view of the South American bearded saki monkeys, genus *Chiropotes* (Cebidae, Platyrrhini), with a description of a new subspecies. *Fieldiana Zoology* 27: 1-45.

Mittermeier, R. A. and van Roosmalen, M. G. M. 1981. Preliminary observations on habitat utilization and diet in eight Surinam monkeys. *Folia Primatol.* 36: 1-39.

Queiroz, H. L. 1992. A new species of capuchin monkey, genus *Cebus* Erxleben 1777 (Cebidae, Primates) from eastern Brazilian Amazonia. *Goeldiana Zool.*, (15): 1-13.

Roussilhon, C. 1988. The general status of monkeys in French Guiana. *Primate Conservation* (9): 70-74.

Silva Jr., J. S. 1992. Revisão dos Macacos-de-Cheiro (*Saimiri* Voigt, 1831) da Bacia Amazônica. Unpublished M.Sc. dissertation, Universidade Federal do Pará and Museu Paraense Emílio Goeldi, Belém.

Torres de Assumpção, C. 1988. Resultados preliminares da reavaliação das raças do macaco-prego *Cebus apella* (Primates: Cebidae). *Rev. Nordest. Biol.* 6(1): 15-28.

Pole Bridges to Avoid Primate Kills: A Sequel to Valladares-Padua *et al.*

Roads can interrupt habitat continuity and reduce the chances of survival of some species by fragmenting their populations (Beier, 1995; Oxley *et al.*, 1974; Wilkins, 1982). Additionally, roads may have a negative impact on wildlife populations by increasing mortality through road deaths (Beier, 1995; Comita, 1984; O'Gara and Harris, 1988; Polaco and Guzmán, 1993; Wilkins and Schmidly, 1980). Road accidents with wildlife also have an important economic and social cost (Hansen, 1983). These are likely to be important and increasing problems as roads are constructed in wilderness areas and where they cross regions inhabited by threatened species and populations. Several solutions have been proposed and implemented, including the use of warning signs, road fencing, illumination, reflectors, and road underpasses and overpasses for wildlife (Feldhamer *et al.*, 1986; Gibson, 1980; Reed, 1981; Reed and Woodward, 1981; Schafer and Penland, 1985). These solutions - which have met with mixed success - may be useful for terrestrial fauna, but their utility for arboreal animals is uncertain.

Valladares-Padua *et al.* (1995) demonstrated a simple and imaginative way of avoiding primate road kills and connecting isolated areas of their habitat by placing a pole bridge above a road. They have observed black lion tamarins (*Leontopithecus chrysopygus*) and capuchin monkeys (*Cebus apella*) using the bridge. Valladares-Padua *et al.* (1995) mentioned the successful implementation of the bridge (although not systematically assessed), and made no reference to any negative effects.

The use of pole bridges in open areas (such as in many roads) may, however, have a potentially serious side-effect: primates, particularly callitrichids, may be more exposed to predators, mainly raptors. To make the design of the pole bridge constructed by Valladares-Padua *et al.* more effective in open areas, it would be necessary to provide some sort of shelter while they cross the bridge. This could be achieved in a number of ways, and using local materials, by simply building a roof or providing some other protection such as a web of ropes. By promoting the growth of creeping vines and other plants, bridges and their 'roofs' could be camouflaged to disguise them or make them more appealing aesthetically. However, care has to be taken to avoid creating in this way places for other predators to hide (for example, snakes). Another issue to consider is that raptors may use poles and other artificial platforms to nest (Steenhof *et al.*, 1993). In fact, it is a common management practice to increase raptor populations by providing them with artificial nesting structures (Lefranc and Millsap, 1984). Thus, in regions where this may be a concern, it may be necessary to build the bridges in such a way as to minimize this problem, and to monitor them to remove undesired raptor nests. Finally, having a single pole bridge may create a bottleneck and make the monkeys (and their travel routes) predictable, hence increasing their risk of predation or of being captured by humans. Having several bridges would help solve these problems. The implementation of these proposals would increase the cost of bridges, but it would be minimal compared to the costs of losing individuals of seriously depleted populations. Of course, as in most management programs, decision of what is appropriate for one site will need to be determined case-by-case.

It is of great importance to make an objective assessment of the effectiveness and cost of different bridge designs under various road conditions (for example, road type - paved or dirt - and width, intensity and speed of traffic flow, noise levels, distance to primate habitats). These evaluations are fundamental in order to convince governments and road constructors and operators of their value. If effective, as current evidence and common sense suggest, the establishment of wildlife tunnels and bridges, as well as other means to mitigate population fragmentation and wildlife mortality, should become a standard practice.

Acknowledgments: I thank Dr. David Chivers, M. Galetti and A. K. Gupta for discussion and comments on the manuscript, and DGAPA-UNAM (México) for support.

Alfredo D. Cuarón, Wildlife Research Group, Department of Anatomy, University of Cambridge, Downing Street, Cambridge CB2 3DY, UK.

References

Beier, P. 1995. Dispersal of juvenile cougars in fragmented habitat. *J. Wildl. Manag.* 59: 228-237.

Comita, J. L. 1984. Impacto de los caminos sobre la fauna en el Parque Nacional El Palmar. *Rev. Mus. Arg. Cienc. Nat. "Bernardino Rivadavia" e Inst. Nac. Investig. Cienc. Nat., Zool.* 13: 513-521.

Feldhamer, G. A., Gates, J. E., Harman, D. M., Loranger, A. J. and Dixon, K. R. 1986. Effects of interstate highway fencing on white-tailed deer activity. *J. Wildl. Manag.* 50: 497-503.

Gibson, G. 1980. Road kills. *Wildl. Rev.* 9: 3-5.

Hansen, C. S. 1983. Cost of deer-vehicle accidents in Michigan. *Wildl. Soc. Bull.*, 11: 161-164.

Lefranc, M. N. and Millsap, B. A. 1984. A summary of state and federal agency raptor management programs. *Wildl. Soc. Bull.* 12: 274-282.

O'Gara, B. W. and Harris, R. B. 1988. Age and condition of deer killed by predators and automobiles. *J. Wildl. Manag.* 52: 316-320.

Oxley, D. J., Fenton, M. B. and Carmody, G. R. 1974. The effects of roads on populations of small mammals. *J. Appl. Ecol.* 11: 51-59.

Polaco, O. J. and Guzmán, A. F. 1993. Mortalidad anual de mamíferos en una carretera al sur de Nuevo León. In: *Avances en el Estudio de los Mamíferos de México*, R. A. Medellín and G. Ceballos (eds.), pp.394-407. Publicaciones Especiales, Vol. 1. Asociación Mexicana de Mastozoología, A. C., México, D. F.

Reed, D. F. 1981. Mule deer behavior at a highway underpass exit. *J. Wildl. Manag.* 45: 452-543.

Reed, D. F. and Woodward, T. N. 1981. Effectiveness of highway lighting in reducing deer-vehicle accidents. *J. Wildl. Manag.* 45: 721-726.

Schafer, J. A. and Penland, S. T. 1985. Effectiveness of Swareflex reflectors in reducing deer-vehicle accidents. *J. Wildl. Manag.* 49: 774-776.

Steenhof, H., Kochert, M. N. and Roppe, J. A. 1993. Nesting by raptors and common ravens on electrical transmission-line towers. *J. Wildl. Manag.* 57: 271-281.

Valladares-Padua, C., Cullen Jr., L. and Padua, S. 1995. A pole bridge to avoid primate road kills. *Neotropical Primates* 3(1): 13-15.

Wilkins, K. T. 1982. Highways as barriers to rodent dispersal. *The Southwestern Naturalist* 27: 459-460.

Wilkins, K. T. and Schmidly, D. J. 1980. Highway mortality of vertebrates in southeastern Texas. *Texas J. Sci.*, 22: 343-350.

Habitat and Distribution of the Buffy-tufted-ear Marmoset *Callithrix aurita* in São Paulo State, Brazil, with Notes on Its Natural History

The buffy-tufted-ear marmoset, *Callithrix aurita* is an endangered primate endemic to the states of Minas Gerais, Rio de Janeiro and São Paulo, in southeastern Brazil (Coimbra-Filho, 1991), living in forests between 500 and 800 m altitude (Rylands, 1994). The species has only recently been studied in the field (Torres de Assumpção, 1983; Muskin, 1984; Bueno, 1989; Corrêa, 1995). Here we discuss the former and present-day distribution of the species in the state of São Paulo in the southern limit of its distribution, and also its habitat and ecology.

Distribution

Rylands (1994), following Hershkovitz (1977), considered the species' distribution in São Paulo to be limited by the Rio Ribeira de Iguape to the south, stretching west between the upper courses of the Rios Tietê/Piracicaba and Paranapanema, and north to the border with Minas Gerais. Overall, in São Paulo the species has actually been recorded from 16 localities (Hershkovitz, 1977; Coimbra-Filho, 1991; Vivo, 1991; Centro de Monitoramento Ambiental da Serra do Itapety - Mogi das Cruzes). Except for Boracéia (22°10'S, 48°45'W; Hershkovitz, 1977) there is no locality south of the Rio Tietê at the latitude of São Paulo city, and none east of the ridge of the Serra do Mar. The species is absent from the eastern slopes of the Serra do Mar and lowland forests. Four new localities for the species have been recently discovered: Mairiporã (23°19'S, 46°35'W), where two individuals were observed in August 1981; Atibaia (23°07'S, 46°33'W), a recently prepared specimen in the Atibaia Natural History Museum; Santa Isabel (23°15'W, 40°19'W), based on several observations (see below); and Fazenda Lagoa, São Luis do Paraitinga (*c.* 23°15'S, 45°20'W), an adult male collected in 1984, in the Zoology Museum of the Universidade Federal de Mato Grosso. The species also apparently occurs in the Serra do Japi (23°14'S, 46°57'W; see Marinho-Filho, 1992), where suitable habitat exists, but as other *Callithrix* species have been released there the record has still to be confirmed, despite several trips we have