

Perrier's Sifaka
Propithecus perrieri Lavauden, 1931
Madagascar
(2000, 2002, 2004, 2014, 2016)

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Perrier's Sifaka (*Propithecus perrieri*)
(Illustrations: Stephen D. Nash)

Perrier's sifaka (*Propithecus perrieri*) is a lemur of intermediate size relative to other members of the genus *Propithecus* (Ranaivoraisoa *et al.* 2006; Lehman *et al.* 2005). It is characterized by an all-black pelage, naked black face and striking orange-red eyes (Mittermeier *et al.* 2010). Perrier's sifaka occurs in dry deciduous forests on limestone karst and semi-evergreen transitional forests on sandstone soils. A preliminary dietary study found that it **feeds predominantly on leaves, flowers and fruit** (Lehman and Mayor 2004). Its current distribution is the smallest of all *Propithecus* species and *P. perrieri* has been recognized as Critically Endangered since 1996 (Mittermeier *et al.* 2010; Banks 2012; Salmona *et al.* 2013a; Andriaholinirina *et al.* 2014). Its geographic range is restricted to the extreme northeast of Madagascar, some 50 km south of Antsiranana (Diego Suarez). It extends from the

Analamerana Massif to the Irodo River and is bounded in the south by the Andrafiama mountain chain (Banks 2012; Zaonarivelo *et al.* 2007). Despite evidence of the species' presence in the Ankarana National Park in the 1980s and 1990s (Hawkins *et al.* 1990; Meyers 1996), three recent surveys in 2003, 2004 and 2012 (Banks *et al.* 2007; Rasoloharijaona *et al.* 2005; Salmona *et al.* 2013a) failed to find Perrier's sifakas there. Furthermore, suggestions that its distribution might also extend south of the Andrafiama mountains and into the Andavakoera Forest (Schwitzer *et al.* 2006) could not be confirmed during two surveys in the area in 2006 and 2012 (Zaonarivelo *et al.* 2007; Salmona *et al.* 2013b). Also, *P. perrieri* is not being kept in captivity anywhere in the world (Andriaholinirina *et al.* 2014).

Earlier estimates of Perrier's sifaka population size suggested that less than 1,000 individuals persist in the wild (Banks *et al.* 2007). Estimates of the effective population size (N_e) from field **data (~230 individuals;** Banks *et al.* 2007) and from genetic data (**N_e ~50–100;** Salmona *et al.* 2015) further support that the population is small. However, extended survey efforts (across 85% of the total remaining habitat) by M. Banks between 2007 and 2012, and considering behaviour, observer,

and habitat type, showed a population size estimate of ~2,100 individuals. Sandstone forests, despite representing only ~12% of the habitat, likely host nearly 40% of Perrier's sifaka populations with densities up to an order of magnitude higher than in other forest types (Banks 2013).

Perrier's sifaka can cross open areas for distances of up to 600 m (Mayor and Lehman 1999). Other sifaka species are known to disperse over larger distances of open habitat (Meyers and Wright 1993; Richard *et al.* 1993). Population level studies and occupancy patterns (Banks 2013) as well as genetic data (Salmona *et al.* 2015) indicate that the population is either not strongly influenced by the fragmentation of forests and the matrix of open grassland habitats or these effects have not yet been detected (i.e. no clear barriers could be identified by these authors). Surprisingly, Mayor *et al.* (2002), Salmona *et al.* (2015) and Bailey *et al.* (2016), identified relatively high levels of genetic diversity compared to other sifakas. Even though Perrier's sifaka may have the ability to cross open grassland, most sifakas encountered were elusive and fled from humans (Salmona *et al.* 2015). Studies of occupancy patterns showed that Perrier's sifakas avoid forest patches in proximity to human settlements with ≥ 10 households where they are susceptible to attacks from dogs, particularly when attempting to cross matrix habitat (Banks 2013). The combined effects of deforestation, fragmentation and human activity could prevent them from routinely crossing open land, thereby decreasing gene flow and further fragmenting the remaining population (Salmona *et al.* 2015). With >2,200 individuals left (Banks 2013), not all of which are reproductive, and a long generation time of 10–20 years, the viability of the population is at a high risk of being compromised. Generation time estimates are tentative and partly based on data from Verreaux's sifaka, *P. verreauxi* (Lawler *et al.* 2009; Morris *et al.* 2011; Salmona *et al.* 2015; see Salmona *et al.* 2017 for details).

Decades ago, several authors reported the presence of Perrier's sifaka outside of its current distribution (Hawkins *et al.* 1990; Meyers 1996). Moreover, subfossils of *P. cf. diadema* (possibly *P. perrieri*) were reported in an Ankarana cave (Jungers *et al.* 1995; Godfrey *et al.* 1999) and far north from its current distribution in Montagne des Français, Andavakoera cave (Dewar *et al.* 2013). Perrier's sifaka paleodistribution and population size may have been larger than today. In addition, recently found genetic signatures of population decline suggest

that the population underwent a major decline in the past 5,000 years (Salmona *et al.* 2017) similar to the decline detected in the neighbouring golden-crowned sifaka (Quéméré *et al.* 2012; Salmona *et al.* 2017). Although it is not clear which events brought Perrier's sifaka to its current restricted distribution and small population size, it is likely due to the conjugated effects of climatic and human driven forest size fluctuations (Salmona *et al.* 2017). Indeed, the population contraction datings overlap with the first documented human presence in the region ~4,000 years ago (Dewar *et al.* 2013), and also with major dry periods such as the mid-Holocene Boundary (Salmona *et al.* 2017). Today, Perrier's sifaka is still strongly protected by a local Antankarana taboo (*fady*) which prohibits poaching and consumption and is shared by more than 95% of local residents (Anania *et al.* submitted). This suggests that the sifaka population may not have been under heavy direct human pressure. The recent range decrease – no observations in Ankarana NP since the 1990s – may be the result of indirect effects such as selective logging, deforestation, and loss of connectivity. While Landsat 7 imagery between 1994 and 2003 suggests a decline of sandstone forest cover of >60% over this period, loss of connectivity has been exacerbated by increasing traffic on the national road crossing the park, likely isolating part of the sifaka population.

Given the small total population size, persistence of local threats and the paucity of wildlife patrols, an appraisal of Perrier's sifaka population levels and an effective control of habitat loss are urgently needed. This requires a unified regional management plan, since the species' natural range and potential areas of migration/seasonal presence overlap with three protected areas of different protective status, independently managed by Madagascar National Parks (Analamerana and Ankarana) and Fanamby (Andrafiarana). Given the diverse group of stakeholders involved (e.g., park services, ministries, universities, tour operators, local businesses, farmers), *P. perrieri* conservation requires a clearly defined institution, committed to leading its conservation plan with incentives for inclusive action that take advantage of the strengths of the different participants.

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