

The Need of Transboundary Efforts to Preserve the Southernmost Jaguar Population in the World

Agustín Paviolo^{1,2}, Carlos De Angelo^{1,2}, Yamil Di Blanco¹, Carolina Ferrari¹, Mario Di Bitetti^{1,2}, Carlos Benhur Kasper^{3,4}, Fábio Mazim³, José Bonifácio G. Soares³ and Tadeu Gomes de Oliveira^{3,5}

At the June 2005 IUCN/SSC/Cat Specialist Group Workshop in Brazil on the “Status and conservation needs of the Neotropical Felids”, Argentine and Brazilian researchers were surprised to learn that the same jaguar *Panthera onca* had been photographed by camera traps in both countries. The Brazilian researchers (Kasper, Mazim, Soares and de Oliveira) “captured” the animal during their sampling activities at Turvo State Park, in Brazil, and the Argentine group (Paviolo, De Angelo, Di Blanco, Ferrari and Di Bitetti) photographed the same animal two months later, 36 km away, during their field study in Yabotí Biosphere Reserve, in Argentina (Fig. 1). The jaguar is a large male in good physical condition (Fig 2); his home range most likely encompasses areas of Argentina and Brazil.

This is not the first reported case of felines crossing the borders between countries in this region. Crawshaw (1995) reported that three radio-tagged ocelots *Leopardus pardalis* in Iguazu National Park crossed the Iguazú River between Iguazu (Brazil) and Iguazú (Argentina) National Parks. He also recorded the movement of a young jaguar that crossed the Iguazú River, which defines the border between Argentina and Brazil, and at least twice it crossed the Paraná River, which divides Argentina and Brazil from Paraguay. It is worth mentioning that the Paraná River is not only a political border between these countries, but also a wide river, second in size only to the Amazon in South America.

A landscape feature important to these transboundary crossings is the threatened Upper Paraná Atlantic Forest (UPAF). To date, less than 7% of

the original forests cover remains. The Green Corridor is the biggest continuous remnant (12,000 km²) of this ecoregion and is strategically situated in a tri-national boundary between Argentina, Brazil and Paraguay (Fig. 1). Misiones province in Argentina contains more than 80% of this forest remnant, and comprises several national and provincial protected areas, including the Iguazú National Park (670 km²), which, along with the Brazilian Iguazu National Park (1,700 km²), protect the world-famous falls. Brazil also has another important protected area in the region, Turvo State Park (140 km²), which is also separated from protected areas on the Argentinean side by a wide river, the Uruguay (Fig. 1). Only small forest remnants are still present in Paraguay near the Paraná border, with a few small connections to the remainder of the Green Corridor. However, jaguar populations isolated from the Green Corridor still remain in the rest of the UPAF ecoregion in at least five isolated forest fragments in Paraguay (San Rafael National Park, Mbaracayú Biosphere Reserve, Morumbí Private Reserve and in Itabó and Limoy Biological Reserves), and in three areas in Brazil (Morro do Diabo and Varzeas do Rio Ivinhema State Parks and in Ilha Grande National Park). These populations are very important, despite their isolation, and should be included into conservation strategies for this species in the ecoregion.

The Green Corridor still contains populations of six wild Neotropical cats, jaguar, puma *Puma concolor*, ocelot, margay *Leopardus wiedii*, oncilla *Leopardus tigrinus* and jaguarundi *Herpailurus yaguarondi*. The area has also been identified as a “Jaguar Conservation Unit” (Sanderson *et al.* 2002). These authors suggested that scientific and conservation efforts should focus on this population because of its long-term conservation potential and its ecological uniqueness. Also, this jaguar population



Fig. 1. Map of forest remnants, protected areas and camera trap “captures” (stars) of the same jaguar in the Green Corridor of Argentina, Brazil and Paraguay.

is the only one that has been categorized with a “high long-term survival possibility” in both the Atlantic Forest and Argentina (Sanderson *et al.* 2002).

Nonetheless, up-to-date results from three camera-trap surveys by the Argentinean team at Iguazú National Park, Urugua-í Provincial Park and at Yabotí Biosphere Reserve indicate a very low jaguar density (0,13 to 0,86 individuals/100 km²) in the region (Paviolo *et al.* 2006).

One of the most serious threats to the jaguar population in the Green Corridor is habitat loss and fragmentation. These processes have already devastated forests in Brazil and Paraguay and are rapidly occurring in several areas of Misiones Province due to the replacement of native forests by exotic species destined for commercial logging, the expansion of cattle raising and to unplanned human settlements. The Green Corridor faces the additional problem of forest degradation caused by the non-sustainable logging of native plant species and by the loss of native fauna due to poaching. This leads into very low density of terrestrial vertebrates in most forests (Cullen *et al.* 2000, Paviolo 2002). The situation is aggravated by the fact that the vertebrate species most valued by hunters are the same prey preferred by large wild felines (Jorgenson & Redford, 1993). Jaguars are also hunted either as trophies or for the threat they represent for cattle. Transboundary efforts are needed to solve these problems. In Argentina’s Yabotí Biosphere Reserve (Fig. 1) park rangers and frontier guards report meeting Brazilian hunters who have crossed the border to gain access to the larger forest areas with more abundant prey. Obviously, joint efforts and coordinated control policies are needed to restrain illegal activities that threaten the regional fauna.

Recent results show that the jaguar population has abruptly declined in the last 10 years. These estimates indicate that the present population of the Green Corridor is about 50 individuals (Paviolo *et al.* 2006). Given the strong likelihood that the processes leading to the present situation will become worse in the future, the conservation of the jaguar population in the Green Corridor and the whole Upper Paraná Atlantic Forest



Fig. 2. Jaguar male captured at Esmeralda Provincial Park, Argentina, and Turvo State Park, Brazil (Photo: Wild Cats of Brazil Project).

is at stake. None of the protected areas of the region can by itself ensure jaguar conservation due to their low population density. The possibility for this species survival is closely related to the safeguarded connection between the protected areas and the existing remnants in the three countries so as to ensure free movement of the species. Equally important is the mitigation of present threats. Argentineans, Brazilians and Paraguayans should realize that to sustain jaguars in the Upper Paraná Atlantic Forest it is critical to coordinate and join efforts to preserve the Green Corridor. Argentinean authorities should consider the Brazilian protected areas that lay on the other side of the international border as vital for the preservation of jaguars and other species of the Green Corridor. Brazilian authorities should understand that without the Green Corridor, both Iguazu National Park and Turvo State Park have no long-term future as isolated forest fragments. Jaguars can still move between two important Brazilian protected areas, Turvo State Park and Iguazu National Park, but they do so only through the Green Corridor of Misiones, Argentina. There is no corridor in Brazil.

Transboundary planning as a regional conservation strategy has already been implemented in different parts of the world. Within the IUCN Global Transboundary Protected Areas Network (www.tbpa.net), several international endeavors are being undertak-

en. Most of these projects involve the protection of large felines as the snow leopard *Panthera uncia* in the Central Asia Transboundary Biodiversity Project (in Kazakhstan, Kyrgyz Republic and Uzbekistan), lions *Panthera leo* in the “Tri-DOM” (Sustainable Rainforest Management in the Cameroon-Gabon-Congo Interzone), and even jaguars in the “Path of the Jaguar” included in the Mesoamerican Biological Corridor, the region encompassing Mexico’s five southernmost states together with Guatemala, Belize, Honduras, El Salvador, Nicaragua, Costa Rica and Panama (Graham 2004, Fall 2003).

Another good example of transboundary planning in this region is the development of the Biodiversity Vision carried out by several members of WWF network (WWF Brasil, WWF-US, the WWF-US Paraguayan Office and the Fundación Vida Silvestre Argentina) and the collaboration of many local institutions from the three countries involved. This Biodiversity Vision is based on an analysis of opportunities and threats for ecoregional conservation and concludes in a proposal of ecoregional landscape: the Biodiversity Conservation Landscape aimed at preserving regional biodiversity and the main ecological processes and ecological services (Di Bitetti *et al.* 2003). This biodiversity conservation landscape was designed with the jaguar as the focal species, supported by the idea that due to its umbrella effect, most species

will benefit from its conservation. This Biodiversity Vision, has been endorsed by local NGOs, government authorities and other international NGOs. The implementation of this biodiversity landscape is a big challenge and should be conducted in coordination among the three countries. Jaguars and even other felids can serve as focal species to guide and monitor regional conservation efforts.

References

- Crawshaw P. G. Jr. 1995. Comparative ecology of ocelot (*Felis pardalis*) and Jaguar (*Panthera onca*) in a protected subtropical forest in Brazil and Argentina. Ph. D. Univ. Florida, USA.
- Cullen L., Bodmer E. and Valladares-Padua C. 2000. Effects of hunting in habitat fragments of the Atlantic forests, Brazil. *Biological Conservation* 95, 49-56.
- Cullen L., Abreu K., Sana D. and Ferreira Dales Navas A. 2005. Jaguars as landscape detectives for the upper Paraná River corridor, Brazil. *Natureza and Conservação* 3, n. 1.
- Di Bitetti M. S., Placci G. and Dietz L. A. 2003. A Biodiversity Vision for the Upper Paraná Atlantic Forest Eco-region: Designing a Biodiversity Conservation Landscape and Setting Priorities for Conservation Action. World Wildlife Fund. Washington, D.C.
- Fall J. J. 2003. Planning protected areas across boundaries: new paradigms and old ghosts. *Journal of Sustainable Forestry*, 17, 81-102.
- Graham B. 2004. Integrating Biodiversity Conservation and Sustainable Use: Lessons Learned From Ecological Networks. IUCN, Gland, Switzerland, and Cambridge, UK. vi + 55 pp.
- Jorgenson J. P. and Redford K. H. 1993. Humans and big cats as predators in the neotropics. In Dunstone N. Gorman M. L. (eds.). *Mammals as predators*. Zoological Society of London Symposia 65. Oxford, England. Pp. 367-390.
- Ministerio do Meio Ambiente, Conservação International do Brasil, Fundação SOS Mata Atlântica, Fundação Biodiversitas, Instituto de Pesquisas Ecológicas, Secretaria do Meio Ambiente do Estado de São Paulo, SEMAD/Instituto Estadual de Florestas-MG.: Avaliação e ações prioritárias para a conservação da biodiversidade da Mata Atlântica e Campos Sulinos. 2000 Brasília. 40pp.
- Paviolo A. J. 2002. Abundancia de presas potenciales de yaguareté (*Panthera onca*) en áreas protegidas y no protegidas de la Selva Paranaense, Argentina. Tesis de licenciatura. Universidad Nacional de Córdoba
- Paviolo A. J., De Angelo C., Di Blanco Y. E., Ferrari C., Di Bitetti M. S. 2006. Estado de conservación del jaguar (*Panthera onca*) en el Bosque Atlántico del Alto Paraná de Misiones, Argentina. Book of abstracts, VII Congreso Internacional sobre Manejo de Fauna Silvestre na Amazonia e America Latina. Ilheus, Brazil.
- Sanderson E. W., Redford K. H., Chetkiewicz C. B., Medellín R. A., Rabinowitz A. R., Robinson J. G. and Taber A. B. 2002. Planning to save a species: the jaguar as a model. *Conservation Biology* 16, 58-72.

¹ Proyecto Yaguareté. Asociación Civil Centro de Investigaciones del Bosque Atlántico, Argentina. <paviolo4@arnet.com.ar>

² National Research Council of Argentina (CONICET) and Laboratorio de Investigaciones Ecológicas de las Yungas (LIEY), Universidad Nacional de Tucumán, Argentina.

³ Wild Cats of Brazil Project (Projeto Gatos do Mato – Brasil, SACCA)

⁴ PPG Biologia Animal - Universidade Federal do Rio Grande do Sul (Brazil)

⁵ Universidade Estadual do Maranhão (UEMA) and Instituto Pró-Carnívoros, Brazil

⁶ Instituto Pró-Pampa (IPPampa), Brazil