

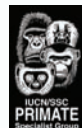
Primates in Peril

The World's 25 Most Endangered Primates
2008–2010



Russell A. Mittermeier, Janette Wallis, Anthony B. Rylands, Jörg U. Ganzhorn,
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M. Cecília M. Kierulff, Long Yongcheng, Jatna Supriatna, Christian Roos,
Sally Walker, Liliana Cortés-Ortiz, and Christoph Schwitzer

2009



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Northern sportive lemur (*Lepilemur septentrionalis*) © Conservation International. Photo by Russell A. Mittermeier

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**IUCN/SSC Primate Specialist Group (PSG)
International Primatological Society (IPS)
Conservation International (CI)**



This publication was supported by the
Margot Marsh Biodiversity Foundation

Published by: IUCN/SSC Primate Specialist Group (PSG), International Primatological Society (IPS), and Conservation International (CI)

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Citation: Mittermeier, R. A., Wallis, J., Rylands, A. B., Ganzhorn, J. U., Oates, J. F., Williamson, E. A., Palacios, E., Heymann, E. W., Kierulff, M. C. M., Long Yongcheng, Supriatna, J., Roos, C., Walker, S., Cortés-Ortiz, L. and Schwitzer, C. (eds.). 2009. *Primates in Peril: The World's 25 Most Endangered Primates 2008–2010*. IUCN/SSC Primate Specialist Group (PSG), International Primatological Society (IPS), and Conservation International (CI), Arlington, VA. 84pp.

ISBN: 978-1-934151-34-1

Illustrations: © Stephen D. Nash, Conservation International, Arlington, VA, and Department of Anatomical Sciences, Health Sciences Center, State University of New York at Stony Brook, NY

Layout: Doan T. Nguyen, Conservation International, Arlington, VA

Printed by: Panamericana Formas e Impresos, S.A., in collaboration with Conservación Internacional – Colombia, Bogotá

September 2009

Available from: Jill Lucena, Conservation International, Arlington, VA, e-mail: <j.lucena@conservation.org>. Website: <<http://www.primate-sg.org>>

Gray-headed Lemur

Eulemur cinereiceps

(Milne-Edwards and Grandidier, 1880)

Madagascar

(2004, 2006, 2008)

Steig Johnson, Jonah Ratsimbazafy, Nancy Stevens,
Hubert Andriamaharoa, Sara Martin
& Fidimalala Ralainasolo

The gray-headed lemur (*Eulemur cinereiceps*) has a complicated taxonomic history. It is closely allied with the brown lemurs (*Eulemur* spp.), particularly the neighboring collared lemur (*E. collaris*). This taxon was until recently classed as a subspecies of *Eulemur fulvus* (Tattersall 1982; Mittermeier *et al.* 1994; Pastorini *et al.* 2000). However, cytogenetic and molecular genetic analyses, as well as infertility in crosses with collared lemurs, suggest full species status (Djletati *et al.* 1997; Wyner *et al.* 1999). The name derives from plates in Milne-Edwards and Grandidier (1890) and was applied to museum specimens from the southeastern coast near Farafangana by Schwarz (1931). Groves (1974) also used this name for “white-cheeked” specimens from southeastern Madagascar, distinguishing them from *E. collaris*. Subsequently, Rumpler (1975) made a similar distinction based on karyotypes, but adopted the presumably junior synonym *E. albocollaris* (or “white-collared lemur”). The latter nomenclature was supported by Tattersall (1979, 1982) and others, and came to prevail in the literature. It was later suggested that *E. cinereiceps* and *E. albocollaris* might represent separate taxa (Groves 2001; Mittermeier *et al.* 2006); in this scenario, *E. cinereiceps* would likely be found in coastal forests—the localities for specimens discussed by Schwarz (1931)—whereas *E. albocollaris* would be restricted to interior forests (for example, near Vondrozo). This idea was tested with available evidence from genetic sampling and population surveys (Johnson *et al.* 2008). Although not all original localities for *E. cinereiceps* could be sampled due to extensive fragmentation and lemur extirpations in this region during the last century, there is no evidence to date from mtDNA or phenotypes for a coastal-interior division. For now it seems most likely that the region contains just one species and that the name *E. cinereiceps* has priority (Johnson *et al.* 2008). Further ground surveys and genetic sampling should be conducted to confirm these findings.

The gray-headed lemur has one of the most restricted distributions of any *Eulemur* species. It



occurs only in southeastern Madagascar from just north of the Manampatrana River to near the Mananara River in the south (Petter and Petter-Rousseaux 1979; Tattersall 1982; Irwin *et al.* 2005). This range includes a continuous forest corridor in the interior escarpment and small forest relicts in the coastal plain. In the north, there is a hybrid zone with *E. rufifrons* centered in Andringitra National Park, extending south to the vicinity of Karianga and north beyond Ankarimbelo (Sterling and Ramarason 1996; Wyner *et al.* 2002; Irwin *et al.* 2005). This encompasses an area of up to 50% of the range of “pure” *E. cinereiceps*. The southern boundary of the species is not well established, and could extend to Vohipaho Forest near Vangaindrano (where *E. cinereiceps* may be sympatric with *E. collaris*; H. Andriamaharoa unpubl. data). Other than Andringitra National Park, *E. cinereiceps* is only found in two protected areas: Manombo Special Reserve and the recently established conservation project at Mahabo Forest, both near Farafangana. The large Andringitra population consists almost entirely of hybrids (Wyner *et al.* 2002), whereas degraded coastal forests at Manombo and Mahabo contain only c.750 *E. cinereiceps* individuals (C. Ingraldi in prep.). Population densities across the range tend to be low relative to other *Eulemur* species (Johnson and Overdorff 1999; Johnson and Wyner 2000). Recent analyses combining ground surveys and Landsat imagery indicate that the

total habitat remaining within the gray-headed lemur range is approximately 700 km², with an estimated remaining population of 7,265 ±2,268 individuals (Irwin *et al.* 2005).

Information regarding the natural history of the gray-headed lemur derives largely from recent studies conducted at the interior Vevembe Forest, along with new long-term studies currently underway at Manombo and Mahabo. This species has a highly frugivorous diet, supplemented with flowers, leaves, and fungi. *Pandanus* spp. flowers are an especially important food late in the dry season at Vevembe (Johnson 2002). *Pandanus* fruit also comprises a major component of the diet at Mahabo, along with *Noronhia*, *Pyrostria*, and *Uapaca* (H. Andriamaharoa, C. Birkinshaw, A. Rued unpubl. data). At Manombo, *E. cinereiceps* has been observed eating non-native plants like *Aframomum angustifolium* and a shelf fungus that grows on invasive *Cecropia* (Ralainasolo *et al.* 2008). Feeding on such items may enable *E. cinereiceps* to cope with habitat disturbance, and perhaps in part to avoid competition with other lemurs such as *Varecia* for native plants. The species is cathemeral (active both day and night) throughout the year. It is an adept arboreal quadruped with frequent use of leaping behaviors, and its limb kinematics correspond closely with those of *Eulemur collaris* (Stevens *et al.* in review). Social groups tend to be multi-male/multi-female and regularly exhibit fission-fusion (Overdorff and Johnson 2003; Johnson 2006). Group size may reach as many as 16 individuals (Johnson 2002). Coastal populations have smaller social groups, with apparently frequent dispersal of individuals among groups (H. Andriamaharoa, S. Martin, C. Ingraldi, A. Rued unpubl. data). Like other lemurs, reproduction is highly seasonal, although extra-seasonal copulations (with at least one birth) have been recorded at Mahabo (A. Rued in prep.).

Deforestation and hunting present the greatest threats to the survival of the gray-headed lemur. Populations in the Manombo lowland rain forest and Mahabo littoral forest are particularly vulnerable to these pressures due to the fragmentation and isolation of the coastal landscape, as well as possible small population effects. They are also susceptible to powerful stochastic climatic events: a cyclone that struck this region in 1997 reduced lemur populations by approximately 50% (Ratsimbazafy *et al.* 2002). These coastal populations have apparently undergone a significant genetic bottleneck, and effective population size (number of breeding individuals) falls well below total population estimates (R. Brennehan, E. E. Louis Jr., S. Johnson in prep.). The extensive hybrid zone with *E. f. rufus* may also pose a risk to the gray-headed lemur; research is presently being conducted to assess the direction and magnitude of gene flow

across the contact zone and “pure” populations (K. Delmore in prep.). Current research is also underway to investigate disease ecology in *E. cinereiceps*. Preliminary evidence suggests heavy infestations of some parasites (for example, pinworms) that could reduce fitness, particularly if degraded environmental conditions compromise immune response (S. Martin in prep.).

The Malagasy government, conservation NGOs, and researchers are together taking steps to counter these alarming trends. The Durrell Wildlife Conservation Trust is working in partnership with Madagascar National Parks to strengthen protection at Manombo, including possible expansion of the Special Reserve. Conservation education and tree-planting programs have also been established in the Manombo communities. Missouri Botanical Garden has supported community-based initiatives to preserve Mahabo Forest within the new framework for protected areas in Madagascar; similar programs are underway at Vohipaho, which may also maintain a small *E. cinereiceps* population. Conservation International is presently initiating programs for the management of the Fandriana-Vondrozo forest corridor. This will be critical for the long-term survival of the gray-headed lemur, as the vast majority of populations are found within this corridor and few are presently protected. Researchers from Université d'Antananarivo, University of Calgary, Stony Brook University, Henry Doorly Zoo, Ohio University, and other institutions are active in studying gray-headed lemur ecology, social systems, population dynamics, and genetics to better understand the risks and baseline requirements for this still poorly known species.

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