



## Supplementary Materials for

### **Averting Lemur Extinctions amid Madagascar's Political Crisis**

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## Materials and Methods

### *GIS Methodology and Creation of Map (Text)*

All data were imported into a GIS and processed using ArcGIS 10.1 (ESRI 2012. ArcGIS Desktop: Release 10.1. Redlands, CA: Environmental Systems Research Institute).

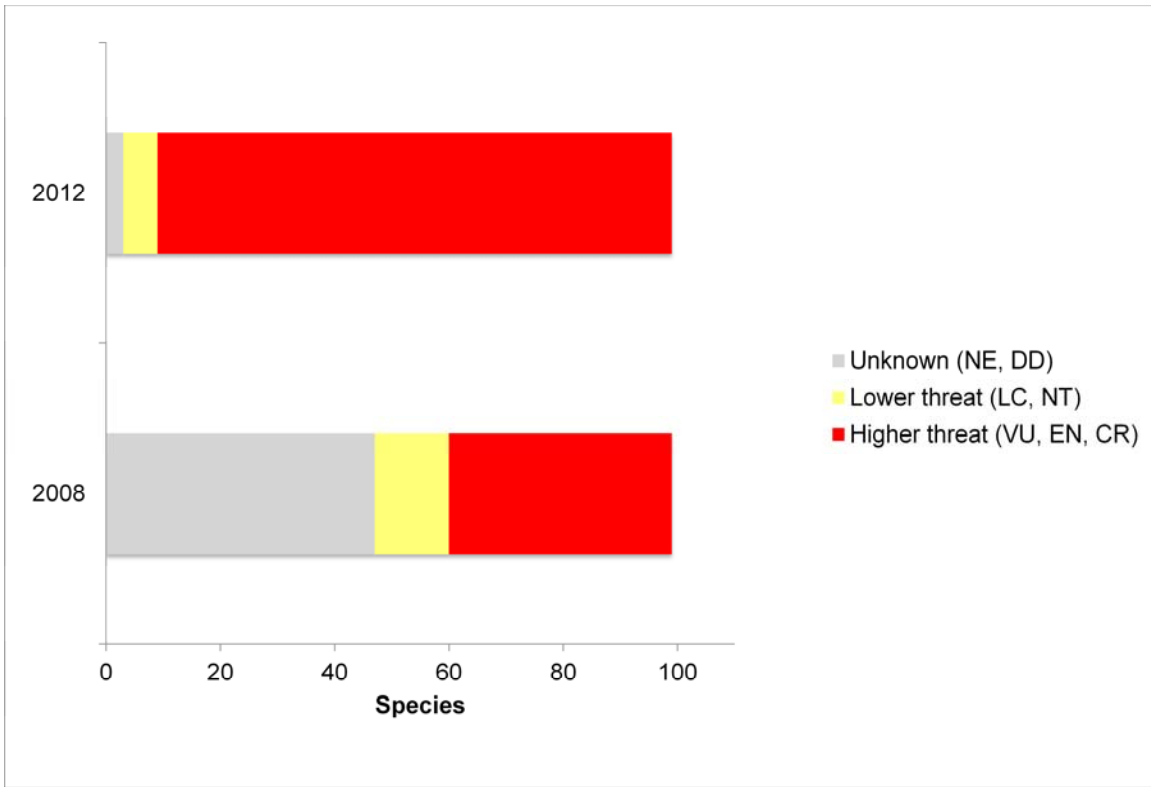
Species ranges ( $n = 98$ ; available from [http://homepages.ualgary.ca/~stjohnso/Schwitzer\\_et\\_al\\_Supplemental/IUCN\\_Red\\_List\\_lemurs\\_maps\\_2013/](http://homepages.ualgary.ca/~stjohnso/Schwitzer_et_al_Supplemental/IUCN_Red_List_lemurs_maps_2013/)) were mapped by a group of 60 Malagasy and international lemur experts at an IUCN Red-Listing and Conservation-Planning Workshop in July 2012 (2) (see also <http://tinyurl.com/LemurRLWorkshop>) and were projected to a custom projection for Madagascar, which was derived from WGS 84 UTM 38S, with the central meridian set to 47°. Land cover, which was obtained for 2000 and 2005 from Conservation International (13), was reprojected to the custom projection, and areas classified as cloud in 2005 were removed by assigning the class from 2000. Any remaining cloud was reclassified with the class of the adjacent cell using the “Nibble” tool. The land cover data set was reclassified as forest or nonforest and converted to vector (polygon). Because lemurs are forest-dependent, the IUCN species range maps—which represent the minimum convex polygons of the species’ known extent of occurrence and, thus, often include unsuitable habitat—were clipped to the extent of remaining forest cover and converted to raster, which gives a better representation of where lemurs actually occur.

Each species was given a single weighting across its range according to its estimated extinction risk (the likelihood of a species becoming extinct in the near future, given current knowledge about population trends; range; and recent, current, or projected threats), expressed by its 2012 IUCN Red List status [as published in (2) and included here as Table S1] by reclassifying the raster (1 = Least Concern; 2 = Near Threatened; 3 = Vulnerable or Data Deficient; 4 = Endangered; 5 = Critically Endangered). All lemur species’ weighted ranges were summed to provide the richness-risk index, which is a composite measure of richness and estimated extinction risk. For example, where two Near Threatened species co-occur, there is a value of 4, and where 2 Critically Endangered species co-occur, there is a value of 10. Areas with high index values can be considered as harboring highly diverse lemur communities that have a high likelihood of becoming extinct and are therefore high priorities for conservation.

Priority sites were manually digitized on the basis of figures published in the lemur action plan (2) and available from [http://homepages.ualgary.ca/~stjohnso/Schwitzer\\_et\\_al\\_Supplemental/Priority\\_Sites/](http://homepages.ualgary.ca/~stjohnso/Schwitzer_et_al_Supplemental/Priority_Sites/), as shapefiles were unavailable.

Protected Areas were obtained from the World Database on Protected Areas, WDPA 2009 ([www.wdpa.org](http://www.wdpa.org)) and projected to the custom projection for Madagascar.

Cities and towns were obtained from MapCruzin ([www.mapcruzin.com/](http://www.mapcruzin.com/)) and projected to the custom projection for Madagascar. Only key cities; larger, more populous areas; and ports were displayed for reference purposes.



**Fig. S1. Numbers of lemur species in IUCN Red List categories in 2008 and 2012.** NE = Not Evaluated; DD = Data Deficient; LC = Least Concern; NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered. [Source (2); see also Table S1]

**Table S1. IUCN Red List categories of 101 lemur species in 2008 and after reassessment in July 2012 (Post Workshop Red List status). NE = Not Evaluated; DD = Data Deficient; LC = Least Concern; NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered. [Source (2) amended]**

Scientific name	Common name	Red List status 2008	Post workshop Red List status
<b>CRITICALLY ENDANGERED</b>			
<i>Microcebus mambiratra</i>	Claire's mouse lemur	DD	CR
<i>Microcebus gerpi</i>	Gerp's mouse lemur		CR
<i>Microcebus marohita</i>	Marohita mouse lemur	NE	CR
<i>Cheirogaleus sibreei</i>	Sibree's dwarf lemur	DD	CR
<i>Lepilemur jamesorum</i>	James' sportive lemur	DD	CR
<i>Lepilemur fleuretteae</i>	Madame Fleurette's sportive lemur	DD	CR
<i>Lepilemur septentrionalis</i>	Northern sportive lemur	CR	CR
<i>Lepilemur tymerlachsonorum</i>	Nosy Be sportive lemur	DD	CR
<i>Lepilemur sahamalazensis</i>	Sahamalaza sportive lemur	DD	CR
<i>Hapalemur alaotrensis</i>	Lake Alaotra bamboo lemur	CR	CR
<i>Hapalemur aureus</i>	Golden bamboo lemur	EN	CR
<i>Prolemur simus</i>	Greater bamboo lemur	CR	CR
<i>Eulemur cinereiceps</i>	White-collared brown lemur	EN	CR
<i>Eulemur flavifrons</i>	Blue-eyed black lemur	CR	CR
<i>Eulemur mongoz</i>	Mongoose lemur	VU	CR
<i>Varecia variegata</i>		CR	CR
<i>Varecia variegata ssp. variegata</i>	Black-and-white ruffed lemur	CR	CR
<i>Varecia variegata ssp. editorum</i>	Southern black-and-white ruffed lemur	CR	CR
<i>Varecia variegata ssp. subcincta</i>	White-belted ruffed lemur	CR	CR
<i>Varecia rubra</i>	Red ruffed lemur	EN	CR
<i>Propithecus tattersalli</i>	Tattersall's sifaka	EN	CR
<i>Propithecus diadema</i>	Diademed sifaka	EN	CR
<i>Propithecus candidus</i>	Silky sifaka	CR	CR
<i>Propithecus perrieri</i>	Perrier's sifaka	CR	CR
<i>Indri indri</i>	Indri	EN	CR
<b>ENDANGERED</b>			
<i>Microcebus berthae</i>	Madame Berthe's mouse lemur	EN	EN
<i>Microcebus ravelobensis</i>	Golden-brown mouse lemur	EN	EN
<i>Microcebus bongolavensis</i>	Bongolava mouse lemur	DD	EN
<i>Microcebus danfossorum</i>	Danfoss' mouse lemur	DD	EN
<i>Microcebus margotmarshae</i>	Margot Marsh's mouse lemur		EN
<i>Microcebus sambiranensis</i>	Sambirano mouse lemur	EN	EN
<i>Microcebus arnholdi</i>	Arnhold's mouse lemur		EN
<i>Microcebus jollyae</i>	Jolly's mouse lemur	DD	EN
<i>Microcebus simmonsii</i>	Simmons' mouse lemur	DD	EN

Scientific name	Common name	Red List status 2008	Post Workshop Red List status
<i>Microcebus macarthurii</i>	MacArthur's mouse lemur		EN
<i>Microcebus mittermeieri</i>	Mittermeier's mouse lemur	DD	EN
<i>Mirza coquereli</i>	Coquerel's giant mouse lemur	NT	EN
<i>Mirza zaza</i>	Northern giant mouse lemur	VU	EN
<i>Phaner pallescens</i>	Pale fork-marked lemur	LC	EN
<i>Phaner parienti</i>	Sambirano fork-marked lemur	VU	EN
<i>Phaner electromontis</i>	Montagne d'Ambre fork-marked lemur	VU	EN
<i>Lepilemur betsileo</i>	Betsileo sportive lemur	DD	EN
<i>Lepilemur microdon</i>	Small-toothed sportive lemur	DD	EN
<i>Lepilemur wrightae</i>	Wright's sportive lemur	DD	EN
<i>Lepilemur hollandorum</i>	Holland's sportive lemur		EN
<i>Lepilemur scottorum</i>	Scott's sportive lemur		EN
<i>Lepilemur milanoii</i>	Daraina sportive lemur	DD	EN
<i>Lepilemur ankaranensis</i>	Ankarana sportive lemur	EN	EN
<i>Lepilemur mittermeieri</i>	Mittermeier's sportive lemur	DD	EN
<i>Lepilemur grewcockorum</i>	Grewcock's sportive lemur	DD	EN
<i>Lepilemur otto</i>	Otto's sportive lemur	DD	EN
<i>Lepilemur edwardsi</i>	Milne-Edwards' sportive lemur	VU	EN
<i>Lepilemur ahmansonorum</i>	Ahmanson's sportive lemur	DD	EN
<i>Lepilemur randrianasoloi</i>	Randrianasolo's sportive lemur	DD	EN
<i>Lepilemur hubbardorum</i>	Hubbard's sportive lemur	DD	EN
<i>Lepilemur leucopus</i>	White-footed sportive lemur	DD	EN
<i>Hapalemur griseus ssp. gilberti</i>	Gilbert's grey bamboo lemur	DD	EN
<i>Lemur catta</i>	Ring-tailed lemur	NT	EN
<i>Eulemur albifrons</i>	White-fronted brown lemur	VU	EN
<i>Eulemur sanfordi</i>	Sanford's brown lemur	EN	EN
<i>Eulemur collaris</i>	Collared brown lemur	VU	EN
<i>Eulemur coronatus</i>	Crowned lemur	VU	EN
<i>Avahi mooreorum</i>	Moore's woolly lemur		EN
<i>Avahi betsileo</i>	Betsileo woolly lemur	DD	EN
<i>Avahi meridionalis</i>	Southern woolly lemur	DD	EN
<i>Avahi occidentalis</i>	Western woolly lemur	EN	EN
<i>Avahi cleesei</i>	Cleese's woolly lemur	EN	EN
<i>Avahi unicolor</i>	Sambirano woolly lemur	DD	EN
<i>Propithecus verreauxi</i>	Verreaux's sifaka	VU	EN
<i>Propithecus deckenii</i>	Decken's sifaka	VU	EN
<i>Propithecus coronatus</i>	Crowned sifaka	EN	EN
<i>Propithecus coquereli</i>	Coquerel's sifaka	EN	EN
<i>Propithecus edwardsi</i>	Milne-Edwards' sifaka	EN	EN
<i>Daubentonia madagascariensis</i>	Aye aye	NT	EN

Scientific name	Common name	Red List status 2008	Post Workshop Red List status
<b>VULNERABLE</b>			
<i>Microcebus myoxinus</i>	Pygmy mouse lemur	DD	VU
<i>Microcebus tavaratra</i>	Tavaratra mouse lemur	EN	VU
<i>Microcebus rufus</i>	Red mouse lemur	LC	VU
<i>Microcebus lehilahytsara</i>	Goodman's mouse lemur	DD	VU
<i>Allocebus trichotis</i>	Hairy-eared mouse lemur	DD	VU
<i>Phaner furcifer</i>	Masoala fork-marked lemur	LC	VU
<i>Lepilemur seali</i>	Seal's sportive lemur	DD	VU
<i>Lepilemur dorsalis</i>	Grey-backed sportive lemur	DD	VU
<i>Lepilemur aeeclis</i>	AEECL's sportive lemur	DD	VU
<i>Lepilemur ruficaudatus</i>	Red-tailed sportive lemur	DD	VU
<i>Lepilemur petteri</i>	Petter's sportive lemur	DD	VU
<i>Hapalemur griseus</i>		VU	VU
<i>Hapalemur griseus ssp. griseus</i>	Grey bamboo lemur	VU	VU
<i>Hapalemur meridionalis</i>	Southern bamboo lemur	VU	VU
<i>Hapalemur occidentalis</i>	Northern bamboo lemur	VU	VU
<i>Eulemur rufus</i>	Rufous brown lemur	DD	VU
<i>Eulemur macaco</i>	Black lemur	VU	VU
<i>Eulemur rubriventer</i>	Red-bellied lemur	VU	VU
<i>Avahi laniger</i>	Eastern woolly lemur	LC	VU
<i>Avahi peyrierasi</i>	Peyrieras' woolly lemur	DD	VU
<i>Avahi ramanantsoavanai</i>	Ramanantsoavana's woolly lemur	DD	VU
<b>NEAR THREATENED</b>			
<i>Lepilemur mustelinus</i>	Weasel sportive lemur	DD	NT
<i>Eulemur fulvus</i>	Common brown lemur	NT	NT
<i>Eulemur rufifrons</i>	Red-fronted brown lemur	NT	NT
<b>LEAST CONCERN</b>			
<i>Microcebus murinus</i>	Common mouse lemur	LC	LC
<i>Microcebus griseorufus</i>	Grey-brown mouse lemur	LC	LC
<i>Cheirogaleus medius</i>	Fat-tailed dwarf lemur	LC	LC
<b>DATA DEFICIENT</b>			
<i>Cheirogaleus major</i>	Greater dwarf lemur	LC	DD
<i>Cheirogaleus crossleyi</i>	Crossley's dwarf lemur	DD	DD
<i>Cheirogaleus minusculus</i>	Lesser iron-grey dwarf lemur	DD	DD
<i>Hapalemur griseus ssp. ranomafanensis</i>	Ranomafana grey bamboo lemur		DD

## References and Notes

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