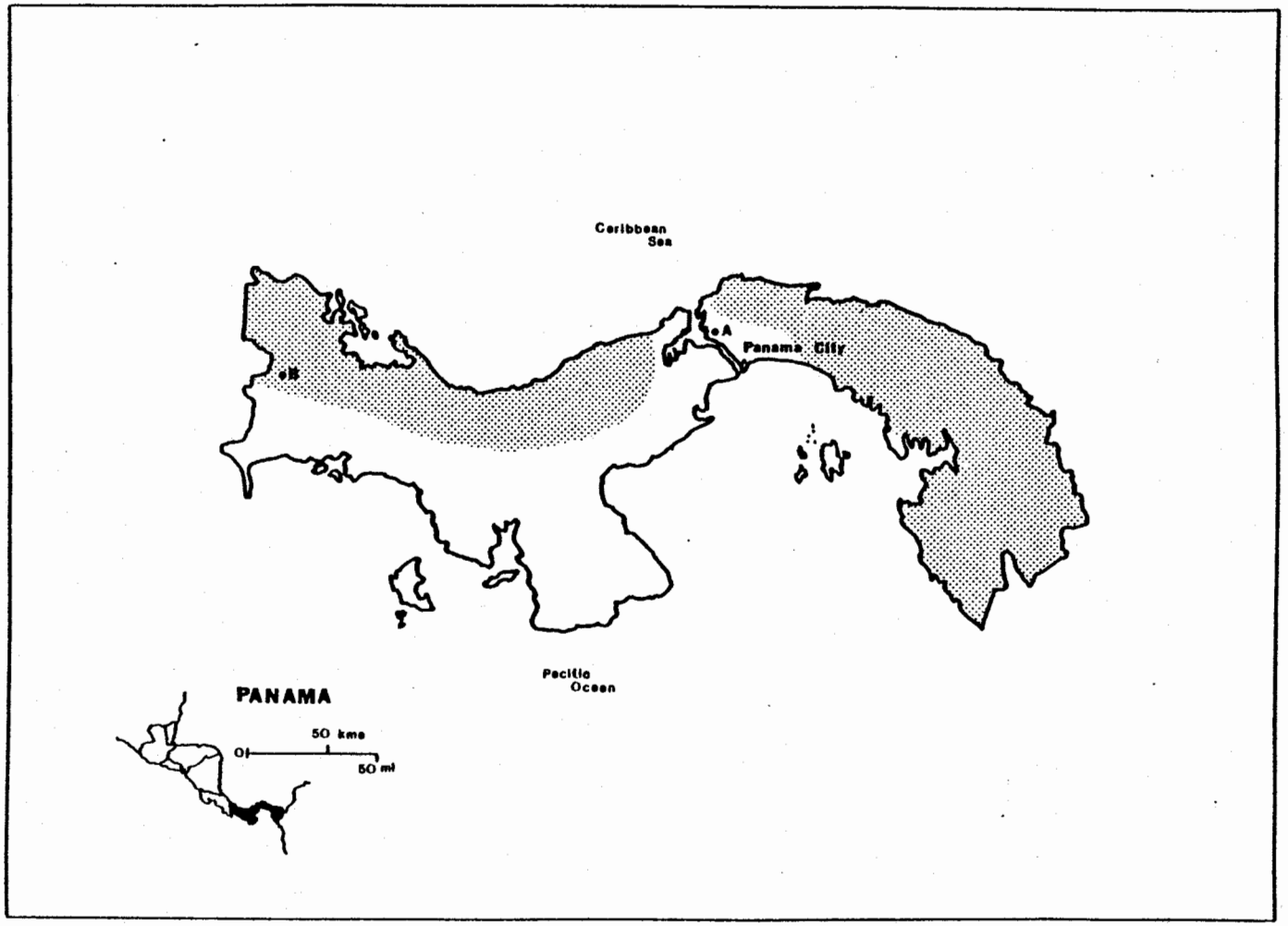

Fig. 46. Remaining favorable habitat for the jaguar (Panthera onca) in Panama is depicted by the shaded areas. Selected records of spotted cats include: (A) In 1980, several jaguar sightings were made in Soberania National Park (22,000 ha) along the Panama Canal; (B) Dr. N. Smythe reported sighting a tiger cat (Felis tigrina) near the Costa Rican border.

statement would appear to be an obvious indication that the tiger cat is probably found throughout Panama. Available habitat types are certainly conducive to the species. The mountains near the Costa Rican border, where Smythe (Pers. comm.) sighted a tiger cat (Fig. 46), provide excellent habitat for this species, as do the mountains in the east.

Status and survival

Most of the spotted cats are probably uncommon, at best, in the more remote areas, such as the Darien and perhaps part of Bocas del Toro province in the northwest. However, these species are probably rare in the more developed areas and where roads have been established for several years. Swamps and rugged terrain should prevent the construction of roads and exploitation of natural resources in certain areas for some time yet. Parks, especially La Amistad and Darien will become increasingly important in preserving cat populations.

Conservation measures

Education, the wise use of natural resources, adequate species and habitat protection, and all the measures suggested for these species in other countries apply here as well.

Lutra longicaudis

Distribution

The numerous Panamanian streams provide excellent habitat throughout the country for Lutra longicaudis , the only species of otter in Central America. Otters can be found in all but the highest mountain streams, where food may be a limiting factor.

Status and survival

Dr. N. Smythe (Pers. comm.) believes that otter populations have been reduced considerably in Panama, but not because of overexploitation for the skins. Apparently the native Indians traditionally use otter eyes in treating blindness, a custom that persists in Colombia as well. However, I was unable to substantiate the assumption that otter populations have been seriously reduced on account of this tradition.

Conservation measures

An abundance of streams throughout Panama should provide adequate habitat for the otter. A law making it illegal to destroy riparian vegetation when land is cleared for agriculture (Boucher pers. comm.) should help to preserve the habitat. Attempts should be made to discourage the use of otter eyes for the treatment of blindness. Accomplishment of this, in addition to adequate protection and habitat preservation should ensure the otter's survival.

Status and Management Options

In general, we define the status of a population in terms of whether the population is stable, increasing, or decreasing. Obtaining the necessary data, especially for carnivore populations, is invariably tedious and costly, with no guarantee that the data obtained are sufficient to make this determination. Dixon (1981) examined 5 separate indicators of a population's status: the percentage of pregnant females, trends in population indexes, changes in the percentage of a species in the harvest relative to other harvested species, changes in the shape of the survival curve, and measures of population and growth rate. Because the data are obtained primarily from harvested animals, these indicators are of little use to us in this analysis.

Good wildlife protection laws exist today in Latin America. Combined with the international framework of CITES, these laws have undoubtedly benefitted the spotted cats and otters. In areas that have escaped the effects of illicit harvest or habitat loss, populations of most species of otters and spotted cats have probably increased as a result of the recent protection afforded them. Unfortunately, determining whether or not the current trends in habitat alteration and destruction have negated these recent gains is beyond the scope of this survey. The illicit fur trade must be halted and each country will have to begin monitoring the situation regarding these species, using whatever means available, to try and

detect any population trends. The lack of prior population data and reliable harvest data precludes any reasonable analysis at this time. In the long-term, conservation and management of the spotted cats and otters will be the responsibility of Latin Americans. We, as foreigners, must be willing to give them full cooperation and support, however.

How to properly manage the fur industry is a complex problem with no simple solutions. At one extreme are the strict preservationists who see absolutely no justification in killing any wildlife species for any reason. At the other end are those intent on reaping the maximum financial benefits from the industry, with total disregard for the welfare of the resource. In between is a broad spectrum of people whose interest and livelihood revolves around a variety of wildlife species, including the cats and otters. In general, these people are not intent on destroying their wildlife, but they would like to, and in many cases they must in order to survive, somehow benefit from the resource. Therefore, in addition to ecological aspects, any conservation strategy and management program must take into account the cultural and economic development. Coe (1980:298) emphasized the following approach to wildlife management in Africa: "The conservation of wildlife in Africa cannot be considered in isolation from the needs of the developing nations of Africa. Above all, the expanding populations of the contingent make it imperative that we take a holistic view, working downwards from problems of human land resource management to those of wildlife." In all

probability, the resource managers of Latin America will need to demonstrate an applied, practical, and economic approach to their proposed policies and programs.

This leads us to a discussion of management options for the Latin American otters and spotted cats. Do we, in fact, have options on how these renewable resources are managed? Yes, we do, but the management program must be capable of insuring their renewal. It would be ludicrous to even consider no protection as an option; this is what created the present situation.

The carnivores, as indicated by Williams (1984), "have been miscast by man in a role evolution did not design them to play. They are equipped to kill, not be killed." Most prey species are r-strategists (Dixon and Swift 1981); they are characterized by high fecundity levels and short generation time. The cats and otters are K-strategists because they exhibit low fecundity levels, increased survival, and long generation times. Unlike their prey, predators cannot readily compensate for heavy losses. Consequently, a harvest strategy for K-selected furbearers would consist of age-specific harvesting to maximize productivity between harvests (Dixon 1981). The harvest strategy for r-selected furbearers concentrates on replacing natural mortality with a harvest rather than attempting to increase productivity, which is probably already high (Watt 1968). It is clear for the cats, otters, and other predators, the ramifications of management schemes involving a harvest need to be carefully evaluated

prior to implementation. And, to avoid long-term adverse effects, management programs need to incorporate appropriate safety factors.

Total protection is the obvious initial option when it appears that a significant portion of a species' total population has been seriously depressed as a result of excessive harvest pressure, habitat loss, or both. For these reasons, and until adequate inventories and basic biological data are available to indicate a harvest could be justified, all of Latin America's otters and spotted cats should remain totally protected; there have to be some reliable indicators. Based on behavioral characteristics and habitat requirements of the giant otter and jaguar, the obvious difficulties in administering a controlled harvest, and the current trend in habitat alteration and destruction, these species will likely require total protection indefinitely (Table 7). Similarly, the Andean cat should remain totally protected throughout its range, but primarily because it has such a limited range and there is no economic justification for it's harvest.

Provided there is sufficient habitat available, most species are resilient enough to respond positively to protection. The likely consequence is that some subpopulations will increase to levels where management adjustments may need to be made. Although there may be no true biological justification for a harvest, an economic incentive likely exists. For species that are not seriously threatened, a controlled harvest may be acceptable. However, management of

Table 7. Feasibility of harvesting Latin America's otters and spotted cats.

Species	Future harvest feasibility		
	Probable	Possible	Unlikely
Felis geoffroyi	X		
Felis guigna		X	
Felis jacobita			X
Felis pardalis	X		
Felis tigrina		X	
Felis wiedii	X		
Panthera onca			X
Lutra felina		X	
Lutra longicaudis	X		
Lutra provocax		X	
Pteronura brasiliensis			X

locally abundant populations of a threatened species is a sensitive issue (see Jewell and Holt 1981), especially when it involves a large terrestrial carnivore such as the jaguar. Large felids are often considered a nuisance to humans because they prey on domestic animals and, occasionally, people. As populations increase, so does the nuisance level. Cobb (1981) indicated that the possible consequence of effective protection and reduced economic pressure on the leopard (Panthera pardus) is an increase in the nuisance level, thereby increasing the pressure to cull (selectively remove).

In Paraguay, and perhaps throughout the jaguar's entire range, depredation problems are handled by the ranchers, who pay employees a bonus for each cat that is killed on their ranch (Eaton pers. comm.). Venezuela has apparently developed guidelines for dealing with jaguar depredation problems (Ojasti pers. comm.). I do not contend that jaguars are a serious nuisance in Latin America, however, populations are increasing in some areas and the likelihood of cat-human interactions will increase as well. Therefore, each country should make provisions for dealing with such potential problems.

I have previously pointed out the need to integrate natural resource management with cultural and economic interests. Before I discuss management involving a harvest, I want to briefly mention the possible social and economic effects of a harvest, and how this could translate into later management problems. The social consequences of annually harvesting economically valuable species may be similar to that

of increased culling of locally overabundant populations. According to Ray (1981), increased culling in the interest of yield and on the basis that no harm to the system will ensue, results in increased yields becoming habit to the extent of social need and perhaps even addiction. Similarly, people quickly become economically dependent on the fur industry, and economic interests tend to discount the value of future harvests, creating a tendency to overexploit rather than pursue a sustainable yield. Through protective measures we have reduced the socioeconomic dependencies of many people on the fur trade. The consequences of instituting an ill-conceived harvest could be considerable once those dependencies are re-established. Therefore, any proposed harvest scheme should be well planned, with authorities evaluating the long-term impact of a harvest on both the resource and the people prior to implementation.

Whether or not wildlife should be harvested has become a moral issue in recent years, and consequently, highly emotional. Scheffer (1976) noted a trend away from killing and towards total protection. But Eberhardt (1977) has suggested that man's interference has created imbalances that may best be dealt with under a managead harvest, not total protection. With this in mind, the protectionist attitude has apparently adversely affected management programs throughout the United States (Stingley 1972). Too many decisions are either politically motivated or based on public pressure, rather than emanating from a biological framework.

In a trapping survey, Kellert (1981) reported that 91% of the general public in the United States agreed that the government should not allow the trapping of wild animals until there is proof that the animals will not be endangered by the trapping; 76% of trappers also agreed with this statement. But how do we know when populations are at a harvestable level, especially when status indicators are derived from harvested populations? Justification for harvesting marine mammals, according to the Marine Mammal Protection Act, is based on a conservative population estimate and evidence that the population is near maximal levels (Eberhardt 1977). Obtaining this information on the cats and otters of Latin America would likely be prohibitive in terms of time and money, with no guarantee that the data will be sufficient to make the final determination.

In theory, all this sounds good, but in reality, a considerable amount of management is based on trial and error. Management decisions are usually formulated under considerable uncertainty (Clark 1976), and frequently, too little is known to accurately predict the effects of a harvest. Therefore, any future harvest should initially be conservative to allow for limitation of knowledge and uncertainties in management. The actual harvest must be monitored and the results evaluated and used in making possible management changes. These are essentially 2 of 4 general principles described by Holt and Talbot (1978) for the use of a natural resource.

Basic guidelines exist for harvesting multi-species resources (May et al. 1979) and for achieving the optimal yield (maximum sustainable yield as modified by biological complexities and social and economic constraints) in furbearer management (Dixon and Swift 1981). However, these approaches require the use of mathematical models for which adequate data are necessary. All things considered, a simple and practical approach to harvesting Latin America's cats and otters would probably be best.

A review by Monk (1981) of the history and status of fur management in Ontario, Canada, provides us with some insights as to possible harvest options. Ontario went through a long period of trial and error furbearer management dating back to 1534. However, inadequate laws and enforcement allowed the overharvest of many furbearer populations. This trend continued until 1916-1946, when management efforts focused on restrictive, rigidly enforced legislation, closed or short open seasons, establishment of game preserves, convictions and confiscations, and even jail sentences. In 1947, registered traplines were established and competitive trapping on government land was virtually eliminated. Quotas were established for several species on registered traplines and pelt tagging regulations were enacted. Trappers councils were organized to assist the Game Department in establishing seasons, solving local problems, and improving furbearer management decisions. During the 1950's, restocking programs and trapper education programs were established. Fur

management officers were appointed to inspect traplines and maintain a close liaison with trappers and conservation officers. Today, trappers are issued licenses by conservation officers or fur management officials. Approximately 70% of Ontario is divided into 2,691 registered traplines averaging 70-1,100 km in size, depending on region. Community traplines have been established for certain villages. Five species, including the lynx (Felis canadensis) , are controlled by quotas. If necessary, the river otter harvest is controlled by quotas as well. Quotas for individual traplines are negotiated each year before a license is issued. Trappers are required to attain a harvest of 75-100% of the established quota.

In summary, contemporary furbearer management programs are widely supported in Ontario. No furbearing species is endangered and harvest rates for some furbearers have never been higher. Registered traplines have eliminated competition and now afford the trapper an opportunity to manage and maintain the production of furbearers. The trapper thus benefits by being a good manager. However, according to the author, communication among trappers, resource managers, and conservation officers has been the key to a sound fur management program in Ontario. This cooperative atmosphere is enhanced by a growing awareness of the importance of the fur resources.

The otters and spotted cats of Latin America have withstood a persistent and uncontrolled harvest for many years. Therefore, provided they are afforded adequate protection to

recover, populations of many of these species could probably withstand controlled harvesting in the future. The Ontario scenario provides us with an example of how some innovative methods can be used to develop a successful furbearer management program. These techniques are, for the most part, applicable to many parts of Latin America.

To be successful, a furbearer management program in Latin America will have to accomplish several goals. The program must generate revenue that can be recycled into the system and used for managing the resources. It will need to create an incentive for hunters and trappers to manage and maintain production of the resource rather than overharvest it (see Kellert 1981). Hunter and trapper workshops will be necessary to teach proper harvest techniques; proper care, handling, and marketing of furs; furbearer biology and management, and, proper hunter and trapper ethics and conduct. The sale of skins and other parts will probably have to be administered and controlled by a government agency. Adequate market outlets (e.g., fur sales or fur auctions) must be provided with competitive bidding to ensure fair prices for the goods. Above all else, there must be effective communication among trappers, hunters, resource managers, and enforcement personnel.

Certain harvest limitations will have to be properly considered. The season of harvest should coincide with pelt primeness and avoid periods that may be detrimental to the species (e.g., during parturition and postnatal care). Season length will have to be controlled to avoid overharvesting. Cat

and otter pelts (K-furbearers) should be registered and properly marked (tagged). And, harvest level objectives should be determined annually. Registered and community traplines should be seriously considered for reasons previously discussed, but also because they would be more acceptable to the public in areas where a general season has not previously been established.

As a final note, I would like to comment on responsibilities for ensuring the health and perpetuation of commercially valuable species -- where does the burden of proof rest? In principle, the collection of data necessary for managing harvesting species is the responsibility of all those who exercise or claim a right to use the resource. In business, a company cannot produce and sell a finished product if it does not have an adequate supply of raw materials. The company clearly has a vested interest in the status and welfare of those raw materials. This business relationship should apply to the fur industry as well. However, because others, including the nonconsumptive user, also benefit from the natural resources, it would behoove all groups to work in a cooperative atmosphere to insure the health and welfare of these species. As pointed out by Myers (1973), the results of being wrong about the status of a species, "could be far more conclusive one way than the other".

RECOMMENDATIONS

The following general recommendations are considered important to the overall management of the otters and spotted cats. Additional recommendations and suggested conservation measures for each species in each country are included elsewhere.

1. Establish a regional TRAFFIC office in Latin America to monitor trade in wildlife and act as a liaison among Central and South American CITES representatives.

   Justification: To understand the legal constraints placed on wildlife trade among neighboring countries would seem to be a simple task. However, based on my recent experience, this appears not to be the case. CITES officials from several Latin American countries expressed the need for a more open and effective line of communication, one that could be provided by a regional TRAFFIC office.

2. All countries that have not already done so, should adopt and implement as soon as possible, the trade permit form proposed by CITES.

   Justification: Use of a standardized form would help to reduce confusion among Latin American countries.

3. Importing countries should be urged to respect the wishes and uphold the laws of those countries trying to protect their native wildlife. Since virtually all native spotted cats and otters are presently protected in Latin America,

there should be no importing of these species until such time when laws permit their harvest and export.

Justification: Many Latin Americans charged with the responsibility of managing wildlife expressed their frustrations over the fact that they need the cooperation of importing countries to control illicit wildlife trade. Latin American countries must achieve a certain level of credibility (i.e. provide evidence that they can properly manage their wildlife) in the eyes of the international community if they expect to gain support for a harvest. In order to achieve this credibility, or confidence, the exporting countries of Latin America will require full cooperation from importing countries.

4. Urge the completion of identification manuals for the cats and otters and distribute copies to CITES authorities as soon as possible for further dissemination to customs officials and other interested parties within their countries.

   Justification: Most authorities are generally unable to differentiate between closely related species.

5. Each Latin American country should be encouraged to implement biological inventories that will aid in determining conservation priorities and the direction of their management programs.

   Justification: We cannot adequately recommend specific conservation measures without sufficient baseline data.

6. Basic biological investigations, beginning with high priority species, should be incorporated into the research programs of Latin American countries.

   Justification: The information is aprerequisite to the development of biologically sound management plans.

7. Continue total protection of Panthera onca and Pteronura brasiliensis throughout their entire ranges indefinitely.

   Justification: Based on what we know about the biological requirements and behavioral characteristics of the jaguar and giant otter, these species will probably always be highly vulnerable. Consequently, I do not feel it would be wise to harvest them at the present time or in the foreseeable future.

8. Continue total protection of the small spotted cats and the Lutra group until adequate data and conditions can justify a change in management policy.

   Justification: Two basic problems exist in terms of whether or not a harvest is justifiable. First, there is insufficient biological data on each species and a lack of accurate distributional data for each country. Second, most Latin American countries would be unable to adequately regulate a controlled harvest at this time. However, provided that the appropriate database becomes available, a controlled, regional harvest of some of these species may be justifiable in the future.

9. Increase efforts to educate people at all levels, but especially school children, to establish a conservation

ethic and an appreciation for the wise use of natural resources.

Justification: The economic picture in Latin America is, at best, not very encouraging. To foster an attitude of strict preservation is not only economically unrealistic, but could prove to be counter-productive in the long-term. Under the circumstances, to deny exploitation of renewable resources on a sustained yield basis without justification is wrong. An attitude of "use but don't abuse" would create a more cooperative atmosphere, as well as be more in tune with the times.

10. CITES should not become a barrier to the implementation of justifiable management techniques. If it could be shown that a particular harvest scheme would not be detrimental to a species' conservation and could be properly managed, then every consideration should be given to permit such a harvest.

Justification: The countries of Latin America will lack the impetus for financially supporting reasonable management programs if they cannot foresee the possibility of obtaining a return on their investment. The United States delegation to the 1983 Conference of CITES Party nations in Botswana expressed their concern over this matter in the following statement: "The economic value of wild fauna and flora to the producing country must be recognized. Whether we are talking about ivory, reptile hides, fur skins, live animals, or other specimens, the

conservation and management in the country of origin for the benefit of species depends in large measure on the long-term economic value to the producing country. This basic concept is a practical fact of life that must be recognized. For the nonproducing Parties to attempt to dictate management priorities to producing Parties is not international cooperation."

11. Jaguar depredation on domestic livestock is an issue that needs to be properly addressed, whether or not it is currently a problem. In Latin American countries where depredation occurs, or is likely to occur, action plans or guidelines should be developed to deal with complaints in a manner acceptable to ranchers, conservation authorities, and other interested parties.

    Justification: It is in the best interest of all concerned parties to resolve wildlife issues in an atmosphere of cooperation and in an agreeable manner.

12. Encourage land-use practices that are compatible with native wildlife species.

    Justification: Many wildlife species, including the cats and otters, can tolerate modifications to the original habitat, but not total elimination.

13. Every effort should be made to preserve and adequately protect natural ecosystems sufficiently large to ensure species diversity and the survival of the spotted cats, otters, and other native wildlife within their boundaries.

Justification: In addition to protecting the watershed, these areas may function as population reservoirs, supplying individuals to adjacent depleted populations by means of dispersal.

14. Where otters and spotted cats occupy regions of multinational jurisdiction, the countries concerned should be encouraged to cooperate and coordinate their management efforts.

    Justification: Frequently, the problems of excessive exploitation of these species are blamed on the ineffectiveness or absence of protection laws in neighboring countries. Multilateral arrangements would help to reduce confusion and misunderstanding among these countries. Without a reasonable amount of cooperation, attempts to implement future management policies will be futile.

15. Encourage preservation and strict protection of riparian habitats. At the same time, emphasize the importance of shoreline vegetation to the watershed.

    Justification: To minimize soil erosion, improve streambank stability, enhance the fisheries, and preserve critical habitat for otters and other wildlife.

16. Where streams define the boundary of protected areas, encourage authorities to extend these boundaries so as to include the riparian vegetation on both sides.

    Justification: Such adjustments are particularly important where giant otters are known to occur on boundary streams.

17. Continue efforts for better enforcement of existing wildlife laws.

    Justification: To discourage and reduce the illicit commercial activities involving wildlife that benefit only a few.

18. Urge Belize, El Salvador, Honduras, and Mexico to ratify CITES.

    Justification: Management would be better coordinated and controlled if all countries within the concerned species' range were under the same international jurisdiction.

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APPENDIX A. LEGAL DOCUMENTATION THAT PROVIDES PROTECTION FOR LATIN AMERICAN OTTERS AND SPOTTED CATS

Appendix A. Legal documentation that provides protection for Latin American otters and spotted cats.

Country	Legal document	Effective date	CITES	
			Date ratified	Entry into force
Argentina	22421	1981	08.01.1981	08.04.1981
Bolivia	12301	Unk.	06.07.1979	04.10.1979
Brazil	5197	1967	06.08.1975	04.11.1975
Chile	4601	1929	14.02.1975	01.07.1975
Colombia	848	1973	31.08.1981	29.11.1981
Costa Rica	Unk.	Unk.	30.06.1975	28.09.1975
Ecuador	487	1980	11.02.1975	01.07.1975
Guatemala	Unk.	Unk.	07.11.1979	05.02.1980
Guyana	Not numerical	Not dated	27.05.1977	25.08.1977
Nicaragua	Unk.	Unk.	06.08.1977	04.11.1977
Panama	Unk.	Unk.	17.08.1978	15.11.1978
Paraguay	18796	1975	15.11.1976	13.02.1977
Peru	934-73-AG	1973	27.06.1975	25.09.1975
Suriname	Not numerical	Varies	17.11.1980	15.02.1981
Uruguay	261/78	1978	02.04.1975	01.07.1975
Venezuela	5-299	1970	24.10.1977	22.01.1978

APPENDIX B. COMMON NAMES USED FOR 11 SPECIES OF OTTERS AND SPOTTED CATS IN LATIN AMERICA

Appendix B. Common names used for 11 species of otters and spotted cats in Latin America.

Felis geoffroyi (Geoffroy's cat)

gato de las salinas
gato de mato
gato do mato pelo curto
gato montés
gato montés común
mbaracayá/mbarakayá
tirica

Felis guigna (kodkod)

gato huina
güiña
huiña
kodkod

Felis jacobita (Andean or mountain cat)

chinchay
gato andino
gato lince
gato montés
gato montés andino

Felis pardalis (ocelot)

canunii
chati
chibiguazú/chiviguazú
cunagüaro
dyagua-mini
gallerino
gato onza
hualperro
jaguaritica/jacaritica
jaguatirica
maracajá-assú
mbaracayá-guazú
mathuntori
ocelote
pumillo
tigrillo
tiricón
yagua-tirica
yaguareté-i
yaguartirica/yagyaterica

manigordo

Felis tigrina (oncilla, little spotted cat, tiger cat)

caucel/cauzel
chivi´/chibi´
gato onza chico
gato pintado
gato tigre
gato tigre chico
gato tigre común
kuichua
margay
mbaracaya´/mbarakaya´
mbaracaya´-miri´
peludo
tigre gallinero
tigrillo
tigrillo chico
tigrillo peludo
tirica

Felis wiedii (margay)

burricón
caucel
chivi
cunaguaro
gato do mato cauda longa
gato do mato pintado
gato montés
gato pintado
gato tigre
gato tigre de wied
gato tigre grande
huamburushu/huamburusho
maracaja´
margay
mbaracaya´/mbarakaya´
tigre gallinero
tigrillo

Panthera onca (jaguar)

acangusu´/cangusu´
banco-puma
dyagua´-ete´
el bicho
tigre americana
tigre mariposa
tigre/tigra
tiog

el overo
gato onza
kaiyoc
kiyué
manitzi
nahuel
ninii
onca pintada/preta
onza
onza negra (for melanistic specimens)
otorongo
pantera onza
uturunku/uturunco
yagua-hú (for melanistic specimens)
yaguá-pará
yaguar/jaguar
yaguara pichuna (for melanistic specimens)
yaguara/yanuara
yaguarazú
yaguareté
yaguat
yaúi/yaí
zauat

Lutra felina (marine otter)

chinchimen
chingungo/chungungo
epu
gato de mar
gato marino
gatuna/nutria gatuna
huallaque
iapooh
lobito marino
nutria
nutria de Magallanes
nutria de mar
nutria de marina
shemtrr

Lutra longicaudis
(Guyana, La Plata, Amazon, and Central American otter)

cachorro d'agua
gato de agua
lobito de agua
nutria
nutria brasileña
nutria de Brasil

lobito del Plata
lobito de rio
lobo chato
lobo de rio chico
lobo-pé
lontra
lontrinha
lutra del plata
mallu-puma
me
nutria de Costa Rica
nutria de rio
nutria del noroeste
nutria del Peru
nutria del plata
nutria peruana
perro de agua
pisua
tacshan lobo

Lutra provocax (southern river otter)

auilä̈f
güillín
huillín
lobito de agua
lobito de rio patagónico
lobito del rio
lobito patagónico
nutria
nutria de Chile
nutria patagonica
yem 'chen

Pteronura brasiliensis (giant river otter)

ariraí
ariranha/arirañ̃a
arraí
inii
lobito de cola ancha/lobito de rio de cola ancha
lobo corbata
lobo de pecho amarillo
lobo grande de rio/lobo de rio grande
lobo marino
lontra
nutria gigante
nutria grande
parare
perro de agua

lobo de rio saro

lobo gargantillo/gargantilla