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A Newsletter of the Neotropical Section of the IUCN/SSC Primate Specialist Group

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Species and Subspecies of Neotropical Primates
Conservation Status According to the Mace-Lande System
and Distribution by Country and Region



Editorial

In October 1993, the Neotropical Section of the IUCN/SSC Primate Specialist Group prepared a revision of the IUCN ratings for the South American primates. The results of this revision were reported in *Neotropical Primates* 1(4) (Rylands, A. B., Encarnación, F. and Mittermeier, R. A. 1993b. South American primates and the IUCN Red List of Threatened Animals, pp.1-2, 1993), and the proposal was accepted by IUCN and published in the 1994 *IUCN Red List of Threatened Animals*, compiled by the World Conservation Monitoring Center, Cambridge.

In this supplement of *Neotropical Primates* we report on a further revision of the ratings for the threatened status of the species and subspecies of all New World primates, this time based on the categorization system first proposed by G. M. Mace and R. Lande (Assessing extinction threats: toward a reevaluation of IUCN threatened species categories. *Conservation Biology* 5(2): 148-157, 1991). Following numerous drafts, consultations and revisions, this system was adopted by the World Conservation Union (IUCN) Council and the Species Survival Commission (SSC) in December 1994. The complete text explaining and defining the new IUCN Red List Categories comprises the first article.

A preliminary proposal for the categorization of the threatened status of the platyrrhines following the Mace-Lande system was drawn up by the PSG Chairman, Russell A. Mittermeier, and the Vice Chairmen for the Neotropical Section, Ernesto Rodríguez-Luna and Anthony B. Rylands, during the XV Congress of the International Primatological Society, Bali, Indonesia, in August 1994. Evaluation of the Middle American primates benefited from the concurrent elaboration of the MesoAmerican Primate Action Plan (Rodríguez-Luna, E., *Neotropical Primates* 1(3):11-13, 1993). This proposal was then submitted for review to 86 members of the Neotropical Section of the PSG in October 1994.

The second article in this supplement provides the results of this evaluation based on a listing of 202 species and subspecies, from southern Mexico to northern Argentina. It should be emphasized that taxonomic revisions have been carried out recently for a number of genera, but for others the taxonomies used date back 30 or 40 years. The common name, distribution by country, and the criteria determining threatened status are also given, along with the numbers of species and subspecies in each country, and in seven phytogeographic regions, including analyses of endemism and the taxa which are threatened in each.

We are most grateful to the following PSG members for their collaboration in drawing up this Mace-Lande listing of threatened species and subspecies: José Márcio Ayres, Ibsen de Gusmão Câmara, Ademar F. Coimbra-Filho, Thomas R. Defler, Andrew G. Johns, Devra G. Kleiman, Claudio Valladares-Padua, Gilberto Silva-López, Karen B. Strier, Roland Wirth, A. Hernández Yañez, and Gabriel Zunino.

Finally, we are publishing a list of the current members of the Neotropical section of the IUCN/SSC Primate Specialist Group, which now total 60 representing the non-human primates in 15 countries (Argentina - 4, Belize - 2, Bolivia - 2, Brasil - 19, Colombia - 3, Costa Rica - 1, Ecuador - 4, Guatemala - 1, Mexico - 12, Panama - 1, Paraguay - 1, Peru - 7, Suriname - 1, and Venezuela - 2), along with seven members based in the USA, and 19 members comprising the Special/Captive Breeding Section.

The editors would be most grateful for any comments or corrections regarding the species/subspecies lists for each of the countries. In addition, we emphasize that the *IUCN Red List of Threatened Species* is subject to continuous revision. We encourage any substantiated proposals for changes in the categories ascribed to the species and subspecies. They will be carefully considered and submitted to PSG members.

Russell A. Mittermeier, Chairman IUCN/SSC Primate Specialist Group
Anthony B. Rylands and Ernesto Rodríguez-Luna - Co-Vice Chairmen - Neotropical Section

A New System for Classifying Threatened Status

The IUCN Species Survival Commission (SSC) of the World Conservation Union (IUCN) recently published the official text which provides information on, and the definitions for, the new threatened status categories adopted by IUCN at the 40th Meeting of the IUCN Council, Gland, Switzerland. The evaluation of the status of animal and plant species is one of the principal tasks of the SSC Specialist Group network, and for this reason we are publishing the text in its entirety.

IUCN Species Survival Commission. 1994. *IUCN Red List Categories*. The World Conservation Union (IUCN), Gland, Switzerland. 30 November 1994.

IUCN Red List Categories

I. INTRODUCTION

1. The threatened species categories now used in Red Data Books and Red Lists have been in place, with some modification, for almost 30 years. Since their introduction these categories have become widely recognised internationally, and they are now used in a whole range of publications and listings, produced by IUCN as well as by numerous governmental and non-governmental organisations. The Red Data Book categories provide an easily and widely understood method for highlighting those species under higher extinction risk, so as to focus attention on conservation measures designed to protect them.

2. The need to revise the categories has been recognised for some time. In 1984, the SSC held a symposium, "The Road to Extinction" (Fitter and Fitter 1987), which examined the issues in some detail, and at which a number of options were considered for the revised system. However, no single proposal resulted. The current phase of development began in 1989 with a request from the SSC Steering Committee to develop a new approach that would provide the conservation community with useful information for action planning.

In this document, proposals for new definitions for Red List categories are presented. The general aim of the new system is to provide an explicit, objective framework for the classification of species according to their extinction risk.

The revision has several specific aims :

- to provide a system that can be applied consistently by different people;
- to improve the objectivity by providing those using the criteria with clear guidance on how to evaluate different factors which affect risk of extinction;
- to provide a system which will facilitate comparisons across widely different taxa;
- to give people using threatened species lists a better understanding of how individual species were classified.

3. The proposals presented in this document result from a continuing process of drafting, consultation and validation. It was clear that the production of a large number of draft proposals led to some confusion, especially as each draft has been used for classifying some set of species for conservation purposes. To clarify matters, and to open the way for modifications as and when they became necessary, a system for version numbering was applied as follows:

Version 1.0: Mace and Lande (1991)

The first paper discussing a new basis for the categories, and presenting numerical criteria especially relevant for large vertebrates.

Version 2.0: Mace *et al.* (1992)

A major revision of Version 1.0, including numerical criteria appropriate to all organisms and introducing the non-threatened categories.

Version 2.1: IUCN (1993)

Following an extensive consultation process within SSC, a number of changes were made to the details of the criteria, and fuller explanation of basic principles was included. A more explicit structure clarified the significance of the non-threatened categories.

Version 2.2: Mace and Stuart (1994)

Following further comments received and additional validation exercises, some minor changes to the criteria were made. In addition, the Susceptible category

present in Versions 2.0 and 2.1 was subsumed into the Vulnerable category. A precautionary application of the system was emphasised.

Final Version

This final document, which incorporated changes as a result of comments from IUCN members, was adopted by the IUCN Council in December 1994.

All future taxon lists including categorisations should be based on this version, and not the previous ones.

4. In the rest of this document the proposed system is outlined in several sections. The Preamble presents some basic information about the context and structure of the proposal, and the procedures that are to be followed in applying the definitions to species. This is followed by a section giving definitions of terms used. Finally the definitions are presented, followed by the quantitative criteria used for classification within the threatened categories. It is important for the effective functioning of the new system that all sections are read and understood, and the guidelines followed.

References

Fitter, R., and M. Fitter, ed. (1987) *The Road to Extinction*. Gland, Switzerland: IUCN.
 IUCN. (1993) *Draft IUCN Red List Categories*. Gland, Switzerland: IUCN
 Mace, G. M. *et al.* (1992) The development of new criteria for listing species on the IUCN Red List. *Species* 19: 16-22.
 Mace, G. M., and Lande, R. (1991) Assessing extinction threats: toward a reevaluation of IUCN threatened species categories. *Conserv. Biol.* 5.2: 148-157.
 Mace, G. M. and S. N. Stuart. (1994) Draft IUCN Red List Categories, Version 2.2. *Species* 21-22: 13-24.

II. PREAMBLE

The following points present important information on the use and interpretation of the categories (= Critically Endangered, Endangered, etc.), criteria (= A to E), and sub-criteria (= a, b etc., i, ii etc.):

1. Taxonomic level and scope of the categorisation process

The criteria can be applied to any taxonomic unit at or below the species level. The term "taxon" in the following notes, definitions and criteria is used for convenience, and may represent species or lower taxonomic levels, including forms that are not yet formally described. There is a sufficient range among the different criteria to enable the appropriate listing of taxa from the complete taxonomic spectrum, with the exception of micro-organisms. The criteria may also be applied within any specified geographical or political area although in such cases special notice should be taken of point 11 below. In presenting the results of applying the criteria, the taxonomic unit and area under consideration should be made explicit. The categorisation process should only be applied to wild populations inside their natural range, and to populations resulting from benign introductions (defined in the draft IUCN Guidelines for Re-introductions as "...an attempt to establish a species, for the purpose of conservation, outside its recorded distribution, but within an appropriate habitat and eco-geographical area").

2. Nature of the categories

All taxa listed as Critically Endangered qualify for Vulnerable and Endangered, and all listed as Endangered qualify for Vulnerable. Together these categories are described as "threatened". The threatened species categories form a part of the overall scheme. It will be possible to place all taxa into one of the categories (see Figure 1).

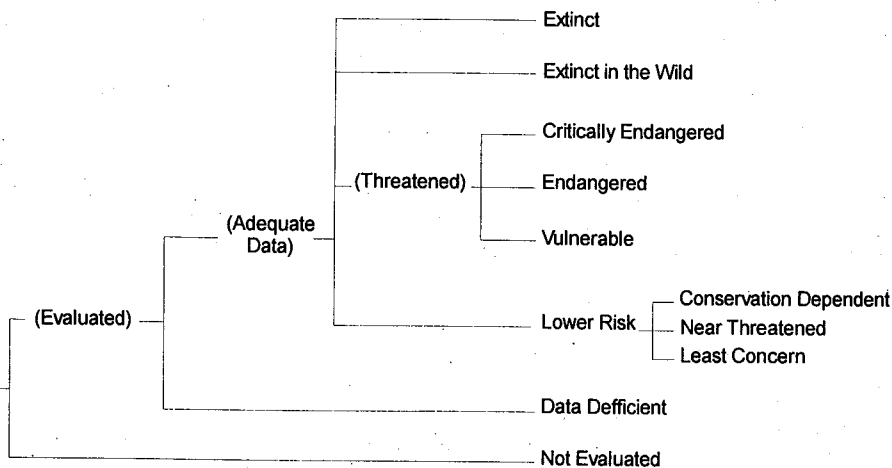


Figure 1. Structure of the Categories.

3. Role of the different criteria

For listing as Critically Endangered, Endangered or Vulnerable there is a range of quantitative criteria; meeting any one of these criteria qualifies a taxon for listing at that level of threat. Each species should be evaluated against all the criteria. The different criteria (A-E) are derived from a wide review aimed at detecting risk factors across the broad range of organisms and the diverse life histories they exhibit. Even though some criteria will be inappropriate for certain taxa (some taxa will never qualify under these however close to extinction they come), there should be criteria appropriate for assessing threat levels for any taxon (other than micro-organisms). The relevant factor is whether any one criterion is met, not whether all are appropriate or all are met. Because it will never be clear which criteria are appropriate for a particular species in advance, each species should be evaluated against all the criteria, and any criterion met should be listed.

4. Derivation of quantitative criteria

The quantitative values presented in the various criteria associated with threatened categories were developed through wide consultation and they are set at what are generally judged to be appropriate levels, even if no formal justification for these values exists. The levels for different criteria within categories were set independently but against a common standard. Some broad consistency between them was sought. However, a given taxon should not be expected to meet all criteria (A-E) in a category; meeting any one criterion is sufficient for listing.

5. Implications of listing

Listing in the categories of Not Evaluated and Data Deficient indicates that no assessment of extinction risk has been made, though for different reasons. Until such time as an assessment is made, species listed in these categories should not be treated as if they were non-threatened, and it may be appropriate (especially for Data Deficient forms) to give them the same degree of protection as threatened taxa, at least until their status can be evaluated.

Extinction is assumed here to be a chance process. Thus, a listing in a higher extinction risk category implies a higher expectation of extinction, and over the time-frames specified more taxa listed in a higher category are expected to go extinct than in a lower one (without effective conservation action). However, the persistence of some taxa in high risk categories does not necessarily mean their initial assessment was

inaccurate.

6. Data quality and the importance of inference and projection

The criteria are clearly quantitative in nature. However, the absence of high quality data should not deter attempts at applying the criteria, as methods involving estimation, inference and projection are emphasised to be acceptable throughout. Inference and projection may be based on extrapolation of current or potential threats into the future (including their rate of change), or of factors related to population abundance or distribution (including dependence on other taxa), so long as these can reasonably be supported. Suspected or inferred patterns in either the recent past, present or near future can be based on any of a series of related factors, and these factors should be specified.

Taxa at risk from threats posed by future events of low probability but with severe consequences (catastrophes) should be identified by the criteria (e.g. small distributions, few locations). Some threats need to be identified particularly early, and appropriate actions take, because their effects are irreversible, or nearly so (pathogens, invasive organisms, hybridization).

7. Uncertainty

The criteria should be applied on the basis of the available evidence on taxon numbers, trend and distribution, making due allowance for statistical and other uncertainties. Given that data are rarely available for the whole range or population of a taxon, it may often be appropriate to use the information that is available to make intelligent inferences about the overall status of the taxon in question. In cases where a wide variation in estimates is found, it is legitimate to apply the precautionary principle and use the estimate (providing it is credible) that leads to listing in the category of highest risk.

Where data are insufficient to assign a category (including Lower Risk), the category of "Data Deficient" may be assigned. However, it is important to recognise that this category indicates that data are inadequate to determine the degree of threat faced by a taxon, not necessarily that the taxon is poorly known. In cases where there are evident threats to a taxon through, for example, deterioration of its only known habitat, it is important to attempt threatened listing, even though there may be little direct information on the biological status of the taxon itself. The category "Data Deficient" is not a threatened category, although it indicated a need to obtain more information on a

taxon to determine the appropriate listing.

8. Conservation actions in the listing process

The criteria for the threatened categories are to be applied to a taxon whatever the level of conservation action affecting it. In cases where it is only conservation action that prevents the taxon from meeting the threatened criteria, the designation of "Conservation Dependent" is appropriate. It is important to emphasise here that a taxon requires conservation action even if it is not listed as threatened.

9. Documentation

All taxon lists including categorisation resulting from these criteria should state the criteria and sub-criteria that were met. No listing can be accepted as valid unless at least one criterion is given. However, failure to mention a criterion should not necessarily imply that it was not met. Therefore, if a re-evaluation indicates that the documented criterion is no longer met, this should not result in automatic down-listing. Instead, the taxon should be re-evaluated with respect to all criteria to indicate its status. The factors responsible for triggering the criteria, especially where inference and projection are used, should at least be logged by the evaluator, even if they cannot be included in published lists.

10. Threats and priorities

The category of threat is not necessarily sufficient to determine priorities for conservation action. The category of threat simply provides an assessment of the likelihood of extinction under current circumstances, whereas a system for assessing priorities for action will include numerous other factors concerning conservation action such as costs, logistics, chances of success, and even perhaps the taxonomic distinctiveness of the subject.

11. Use at regional level

The criteria are most appropriately applied to whole taxa at a global scale, rather than those units defined by regional or national boundaries. Regionally or nationally based threat categories, which are aimed at including taxa that are threatened at regional or national levels (but not necessarily throughout their global ranges), are best used with two key pieces of information: the global status category for the taxon, and the proportion of the global population or range that occurs within the region or nation. However, if applied at regional or national level it must be recognised that a global category of threat may not

be the same as regional or national category for a particular taxon. For example, taxa classified as Vulnerable on the basis of their global declines in numbers or range might be Lower Risk within a particular region where their populations are stable. Conversely, taxa classified as Lower Risk globally might be Critically Endangered within a particular region where numbers are very small or declining, perhaps only because they are at the margins of their global range. IUCN is still in the process of developing guidelines for the use of national red list categories.

12. Re-evaluation

Evaluation of taxa against the criteria should be carried out at appropriate intervals. This is especially important for taxa listed under Near Threatened, or Conservation Dependent, and for threatened species whose status is known or suspected to be deteriorating.

13. Transfer between categories

There are rules to govern the movement of taxa between categories. These are as follows: (A) A taxon may be moved from a category of higher threat to a category of lower threat if none of the criteria of the higher category has been met for 5 years or more. (B) If the original classification is found to have been erroneous, the taxon may be transferred to the appropriate category or removed from the threatened categories altogether, without delay (but see Section 9). (C) Transfer from categories of lower to higher risk should be made without delay.

14. Problems of scale

Classification based on the sizes of geographic ranges or the patterns of habitat occupancy is complicated by problems of spatial scale. The finer the scale at which the distributions or habitats of taxa are mapped, the smaller will be the area that they are found to occupy. Mapping at finer scales reveals more areas in which the taxon is unrecorded. It is impossible to provide any strict but general rules for mapping taxa or habitats; the most appropriate scale will depend on the taxa in question, and the origin and comprehensiveness of the distribution data. However, the thresholds for some criteria (e.g., Critically Endangered) necessitate mapping at a fine scale.

III. DEFINITIONS

1. Population

Population is defined as the total number of individu-

als of the taxon. For functional reasons, primarily owing to differences between life-forms, population numbers are expressed as numbers of mature individuals only. In the case of taxa obligately dependent on other taxa for all or part of their life cycles, biologically appropriate values for the host taxon should be used.

2. Subpopulations

Subpopulations are defined as geographically or otherwise distinct groups in the population between which there is little exchange (typically one successful migrant individual or gamete per year or less).

3. Mature Individuals

The number of mature individuals is defined as the number of individuals known, estimated or inferred to be capable of reproduction. When estimating this quantity the following points should be borne in mind:

- Where the population is characterised by natural fluctuations the minimum number should be used.
- This measure is intended to count individuals capable of reproduction and should therefore exclude individuals that are environmentally, behaviourally or otherwise reproductively suppressed in the wild.
- In the case of populations with biased adult or breeding sex ratios it is appropriate to use lower estimates for the number of mature individuals which take this into account (e.g. the estimated effective population size).
- Reproducing units within a clone should be counted as individuals, except where such units are unable to survive alone (e.g., corals).
- In the case of taxa that naturally lose all or a subset of mature individuals at some point in their life cycle, the estimate should be made at the appropriate time, when mature individuals are available for breeding.

4. Generation

Generation may be measured as the average age of parents in the population. This is greater than the age at first breeding, except in taxa where individuals breed only once.

5. Continuing decline

A continuing decline is a recent, current or projected

future decline whose causes are not known or not adequately controlled and so is liable to continue unless remedial measures are taken. Natural fluctuations will not normally count as a continuing decline, but an observed decline should not be considered to be part of a natural fluctuation unless there is evidence for this.

6. Reduction

A reduction (criterion A) is a decline in the number of mature individuals of least the amount (%) stated over the time period (years) specified, although the decline need not still be continuing. A reduction should not be interpreted as part of a natural fluctuation unless there is good evidence for this. Downward trend that are part of natural fluctuations will not normally count as a reduction.

7. Extreme fluctuations

Extreme fluctuations occur in a number of taxa where population size or distribution area varies widely, rapidly and frequently, typically with a variation greater than one order of magnitude (i.e., a tenfold increase or decrease).

8. Severely fragmented

Severely fragmented refers to the situation where increased extinction risks to the taxon result from the fact that most individuals within a taxon are found in small and relatively isolated subpopulations. These small subpopulations may go extinct, with a reduced probability of recolonisation.

9. Extent of occurrence

Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy. This measure may exclude discontinuities or disjunctions within the overall distributions of taxa (e.g., large areas of obviously unsuitable habitat) (but see "area of occupancy"). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

10. Area of occupancy

Area of occupancy is defined as the area within its "extent of occurrence" (see definition) which is occupied by a taxon, excluding cases of vagrancy. The

measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may, for example, contain unsuitable habitats. The area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon (e.g., colonial nesting sites, feeding sites for migratory taxa). The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon. The criteria include values in km², and thus to avoid errors in classification, the area of occupancy should be measured on grid squares (or equivalents) which are sufficiently small (see Figure 2).

11. Location

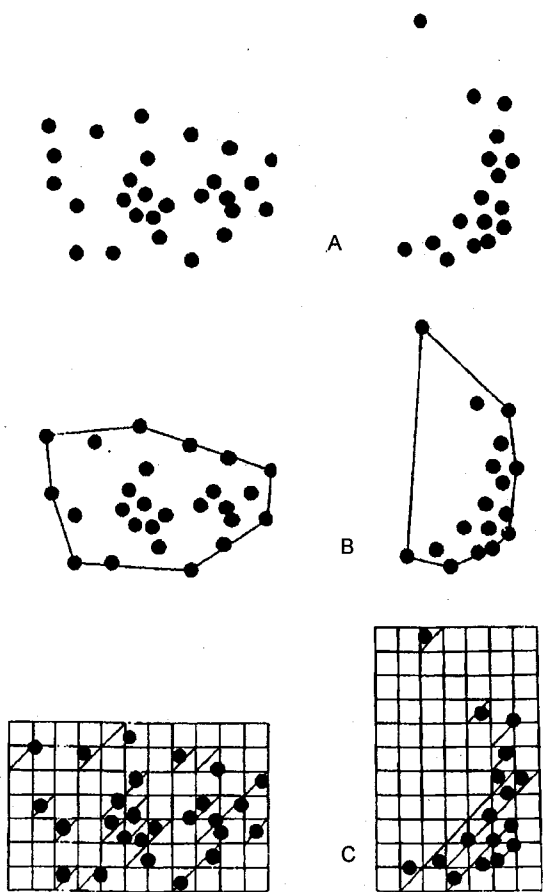


Figure 2. Two examples of the distinction between extent of occurrence and area of occupancy. (a) is the spatial distribution of known, inferred or projected sites of occurrence. (b) shows one possible boundary to the extent of occurrence, which is the measured area within this boundary. (c) shows one measure of area of occupancy which can be measured by the sum of the occupied grid squares.

Location defines a geographically or ecologically distinct area in which a single event (e.g., pollution) will soon affect all individuals of the taxon present. A location usually, but not always, contains all or part of a subpopulation of the taxon, and is typically a small proportion of the taxon's total distribution.

12. Quantitative analysis

A quantitative analysis is defined here as the technique of population viability analysis (PVA), or any other quantitative form of analysis, which estimates the extinction probability of a taxon or population based on the known life history and specific management or non-management options. In presenting the results of quantitative analyses the structural equations and the data should be explicit.

IV. THE CATEGORIES¹

EXTINCT (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died.

EXTINCT IN THE WILD (EW)

A taxon is Extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the criteria (A to E) on pages 110 and 111.

ENDANGERED (EN)

A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the medium-term future, as defined by any of the criteria (A to D) on pages 111 and 112.

¹Note: As in previous IUCN categories, the abbreviation of each category (in parenthesis) follows the English denominations when translated into other languages.

VULNERABLE (VU)

A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the criteria (A to D) on page 112.

LOWER RISK (LR)

A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:

Conservation Dependent (cd). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.

Near Threatened (nt). Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.

Least Concern (lc). Taxa which do not qualify for Conservation Dependent or Near Threatened.

DATA DEFICIENT (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution is lacking. Data Deficient is therefore not a category of threat or Lower Risk. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

NOT EVALUATED (NE)

A taxon is Not Evaluated when it has not yet been assessed against the criteria.

V. THE CRITERIA FOR CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE**CRITICALLY ENDANGERED (CR)**

A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the following criteria (A to E):

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:

- (a) direct observation
- (b) an index of abundance appropriate for the taxon
- (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
- (d) actual or potential levels of exploitation
- (e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.

2. A reduction of at least 80% , projected or suspected to be met within the next ten years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d) or (e) above.

B. Extent of occurrence estimated to be less than 100 km² or area of occupancy estimated to be less than 10 km², and estimates indicating any two of the following:

1. Severely fragmented or known to exist at only a single location.

2. Continuing decline, observed, inferred or projected, in any of the following:

- (a) extent of occurrence
- (b) area of occupancy
- (c) area, extent and/or quality of habitat
- (d) number of locations or subpopulations
- (e) number of mature individuals.

3. Extreme fluctuations in any of the following:

- (a) extent of occurrence
- (b) area of occupancy
- (c) number of locations or subpopulations
- (d) number of mature individuals.

C. Population estimated to number less than 250 mature individuals and either:

1. An estimated continuing decline of at least 25% within 3 years or one generation, whichever is longer or

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:

- (a) severely fragmented (i.e., no subpopulation estimated to contain more than 50 mature individuals)
- (b) all individuals are in a single subpopulation.

D. Population estimated to number less than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or 3 generations, whichever is the longer.

ENDANGERED (EN)

A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the following criteria (A to E):

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:

- (a) direct observation
- (b) an index of abundance appropriate for the taxon
- (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
- (d) actual or potential levels of exploitation
- (e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.

2. A reduction of at least 50%, projected or suspected to be met within the next ten years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d) or (e) above.

B. Extent of occurrence estimated to be less than 5000 km² or area of occupancy estimated to be less than 500 km², and estimates indicating any two of the following:

1. Severely fragmented or known to exist at no more than five locations.

2. Continuing decline, observed, inferred or projected,

in any of the following:

- (a) extent of occurrence
- (b) area of occupancy
- (c) area, extent and/or quality of habitat
- (d) number of locations or subpopulations
- (e) number of mature individuals.

3. Extreme fluctuations in any of the following:

- (a) extent of occurrence
- (b) area of occupancy
- (c) number of locations or subpopulations
- (d) number of mature individuals.

C. Population estimated to number less than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within 5 years or 2 generations, whichever is longer, or

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:

- (a) severely fragmented (i.e., no subpopulation estimated to contain more than 250 mature individuals)
- (b) all individuals are in a single subpopulation.

D. Population estimated to number less than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or 5 generations, whichever is the longer.

VULNERABLE (VU)

A taxon is Endangered when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the following criteria (A to E):

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following :

- (a) direct observation
- (b) an index of abundance appropriate for the taxon
- (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
- (d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.

2. A reduction of at least 20%, projected or suspected to be met within the next ten years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d) or (e) above.

B. Extent of occurrence estimated to be less than 20,000 km² or area of occupancy estimated to be less than 2000 km², and estimates indicating any two of the following:

1. Severely fragmented or known to exist at no more than ten locations.

2. Continuing decline, observed, inferred or projected, in any of the following:

- (a) extent of occurrence
- (b) area of occupancy
- (c) area, extent and/or quality of habitat
- (d) number of locations or subpopulations
- (e) number of mature individuals.

3. Extreme fluctuations in any of the following:

- (a) extent of occurrence
- (b) area of occupancy
- (c) number of locations or subpopulations
- (d) number of mature individuals.

C. Population estimated to number less than 10,000 mature individuals and either:

1. An estimated continuing decline of at least 10% within 10 years or 3 generations, whichever is longer, or

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:

- (a) severely fragmented (i.e., no subpopulation estimated to contain more 1000 mature individuals)
- (b) all individuals are in a single subpopulation.

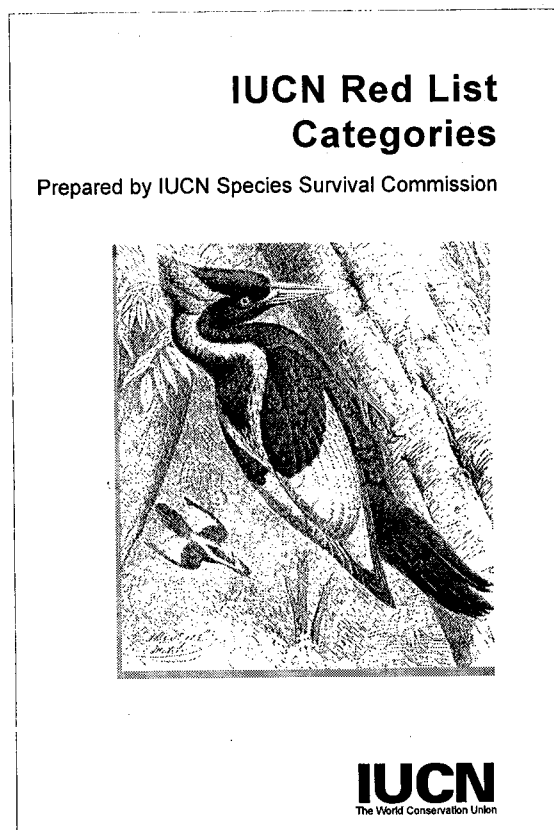
D. Population very small or restricted in the form of either of the following:

1. Population estimated to number less than 1000 mature individuals.

2. Population is characterised by an acute restriction in its area of occupancy (typically less than 100 km²) or in the number of locations (typically less than 5). Such a taxon would thus be prone to the effects of

human activities (or stochastic events whose impact is increased by human activities) within a very short period of time in an unforeseeable future, and is thus capable of becoming Critically Endangered or even Extinct in a very short period.

E. Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.



A SPECIES LIST FOR THE NEW WORLD PRIMATES (PLATYRRHINI): DISTRIBUTION BY COUNTRY, ENDEMISM, AND CONSERVATION STATUS ACCORDING TO THE MACE-LAND SYSTEM

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Introduction

The importance of an up to date evaluation of the diversity of Neotropical primates is emphasized by the increasing numbers of threatened species and subspecies, and the need to pinpoint specific areas for priority action for their protection. The latter may be at the country level (the "megadiversity country" concept: Mittermeier 1987; Mittermeier and Oates 1985; Mittermeier *et al.* 1992b; Conservation International, 1990) or at the level of biomes, regions or localities, for example the "hot-spot" concept of Myers (1988, 1990), and regional workshops to establish priority conservation areas in specific biomes (for example, Fonseca *et al.* 1995).

Priority setting at the species or species' group level has also been emphasized in recent years with the elaboration of action plans by the Specialist Groups of the IUCN Species Survival Commission (Mittermeier, 1987; McNeely *et al.* 1990) along with a major revision of the methodology involved in drawing up the *IUCN Red List of Threatened Animals* (Groombridge, 1994) and the evaluation of their threatened status. The Mace-Lande system for categorizing threatened species was adopted by the World Conservation Union (IUCN) in December 1994 (IUCN 1994), and includes three levels of threat (Critically Endangered, Endangered, and Vulnerable), a further four related categories (Extinct, Extinct in the Wild, Lower Risk, Data Deficient) and a final category (Not Evaluated) which allows for situations where assessment is not possible. As such, the Mace-Lande system requires a working list of *all* species and subspecies of platyrrhines. It was first proposed in 1991 (Mace and Lande 1991) and was subsequently amply discussed and revised. Four versions were published before it was finally accepted by IUCN (Mace and Lande 1991; Mace *et al.* 1992; IUCN 1993; Mace and Stuart 1993). The process involved in establishing this new system and the philosophy behind it are discussed in these publications and also Mace (1994a, 1994b, 1995).

Here we present a summary review of the recent taxonomic studies published for Neotropical primates, with the specific aim of establishing a species list for the application of the Mace-Lande categories as well as to provide the basis for analyses of distributions by country and by major phytogeographic region (based on Gentry, 1982) for the evaluation of key areas.

Taxonomy - Families and Subfamilies

The taxonomy of the New World primates has undergone considerable change over the last two decades, stimulated in large part by the extensive revision of the callitrichids by Professor Philip Hershkovitz (1977, 1979, 1982), and his subsequent reviews of the cebid genera, *Aotus*, *Saimiri*, *Chiropotes*, *Pithecia*, *Cacajao* and *Callicebus* (1983, 1984, 1985, 1987a, 1987b, 1990). Considerable attention has also been given to the phylogeny and taxonomy at family and subfamily level, principally through morphological studies (Rosenberger 1980, 1981; Rosenberger and Coimbra-Filho 1984; Rosenberger and Strier 1989; Rosenberger *et al.* 1990), but also more recently using chromosome and molecular genetics (Dutrillaux 1988; Schneider *et al.* 1993, 1995; Schneider *et al.* in press). Cytotaxonomy is also becoming increasingly important for systematics at the species and subspecies level (see for, example the revision of *Aotus* by Hershkovitz, 1983).

Platyrrhine systematics at the family and subfamily level were reviewed by Rosenberger (1981). The predominant classification during this century has involved the use of just two families, the Callitrichidae (or, formerly, Hapalidae) and Cebidae, with *Callimico* being placed in either of the two, or in its own family (v. Dollman 1933; Hershkovitz 1977). This system was maintained in all of the major syntheses published over the last 75 years (for example, Simpson 1945; Hill 1957, 1960, 1962; Cabrera 1957; Napier and Napier 1967; Simons 1972; and Hershkovitz 1977). Hershkovitz (1977) placed the extant cebids in seven

subfamilies: Saimiriinae, Aotinae, Callicebinae, Alouattinae, Pitheciinae, Cebinae, and Atelinae (Table 1). Groves (1989) divided the Cebidae into five families (Cebidae, Aotidae, Atelidae, Callicebidae, and Pitheciidae), although he subsequently (1993) modified this arrangement, defining the Cebidae by the following subfamilies: Alouattinae, Aotinae, Atelinae (*Ateles*, *Brachyteles*, and *Lagothrix*), Callicebinae, Cebinae (including *Cebus* and *Saimiri*, following Rosenberger 1981, see below), and Pitheciinae (*Cacajao*, *Chiropotes* and *Pithecia*).

Rosenberger (1981) proposed an alternative classification (Table 1), based on hypotheses concerning phylogenetic relationships and a proposal for the scenario of their adaptive radiation (see also, Rosenberger, 1980; Rosenberger and Coimbra-Filho, 1984; Rosenberger and Strier, 1989; Rosenberger *et al.* 1990). Rosenberger's (1981) scheme includes the use of tribes and subtribes (Table 1). It maintains but redefines the use of the family name Cebidae to include two subfamilies; the Cebinae (extant genera *Cebus* and *Saimiri*) and Callitrichinae (extant genera *Callithrix* [includes *Cebuella*], *Saguinus*, *Leontopithecus*, and *Callimico*), and places all other platyrrhines into a second family, the Atelidae, which includes the following subfamilies: Atelinae (*Alouatta*, *Ateles*, *Brachyteles*, *Lagothrix*) and Pitheciinae (*Pithecia*, *Chiropotes*, *Cacajao*, *Callicebus*, *Aotus*).

A recent molecular phylogeny, elaborated by Schneider *et al.* (1993; 1995, Schneider *et al.* in press), agrees in large part with the classification of Rosenberger (1981), having only one major difference; the alignment of *Aotus* with the Cebidae (subfamily Aotinae) rather than the Pitheciinae. Tyler (1991) argued that there are three well-defined clades among the extant platyrrhines: atelines, pithecines, and callitrichids, but that evolutionary relationships among the remaining four genera (*Aotus*, *Callicebus*, *Cebus* and *Saimiri*) remain uncertain. Like Schneider *et al.* (1993), Tyler (1991) argued that *Aotus* and *Callicebus* are not closely related, but went even further, and, reviewing morphological characters of the former, concluded that "*Aotus* must be removed from other ceboids and made a sister group of the entire Anthroidea". Dutrillaux (1988) also argued for the primitiveness of *Aotus* on the basis of its karyotype.

The other differences between the schemes of Rosenberger *et al.* (1990) and Schneider *et al.* (1993, 1995, in press) are as follows: 1) Schneider *et al.* place *Saguinus* in the Subtribe Saguina rather than Leontocebina; 2) Schneider *et al.* separate

Leontopithecus from *Callithrix* and *Cebuella* and place it in its own Subtribe Leontopithecina; 3) Schneider *et al.* align *Callimico* more closely with *Callithrix* and *Cebuella* and place it in the Subtribe Callimiconina; 4) Schneider *et al.* align *Lagothrix* with *Brachyteles* in the Subtribe Brachytelina, whereas Rosenberger *et al.* place *Lagothrix* in the Subtribe Atelina 5) Schneider *et al.* place *Cacajao* and *Chiropotes* in the Subtribe Chiropotina separate from *Pithecia* and; 5) place *Callicebus* in a separate Tribe rather than Subtribe of the Pitheciinae.

While not making any statement regarding the validity of the various classifications outlined above, the species list we present in the next section maintains the division of Callitrichidae Gray 1821 and Cebidae Bonaparte 1831 as used by Hershkovitz (1977) (Table 1).

Species and Subspecies

The taxonomy of most of the platyrrhine genera is still controversial, with discrepancies arising due to differing emphases given to the concepts and characters used in describing and differentiating forms at the species and subspecies level. Table 2 and Table 3 give a listing of the callitrichid and cebid species and subspecies. We have provided notes so that the reader can be aware of differing opinions, but we emphasize that the lists do not reflect any judgment on our part as to the validity or otherwise of the numerous opposing points of view. We have taken, however, the side of the "splitters" rather than the "lumpers". This is most evident in cases such as that of *Saimiri*, where current evaluations have demonstrated the existence of five species and 12 subspecies on the one hand (Hershkovitz 1984, 1987b), and just two (or even one) species, on the other (Costello *et al.* 1993). *Alouatta* is another case in point, where contemporary taxonomic research is only just emerging. Our aim is to provide an estimate of the diversity of Neotropical primates, and while there is still discussion as to the validity or otherwise of numerous forms, we prefer to maintain them. For conservation purposes it would be a serious mistake to ignore the genetic and morphological diversity of such wide-ranging genera as *Saimiri*. Even while splitting, it is highly probable that the list understates the diversity of most Neotropical primate genera, most particularly in such as *Ateles*, *Alouatta*, *Cebus*, and *Lagothrix*, which have yet to receive modern systematic revisions, but also in, for example *Callithrix*, for which new species have been described recently, and more will undoubtedly be described in the near future.

The listings in Tables 2 and 3 provide a total of five genera, 35 species and 55 species and subspecies of callitrichids, and 11 genera, 63 species and 147 species and subspecies of cebids. In all, we list 16 genera, 98 species and 202 species and subspecies of Neotropical monkeys, ranging from southern Mexico through to northern Argentina and Paraguay, and possibly the northeasternmost tip of Uruguay (Table 9). Mittermeier (1987), in his analysis of the diversity of Neotropical primates and their distributions by country and the major phytogeographic regions of Gentry (1982), worked on the basis of "some 65 species". The increase in species listed here comes from both taxonomic revisions which have raised subspecific forms to full species (for example, the

placing of all *Callithrix* forms as species, and the recognition of such as *Alouatta sara*, *A. arctoidea*, *Ateles chamek*, *Ateles marginatus*, and *Brachyteles hypoxanthus*), as well the descriptions of entirely new species, including *Callithrix mauesi*, *Callithrix marcai*, *Callithrix saterei*, *Leontopithecus caissara*, *Aotus herskovitzi*, *Callicebus dubius* and *Cebus kaapori*. The taxonomic revision of *Callicebus* by Hershkovitz (1990) increased the number of species from just three to 13, and a further species has yet to be described (Kobayashi and Langguth 1994a, 1994b).

Table 1. The classifications of the extant genera of Platyrrhini according to Hershkovitz (1977), Rosenberger (1981; Rosenberger et al. 1990), and Schneider et al. (1993, in press).

Hershkovitz (1977)	Rosenberger (1981)	Schneider et al. (in press)
Infraorder Platyrrhini	Infraorder Platyrrhini	Infraorder Platyrrhini
Family Callitrichidae	Family Cebidae	Family Cebidae
<i>Cebuella</i> Gray 1886	Subfamily Cebinae	Subfamily Cebinae
<i>Callithrix</i> Erxleben 1777	Tribe Cebini	Tribe Cebini
<i>Leontopithecus</i> Lesson 1840	<i>Cebus</i> Erxleben 1777	<i>Cebus</i> Erxleben 1777
<i>Saguinus</i> Hoffmannsegg 1807	Tribe Saimiriini	Tribe Saimiriini
Family Callimiconidae	<i>Saimiri</i> Voigt 1831	<i>Saimiri</i> Voigt 1831
<i>Callimico</i> Thomas 1913	Subfamily Callitrichinae	Subfamily Aotinae
Family Cebidae	Tribe Callitrichini	<i>Aotus</i> Illiger 1811
Subfamily Saimiriinae	Subtribe Callitrichina	Subfamily Callitrichinae
<i>Saimiri</i> Voigt 1831	<i>Callithrix</i> Erxleben 1777	Tribe Callitrichini
Subfamily Aotinae	<i>Cebuella</i> Gray 1866	Subtribe Callitrichina
<i>Aotus</i> Illiger 1811	<i>Leontopithecus</i> Lesson 1840	<i>Callithrix</i> Erxleben 1777
Subfamily Callicebinae	Subtribe Leontocebina	<i>Cebuella</i> Gray 1866
<i>Callicebus</i> Thomas 1903	<i>Saguinus</i> Hoffmannsegg 1807	Subtribe Saguina
Subfamily Alouattinae	Tribe Callimiconini	<i>Saguinus</i> Hoffmannsegg 1807
<i>Alouatta</i> Lacépède 1799	<i>Callimico</i> Thomas 1913	Subtribe Leontopithecina
Subfamily Pitheciinae	Family Atelidae	<i>Leontopithecus</i> Lesson 1840
<i>Pithecia</i> Desmarest 1820	Subfamily Atelinae	Subtribe Callimiconina
<i>Chiropotes</i> Lesson 1840	Tribe Atelini	<i>Callimico</i> Thomas 1913
<i>Cacajao</i> Lesson 1840	Subtribe Atelina	Family Atelidae
Subfamily Cebinae	<i>Ateles</i> É. Geoffroy 1806	Subfamily Atelinae
<i>Cebus</i> Erxleben 1777	<i>Brachyteles</i> Spix 1831	Tribe Atelini
Subfamily Atelinae	Subtribe Lagotrichina	Subtribe Atelina
<i>Ateles</i> É. Geoffroy 1806	<i>Lagothrix</i> É. Geoffroy 1812	<i>Ateles</i> É. Geoffroy 1806
<i>Lagothrix</i> É. Geoffroy 1812	Tribe Alouattini	Subtribe Brachytelina
<i>Brachyteles</i> Spix 1831	<i>Alouatta</i> Lacépède 1799	<i>Brachyteles</i> Spix 1831
	Subfamily Pitheciinae	<i>Lagothrix</i> É. Geoffroy 1812
	Tribe Pitheciini	Tribe Alouattini
	Subtribe Pitheciina	<i>Alouatta</i> Lacépède 1799
	<i>Pithecia</i> Desmarest 1820	Subfamily Pitheciinae
	<i>Chiropotes</i> Lesson 1840	Tribe Pitheciini
	<i>Cacajao</i> Lesson 1840	Subtribe Pitheciina
	Subtribe Aotina	<i>Pithecia</i> Desmarest 1820
	<i>Aotus</i> Illiger 1811	Subtribe Chiropotina
	Subtribe Callicebina	<i>Chiropotes</i> Lesson 1840
	<i>Callicebus</i> Thomas 1903	<i>Cacajao</i> Lesson 1840
		Tribe Callicebini
		<i>Callicebus</i> Thomas 1903

Table 2. A listing of the species and subspecies of the Family Callitrichidae.

Family Callitrichidae	Notes	Common name (1)
<i>Cebuella</i> Gray 1866	2	Pygmy marmoset
<i>C. pygmaea</i> Spix 1823		Pygmy marmoset
<i>Callithrix</i> Erxleben 1777	3	Marmosets
Callithrix argentata Group		Bare-ear and tassel-ear marmosets
<i>C. argentata</i> (Linnaeus 1771)	3,4	Silvery marmoset
<i>C. leucippe</i> (Thomas 1922)	3	Golden-white bare-ear marmoset
<i>C. melanura</i> (É. Geoffroy in Humboldt 1812)	3	Black-tailed marmoset
<i>C. intermedia</i> Hershkovitz 1977	3,4	Aripuanã marmoset
<i>C. emiliae</i> (Thomas 1920)	3,4,5	Snethlage's marmoset
<i>C. nigriceps</i> Ferrari & Lopes 1992	3,6	Black-headed marmoset
<i>C. marcai</i> Alperin 1993	3,7	Marca's marmoset
<i>C. humeralifera</i> (É. Geoffroy in Humboldt 1812)	3,4	Black and white tassel-ear marmoset
<i>C. chrysoleuca</i> (Wagner 1842)	3	Golden-white tassel-ear marmoset
<i>C. mauesi</i> Mittermeier, Schwarz & Ayres 1992	3,8	Maués marmoset
<i>C. saterei</i> Silva e Sousa Jr & Noronha 1995	3,9	Sateré marmoset
Callithrix jacchus Group		True marmosets
<i>C. jacchus</i> (Linnaeus 1758)	3	White-tufted-ear marmoset, common marmoset
<i>C. penicillata</i> (É. Geoffroy 1812)	3	Black-tufted-ear marmoset
<i>C. kuhli</i> (Wied-Neuwied 1826)	3,9	Wied's black-tufted-ear marmoset
<i>C. geoffroyi</i> (É. Geoffroy in Humboldt 1812)	3	Geoffroy's tufted-ear marmoset
<i>C. aurita</i> (É. Geoffroy in Humboldt 1812)	3,10	Buffy-tufted-ear marmoset
<i>C. flaviceps</i> (Thomas 1903)	3,11	Buffy-headed marmoset
<i>Saguinus</i> Hoffmannsegg 1807		Tamarins
Hairy-face tamarin Section		
Saguinus nigricollis Group		White-mouth tamarins
<i>S. nigricollis nigricollis</i> (Spix 1823)	12	Spix's black mantle tamarin
<i>S. nigricollis graellsii</i> (Jiménez de la Espada 1870)	12	Graell's black-mantle tamarin
<i>S. nigricollis hernandezi</i> Hershkovitz 1982	12	Hernández-Camacho's black mantle tamarin
<i>S. fuscicollis fuscicollis</i> (Spix 1823)	13	Spix's saddle-back tamarin
<i>S. fuscicollis fuscus</i> (Lesson 1840)	13	Lesson's saddle-back tamarin
<i>S. fuscicollis avilapiresi</i> Hershkovitz 1966	13	Ávila Pires' saddle-back tamarin
<i>S. fuscicollis cruzlimai</i> Hershkovitz 1966	13	Cruz Lima's saddle-back tamarin
<i>S. fuscicollis leucogenys</i> (Gray 1866)	13	Andean saddle-back tamarin
<i>S. fuscicollis lagonotus</i> (Jiménez de la Espada 1870)	13	Red-mantle saddle-back tamarin
<i>S. fuscicollis primitivus</i> Hershkovitz 1977	13	Saddle-back tamarin
<i>S. fuscicollis illigeri</i> (Pucheran 1845)	13	Illiger's saddle-back tamarin
<i>S. fuscicollis nigrifrons</i> (I. Geoffroy 1850)	13	Geoffroy's saddle-back tamarin
<i>S. fuscicollis weddelli</i> (Deville 1849)	13	Weddell's saddle-back tamarin
<i>S. fuscicollis melanoleucus</i> (Miranda Ribeiro 1912)	13	White saddle-back tamarin
<i>S. fuscicollis crandalli</i> Hershkovitz 1966	13	Crandall's saddle-back tamarin
<i>S. tripartitus</i> (Milne-Edwards 1878)	14	Golden-mantle saddle-back tamarin
Saguinus mystax Group		Moustached tamarins
<i>S. mystax mystax</i> (Spix 1823)	15	Spix's moustached tamarin
<i>S. mystax pileatus</i> (I. Geoffroy & Deville 1848)	15	Red-cap moustached tamarin
<i>S. mystax pluto</i> (Lönnerberg 1926)	15	White-rump moustached tamarin
<i>S. labiatus labiatus</i> (É. Geoffroy in Humboldt 1812)	16	Geoffroy's moustached tamarin, red-bellied tamarin
<i>S. labiatus thomasi</i> (Goeldi 1907)	16	Thomas' moustached tamarin
<i>S. imperator imperator</i> (Goeldi 1907)	17	Black-chinned emperor tamarin
<i>S. imperator subgriseus</i> (Lönnerberg 1940)	17	Bearded emperor tamarin
<i>S. midas midas</i> (Linnaeus 1758)	18	Golden-handed tamarin
<i>S. midas niger</i> (É. Geoffroy 1803)	18	Black-handed tamarin
Mottled-face tamarin Section		
<i>S. inustus</i> (Schwarz 1951)	19	Mottled-face tamarin

continued ...

Table 2 (continued)

Bare-face tamarin Section***Saguinus bicolor* Group**

<i>S. bicolor bicolor</i> (Spix 1823)	20	Brazilian bare-faced tamarins
<i>S. bicolor martinsi</i> (Thomas 1912)	20	Pied bare-face tamarin
<i>S. bicolor ochraceus</i> Hershkovitz 1966	20	Martin's bare-face tamarin
		Ochraceous bare-face tamarin

***Saguinus oedipus* Group**

<i>S. leucopus</i> (Günther 1877)	21	Colombian and Panamanian bare-face tamarins
<i>S. oedipus</i> (Linnaeus 1758)	21	Silvery-brown bare-face tamarin
<i>S. geoffroyi</i> (Pucheran 1845)	21	Cotton-top tamarin
		Geoffroy's tamarin

***Leontopithecus* Lesson 1840**

<i>L. rosalia</i> (Linnaeus 1766)	22	Lion tamarins
<i>L. chrysomelas</i> (Kuhl 1820)	22	Golden lion tamarin
<i>L. chrysopygus</i> (Mikan 1823)	22	Golden-headed lion tamarin
<i>L. caissara</i> Lorini & Persson 1990	22	Black lion tamarin
	22	Black-faced lion tamarin

***Callimico* Miranda Ribeiro 1911**

<i>C. goeldii</i> (Thomas 1904)	23	Goeldi's monkey
		Goeldi's monkey

Notes

1. Common names of Callitrichidae follow Hershkovitz (1977).

2. Rosenberger (1981 see also Rosenberger and Coimbra-Filho, 1984) argued, on morphological terms, that the pygmy marmoset should correctly be included in the genus *Callithrix*. This argument was not maintained in Rosenberger *et al.* (1990), although recently Barroso (1995) and Schneider *et al.* (in press) also argued for this arrangement on the basis of molecular genetics. Taxonomy and distribution follows Hershkovitz (1977), Eisenberg (1989) and Bicca-Marques and Calegario-Marques (1995).

3. Hershkovitz (1977) placed all of the *Callithrix jacchus* Group marmosets as subspecies of *Callithrix jacchus*. Coimbra-Filho (1970a, 1971, 1990) and Coimbra-Filho and Mittermeier (1973b), Mittermeier and Coimbra-Filho (1981), Natori (1986, 1994), Vivo (1985, 1991), Mittermeier *et al.* (1988, 1992a), Natori and Shigehara (1992), and Groves (1993) (see also Marroig, 1995) listed all the Atlantic forest marmosets as full species. Coimbra-Filho (1990) argued that the three subspecies of *C. humeralifer* (*C. h. humeralifer*, *C. h. chrysoleuca*, and *C. h. intermedius*) listed by Hershkovitz (1977) should be considered species, following De Boer (1974) and Vivo (1991). Genetic studies by Meireles *et al.* (1992) concluded that *C. humeralifer* and *C. emiliae* are subspecies of *C. argentata*; and that *C. jacchus*, *C. penicillata*, and *C. geoffroyi* are subspecies; but that *C. geoffroyi* is the most primitive of the "jacchus" group (most similar genetically to *C. argentata*), which should therefore be referred to as the "geoffroyi" group, with *C. jacchus* and *C. penicillata* as subspecific to *C. geoffroyi*. The primitiveness (Hershkovitz 1977) of *C. geoffroyi* was also advocated by Natori (1986, 1994) and Natori and Shigehara (1992), and also makes sense concerning the degree of morphological adaptation for tree-gouging, which is most advanced in *C. jacchus* and *C. penicillata*. The following publications list

all marmosets as species: Mittermeier *et al.* (1992a), Vivo (1985, 1991), and Groves (1993). Distributions of *Callithrix* according to Hershkovitz (1977), Stallings (1985), Mittermeier *et al.* (1992a), and Rylands *et al.* (1993).

4. *Callithrix intermedia* was described as an intermediate color form of *C. humeralifer* by Hershkovitz (1977). Pelage color and pattern, and its geographic distribution, however, would place it as a subspecies of *C. argentata* if, following Hershkovitz (1977), the Amazonian marmosets are considered subspecies of just two species, *C. argentata* and *C. humeralifer* (see Rylands *et al.* 1993). Meireles *et al.* (1992) indicated that *C. humeralifer* and *C. emiliae* are subspecific to *C. argentata*.

5. *Callithrix emiliae* was first described by Thomas (1920) from the Rio Iriri, southern Pará. It was not recognized by Hershkovitz (1977) who regarded it as a dark form of *C. argentata argentata*. Vivo (1985; see also Vivo 1991), revalidated this form on the basis of specimens from the state of Rondônia. However, Rylands *et al.* (1993) argued that the Rondônia marmosets described by Vivo should be considered a distinct species based on the fact that the distribution of this form and that of the *C. emiliae* described by Thomas (1920) from Maloca on the Rio Curuá (see Vivo 1985; Ávila Pires 1986) are disjunct, and separated by *C. melanura*. *C. emiliae* was not listed by Groves (1993). Distribution according to Vivo (1985, 1991).

6. Distribution of *Callithrix nigriceps* based on Ferrari and Lopes (1992) and Ferrari (1993, 1994).

7. *Callithrix marcai* was described as a subspecies of *Callithrix argentata* by Alperin 1993. It is listed here as a species to conform with the view that all *Callithrix* should be considered species (Vivo 1985, 1991; Mittermeier *et al.* 1992a). It is known only from the type locality, "Foz do Rio Castanho (= Rio Roosevelt), afluenta e esquerda do rio Aripuanã. Estado do Amazonas, Brasil" (Alperin 1993). The type locality as described by Alperin is confused in

that the Rio Castanho is not a synonym of the Rio Roosevelt, and is a left bank affluent of the Rio Roosevelt, not the Rio Aripuanã. Confused also is the map and gazetteer of localities provided in Alperin (1993) which do not correspond.

8. Distribution of *Callithrix mauesi* according to Mittermeier *et al.* (1992a) and Silva Jr. and Noronha (1995a).

9. Coimbra-Filho (1984, 1985, 1990), Rylands (1989b), Mittermeier *et al.* (1988), Natori (1990), Rylands *et al.* (1993), and Groves (1993) recognize *Callithrix kuhli* from southern Bahia as a valid form. Hershkovitz (1977) regarded it as a hybrid between *C. j. geoffroyi* and *C. j. penicillata*. Vivo (1991) considered it to be indistinguishable from *C. penicillata*. Distribution restricted to Brazil (southern Bahia) follows Rylands *et al.* (1993). Groves (1993) gave the distribution as Bolivia - evidently a typographic error.

10. The distribution of *Callithrix aurita* is reviewed by Hershkovitz (1977), Muskin (1984), Coimbra-Filho (1986b, 1991), and Olmos and Martuscelli (1995).

11. Coimbra-Filho (1986a, 1986b, 1990; Coimbra-Filho *et al.* 1991) argued that *Callithrix flaviceps* should be considered subspecific to *C. aurita*. The distribution of *C. flaviceps* is reviewed by Hershkovitz (1977), Coimbra-Filho (1986a), and Mendes (1993).

12. The taxonomy of *Saguinus nigricollis* follows Hershkovitz (1982). *S. n. graellsii* is listed as a full species, *S. graellsii*, by Hernández-Camacho and Cooper (1976) and Defler (1994), on the basis that it is sympatric with a population of *S. nigricollis* in the region of Puerto Leguizamo in southern Colombia. Hernández-Camacho and Defler (1991) listed it as a subspecies of *S. nigricollis*, in conformity with Hershkovitz (1977). Defler (1994) stated that further studies are needed to prove the species' status of this form. Distribution according to Hernández-Camacho and Cooper (1976), Hershkovitz (1982) and Eisenberg (1989).

13. The taxonomy of *Saguinus fuscicollis* is based on Hershkovitz (1977; see also Cheverud and Moore 1990). *S. f. melanoleucus*, *S. f. acrensis*, and *S. f. crandalli* were listed as subspecies of *S. melanoleucus* by Coimbra-Filho (1990). *Saguinus fuscicollis acrensis* Carvalho 1957 is not considered a valid form, following Peres (1991). *S. f. cruzlimai* and *S. f. crandalli* are of unknown provenance (Hershkovitz 1977). Hernández-Camacho and Cooper (1976) indicated the existence of an undescribed *S. fuscicollis* subspecies in the region of San José de Guaviare, Colombia (also cited by Defler 1994). Distributions are given by Hershkovitz (1977), Eisenberg (1989), and Aquino and Encarnación (1995) (see also Rylands *et al.* 1993).

14. Hershkovitz (1977) listed *Saguinus tripartitus* as a subspecies of *S. fuscicollis*. Thorington (1988) argued for its species status (see also Albuja, 1994;). Distribution based on Hershkovitz (1977), Thorington (1988), Albuja (1994), and Aquino and Encarnación (1994, in press).

15. The taxonomy of *Saguinus mystax* follows Hershkovitz (1977). Distributions are based on Hershkovitz (1977), Rylands *et al.* (1993), and Aquino and Encarnación (1994).

16. The taxonomy of *Saguinus labiatus* follows Hershkovitz (1977). Distribution based on Hershkovitz (1977) and Silva Jr. (1988), Aquino and Castro (1989), and Aquino and Encarnación (1994).

17. The taxonomy of *Saguinus imperator* follows Hershkovitz (1982). Distribution based on Hershkovitz (1982), Aquino and Encarnación (1994).

18. The taxonomy and distribution of *Saguinus midas* follows Hershkovitz (1977) and Eisenberg (1989). On the basis of morphometric studies of the postcanine dentition, Natori and Hanihara (1992) found *S. m. midas* to be more similar to *S. bicolor* than to *S. m. niger*. For this reason *S. m. niger* should possibly be raised to species status (Rylands *et al.* 1993), and would also argue for a modification of the species' group arrangements of Hershkovitz (1977): that is, placing the *S. midas* Group in the Bare-face Tamarin section. Melo *et al.* (1992), on the other hand, examined blood genetic systems in the two subspecies and obtained results compatible with their classification as subspecies, not being sufficiently divergent to warrant species status.

19. The taxonomy and distribution of *Saguinus inustus* follows Hernández-Camacho and Cooper (1976), Hershkovitz (1977), Eisenberg (1989), and Rylands *et al.* (1993). Hernández-Camacho and Defler (1991) indicated possibility of two subspecies in Colombia.

20. The taxonomy of *Saguinus bicolor* is based on Hershkovitz (1977). Distributions follow Hershkovitz (1977), Ayres *et al.* (1982), Egler (1983) and Coimbra-Filho (1987).

21. Hershkovitz (1977) considered *Saguinus geoffroyi* to be subspecific to *S. oedipus*. Comparative morphological studies by Hanihara and Natori (1987), Moore and Cheverud (1992) and Skinner (1991) argue for them being separate species (see also Rylands, 1993). Hernández-Camacho and Cooper (1976), Mittermeier and Coimbra-Filho (1981), Hernández-Camacho and Defler (1985, 1991), Mittermeier *et al.* (1988), Rylands *et al.* (1993), Groves (1993), Mast *et al.* (1993) and Defler (1994) considered them to be separate species. Distributions are based on Hernández-Camacho and Cooper (1976), Hershkovitz (1977), Eisenberg (1989), Hernández-Camacho and Defler (1991), and Mast *et al.* (1993). Eisenberg (1989) lists *S. geoffroyi* and *S. oedipus* as separate species. The author of the name *S. geoffroyi* is given by him as Reichenbach 1862.

22. The lion tamarins, *Leontopithecus*, are given as separate species following Della Serra (1951), Rosenberger and Coimbra-Filho (1984), Mittermeier *et al.* (1988), Natori (1989), and Rylands *et al.* (1993). They have been listed as subspecies of *L. rosalia* by Coimbra-Filho and Mittermeier (1972, 1973a), Hershkovitz (1977), Mittermeier and Coimbra-Filho (1981), and Forman *et al.* (1986). *L. caissara*

Lorini and Persson 1990 is regarded as a subspecies of *L. chrysopygus* by Coimbra-Filho (1990). Distribution follows Coimbra-Filho and Mittermeier (1972, 1973a, 1977), Hershkovitz (1977), Rylands *et al.* (1991), Rosenberger and Coimbra-Filho (1984), Kierulff (1993), Kierulff and Oliveira (1994), Pinto and Tavares (1994), Lorini and Persson (1994), and Valladares-Padua *et al.* (1994a, 1994b).

23. Hershkovitz (1977) placed *Callimico* in its own family, Callimiconidae. Rosenberger (1981) argued for its alignment as the subfamily Callimiconinae within the family Cebidae, redefined as including, besides, the subfamilies Cebinae (*Cebus*, *Saimiri*) and Callitrichinae. See also Martin (1991) and Barroso (1995). Distribution according to Hershkovitz (1977) and Eisenberg (1989).

Table 3. A listing of the species and subspecies of the Family Cebidae.

Family Cebidae	Notes	Common name
<i>Aotus</i> Illiger 1811	1-2	Night monkeys, owl monkeys, douroucouli
Gray-neck Species Group		
<i>A. lemurinus lemurinus</i> (I. Geoffroy 1846)	1	Colombian or lemurine night monkey
<i>A. lemurinus griseimembra</i> (Elliot 1913)	1	Grey-legged night monkey
<i>A. vociferans</i> (Spix 1823)		
<i>A. trivirgatus</i> (Humboldt 1812)	1	Douroucouli, owl monkey, night monkey
<i>A. brumbacki</i> Hershkovitz 1983	1	Brumback's night monkey
<i>A. hershkovitzi</i> Ramirez-Cerquera 1983	1	Hershkovitz's night monkey
Red-neck Species Group		
<i>A. miconax</i> (Thomas 1927)	1	Andean night monkey
<i>A. nigriceps</i> Dollman 1909	1	Black-headed or Peruvian night monkey
<i>A. infulatus</i> (Kuhl 1820)	1	Feline night monkey
<i>A. azarai azarai</i> (Humboldt 1812)	1,2	Azara's night monkey
<i>A. azarai boliviensis</i> (Elliot 1907)	1,2	Bolivian night monkey
<i>A. nancymae</i> Hershkovitz 1983	1,2	Ma's night monkey
<i>Callicebus</i> Thomas 1903	3-4	Titi monkeys
Callicebus modestus Group		
<i>C. modestus</i> Lönnberg 1939	3	
Callicebus donacophilus Group		
<i>C. donacophilus donacophilus</i> D'Orbigny 1836	3	
<i>C. donacophilus pallescens</i> Thomas 1907	3	
<i>C. olallae</i> (Lönnberg 1939)	3	Beni titi monkey
<i>C. oenanthe</i> (Thomas 1924)	3	Andean titi monkey
Callicebus moloch Group		
<i>C. cinerascens</i> (Spix 1823)	3	
<i>C. hoffmannsi hoffmannsi</i> (Thomas 1908)	3	Hoffmann's titi monkey
<i>C. hoffmannsi baptista</i> (Lönnberg 1939)	3	
<i>C. moloch</i> Hoffmannsegg 1807	3	
<i>C. brunneus</i> (Wagner 1842)	3	
<i>C. cupreus cupreus</i> (Spix 1823)	3	
<i>C. cupreus discolor</i> (I. Geoffroy & Deville 1848)	3	
<i>C. cupreus ornatus</i> (Gray 1866)	3	Ornate titi monkey
<i>C. caligatus</i> (Wagner 1842)	3	
<i>C. dubius</i> Hershkovitz 1988	3	
<i>C. personatus personatus</i> (É. Geoffroy 1812)	3	Northern masked titi
<i>C. personatus nigrifrons</i> (Spix 1823)	3	Black-fronted titi
<i>C. personatus melanochir</i> (Wied-Neuwied 1820)	3	Southern Bahian masked titi
<i>C. personatus barbarabrownae</i> Hershkovitz 1990	3	Northern Bahian blond titi
<i>Callicebus</i> sp.	3,4	
Callicebus torquatus Group		
<i>C. torquatus torquatus</i> (Hoffmannsegg 1807)	3	Collared titi, widow monkey
<i>C. torquatus medemi</i> Hershkovitz 1963	3	
<i>C. torquatus lugens</i> (Humboldt 1811)	3	
<i>C. torquatus lucifer</i> (Thomas 1914)	3	Widow monkey
<i>C. torquatus purinus</i> (Thomas 1927)	3	
<i>C. torquatus regulus</i> Thomas 1927	3	

continued ...

Table 3 (continued)

<i>Saimiri</i> Voigt 1831	5	Squirrel monkeys
<i>Saimiri boliviensis</i> Group (Roman type)		
<i>S. boliviensis boliviensis</i> (I. Geoffroy & de Blainville 1834)	5	Black-headed squirrel monkey
<i>S. boliviensis peruviansis</i> Hershkovitz 1984	5	Peruvian squirrel monkey
<i>S. boliviensis pluvialis</i> Lönnberg 1940	5	
<i>S. boliviensis jaburuensis</i> Lönnberg 1940	5	
<i>S. vanzolinii</i> Ayres 1981	5	
<i>Saimiri sciureus</i> Group (Gothic type)		
<i>S. sciureus sciureus</i> (Linnaeus 1758)	5	Common squirrel monkey
<i>S. sciureus macrodon</i> (Elliot 1907)	5	Ecuadorian squirrel monkey
<i>S. sciureus cassiquiarensis</i> (Lesson 1840)	5	Humboldt's squirrel monkey
<i>S. sciureus albigena</i> (von Pusch 1941)	5	
<i>S. oerstedii oerstedii</i> (Reinhardt 1872)	5	Black-crowned Central American squirrel monkey
<i>S. oerstedii citrinellus</i> Thomas 1904	5	Grey-crowned Central American squirrel monkey
<i>S. ustus</i> I. Geoffroy 1843	5	Golden-backed squirrel monkey
<i>Cebus</i> Erxleben 1777	6-7	Tufted and untufted capuchins
Tufted Group		
<i>C. apella apella</i> (Linnaeus 1758)	6	Guianan brown capuchin
<i>C. apella macrocephalus</i> Spix 1823	6	Large-headed capuchin
<i>C. apella maranonis</i> (von Pusch, 1941)	6	Marañón tufted capuchin
<i>C. apella pallidus</i> (Gray 1865)	6	Tambopata tufted capuchin, pale capuchin
<i>C. apella peruanus</i> (Thomas 1901)	6	Peruvian tufted capuchin
<i>C. apella libidinosus</i> (Spix 1823)	6	Bearded capuchin
<i>C. apella nigrinus</i> (Goldfuss 1809)	6	Black-horned capuchin
<i>C. apella robustus</i> (Kuhl 1820)	6	Crested capuchin
<i>C. apella margaritae</i> Hollister 1914	6	Margarita Island capuchin
<i>C. apella paraguayanus</i> Fischer, 1829	6	Paraguayan tufted capuchin
<i>C. xanthosternus</i> (Wied 1820)	6,7	Yellow-breasted capuchin
Untufted Group		
<i>C. albifrons albifrons</i> (Humboldt 1812)	8	White-fronted capuchin
<i>C. albifrons unicolor</i> Spix 1823	8	
<i>C. albifrons adustus</i> Hershkovitz 1949	8	Brown-faced capuchin
<i>C. albifrons aequatorialis</i> Allen 1914	8	Ecuadorian capuchin
<i>C. albifrons cesarae</i> Hershkovitz 1949	8	
<i>C. albifrons cuscinus</i> (Thomas 1901)	8	Shock-headed capuchin
<i>C. albifrons malitiosus</i> Elliot 1909	8	
<i>C. albifrons trinitatis</i> von Pusch 1941	8	Trinidad white-fronted capuchin
<i>C. albifrons versicolor</i> Pucheran 1845	8	Varied capuchin
<i>C. albifrons yuracus</i> Hershkovitz 1949	8	Andean white-fronted capuchin
<i>C. albifrons leucocephalus</i> Gray 1865	8	
<i>C. capucinus capucinus</i> (Linnaeus 1758)	9	White-throat capuchin, white-faced capuchin
<i>C. capucinus limitaneus</i> Hollister 1914	9	
<i>C. capucinus imitator</i> Thomas 1903	9	Panamanian white-throated capuchin
<i>C. capucinus curtus</i> Bangs 1905	9	Gorgona white-fronted capuchin
<i>C. olivaceus olivaceus</i> Schomburgk 1848	10	Wedge-capped capuchin
<i>C. olivaceus apiculatus</i> Hershkovitz 1949	10	
<i>C. olivaceus brunneus</i> Allen 1914	10	Brown weeper capuchin
<i>C. olivaceus castaneus</i> I. Geoffroy 1851	10	Chestnut capuchin
<i>C. olivaceus</i> ssp.	10,11	
<i>C. kaapori</i> Queiroz 1992	10	Ka'apor capuchin
<i>Pithecia</i> Desmarest 1804	12	Saki monkeys
<i>P. pithecia pithecia</i> Linnaeus 1766	12	White-faced saki
<i>P. pithecia chrysocephala</i> I. Geoffroy 1850	12	Golden-faced saki
<i>P. monachus monachus</i> (É. Geoffroy 1812)	12	Geoffroy's monk saki
<i>P. monachus milleri</i> Allen 1914	12	Miller's monk saki
<i>P. irrorata irrorata</i> Gray 1842	12	Gray's bald faced saki
<i>P. irrorata vanzolinii</i> Hershkovitz 1987	12	Vanzolini's bald-faced saki
<i>P. albicans</i> Gray 1860	12	White saki, buffy saki

continued ...

Table 3 (continued)

<i>P. aequatorialis</i> Hershkovitz 1987	12	Equatorial saki
<i>Chiropotes</i> Lesson 1840	13	Bearded sakis
<i>C. albinasus</i> (I. Geoffroy & Deville 1848)	13	White-nosed bearded saki
<i>C. satanas satanas</i> (Hoffmannsegg 1807)	13	Bearded saki
<i>C. satanas chiropotes</i> (Humboldt 1811)	13	Black saki
<i>C. satanas utahicki</i> Hershkovitz 1985	13	Uta Hick's bearded saki
<i>Cacajao</i> Lesson 1840	14	Uacaris
<i>C. calvus calvus</i> (I. Geoffroy 1847)	14	White bald-headed uacari
<i>C. calvus ucayalii</i> (Thomas 1928)	14	Ucayali bald-headed uacari
<i>C. calvus novaesi</i> Hershkovitz 1987	14	Novaes' bald-headed uacari
<i>C. calvus rubicundus</i> (I. Geoffroy and Deville 1848)	14	Red bald-headed uacari
<i>C. melanocephalus melanocephalus</i> (Humboldt 1811)	14	Humboldt's black-headed uacari
<i>C. melanocephalus ouakary</i> (Spix 1823)	14	Spix's black-headed uacari
<i>Alouatta</i> Lacépède 1799	15-21	Howling monkeys
<i>A. seniculus seniculus</i> (Linnaeus 1766)	15,21	Red howling monkey
<i>A. seniculus insulanus</i> Elliot 1910	15,21	Trinidad howling monkey
<i>A. seniculus stramineus</i> (Humboldt 1812)	15,21	Golden howling monkey
<i>A. seniculus macconnelli</i> Elliot 1910	15,21	Guianan red howling monkey
<i>A. seniculus amazonica</i> Lönnberg 1941	15,21	
<i>A. seniculus juara</i> Elliot 1910	15,21	
<i>A. seniculus puruensis</i> Lönnberg 1941	15,21	
<i>A. seniculus</i> ssp.	16	
<i>A. arctoidea</i> Cabrera 1940	15,21	Ursine howling monkey
<i>A. sara</i> Elliot 1910	15,21	Bolivian red howling monkey
<i>A. belzebul belzebul</i> (Linnaeus 1766)	17,21	Red-handed howling monkey
<i>A. belzebul nigerrima</i> Lönnberg 1941	17,21	Black howling monkey
<i>A. belzebul discolor</i> (Spix 1823)	17,21	
<i>A. belzebul ululata</i> (Elliot 1912)	17,21	
<i>A. fusca fusca</i> (Ihering 1914)	17,21	Northern brown howling monkey
<i>A. fusca clamitans</i> (Cabrera 1940)	17,21	Southern brown howling monkey
<i>A. palliata palliata</i> (Gray 1848)	21	Golden-mantled howling monkey
<i>A. palliata mexicana</i> (Merriam 1902)	21	Mexican howling monkey
<i>A. palliata aequatorialis</i> (Festa 1903)	21	South Pacific blackish howling monkey
<i>A. coibensis coibensis</i> (Thomas 1902)	21	Coiba Island howling monkey
<i>A. coibensis trabeata</i> Lawrence 1933	21	Azuero howling monkey
<i>A. caraya</i> (Humboldt 1812)	19,21	Black howling monkey
<i>A. pigra</i> (Lawrence 1933)	20,21	Black howling monkey
<i>Ateles</i> É. Geoffroy 1806	22-23	Spider monkeys
<i>A. geoffroyi geoffroyi</i> Kuhl 1820	22	Geoffroy's spider monkey
<i>A. geoffroyi azuerensis</i> (Bole 1937)	22	Azuero spider monkey
<i>A. geoffroyi frontatus</i> (Gray 1842)	22	Black-browed spider monkey
<i>A. geoffroyi grisescens</i> (Gray 1866)	22	Hooded spider monkey
<i>A. geoffroyi pan</i> (Schlegel 1876)	22	Guatemalan spider monkey
<i>A. geoffroyi panamensis</i> Kellogg & Goldman 1944	22	Red spider monkey
<i>A. geoffroyi ornatus</i> (Gray 1870)	22	Ornate spider monkey
<i>A. geoffroyi vellerosus</i> (Gray 1866)	22	Mexican spider monkey
<i>A. geoffroyi yucatanensis</i> Kellogg & Goldman 1944	22	Yucatán spider monkey
<i>A. fusciceps fusciceps</i> Gray 1866	22	Brown-headed spider monkey
<i>A. fusciceps robustus</i> (= <i>rufiventris</i>) (Allen 1914)	22	Colombian black spider monkey
<i>A. chamek</i> (Humboldt 1812)	22	Black-faced black spider monkey
<i>A. paniscus</i> (Linnaeus, 1758)	22	Red-faced black spider monkey
<i>A. marginatus</i> (É. Geoffroy 1809)	22	White-whiskered spider monkey
<i>A. belzebuth belzebuth</i> (É. Geoffroy 1806)	22	White-bellied spider monkey
<i>A. belzebuth hybridus</i> (I. Geoffroy 1829)	22	Variiegated spider monkey
<i>A. belzebuth brunneus</i> Gray 1870	22,23	Brown spider monkey

continued ...

Table 3 (continued)

<i>Lagothrix</i> É. Geoffroy 1812	24	Woolly monkeys
<i>L. lagotricha lagotricha</i> (Humboldt 1812)	24	Humboldt's woolly monkey
<i>L. lagotricha cana</i> (É. Geoffroy in Humboldt 1812)	24	Geoffroy's woolly monkey
<i>L. lagotricha poeppigii</i> (Schinz 1844)	24	Poeppig's woolly monkey
<i>L. lagotricha lugens</i> (Elliot 1907)	24	Colombian woolly monkey
<i>L. flavicauda</i> (Humboldt 1812)	24	Yellow-tailed woolly monkey
<i>Brachyteles</i> Spix 1823	25	Muriqui
<i>B. arachnoides</i> (É. Geoffroy 1806)	25	Southern muriqui
<i>B. hypoxanthus</i> (Kuhl 1820)	25	Northern muriqui

Notes

1. The taxonomy of *Aotus* follows Hershkovitz (1983), except for *A. hershkovitzi*, described by Ramirez-Cerquera in 1983 (*Abstracts. IX Cong. Latinoamericano de Zoología, Arequipa, Peru, p.148*) (see also Defler 1994). Defler (1994) mentions the possibility of a further two Colombian species of *Aotus* from the Colombian trapezium, *A. nigriceps* (possibly introduced) and *A. nancymae*. Hernández-Camacho and Cooper (1976) referred to *A. trivirgatus zonalis* (Goldman 1914) in Panama and Colombia, which is considered a synonym of *A. t. griseimembra* by Hershkovitz (1949), but as a synonym of *A. l. lemurinus* by Hershkovitz (1983), and a synonym of *A. lemurinus* by Groves (1993). The status recommended by Hershkovitz (1983) was accepted by Hernández-Camacho and Defler (1991). Groves (1993) lists *A. azarai boliviensis* as a synonym of *A. azarai*, and *A. lemurinus griseimembra* as a synonym of *A. lemurinus*. Pieczarka and Nagamachi (1988) found that the karyotypes of *A. infulatus* and *A. azarae boliviensis* are closer to each other than to the karyotype of *A. a. azarae*, and argue for the need to further revise the systematic classification of the genus. Recent cytogenetic studies by Pieczarka *et al.* (1992) have reinforced the validity of the species *A. vociferans* and *A. nancymae*. A phylogeny based on karyotypes is provided by Galbreath (1983). Distributions according to Hernández-Camacho and Cooper (1976), Hershkovitz (1983), Stallings (1985), Eisenberg (1989), Zunino *et al.* (1991), Redford and Eisenberg (1992), Fernandes (1993), and Aquino and Encarnación (1994). Common names follow Hill (1960) except in the use of "night monkey" rather than "douroucouli".

2. *A. azarai* is used rather than *A. azarae*, and *A. nancymae* rather than *A. nancymai* (see Hershkovitz 1983), following Groves (1993) who pointed out the correct specific names in accordance with Article 31 (a(ii)) of the *International Code of Zoological Nomenclature* (International Commission on Zoological Nomenclature, 1985).

3. *Callicebus* taxonomy according to Hershkovitz (1990). Groves (1992, 1993) indicated that *C. brunneus* and *C. hoffmannsi* may be subspecies of *C. moloch* (*C. h. baptista* is a synonym of *C. hoffmannsi*), that *C. caligatus* and *C. dubius* may be synonyms of *C. cupreus*, that *C. cupreus discolor* and *C. c. ornatus* are synonyms of *C. cupreus*, that *C. donacophilus pallescens* is a synonym of *C.*

donacophilus, and that all subspecies of *C. torquatus* and *C. personatus* listed here are synonyms of their respective species. Hershkovitz (1990) placed the *Callicebus* species into four groupings: 1) *C. modestus* (*C. modestus*); 2) *C. donacophilus* (*C. olallae*, *C. donacophilus*, *C. oenanthe*); 3) *C. moloch* (*C. brunneus*, *C. caligatus*, *C. cupreus*, *C. dubius*, *C. hoffmannsi*, *C. moloch*, *C. cinerascens* and *C. personatus*); and 4) *C. torquatus* (*C. torquatus*). The species groupings used here are those of Hershkovitz (1990), although a recent phylogenetic study, based on cranial measurements, by Kobayashi (1995) resulted in the following five groupings: 1) *C. donacophilus* (*C. modestus*, *C. ollallae*, *C. donacophilus*); 2) *C. cupreus* (*C. caligatus*, *C. cupreus*); *C. moloch* (*C. brunneus*, *C. hoffmannsi*, *C. moloch*, *C. cinerascens*); 4) *C. personatus* (*C. personatus*); and 5) *C. torquatus* (*C. torquatus*). Kobayashi (1995) did not evaluate *C. oenanthe* and *C. p. barbarabrownae*, and the position of *C. dubius* was uncertain. Kobayashi (1995) indicated that *C. caligatus* is a synonym of *C. cupreus*. Distributions according to Hernández-Camacho and Cooper (1976), Eisenberg (1989), Stallings (1985), Hershkovitz (1990), and Aquino and Encarnación (1994).

4. Kobayashi and Langguth (1994a, 1994b) recorded the existence of a new *Callicebus* from the coast of the state of Sergipe, Brazil.

5. *Saimiri* taxonomy follows Hershkovitz (1984). Hershkovitz (1987b; footnote page 22) also recognized *Saimiri boliviensis jaburuensis* and *S. b. pluvialis* (given as junior synonyms of *S. b. boliviensis* in Hershkovitz 1984) as valid subspecies. Hershkovitz (1987b) referred to *S. vanzolinii* Ayres 1981 as a subspecies of *S. boliviensis*. An alternative taxonomy is presented by Thorington (1985) as follows: *S. sciureus sciureus* (includes the forms *albigena*, *macrodon*, and *ustus* recognized by Hershkovitz, 1984), *S. sciureus boliviensis* (includes the forms *pluvialis* Lönnberg 1940 and *jaburuensis* Lönnberg 1940 recognized by Hershkovitz 1987), *S. sciureus cassiquiarensis*, *S. sciureus oerstedi* (includes the form *citrinellus* recognized by Hershkovitz 1984), and *S. madeirae* (given as a junior synonym of *S. ustus* by Hershkovitz 1984). Hernández-Camacho and Defler (1991) recognize *S. sciureus caquetensis* Allen 1916, given as a junior synonym of *S. sciureus macrodon* by Hershkovitz (1984). Groves (1993) recognized just five species of *Saimiri* (*S. boliviensis*, *S. oerstedi*, *S. sciureus*, *S. ustus* and *S. vanzolinii*) with no subspecies. He listed *S. b. peruviansis*, *S. b. jaburuensis*

and *S. b. pluvialis* as synonyms of *S. boliviensis*, *S. o. citrinellus* as a synonym of *S. oerstedii*, all subspecies of *S. sciureus* listed here as synonyms, and *S. madeirae* recognized by Thorington (1985) as a synonym of *S. ustus*. The most recent review (morphology, genetics and behavior) of squirrel monkey taxonomy by Costello *et al.* (1993) argued for the recognition of just two species: *S. sciureus* in South America, and *S. oerstedii* in Panama and Costa Rica. Silva *et al.* (1993) also gave evidence for just one large polytypic South American species, *Saimiri sciureus*. Distributions according to Hernández-Camacho and Cooper (1976), Hershkovitz (1984), Ayres (1985), Eisenberg (1989), and Aquino and Encarnación (1994).

6. The *C. apella* taxonomy of Hill (1960) was based on personal communications from Kellogg, who was revising the taxonomy but died before completing it. Apart from those listed above, Hill (1960) gives the following subspecies: *Cebus apella fatuellus* Colombian brown capuchin, from northern Colombia, type locality unknown; *Cebus apella tocantinus* from type locality Rio Tocantins - no clear difference from *peruanus*; *Cebus apella magnus* from the Rio Putumayo; *Cebus apella juruanus* from the Rio Juruá; *Cebus apella cay* Azara's capuchin from Paraguay, Goiás; *Cebus apella frontatus* the white-cheeked capuchin, no type locality, but argued by Vieira (1955) to be from the Serra da Paranapiacaba, Alto da Serra, Cananéia, Santa Catarina, and Rio Grande do Sul; *Cebus apella vellerosus* from Argentina is given by Hill (1960) as a synonym of *C. a. nigrinus*. Hernández-Camacho and Cooper (1976) argue that *C. apella* north of the Amazon in Colombia exhibit no phenotypic distinctions sufficient to warrant subspecies. They give the subspecies as *C. a. apella* (see also Hernández-Camacho and Defler 1991; Defler 1994). Hershkovitz in his current studies of *Cebus* taxonomy will maintain as valid the subspecies *C. a. maranonis*, *C. a. macrocephalus*, *C. a. pallidus*, and *C. a. peruanus* (*apud* Encarnación, 1993). All these subspecies were listed by Aquino and Encarnación (1994). Groves (1993) gave all subspecific forms listed here as synonyms of *C. apella*. Torres de Assumpção (1988) and Torres (1989) carried out an incomplete study, but the taxonomy of *Cebus apella* awaits a modern revision, and is not definite. Taxonomy of Brazilian Atlantic forest *C. apella* follows Kinzey (1982), except for *C. a. paraguayanus* Fischer, 1829 from Argentina and Paraguay which was considered by him to be a junior synonym of *C. a. libidinosus*. Bodini and Pérez-Hernández (1987) and Bodini (1989) list only two subspecies for Venezuela: *C. a. margaritae* and *C. a. apella* (Federal Territory of Amazonas) (see also Sanz and Márquez, 1994).

7. *C. xanthosternus*, formerly considered a subspecies of *Cebus apella*, is genetically quite distinct (Seuánez *et al.* 1986), and is, therefore, listed as a valid species (Mittermeier *et al.* 1988; see also Coimbra-Filho *et al.* 1991).

8. Eleven subspecies are listed for *Cebus albifrons*. The taxonomy and distributions of the white-fronted capuchins are confused and require revision. The subspecies listed here are based on Hershkovitz (1949) and Hernández-Camacho and Cooper (1976) (see also Hernández-Camacho

and Defler 1985, 1991). Hernández-Camacho and Defler (1991) mentioned six subspecies in Colombia and listed five: *C. a. malitiosus*, *C. a. cesarae*, *C. a. versicolor*, *C. a. albifrons*, and *C. a. yuracus*. They regarded *C. a. unicolor* as possibly a junior synonym of *C. a. albifrons*, although, later, Defler (1994) also included this subspecies for Colombia. Defler (1994) listed six subspecies for Colombia, three endemic: *C. a. albifrons*, *C. a. cesarae* (endemic), *C. a. versicolor* (endemic), *C. a. malitiosus* (endemic), *C. a. unicolor*, and *C. a. yuracus*. *C. a. pleei* Hershkovitz 1949 and *C. a. leucocephalus* Gray 1865 (listed by Hershkovitz 1949) are regarded by Hernández-Camacho and Cooper (1976), Hernández-Camacho and Defler (1991), and Defler (1994) as junior synonyms of *C. a. versicolor*. Bodini and Pérez-Hernández (1987) listed three subspecies for Venezuela: *C. a. adustus*, *C. a. leucocephalus* (regarded a junior synonym of *C. a. versicolor* by Hernández-Camacho and Cooper 1976), and *C. a. unicolor*. Bodini (1989) pointed out that Hill (1960) gives four subspecies for Venezuela, *C. a. cesarae*, *C. a. adustus*, *C. a. albifrons* and *C. a. unicolor*. Bodini and Pérez-Hernández (1987) give the form in the Federal Territory of Amazonas as *C. a. unicolor*, in agreement with Hershkovitz (1949), although Hershkovitz was uncertain of the limits of both this subspecies and *C. a. unicolor*. Hernández-Camacho and Cooper (1976) indicated that the Amazonian form in Venezuela was *C. a. albifrons* based on their belief that *C. a. unicolor* is a junior synonym. All subspecies of *C. albifrons* listed here are regarded as synonyms of just one species, *C. albifrons*, by Groves (1993).

9. Hill (1960) lists five subspecies of *Cebus capucinus*. *C. c. nigripictus* from the upper Rio Cauca in Colombia, *C. c. capucinus* (Colombia), *C. c. imitator* (Costa Rica, including Coiba Island, and Panama), *C. c. limitaneus* (Honduras and Nicaragua), and *C. c. curtus* (Colombia). Hernández-Camacho and Cooper (1976) argued that variability in populations of these capuchins on the upper Rio Cauca argued against the validity of *C. c. nigripictus*, and Hernández-Camacho and Defler (1991) and Defler (1994) listed just two subspecies of *C. capucinus* for Colombia: *C. c. capucinus* and *C. c. curtus*. Defler (1994) includes *C. c. nigripictus* under the name of *C. c. curtus*. *C. c. curtus* is endemic to the Colombian Island of Gorgona. It was possibly introduced in the 16th or 17th Centuries (Hernández-Camacho and Defler 1991) and is very similar to Panamanian *C. capucinus* (R. A. Mittermeier, pers. obs.). Silva-López *et al.* (1995) report on the possibility that *C. capucinus* may extend into Guatemala. Groves (1993) recognizes no subspecific differentiation in *C. capucinus*.

10. *Cebus olivaceus* requires a taxonomic revision. The subspecies listed are based on Hershkovitz (1949). The species name of *C. olivaceus* Schomburgk 1848 rather than *C. nigrivittatus* Wagner 1947 is argued by Husson (1978), and used by Eisenberg (1989). Groves (1993) gave all forms listed here as junior synonyms of *C. olivaceus*.

11. Bodini and Pérez-Hernández (1987) list five subspecies for Venezuela: *C. n. brunneus*, *C. n. apiculatus*, *C. n. nigrivittatus* (Amazonian), *C. n. olivaceus* and a fifth form

which has yet to be classified (widely distributed throughout central and northern Venezuela, to the north of Río Orinoco). Bodini (1989) pointed out that the subspecies of *C. nigrivittatus* are not well defined.

12. Taxonomy and distributions of *Pithecia* according to Hershkovitz (1987a) and Eisenberg (1989). Groves (1993) listed the following species: *P. aequatorialis*, *P. albicans*, *P. irrorata* (*P. i. vanzolinii* a synonym), *P. monachus* (*P. m. milleri* a synonym), *P. pithecia* (*P. p. chrysocephala* a synonym). A phylogeny at the generic level was recently proposed by Schneider *et al.* (1995).

13. *Chiropotes* taxonomy and distributions according to Hershkovitz (1985), Eisenberg (1989), and Ferrari (1995). Groves (1993) recognized just two species, *C. albinasus* and *C. satanas*: the subspecies of *C. satanas* recognized by Hershkovitz (1984) are considered by him to be synonyms.

14 Taxonomy and distributions of *Cacajao* according to Hernández-Camacho and Cooper (1976), Hershkovitz (1987b), Eisenberg (1989) and Boubli (1994). Groves (1989) listed the subspecies of *C. calvus* (*rubicundus*, *ucayalii*, and *novaesi*) recognized by Hershkovitz (1987b), as synonyms. Szalay and Delson (1979) gave *C. c. rubicundus* full species status.

15. Hill (1962) and Stanyon *et al.* (1995) list nine subspecific forms of *A. seniculus*: *A. s. seniculus*, *A. s. arctoidea*, *A. s. stramineus*, *A. s. macconelli*, *A. s. insulanus*, *A. s. amazonica*, *A. s. juara*, *A. s. puruensis*, *A. s. sara*. Cytogenetic studies have been carried out on; *A. s. seniculus* by Chu and Bender (1961), Bender and Chu (1963), and Yunis *et al.* (1976); *A. s. stramineus* by Lima and Seuánez (1991); *A. s. macconelli* by Lima *et al.* (1990); *A. s. sara* by Minezawa *et al.* (1985) and Stanyon *et al.* (1995); and *A. s. arctoidea* by Stanyon *et al.* (1995). *A. sara* is recognized here as a full species here following Minezawa *et al.* (1985; see also Groves 1993; Stanyon *et al.* 1995). Stanyon *et al.* (1995) concluded that the number of chromosomal differences between *A. s. sara* and *A. s. arctoidea* was on a similar scale to those found between *A. s. sara* and *A. s. seniculus* by Minezawa *et al.* (1985). *A. s. arctoidea* is here listed as a distinct species for this reason. Stanyon *et al.* (1995) noted that "as for other organisms in tropical forest regions, it is probable the biological diversity and number of species have been underestimated". Hill (1962) argued that the description of *A. s. juara* by Elliot (1910) confused the name and type locality. Hill (1962) demonstrated that it came in fact from the Rio Juruá in Brazil, whereas Elliot gave the Rio Juara in the Peruvian Amazon. Three years later, Elliot (1913) referred to the Rio Juara in the Brazilian, not Peruvian, Amazon. Hill (1962) mentioned that *A. s. juara* is probably a junior synonym of *A. s. seniculus*.

16. An undescribed subspecies of *A. seniculus* north of the Río Orinoco, reported by Bodini and Pérez-Hernández (1987).

17. The taxonomy and distributions of *A. belzebul* follow Hill (1962), Langguth *et al.* (1987), and Bonvicino *et al.*

(1989). Cytogenetic studies have indicated, however, the probability that *A. b. nigerrima* is sufficiently distinct as to warrant species status (Armada *et al.* 1987; see also Lima and Seuánez 1989)).

18. The taxonomy and distribution of *Alouatta fusca* is discussed in Rylands *et al.* (1988; see also Hirsch *et al.* 1991). Occurrence of *A. fusca* in Argentina reviewed by Bitteti *et al.* (1994). Cytogenetic studies were carried out by Lima and Seuánez (1991).

19. Villalba *et al.* (1995) have raised the possibility that *A. caraya* extends as far south as Uruguay.

20. Taxonomic status and distribution of *Alouatta pigra* according to Smith (1970), Horwich (1983), Horwich and Johnson (1984), and Silva-López. *et al.* (1995). *Alouatta palliata luctuosa* Lawrence, 1933 listed by Hill (1962) for Belize was not recognized by Froehlich and Froehlich (1986). *Alouatta pigra luctuosa* was listed by Dahl (1987) for the primates of Belize.

21. Groves (1993) lists the following species: *A. belzebul* (*discolor*, *nigerrima*, and *ululata* synonyms), *A. caraya*, *A. coibensis* (*trabeata* synonym), *A. fusca* (*clamitans* synonym), *A. palliata* (*aequatorialis*, *mexicana* synonyms), *A. pigra* (*A. p. luctuosa* synonym), *A. seniculus*, and *A. sara*. Distributions of *Alouatta* follow Hershkovitz (1949), Hill (1962), Froehlich and Froehlich (1986, 1987), Dahl (1987), Langguth *et al.* (1987), Bonvicino *et al.* (1989), Eisenberg (1989), Hirsch *et al.* (1991), Redford and Eisenberg (1992), and Curdts (1993). Note that Stanyon *et al.* (1995) gave the distribution of *A. seniculus amazonica* as the northern Atlantic forest, obviously an oversight rather than an affirmation. Their distribution map for the species is taken from Hill (1962) who placed *A. s. amazonica* in a small area north of the Rio Solimões, to the west of the Rio Negro, in the state of Amazonas, Brazil.

22. *Ateles* taxonomy according to Kellogg and Goldman (1944) and Konstant *et al.* (1985), except in the recognition of the forms *chamek* and *marginatus* as distinct species, following Groves (1989, 1993). De Boer and Bruijn (1990), Froehlich *et al.* (1991), and Medeiros (1994) argued that *A. paniscus* is a distinct form with no subspecies. De Boer and Bruijn (1990) indicated that *chamek* should be considered a full species. Froehlich *et al.* (1991) indicated that the form *chamek* is subspecific to *A. belzebul* rather than *A. paniscus*. Hernández-Camacho and Cooper (1976), Hernández-Camacho and Defler (1991) refer to all *Ateles* as subspecies of *A. paniscus*, following Hershkovitz (1972). Defler (1994), on the other hand follows Kellogg and Goldman (1944) and refers to three species in Colombia: *A. belzebul*, *A. fusciceps*, and *A. geoffroyi*. Groves (1989, 1993) gave the forms *chamek* Humboldt 1812, and *marginatus* É. Geoffroy 1809, species status, regarded *A. f. robustus* as a synonym of *A. f. fusciceps*, *A. b. brunneus* and *A. b. hybridus* as synonyms of *A. belzebul*, and all *A. geoffroyi* subspecies as synonyms. Heltne and Kunkel (1975) provided additional taxonomic notes concerning pelage coloration in *A. paniscus* (including *chamek*) and *A.*

fusciceps. Kunkel *et al.* (1980), reported on chromosomal variation and zoogeography in the genus. Distributions according to Kellogg and Goldman (1944), Hershkovitz (1949), Hernández-Camacho and Cooper (1976), Martins *et al.* (1988), Eisenberg (1989), and Aquino and Encarnación (1994).

23. Hernández-Camacho and Defler (1985, 1991) and Defler (1994) also refer to *A. p. brunneus* Gray 1872 from the south-east of the Department of Bolivar, Colombia, listed here as a subspecies of *A. b. belzebuth* (see Hill 1962).

24. *Lagothrix* taxonomy and distributions according to Fooden (1963), Hernández-Camacho and Cooper (1976), Eisenberg (1989), Hernández-Camacho and Defler (1991) and Aquino and Encarnación (1994). This genus is in need of revision. Distribution of *L. flavicauda* follows Leo Luna (1987) and Butchart *et al.* (in press). Groves (1993) does not recognize the subspecific forms of *L. lagothrica*.

25. Vieira (1944) recognized two subspecies of *Brachyteles*. Recent evidence provided by Lemos de Sá *et al.* (1990, 1993), Fonseca *et al.* (1991) and Lemos de Sá and Glander (1993) indicates that Vieira's original (1944) standing was valid, but that differentiation is even more extreme and justifies the classification of the two forms as separate species. Distribution according to Aguirre (1971), Mittermeier *et al.* (1987), Santos *et al.* (1987), and Oliver and Santos (1991).

Mace-Lande Categories for Neotropical Primates

A draft version of the application of the Mace-Lande classification to the Neotropical primates was drawn up by the authors on the occasion of the XVth Congress of the International Primatological Society, held in Bali, 3-8 August 1994. This proposal was then sent to 86 members of the IUCN Species Survival Commission (SSC) Primate Specialist Group in October 1994 for comments and adjustments. The evaluation of the Mesoamerican primates also benefited from the concurrent preparation of the Primate Action Plan for the region (Rodríguez-Luna 1993). The final version is presented in Table 4, and Tables 5, 6, and 7 list the primates in each threatened category (Critically Endangered, Endangered and Vulnerable) with the criteria which determined their rating. Table 8 lists the species which are considered threatened according to the Mace-Lande System. Table 9 provides a summary of the number of species and taxa of Callitrichidae and Cebidae in the Critical (CR), Endangered (EN) and Vulnerable (VU), and the percentage of cebid and callitrichid and the total species and taxa in each threatened category is also shown.

From this evaluation it is possible to make the following statements:

Family Callitrichidae

1. This synthesis considers five genera, 35 species, and 55 species and subspecies of callitrichids.
2. Two of the five genera of callitrichids (40%) are threatened (*Leontopithecus* and *Callimico*).
3. Thirteen of the 35 species of callitrichids (37%) are threatened.
4. Sixteen of the 55 species and subspecies of callitrichids (29%) are threatened.
5. Seven of the 35 species of callitrichids (20%) are critically endangered or endangered (*Callithrix flaviceps*, *C. aurita*, *Saguinus oedipus*, *Leontopithecus rosalia*, *L. chrysomelas*, *L. chrysopygus*, *L. caissara*).
6. Eight of the 55 species and subspecies of callitrichids (14.5%) are critically endangered or endangered.

Family Cebidae

1. This synthesis considers 11 genera, 63 species, and 147 species and subspecies of cebids.
2. One of the 11 genera of cebids are threatened (*Brachyteles*).
3. Twenty of the 63 species of cebids (32%) are threatened.
4. Fifty-four of the 147 species and subspecies of the cebids (37%) are threatened.
5. Eight of the 63 species of cebids (13%) are critically endangered or endangered (*Aotus lemurinus*, *Saimiri oerstedii*, *Callicebus* sp., *Cebus xanthosternos*, *Alouatta coibensis*, *Ateles marginatus*, *Brachyteles arachnoides*, *B. hypoxanthus*).
6. Twenty-seven of the 147 species and subspecies of cebids (18%) are critically endangered or endangered.

New World Primates

1. This synthesis considers 16 genera, 98 species, and 202 species and subspecies of New World primates.
2. Three of the 16 genera of New World primates are threatened (*Callimico*, *Leontopithecus*, *Brachyteles*).
3. Thirty-three of the 98 species of New World primates (34%) are threatened.
4. Seventy of the 202 species and subspecies of

New World primates (35%) are threatened.

5. Fifteen of 98 species of New World primates (15%) are critically endangered or endangered.
6. Thirty-five of the 202 species and subspecies of New World primates (17%) are critically endangered or endangered.

CRITICALLY ENDANGERED

The two criteria applicable to all of the taxa listed as critically endangered taxa (Table 5) are: B. the extent of occurrence is estimated to be less than 100 km² or area of occupancy estimated to be less than 10 km², and estimates indicating 1) Severely fragmented or known to exist at only a single location, and 2) Continuing decline, observed, inferred or projected in any of the following (a) extent of occurrence, (b) area of occupancy (c) area, extent and/or quality of habitat, (d) number of locations or subpopulations and (e) number of mature individuals. For all, except *Callicebus personatus barbarabrownae*, it was also possible to invoke the following criterion: C. Population estimated to number less than 250 mature individuals and 2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals

and population structure in the form of (a) severely fragmented (i.e., no subpopulation estimated to contain more than 50 mature individuals). For both *Alouatta fusca fusca* and *Leontopithecus caissara* it is also estimated that the population contains no more than 50 mature individuals (D).

ENDANGERED

Universal criteria for the endangered species and subspecies listed in Table 6 are the following: B. Extent of occurrence estimated to be less than 5000 km² or area of occupancy estimated to be less than 500 km², and estimates indicating 1. Severely fragmented or known to exist at no more than five locations, and 2. Continuing decline, observed, inferred or projected, in any of the following: (a) extent of occurrence, (b) area of occupancy, (c) area, extent and/or quality of habitat, (d) number of locations or subpopulations and (e) number of mature individuals. In the case of all of the callitrichids, *Saimiri oerstedii oerstedii*, *Alouatta coibensis coibensis*, *Ateles geoffroyi griseus*, *Ateles geoffroyi panamensis*, *Brachyteles arachnoides*, and *Brachyteles hypoxanthus* criterion C2 was also applied: C. Population estimated to number less than 2500 mature individuals and 2. A continuing decline,

Table 4. The IUCN Mace-Lande Categories for the status of New World Monkeys. Also shown is the distribution by country.

Species	Category	Distribution
Family Callitrichidae		
<i>Cebuella pygmaea</i>	LR	Bolivia, Brazil, Colombia, Ecuador, Peru
<i>Callithrix argentata</i>	LR	Brazil
<i>Callithrix leucippe</i>	VU	Brazil
<i>Callithrix melanura</i>	LR	Bolivia, Brazil, Paraguay
<i>Callithrix intermedia</i>	LR	Brazil
<i>Callithrix emiliae</i>	LR	Brazil
<i>Callithrix nigriceps</i>	VU	Brazil
<i>Callithrix marcai</i>	LR	Brazil
<i>Callithrix humeralifer</i>	LR	Brazil
<i>Callithrix chrysoleuca</i>	VU	Brazil
<i>Callithrix mauesi</i>	LR	Brazil
<i>Callithrix saterei</i>	DD	Brazil
<i>Callithrix jacchus</i>	LR	Brazil
<i>Callithrix penicillata</i>	LR	Brazil
<i>Callithrix kuhli</i>	LR	Brazil
<i>Callithrix geoffroyi</i>	VU	Brazil
<i>Callithrix flaviceps</i>	EN	Brazil
<i>Callithrix aurita</i>	EN	Brazil
<i>Saguinus nigricollis nigricollis</i>	LR	Brazil (?), Colombia, Peru
<i>Saguinus nigricollis graellsii</i>	LR	Colombia, Ecuador, Peru
<i>Saguinus nigricollis hernandezi</i>	VU	Colombia
<i>Saguinus fuscicollis fuscicollis</i>	LR	Brazil, Peru
<i>Saguinus fuscicollis fuscus</i>	LR	Brazil, Colombia

continued ...

Table 4 (continued)

<i>Saguinus fuscicollis avilapiresei</i>	LR	Brazil
<i>Saguinus fuscicollis cruzlimai</i>	DD	Brazil (?)
<i>Saguinus fuscicollis illigeri</i>	LR	Peru
<i>Saguinus fuscicollis leucogenys</i>	LR	Peru
<i>Saguinus fuscicollis nigrifrons</i>	LR	Peru
<i>Saguinus fuscicollis lagonotus</i>	LR	Ecuador, Peru
<i>Saguinus fuscicollis weddelli</i>	LR	Bolivia, Brazil, Peru
<i>Saguinus fuscicollis primitivus</i>	LR	Brazil
<i>Saguinus fuscicollis melanoleucus</i>	LR	Brazil
<i>Saguinus fuscicollis crandalli</i>	DD	Peru (?)
<i>Saguinus tripartitus</i>	LR	Ecuador, Peru
<i>Saguinus mystax mystax</i>	LR	Brazil, Peru
<i>Saguinus mystax pileatus</i>	LR	Brazil
<i>Saguinus mystax pluto</i>	LR	Brazil
<i>Saguinus labiatus labiatus</i>	LR	Bolivia, Brazil, Peru
<i>Saguinus labiatus thomasi</i>	LR	Brazil
<i>Saguinus imperator imperator</i>	VU	Brazil, Peru
<i>Saguinus imperator subgriseescens</i>	LR	Bolivia, Brazil, Peru
<i>Saguinus inustus</i>	LR	Brazil, Colombia
<i>Saguinus midas midas</i>	LR	Brazil, French Guiana, Guyana, Suriname
<i>Saguinus midas niger</i>	LR	Brazil
<i>Saguinus bicolor bicolor</i>	EN	Brazil
<i>Saguinus bicolor ochraceus</i>	LR	Brazil
<i>Saguinus bicolor martinsi</i>	LR	Brazil
<i>Saguinus leucopus</i>	VU	Colombia
<i>Saguinus oedipus</i>	EN	Colombia
<i>Saguinus geoffroyi</i>	LR	Colombia, Costa Rica, Panama
<i>Leontopithecus rosalia</i>	CR	Brazil
<i>Leontopithecus chrysomelas</i>	EN	Brazil
<i>Leontopithecus chrysopygus</i>	CR	Brazil
<i>Leontopithecus caissara</i>	CR	Brazil
<i>Callimico goeldii</i>	VU	Bolivia, Brazil, Colombia, Peru
Family Cebidae		
<i>Aotus lemurinus lemurinus</i>	VU	Colombia, Costa Rica, Panama
<i>Aotus lemurinus griseimembra</i>	EN	Colombia
<i>Aotus vociferans</i>	LR	Colombia, Brazil, Ecuador, Peru
<i>Aotus trivirgatus</i>	LR	Brazil, Colombia, Venezuela
<i>Aotus brumbacki</i>	VU	Colombia
<i>Aotus miconax</i>	VU	Peru
<i>Aotus nigriceps</i>	LR	Brazil, Colombia, Peru
<i>Aotus infulatus</i>	LR	Brazil
<i>Aotus azarai azarai</i>	LR	Argentina, Bolivia, Paraguay
<i>Aotus azarai boliviensis</i>	LR	Bolivia, Peru
<i>Aotus nancymae</i>	LR	Brazil, Colombia, Peru
<i>Aotus herskovitzi</i>	DD	Colombia
<i>Callicebus modestus</i>	LR	Bolivia
<i>Callicebus donacophilus donacophilus</i>	LR	Bolivia
<i>Callicebus donacophilus pallescens</i>	LR	Bolivia, Brazil, Paraguay
<i>Callicebus olallae</i>	DD	Bolivia
<i>Callicebus oenanthe</i>	VU	Peru
<i>Callicebus cinerascens</i>	LR	Brazil
<i>Callicebus hoffmannsi hoffmannsi</i>	LR	Brazil
<i>Callicebus hoffmannsi baptista</i>	LR	Brazil
<i>Callicebus moloch</i>	LR	Brazil
<i>Callicebus brunneus</i>	LR	Brazil, Peru
<i>Callicebus cupreus cupreus</i>	LR	Brazil, Peru

continued ...

Table 4 (continued)

<i>Callicebus cupreus discolor</i>	LR	Colombia, Ecuador, Peru
<i>Callicebus cupreus ornatus</i>	VU	Colombia
<i>Callicebus caligatus</i>	LR	Brazil, Peru
<i>Callicebus dubius</i>	VU	Brazil
<i>Callicebus personatus personatus</i>	VU	Brazil
<i>Callicebus personatus nigrifrons</i>	VU	Brazil
<i>Callicebus personatus melanochir</i>	VU	Brazil
<i>Callicebus personatus barbarabrownae</i>	CR	Brazil
<i>Callicebus</i> sp.	CR	Brazil
<i>Callicebus torquatus torquatus</i>	LR	Brazil
<i>Callicebus torquatus medemi</i>	VU	Colombia
<i>Callicebus torquatus lugens</i>	LR	Brazil, Colombia, Venezuela
<i>Callicebus torquatus lucifer</i>	LR	Brazil, Colombia, Peru
<i>Callicebus torquatus purinus</i>	LR	Brazil
<i>Callicebus torquatus regulus</i>	LR	Brazil
<i>Saimiri boliviensis boliviensis</i>	LR	Bolivia, Brazil, Peru
<i>Saimiri boliviensis peruviansis</i>	LR	Peru
<i>Saimiri boliviensis pluvialis</i>	LR	Brazil
<i>Saimiri boliviensis jaburuensis</i>	LR	Brazil
<i>Saimiri vanzolinii</i>	VU	Brazil
<i>Saimiri sciureus sciureus</i>	LR	Brazil, French Guiana, Guyana, Suriname
<i>Saimiri sciureus macrodon</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Saimiri sciureus cassiquiarensis</i>	LR	Brazil, Colombia, Venezuela
<i>Saimiri sciureus albigena</i>	LR	Colombia
<i>Saimiri oerstedii oerstedii</i>	EN	Costa Rica, Panama
<i>Saimiri oerstedii citrinellus</i>	CR	Costa Rica
<i>Saimiri ustus</i>	LR	Brazil
<i>Cebus apella apella</i>	LR	Colombia, Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Cebus apella macrocephalus</i>	LR	Brazil, Peru
<i>Cebus apella maranonis</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Cebus apella pallidus</i>	LR	Bolivia, Peru
<i>Cebus apella peruanus</i>	LR	Brazil, Peru
<i>Cebus apella libidinosus</i>	LR	Brazil
<i>Cebus apella nigritus</i>	LR	Argentina, Brazil
<i>Cebus apella robustus</i>	VU	Brazil
<i>Cebus apella margaritae</i>	CR	Venezuela
<i>Cebus apella paraguayanus</i>	LR	Argentina, Brazil, Paraguay
<i>Cebus xanthosternos</i>	CR	Brazil
<i>Cebus albifrons albifrons</i>	LR	Colombia
<i>Cebus albifrons unicolor</i>	LR	Colombia, Bolivia, Brazil, Peru, Venezuela
<i>Cebus albifrons adustus</i>	DD	Venezuela
<i>Cebus albifrons aequatorialis</i>	DD	Ecuador
<i>Cebus albifrons cesariae</i>	DD	Colombia
<i>Cebus albifrons cuscinus</i>	DD	Bolivia, Brazil, Peru
<i>Cebus albifrons hypoleucus</i>	DD	Colombia
<i>Cebus albifrons malitiosus</i>	DD	Colombia
<i>Cebus albifrons trinitatis</i>	CR	Trinidad
<i>Cebus albifrons versicolor</i>	DD	Colombia
<i>Cebus albifrons yuracus</i>	DD	Colombia, Ecuador, Peru
<i>Cebus albifrons leucocephalus</i>	DD	Venezuela
<i>Cebus capucinus capucinus</i>	LR	Colombia
<i>Cebus capucinus limitaneus</i>	LR	Belize, Honduras, Nicaragua
<i>Cebus capucinus imitator</i>	LR	Costa Rica, Panama
<i>Cebus capucinus curtus</i>	VU	Gorgona Island, Colombia
<i>Cebus olivaceus olivaceus</i>	LR	Brazil, Guyana, Venezuela,
<i>Cebus olivaceus apiculatus</i>	LR	Venezuela
<i>Cebus olivaceus brunneus</i>	LR	Venezuela

continued ...

Table 4 (continued)

<i>Cebus olivaceus castaneus</i>	LR	French Guiana, Suriname
<i>Cebus olivaceus</i> ssp.	DD	Venezuela
<i>Cebus kaapori</i>	VU	Brazil
<i>Pithecia pithecia pithecia</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Pithecia pithecia chrysocephala</i>	LR	Brazil
<i>Pithecia monachus monachus</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Pithecia monachus milleri</i>	VU	Colombia
<i>Pithecia irrorata irrorata</i>	LR	Bolivia, Brazil, Peru
<i>Pithecia irrorata vanzolinii</i>	LR	Brazil
<i>Pithecia albicans</i>	LR	Brazil
<i>Pithecia aequatorialis</i>	LR	Colombia (?), Ecuador, Peru
<i>Chiropotes albinasus</i>	LR	Brazil
<i>Chiropotes satanas satanas</i>	EN	Brazil
<i>Chiropotes satanas chiropotes</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Chiropotes satanas utahicki</i>	VU	Brazil
<i>Cacajao calvus calvus</i>	EN	Brazil
<i>Cacajao calvus ucayalii</i>	VU	Brazil (?), Peru
<i>Cacajao calvus novaesi</i>	EN	Brazil
<i>Cacajao calvus rubicundus</i>	EN	Brazil, Colombia
<i>Cacajao melanocephalus melanocephalus</i>	LR	Brazil, Venezuela
<i>Cacajao melanocephalus ouakary</i>	LR	Brazil, Colombia
<i>Alouatta seniculus seniculus</i>	LR	Colombia, Bolivia, Brazil, Ecuador, Peru, Venezuela
<i>Alouatta seniculus insulanus</i>	VU	Trinidad
<i>Alouatta seniculus stramineus</i>	LR	Brazil, Venezuela
<i>Alouatta seniculus macconnelli</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Alouatta seniculus amazonica</i>	DD	Brazil
<i>Alouatta seniculus juara</i>	DD	Brazil
<i>Alouatta seniculus puruensis</i>	DD	Bolivia, Brazil
<i>Alouatta seniculus</i> ssp.	LR	Venezuela
<i>Alouatta arctoidea</i>	LR	Venezuela
<i>Alouatta sara</i>	LR	Bolivia
<i>Alouatta belzebul belzebul</i>	LR	Brazil
<i>Alouatta belzebul nigerrima</i>	LR	Brazil
<i>Alouatta belzebul discolor</i>	LR	Brazil
<i>Alouatta belzebul ululata</i>	CR	Brazil
<i>Alouatta fusca fusca</i>	CR	Brazil
<i>Alouatta fusca clamitans</i>	VU	Argentina, Brazil
<i>Alouatta palliata palliata</i>	LR	Costa Rica, Nicaragua, Honduras, Panama
<i>Alouatta palliata mexicana</i>	VU	Mexico, Guatemala
<i>Alouatta palliata aequatorialis</i>	LR	Colombia, Ecuador, Panama, Peru
<i>Alouatta coibensis coibensis</i>	EN	Coiba Island, Panama
<i>Alouatta coibensis trabeata</i>	CR	Panama
<i>Alouatta caraya</i>	LR	Argentina, Brazil, Paraguay, Uruguay (?)
<i>Alouatta pigra</i>	LR	Belize, Guatemala, Mexico
<i>Ateles geoffroyi geoffroyi</i>	LR	Nicaragua
<i>Ateles geoffroyi azuerensis</i>	CR	Panama
<i>Ateles geoffroyi frontatus</i>	VU	Costa Rica, Nicaragua
<i>Ateles geoffroyi griseescens</i>	EN	Colombia, Panama
<i>Ateles geoffroyi pan</i>	DD	Guatemala
<i>Ateles geoffroyi panamensis</i>	EN	Costa Rica, Panama

continued ...

Table 4 (continued)

<i>Ateles geoffroyi ornatus</i>	VU	Costa Rica
<i>Ateles geoffroyi vellerosus</i>	LR	El Salvador, Honduras, Guatemala, Mexico
<i>Ateles geoffroyi yucatanensis</i>	VU	Belize, Guatemala, Mexico
<i>Ateles fusciceps fusciceps</i>	CR	Ecuador
<i>Ateles fusciceps robustus</i> (= <i>rufiventris</i>)	VU	Colombia, Panama
<i>Ateles paniscus</i>	LR	Brazil, French Guiana, Guyana, Suriname
<i>Ateles belzebuth belzebuth</i>	VU	Brazil, Colombia, Ecuador, Peru, Venezuela
<i>Ateles belzebuth hybridus</i>	EN	Colombia, Venezuela
<i>Ateles belzebuth brunneus</i>	EN	Colombia
<i>Ateles chamek</i>	LR	Bolivia, Brazil, Peru
<i>Ateles marginatus</i>	EN	Brazil
<i>Lagothrix lagotricha lagotricha</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Lagothrix lagotricha cana</i>	VU	Brazil, Peru
<i>Lagothrix lagotricha poeppigii</i>	VU	Brazil, Ecuador, Peru
<i>Lagothrix lagotricha lugens</i>	CR	Colombia, Venezuela
<i>Lagothrix flavicauda</i>	CR	Peru
<i>Brachyteles arachnoides</i>	EN	Brazil
<i>Brachyteles hypoxanthus</i>	EN	Brazil

observed, projected, or inferred, in numbers of mature individuals and population structure in the form: (a) severely fragmented (i.e. no subpopulation estimated to contain more 250 mature individuals).

VULNERABLE

The criteria used for the categorization of the species and subspecies which are considered vulnerable (Table 7) are more varied, and include the following:

A. Population reduction in the form of the following : 1. An observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following : (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat; B. Extent of occurrence estimated to be less than 20,000 km² or area of occupancy estimated to be less than 2000 km², and estimates indicating any two of the following : 1. Severely fragmented or

Table 5. The New World primates (5 species and 16 taxa) considered to be Critically Endangered (CR) following the IUCN Mace-Lande Categories.

Species	Criteria	Distribution
Family Callitrichidae		
<i>Leontopithecus rosalia</i>	B1, B2, C2(a)	Brazil
<i>Leontopithecus chrysopygus</i>	B1, B2, C2(a)	Brazil
<i>Leontopithecus caissara</i>	B1, B2, C2(a), D	Brazil
Family Cebidae		
<i>Callicebus personatus barbarabrownae</i>	B1, B2	Brazil
<i>Callicebus</i> sp.	B1, B2, C2(a)	Brazil
<i>Saimiri oerstedii citrinellus</i>	B1, B2, C2(a)	Costa Rica
<i>Cebus apella margaritae</i>	B1, B2, C2(a)	Margarita Island, Venezuela
<i>Cebus albifrons trinitatis</i>	B1, B2, C2(a)	Trinidad
<i>Cebus xanthosternos</i>	B1, B2, C2(a)	Brazil
<i>Alouatta belzebul ululata</i>	B1, B2, C2(a)	Brazil
<i>Alouatta fusca fusca</i>	B1, B2, C2(a), D	Brazil
<i>Alouatta coibensis trabeata</i>	B1, B2, C2(a)	Panama
<i>Ateles geoffroyi azuerensis</i>	B1, B2, C2(a)	Panama
<i>Ateles fusciceps fusciceps</i>	B1, B2, C2(a)	Ecuador
<i>Lagothrix lagotricha lugens</i>	B1, B2, C2(a)	Colombia, Venezuela
<i>Lagothrix flavicauda</i>	B1, B2, C2(a)	Peru

known to exist at no more than ten locations. 2. Continuing decline, observed, inferred or projected, in the following: (a) extent of occurrence, (b) number of populations, (c) area, extent and/or quality of habitat, (d) number of locations or subpopulations, and (e) number of mature individuals; and C. Population estimated to number less than 10,000 mature individuals and 2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and populations structure in the form of either: (a) severely fragmented (i.e. no subpopulation estimated to contain more 1000 mature individuals) or (b) all individuals are in a single subpopulation.

in Table 32. From this evaluation it is possible to state the following:

Distribution by country

1. Neotropical primates are distributed through 20, possibly 21, countries from southern Mexico through Central America to Argentina and possibly Uruguay.

Family Callitrichidae

2. Callitrichids are distributed through 11 countries. That with the most species of callitrichids

Table 6. The New World primates considered to be Endangered (EN), following the IUCN Mace-Lande Categories.

Species	Criteria	Distribution
Family Callitrichidae		
<i>Callithrix flaviceps</i>	B1, B2, C2(a)	Brazil
<i>Callithrix aurita</i>	B1, B2, C2(a)	Brazil
<i>Saguinus bicolor bicolor</i>	B1, B2, C2(a)	Brazil
<i>Saguinus oedipus</i>	B1, B2, C2(a)	Colombia
<i>Leontopithecus chrysomelas</i>	B1, B2, C2(a)	Brazil
Family Cebidae		
<i>Aotus lemurinus griseimembra</i>	B1, B2	Colombia
<i>Saimiri oerstedii oerstedii</i>	B1, B2, C2(a)	Costa Rica, Panama
<i>Chiropotes satanas satanas</i>	B1, B2	Brazil
<i>Cacajao calvus calvus</i>	B1, B2	Brazil
<i>Cacajao calvus novaesi</i>	B1, B2	Brazil
<i>Cacajao calvus rubicundus</i>	B1, B2	Brazil, Colombia
<i>Alouatta coibensis coibensis</i>	B1, B2, C2(a)	Coiba Island, Panama
<i>Ateles geoffroyi grisescens</i>	B1, B2, C2 (a)	Colombia, Panama
<i>Ateles geoffroyi panamensis</i>	B1, B2, C2 (a)	Costa Rica, Panama
<i>Ateles marginatus</i>	B1, B2	Brazil
<i>Ateles belzebuth hybridus</i>	B1, B2	Colombia, Venezuela
<i>Ateles belzebuth brunneus</i>	B1, B2	Colombia
<i>Brachyteles arachnoides</i>	B1, B2, C2 (a)	Brazil
<i>Brachyteles hypoxanthus</i>	B1, B2, C2 (a)	Brazil

Primate Diversity by Country - Richness, Endemism, and Threatened Species

The primates occurring in each of the 21 countries, ranging from Mexico to northern Argentina and possibly Uruguay, are shown in Tables 10 to 30. Endemic species are in bold. A summary is provided in Table 31 and Figure 1 which give the number of species and taxa of callitrichids and cebids and the numbers for both families combined, along with the number of endemic species and taxa in each country. The numbers of threatened taxa in each country are shown

is Brazil (31 species and 44 species and subspecies). In second place is Peru, with eight species and 16 species and subspecies, and in third place is Colombia, with eight species and 10 species and subspecies. Six species occur in Bolivia, and the remaining seven countries have four or less species.

Family Cebidae

3. Cebids occur in 20, possibly 21 countries. That with the most species is Brazil, with

45 species and 84 species and subspecies. Colombia has 23 species and 41 species and subspecies. Third place is taken by Peru with 24 species and 35 species and subspecies. Venezuela is in fourth place with 13 species and 24 species and subspecies. Ecuador has 12 species and 14 species and subspecies and Bolivia has 11 species and 15 species and subspecies.

New World Primates

4. The country with the most primates is Brazil with 76 species (77% of the New World primate species) and 128 species and subspecies (63% of the New World primate taxa). Brazil is followed by Colombia with 31 species (32%) and 51 species and subspecies (25%) and Peru with 32 species (33%) and 51 spe-

Table 7. The New World primates considered to be Vulnerable (VU), following the IUCN Mace-Lande Categories.

Species	Criteria	Distribution
Family Callitrichidae		
<i>Callithrix leucippe</i>	B2	Brazil
<i>Callithrix chrysoleuca</i>	B2	Brazil
<i>Callithrix nigriceps</i>	B2	Brazil
<i>Callithrix geoffroyi</i>	B1, B2(b), C2	Brazil
<i>Saguinus nigricollis hernandezi</i>	A1(c), B2	Colombia
<i>Saguinus imperator imperator</i>	A1(c), B2	Brazil, Peru
<i>Saguinus leucopus</i>	A1(c), B1, B2, C2	Colombia
<i>Callimico goeldii</i>	A1(c)	Bolivia, Brazil, Colombia, Peru
Family Cebidae		
<i>Aotus lemurinus lemurinus</i>	B1, B2, C2	Colombia, Costa Rica, Panama
<i>Aotus brumbacki</i>	B1, B2	Colombia
<i>Aotus miconax</i>	A1(c), B1, B2	Peru
<i>Callicebus oenanthe</i>	B1, B2	Peru
<i>Callicebus cupreus ornatus</i>	A1(c), B1, B2	Colombia
<i>Callicebus dubius</i>	B1, B2	Brazil
<i>Callicebus personatus personatus</i>	A1(c), B1, B2	Brazil
<i>Callicebus personatus nigrifrons</i>	A1(c)	Brazil
<i>Callicebus personatus melanochir</i>	A1(c)	Brazil
<i>Callicebus torquatus medemi</i>	B1, B2, C2	Colombia
<i>Saimiri vanzolinii</i>	B1, B2, C2	Brazil
<i>Cebus apella robustus</i>	B1, B2	Brazil
<i>Cebus kaapori</i>	A1(c), B1, B2	Brazil
<i>Cebus capucinus curtus</i>	B1, B2	Gorgona Island, Colombia
<i>Pithecia monachus milleri</i>	A1(c), B1, B2	Colombia
<i>Chiropotes satanas utahicki</i>	A1(c)	Brazil
<i>Cacajao calvus ucayalii</i>	A1(c)	Brazil (?), Peru
<i>Alouatta seniculus insulanus</i>	A1(c), B1, B2	Trinidad
<i>Alouatta fusca clamitans</i>	A1(c)	Argentina, Brazil
<i>Alouatta palliata mexicana</i>	A1(c), B1, B2	Mexico, Guatemala
<i>Ateles geoffroyi frontatus</i>	A1(c), B1, B2	Costa Rica, Nicaragua
<i>Ateles geoffroyi ornatus</i>	A1(c), B1, B2	Costa Rica
<i>Ateles geoffroyi yucatanensis</i>	A1(c), B1, B2	Belize, Guatemala, Mexico
<i>Ateles fusciceps robustus (= rufiventris)</i>	A1(c), B1, B2	Colombia, Panama
<i>Ateles belzebuth belzebuth</i>	A1(c)	Brazil, Colombia, Ecuador, Peru, Venezuela
<i>Lagothrix lagotricha cana</i>	A1(c)	Brazil, Peru
<i>Lagothrix lagotricha poeppigii</i>	A1(c)	Brazil, Ecuador, Peru

Table 8. Threatened species of Neotropical Primates.

Species
Family Callitrichidae
<i>Callithrix leucippe</i>
<i>Callithrix chrysoleuca</i>
<i>Callithrix nigriceps</i>
<i>Callithrix geoffroyi</i>
<i>Callithrix flaviceps</i>
<i>Callithrix aurita</i>
<i>Saguinus leucopus</i>
<i>Saguinus oedipus</i>
<i>Leontopithecus rosalia</i>
<i>Leontopithecus chrysomelas</i>
<i>Leontopithecus chrysopygus</i>
<i>Leontopithecus caissara</i>
<i>Callimico goeldii</i>
Family Cebidae
<i>Aotus lemurinus</i>
<i>Aotus brumbacki</i>
<i>Aotus miconax</i>
<i>Callicebus oenanthe</i>
<i>Callicebus dubius</i>
<i>Callicebus personatus</i>
<i>Callicebus sp.</i>
<i>Saimiri vanzolinii</i>
<i>Saimiri oerstedii</i>
<i>Cebus xanthosternos</i>
<i>Cebus kaapori</i>
<i>Cacajao calvus</i>
<i>Alouatta fusca</i>
<i>Alouatta coibensis</i>
<i>Ateles fusciceps</i>
<i>Ateles belzebuth</i>
<i>Ateles marginatus</i>
<i>Lagothrix flavicauda</i>
<i>Brachyteles arachnoides</i>
<i>Brachyteles hypoxanthus</i>

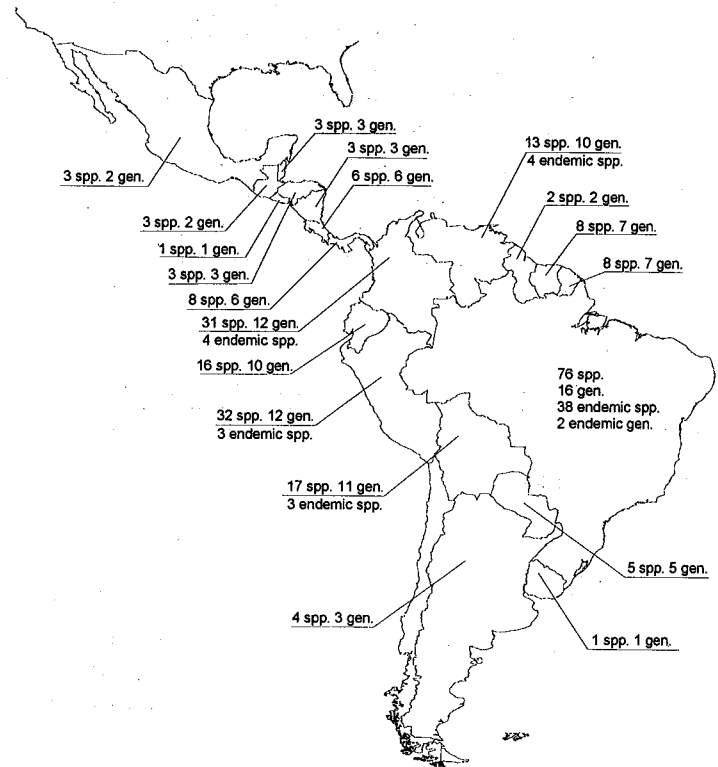


Figure 1. Number of Neotropical primate species and genera by country, with number of endemics indicated (map by R. B. Machado).

cies and subspecies (25%). Bolivia has 17 species and 21 species and subspecies, Venezuela has 13 species and 24 species and subspecies, and Ecuador 16 species and 18 species and subspecies. Panama has the most primates in Central America, with eight species and 12 species and subspecies.

Endemism

5. Fifty species, or 51% of the Neotropical primate species, are endemic to one country. A total of 114 species and subspecies, or 56% of the Neotropical primate taxa, are restricted to just one country. Six countries have endemic species: Brazil (38), Colombia (6), Bolivia (3),

Table 9. A summary of the number of species and taxa of Callitrichidae and Cebidae in the IUCN Mace-Lande categories of Critical (CR), Endangered (EN) and Vulnerable (VU). The percentage of cebid and callitrichid and the total species and taxa in each threatened category is also shown.

Family	Genus Species Taxa			Threatened Category (sp.)				Threatened Category (taxa)			
	CR	EN	VU	Total	CR	EN	VU	Total			
Callitrichidae	5	35	55	3	4	6	13	3	5	8	16
	8.6%	11.4%	17.1%	37.1%	5.4%	9.1%	14.5%	29.1%			
Cebidae	11	63	147	3	3	6	20	13	14	27	54
	4.8%	4.8%	9.7%	31.7%	8.8%	9.5%	18.4%	36.7%			
TOTAL	16	98	202	6	7	12	33	16	19	35	69
	6.1%	7.2%	12.4%	33.7%	7.9%	9.4%	17.3%	34.1%			

Peru (3), Ecuador (2), and Panama (1). Venezuela has six endemic subspecies and one endemic species. Costa Rica and Trinidad each have two endemic subspecies.

Threatened Species by Country

6. Brazil has the highest number of threatened species and subspecies 38 taxa accounting for 29% of its primates. Thirteen of 44 callitrichids (30%) are threatened, 25 of Brazil's 84 cebids (30%) are threatened. Brazil has 69 endemic taxa, 30 (43%) of which are threatened.
7. Colombia has 18 threatened species and subspecies which account for 35% of its 51 primates. Colombia has 18 endemic taxa, 10 (55%) of which are threatened.
8. Peru has ten threatened species and subspecies which account for 20% of its 51 primates. Peru has seven endemic taxa, three (43%) of which are threatened.
9. Panama has eight threatened species and subspecies which account for two-thirds of its primates. All three of Panama's endemic primates are threatened.
10. Costa Rica has six threatened species and subspecies, accounting for two-thirds of its primates. The two primates endemic to Costa Rica are threatened.
11. Venezuela has four threatened species and subspecies, accounting for 17% of its primates. None its seven endemic taxa are ranked as threatened.
12. Ecuador has three threatened species and subspecies, accounting for 18% of its primates. One of Ecuador's two endemic primates is threatened.
13. Mexico has two threatened taxa, accounting for one-half of its primates. Guatemala has two threatened taxa.
14. Argentina, Belize, Bolivia, Honduras, Nicaragua and Trinidad each have one threatened taxon.
15. Trinidad has two threatened endemic primates
16. No threatened species or subspecies are recorded for El Salvador, French Guiana, Guyana, Paraguay, Suriname, and Uruguay.

ARGENTINA

Table 10. The IUCN Mace-Lande Categories for the conservation status of the primates of Argentina.

Species	Category	Distribution
Family Cebidae		
<i>Aotus azarai azarai</i>	LR	Argentina, Bolivia, Paraguay
<i>Cebus apella nigrinus</i>	LR	Argentina, Brazil
<i>Cebus apella paraguayanus</i>	LR	Argentina, Brazil, Paraguay
<i>Alouatta fusca clamitans</i>	VU	Argentina, Brazil
<i>Alouatta caraya</i>	LR	Argentina, Brazil, Paraguay, Uruguay (?)

BELIZE

Table 11. The IUCN Mace-Lande Categories for the conservation status of the primates of Belize.

Species	Category	Distribution
Family Cebidae		
<i>Cebus capucinus limitaneus</i>	LR	Belize, Honduras, Nicaragua
<i>Alouatta pigra</i>	LR	Belize, Guatemala, Mexico
<i>Ateles geoffroyi yucatanensis</i>	VU	Belize, Guatemala, Mexico

BOLIVIA

Table 12. The IUCN Mace-Lande Categories for the conservation status of the primates of Bolivia. Endemic taxa are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Cebuella pygmaea</i>	LR	Bolivia, Brazil, Colombia, Ecuador, Peru
<i>Callithrix melanura</i>	LR	Bolivia, Brazil, Paraguay
<i>Saguinus fuscicollis weddelli</i>	LR	Bolivia, Brazil, Peru
<i>Saguinus labiatus labiatus</i>	LR	Bolivia, Brazil, Peru
<i>Saguinus imperator subgriseus</i>	LR	Bolivia, Brazil, Peru
<i>Callimico goeldii</i>	VU	Bolivia, Brazil, Colombia, Peru
Family Cebidae		
<i>Aotus azarai azarai</i>	LR	Argentina, Bolivia, Paraguay
<i>Aotus azarai boliviensis</i>	LR	Bolivia, Peru
<i>Callicebus modestus</i>	LR	Bolivia
<i>Callicebus donacophilus donacophilus</i>	LR	Bolivia
<i>Callicebus donacophilus pallescens</i>	LR	Bolivia, Brazil, Paraguay
<i>Callicebus olallae</i>	DD	Bolivia
<i>Saimiri boliviensis boliviensis</i>	LR	Bolivia, Brazil, Peru
<i>Cebus apella pallidus</i>	LR	Bolivia, Peru
<i>Cebus albifrons unicolor</i>	LR	Colombia, Bolivia, Brazil, Peru, Venezuela
<i>Cebus albifrons cuscinus</i>	DD	Bolivia, Brazil, Peru
<i>Pithecia irrorata irrorata</i>	LR	Bolivia, Brazil, Peru
<i>Alouatta seniculus seniculus</i>	LR	Colombia, Bolivia, Brazil, Ecuador, Peru, Venezuela
<i>Alouatta seniculus puruensis</i>	LR	Bolivia, Brazil
<i>Alouatta sara</i>	LR	Bolivia
<i>Ateles chamek</i>	LR	Bolivia, Brazil, Peru

BRAZIL

Table 13. The IUCN Mace-Lande Categories for the conservation status of the primates of Brazil. Endemic taxa are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Cebuella pygmaea</i>	LR	Bolivia, Brazil, Colombia, Ecuador, Peru
<i>Callithrix argentata</i>	LR	Brazil
<i>Callithrix leucippe</i>	VU	Brazil
<i>Callithrix melanura</i>	LR	Bolivia, Brazil, Paraguay
<i>Callithrix intermedia</i>	LR	Brazil
<i>Callithrix emiliae</i>	LR	Brazil
<i>Callithrix nigriceps</i>	VU	Brazil
<i>Callithrix marcai</i>	LR	Brazil
<i>Callithrix humeralifer</i>	LR	Brazil
<i>Callithrix chrysoleuca</i>	VU	Brazil
<i>Callithrix mauesi</i>	LR	Brazil
<i>Callithrix saterei</i>	DD	Brazil
<i>Callithrix jacchus</i>	LR	Brazil
<i>Callithrix penicillata</i>	LR	Brazil

continued ...

Table 13 (continued)

<i>Callithrix kuhli</i>	LR	Brazil
<i>Callithrix geoffroyi</i>	VU	Brazil
<i>Callithrix flaviceps</i>	EN	Brazil
<i>Callithrix aurita</i>	EN	Brazil
<i>Saguinus nigricollis nigricollis</i>	LR	Brazil (?), Colombia, Peru
<i>Saguinus fuscicollis fuscicollis</i>	LR	Brazil, Peru
<i>Saguinus fuscicollis fuscus</i>	LR	Brazil, Colombia
<i>Saguinus fuscicollis avilapiresi</i>	LR	Brazil
<i>Saguinus fuscicollis cruzlimai</i>	DD	Brazil (?)
<i>Saguinus fuscicollis weddelli</i>	LR	Bolivia, Brazil, Peru
<i>Saguinus fuscicollis primitivus</i>	LR	Brazil
<i>Saguinus fuscicollis melanoleucus</i>	LR	Brazil
<i>Saguinus mystax mystax</i>	LR	Brazil, Peru
<i>Saguinus mystax pileatus</i>	LR	Brazil
<i>Saguinus mystax pluto</i>	LR	Brazil
<i>Saguinus labiatus labiatus</i>	LR	Bolivia, Brazil, Peru
<i>Saguinus labiatus thomasi</i>	LR	Brazil
<i>Saguinus imperator imperator</i>	VU	Brazil, Peru
<i>Saguinus imperator subgriseus</i>	LR	Bolivia, Brazil, Peru
<i>Saguinus inustus</i>	LR	Brazil, Colombia
<i>Saguinus midas midas</i>	LR	Brazil, French Guiana, Guyana, Suriname
<i>Saguinus midas niger</i>	LR	Brazil
<i>Saguinus bicolor bicolor</i>	EN	Brazil
<i>Saguinus bicolor ochraceus</i>	LR	Brazil
<i>Saguinus bicolor martinsi</i>	LR	Brazil
<i>Leontopithecus rosalia</i>	CR	Brazil
<i>Leontopithecus chrysomelas</i>	EN	Brazil
<i>Leontopithecus chrysopygus</i>	CR	Brazil
<i>Leontopithecus caissara</i>	CR	Brazil
<i>Callimico goeldii</i>	VU	Bolivia, Brazil, Colombia, Peru
Family Cebidae		
<i>Aotus vociferans</i>	LR	Colombia, Brazil, Ecuador, Peru
<i>Aotus trivirgatus</i>	LR	Brazil, Colombia, Venezuela
<i>Aotus nigriceps</i>	LR	Brazil, Colombia, Peru
<i>Aotus infulatus</i>	LR	Brazil
<i>Aotus azarai azarai</i>	LR	Bolivia, Brazil, Paraguay
<i>Aotus nancymaae</i>	LR	Brazil, Colombia, Peru
<i>Callicebus donacophilus pallescens</i>	LR	Bolivia, Brazil, Paraguay
<i>Callicebus cinerascens</i>	LR	Brazil
<i>Callicebus hoffmannsi hoffmannsi</i>	LR	Brazil
<i>Callicebus hoffmannsi baptista</i>	LR	Brazil
<i>Callicebus moloch</i>	LR	Brazil
<i>Callicebus brunneus</i>	LR	Brazil, Peru
<i>Callicebus cupreus cupreus</i>	LR	Brazil, Peru
<i>Callicebus caligatus</i>	LR	Brazil, Peru
<i>Callicebus dubius</i>	VU	Brazil
<i>Callicebus personatus personatus</i>	VU	Brazil
<i>Callicebus personatus nigrifrons</i>	VU	Brazil
<i>Callicebus personatus melanochir</i>	VU	Brazil
<i>Callicebus personatus barbarabrownae</i>	CR	Brazil
<i>Callicebus sp.</i>	CR	Brazil
<i>Callicebus torquatus torquatus</i>	LR	Brazil
<i>Callicebus torquatus lugens</i>	LR	Brazil, Colombia, Venezuela
<i>Callicebus torquatus lucifer</i>	LR	Brazil, Colombia, Peru
<i>Callicebus torquatus purinus</i>	LR	Brazil
<i>Callicebus torquatus regulus</i>	LR	Brazil

continued ...

Table 13 (continued)

<i>Saimiri boliviensis boliviensis</i>	LR	Bolivia, Brazil, Peru
<i>Saimiri boliviensis pluvialis</i>	LR	Brazil
<i>Saimiri boliviensis jaburuensis</i>	LR	Brazil
<i>Saimiri vanzolinii</i>	VU	Brazil
<i>Saimiri sciureus sciureus</i>	LR	Brazil, French Guiana, Guyana, Suriname
<i>Saimiri sciureus macrodon</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Saimiri sciureus cassiquiarensis</i>	LR	Brazil, Colombia, Venezuela
<i>Saimiri ustus</i>	LR	Brazil
<i>Cebus apella apella</i>	LR	Colombia, Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Cebus apella macrocephalus</i>	LR	Brazil, Peru
<i>Cebus apella maranonis</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Cebus apella peruanus</i>	LR	Brazil, Peru
<i>Cebus apella libidinosus</i>	LR	Brazil
<i>Cebus apella nigritus</i>	LR	Argentina, Brazil
<i>Cebus apella robustus</i>	VU	Brazil
<i>Cebus apella paraguayanus</i>	LR	Argentina, Brazil, Paraguay
<i>Cebus xanthosternos</i>	CR	Brazil
<i>Cebus albifrons unicolor</i>	LR	Colombia, Bolivia, Brazil, Peru, Venezuela
<i>Cebus albifrons cuscinus</i>	DD	Bolivia, Brazil, Peru
<i>Cebus olivaceus olivaceus</i>	LR	Brazil, Guyana, Venezuela
<i>Cebus kaapori</i>	VU	Brazil
<i>Pithecia pithecia pithecia</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Pithecia pithecia chrysocephala</i>	LR	Brazil
<i>Pithecia monachus monachus</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Pithecia irrorata irrorata</i>	LR	Bolivia, Brazil, Peru
<i>Pithecia irrorata vanzolinii</i>	LR	Brazil
<i>Pithecia albicans</i>	LR	Brazil
<i>Chiropotes albinus</i>	LR	Brazil
<i>Chiropotes satanas satanas</i>	EN	Brazil
<i>Chiropotes satanas chiropotes</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Chiropotes satanas utahicki</i>	VU	Brazil
<i>Cacajao calvus calvus</i>	EN	Brazil
<i>Cacajao calvus ucayalii</i>	VU	Brazil (?), Peru
<i>Cacajao calvus novaesi</i>	EN	Brazil
<i>Cacajao calvus rubicundus</i>	EN	Brazil, Colombia
<i>Cacajao melanocephalus melanocephalus</i>	LR	Brazil, Venezuela
<i>Cacajao melanocephalus ouakary</i>	LR	Brazil, Colombia
<i>Alouatta seniculus seniculus</i>	LR	Colombia, Bolivia, Brazil, Ecuador, Peru, Venezuela
<i>Alouatta seniculus stramineus</i>	LR	Brazil, Venezuela
<i>Alouatta seniculus macconnelli</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela.
<i>Alouatta seniculus amazonica</i>	LR	Brazil
<i>Alouatta seniculus juara</i>	LR	Brazil, Peru
<i>Alouatta seniculus puruensis</i>	LR	Bolivia, Brazil
<i>Alouatta belzebul belzebul</i>	LR	Brazil
<i>Alouatta belzebul nigerrima</i>	LR	Brazil
<i>Alouatta belzebul discolor</i>	LR	Brazil
<i>Alouatta belzebul ululata</i>	CR	Brazil
<i>Alouatta fusca fusca</i>	CR	Brazil
<i>Alouatta fusca clamitans</i>	VU	Argentina, Brazil
<i>Alouatta caraya</i>	LR	Argentina, Brazil, Paraguay, Uruguay (?)
<i>Ateles paniscus</i>	LR	Brazil, French Guiana, Guyana, Suriname
<i>Ateles belzebuth belzebuth</i>	VU	Brazil, Colombia, Ecuador, Peru, Venezuela
<i>Ateles chamek</i>	LR	Bolivia, Brazil, Peru

continued ...

Table 13 (continued)

<i>Ateles marginatus</i>	EN	Brazil
<i>Lagothrix lagotricha lagotricha</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Lagothrix lagotricha cana</i>	VU	Brazil, Peru
<i>Lagothrix lagotricha poeppigii</i>	VU	Brazil, Ecuador, Peru
<i>Brachyteles arachnoides</i>	EN	Brazil
<i>Brachyteles hypoxanthus</i>	EN	Brazil

COLOMBIA

Table 14. The IUCN Mace-Lande Categories for the conservation status of the primates of Colombia. Endemic taxa are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Cebuella pygmaea</i>	LR	Bolivia, Brazil, Colombia, Ecuador, Peru
<i>Saguinus nigricollis nigricollis</i>	LR	Brazil (?), Colombia, Peru
<i>Saguinus nigricollis graellsii</i>	LR	Colombia, Ecuador, Peru
<i>Saguinus nigricollis hernandezii</i>	VU	Colombia
<i>Saguinus fuscicollis fuscus</i>	LR	Brazil, Colombia
<i>Saguinus inustus</i>	LR	Brazil, Colombia
<i>Saguinus leucopus</i>	VU	Colombia
<i>Saguinus oedipus</i>	EN	Colombia
<i>Saguinus geoffroyi</i>	LR	Colombia, Costa Rica, Panama
<i>Callimico goeldii</i>	VU	Bolivia, Brazil, Colombia, Peru
Family Cebidae		
<i>Aotus lemurinus lemurinus</i>	VU	Colombia, Costa Rica, Panama
<i>Aotus lemurinus griseimembra</i>	EN	Colombia
<i>Aotus vociferans</i>	LR	Colombia, Brazil, Ecuador, Peru
<i>Aotus trivirgatus</i>	LR	Brazil, Colombia, Venezuela
<i>Aotus brumbacki</i>	VU	Colombia
<i>Aotus nigriceps</i>	LR	Brazil, Colombia, Peru
<i>Aotus nancymaae</i>	LR	Brazil, Colombia, Peru
<i>Aotus herskovitzi</i>	DD	Colombia
<i>Callicebus cupreus discolor</i>	LR	Colombia, Ecuador, Peru
<i>Callicebus cupreus ornatus</i>	VU	Colombia
<i>Callicebus torquatus medemi</i>	VU	Colombia
<i>Callicebus torquatus lugens</i>	LR	Brazil, Colombia, Venezuela
<i>Callicebus torquatus lucifer</i>	LR	Brazil, Colombia, Peru
<i>Saimiri sciureus macrodon</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Saimiri sciureus cassiquiarensis</i>	LR	Brazil, Colombia, Venezuela
<i>Saimiri sciureus albigena</i>	LR	Colombia
<i>Cebus apella apella</i>	LR	Colombia, Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Cebus apella maranonis</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Cebus albifrons albifrons</i>	LR	Colombia
<i>Cebus albifrons unicolor</i>	LR	Colombia, Bolivia, Brazil, Peru, Venezuela
<i>Cebus albifrons cesaruae</i>	DD	Colombia
<i>Cebus albifrons hypoleucus</i>	DD	Colombia
<i>Cebus albifrons malitiosus</i>	DD	Colombia
<i>Cebus albifrons versicolor</i>	DD	Colombia
<i>Cebus albifrons yuracus</i>	DD	Colombia, Ecuador, Peru

continued ...

Table 14 (continued)

<i>Cebus capucinus capucinus</i>	LR	Colombia
<i>Cebus capucinus curtus</i>	VU	Gorgona Island, Colombia
<i>Pithecia monachus monachus</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Pithecia monachus milleri</i>	VU	Colombia
<i>Pithecia aequatorialis</i>	LR	Colombia (?), Ecuador, Peru
<i>Cacajao calvus rubicundus</i>	EN	Brazil, Colombia
<i>Cacajao melanocephalus ouakary</i>	LR	Brazil, Colombia
<i>Alouatta seniculus seniculus</i>	LR	Colombia, Bolivia, Brazil, Ecuador, Peru, Venezuela
<i>Alouatta palliata aequatorialis</i>	LR	Colombia, Ecuador, Panama, Peru
<i>Ateles geoffroyi grisescens</i>	EN	Colombia, Panama
<i>Ateles fusciceps robustus</i> (= <i>rufiventris</i>)	VU	Colombia, Panama
<i>Ateles belzebuth belzebuth</i>	VU	Brazil, Colombia, Ecuador, Peru, Venezuela
<i>Ateles belzebuth hybridus</i>	EN	Colombia, Venezuela
<i>Ateles belzebuth brunneus</i>	EN	Colombia
<i>Lagothrix lagotricha lagotricha</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Lagothrix lagotricha lugens</i>	CR	Colombia, Venezuela

COSTA RICA

Table 15. The IUCN Mace-Lande Categories for the conservation status of the primates of Costa Rica. Endemic taxa are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Saguinus geoffroyi</i>	LR	Colombia, Costa Rica, Panama
Family Cebidae		
<i>Aotus lemurinus lemurinus</i>	VU	Colombia, Costa Rica, Panama
<i>Saimiri oerstedii oerstedii</i>	EN	Costa Rica, Panama
<i>Saimiri oerstedii citrinellus</i>	CR	Costa Rica
<i>Cebus capucinus imitator</i>	LR	Costa Rica, Panama
<i>Alouatta palliata palliata</i>	LR	Costa Rica, Nicaragua, Honduras, Panama
<i>Ateles geoffroyi frontatus</i>	VU	Costa Rica, Nicaragua
<i>Ateles geoffroyi panamensis</i>	EN	Costa Rica, Panama
<i>Ateles geoffroyi ornatus</i>	VU	Costa Rica

ECUADOR

Table 16. The IUCN Mace-Lande Categories for the conservation status of the primates of Ecuador. Endemic taxa are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Cebuella pygmaea</i>	LR	Bolivia, Brazil, Colombia, Ecuador, Peru
<i>Saguinus nigricollis graellsii</i>	LR	Colombia, Ecuador, Peru
<i>Saguinus fuscicollis lagonotus</i>	LR	Ecuador, Peru
<i>Saguinus tripartitus</i>	LR	Ecuador, Peru

continued ...

Table 16 (continued)

Family Cebidae		
<i>Aotus vociferans</i>	LR	Colombia, Brazil, Ecuador, Peru
<i>Callicebus cupreus discolor</i>	LR	Colombia, Ecuador, Peru
<i>Saimiri sciureus macrodon</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Cebus apella maranonis</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Cebus albifrons aequatorialis</i>	DD	Ecuador
<i>Cebus albifrons yuracus</i>	DD	Colombia, Ecuador, Peru
<i>Pithecia monachus monachus</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Pithecia aequatorialis</i>	LR	Colombia (?), Ecuador, Peru
<i>Alouatta seniculus seniculus</i>	LR	Colombia, Bolivia, Brazil, Ecuador, Peru, Venezuela
<i>Alouatta palliata aequatorialis</i>	LR	Colombia, Ecuador, Panama, Peru
<i>Ateles fusciceps fusciceps</i>	CR	Ecuador
<i>Ateles belzebuth belzebuth</i>	VU	Brazil, Colombia, Ecuador, Peru, Venezuela
<i>Lagothrix lagotricha lagotricha</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Lagothrix lagotricha poeppigii</i>	VU	Brazil, Ecuador, Peru

EL SALVADOR

Table 17. The IUCN Mace-Lande Categories for the conservation status of the primates of El Salvador.

Species	Category	Distribution
Family Cebidae		
<i>Ateles geoffroyi vellerosus</i>	LR	El Salvador, Honduras, Guatemala, Mexico

FRENCH GUIANA

Table 18. The IUCN Mace-Lande Categories for the conservation status of the primates of French Guiana.

Species	Category	Distribution
Family Callitrichidae		
<i>Saguinus midas midas</i>	LR	Brazil, French Guiana, Guyana, Suriname
Family Cebidae		
<i>Saimiri sciureus sciureus</i>	LR	Brazil, French Guiana, Guyana, Suriname
<i>Cebus apella apella</i>	LR	Colombia, Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Cebus olivaceus castaneus</i>	LR	French Guiana, Suriname
<i>Pithecia pithecia pithecia</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Chiropotes satanas chiropotes</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Alouatta seniculus macconnelli</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Ateles paniscus</i>	LR	Brazil, French Guiana, Guyana, Suriname

GUATEMALA

Table 19. The IUCN Mace-Lande Categories for the conservation status of the primates of Guatemala.

Species	Category	Distribution
Family Cebidae		
<i>Alouatta palliata mexicana</i>	VU	Guatemala, Mexico
<i>Alouatta pigra</i>	LR	Belize, Guatemala, Mexico
<i>Ateles geoffroyi vellerosus</i>	LR	El Salvador, Honduras, Guatemala, Mexico
<i>Ateles geoffroyi yucatanensis</i>	VU	Belize, Guatemala, Mexico

GUYANA

Table 20. The IUCN Mace-Lande Categories for the conservation status of the primates of Guyana.

Species	Category	Distribution
Family Callitrichidae		
<i>Saguinus midas midas</i>	LR	Brazil, French Guiana, Guyana, Suriname
Family Cebidae		
<i>Saimiri sciureus sciureus</i>	LR	Brazil, French Guiana, Guyana, Suriname
<i>Cebus apella apella</i>	LR	Colombia, Brazil, French Guiana, Guyana, Suriname Venezuela
<i>Cebus olivaceus olivaceus</i>	LR	Brazil, Guyana, Venezuela,
<i>Pithecia pithecia pithecia</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Chiropotes satanas chiropotes</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Alouatta seniculus macconnelli</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Ateles paniscus</i>	LR	Brazil, French Guiana, Guyana, Suriname

HONDURAS

Table 21. The IUCN Mace-Lande Categories for the conservation status of the primates of Honduras.

Species	Category	Distribution
Family Cebidae		
<i>Cebus capucinus limitaneus</i>	LR	Belize, Honduras, Nicaragua
<i>Alouatta palliata palliata</i>	LR	Costa Rica, Nicaragua, Honduras, Panama
<i>Ateles geoffroyi vellerosus</i>	LR	El Salvador, Honduras, Guatemala, Mexico

MEXICO

Table 22. The IUCN Mace-Lande Categories for the conservation status of the primates of Mexico.

Species	Category	Distribution
Family Cebidae		
<i>Alouatta palliata mexicana</i>	VU	Guatemala, Mexico
<i>Alouatta pigra</i>	LR	Belize, Guatemala, Mexico
<i>Ateles geoffroyi vellerosus</i>	LR	El Salvador, Honduras, Guatemala, Mexico

NICARAGUA

Table 23. The IUCN Mace-Lande Categories for the conservation status of the primates of Nicaragua.

Species	Category	Distribution
Family Cebidae		
<i>Cebus capucinus limitaneus</i>	LR	Belize, Honduras, Nicaragua
<i>Alouatta palliata palliata</i>	LR	Costa Rica, Nicaragua, Honduras, Panama
<i>Ateles geoffroyi frontatus</i>	VU	Costa Rica, Nicaragua

PANAMA

Table 24. The IUCN Mace-Lande Categories for the conservation status of the primates of Panama. Endemic taxa are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Saguinus geoffroyi</i>	LR	Colombia, Costa Rica, Panama
Family Cebidae		
<i>Aotus lemurinus lemurinus</i>	VU	Colombia, Costa Rica, Panama
<i>Saimiri oerstedii oerstedii</i>	EN	Costa Rica, Panama
<i>Cebus capucinus imitator</i>	LR	Costa Rica, Panama
<i>Alouatta palliata palliata</i>	LR	Costa Rica, Nicaragua, Honduras, Panama
<i>Alouatta palliata aequatorialis</i>	LR	Colombia, Ecuador, Panama, Peru
<i>Alouatta coibensis coibensis</i>	EN	Coiba Island, Panama
<i>Alouatta coibensis trabeata</i>	CR	Panama
<i>Ateles geoffroyi azuerensis</i>	CR	Panama
<i>Ateles geoffroyi grisescens</i>	EN	Colombia, Panama
<i>Ateles geoffroyi panamensis</i>	EN	Costa Rica, Panama
<i>Ateles fusciceps robustus (= rufiventris)</i>	VU	Colombia, Panama

PARAGUAY

Table 25. The IUCN Mace-Lande Categories for the conservation status of the primates of Paraguay.

Species	Category	Distribution
Family Callitrichidae		
<i>Callithrix melanura</i>	LR	Bolivia, Brazil, Paraguay
Family Cebidae		
<i>Aotus azarai azarai</i>	LR	Argentina, Bolivia, Paraguay
<i>Callicebus donacophilus pallescens</i>	LR	Bolivia, Brazil, Paraguay
<i>Cebus apella paraguayanus</i>	LR	Argentina, Brazil, Paraguay
<i>Alouatta caraya</i>	LR	Argentina, Brazil, Paraguay, Uruguay (?)

PERU

Table 26. The IUCN Mace-Lande Categories for the conservation status of the primates of Peru. Endemic taxa are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Cebuella pygmaea</i>	LR	Bolivia, Brazil, Colombia, Ecuador, Peru
<i>Saguinus nigricollis nigricollis</i>	LR	Brazil (?), Colombia, Peru
<i>Saguinus nigricollis graellsii</i>	LR	Colombia, Ecuador, Peru
<i>Saguinus fuscicollis fuscicollis</i>	LR	Brazil, Peru
<i>Saguinus fuscicollis illigeri</i>	LR	Peru
<i>Saguinus fuscicollis leucogenys</i>	LR	Peru
<i>Saguinus fuscicollis nigrifrons</i>	LR	Peru
<i>Saguinus fuscicollis lagonotus</i>	LR	Ecuador, Peru
<i>Saguinus fuscicollis weddelli</i>	LR	Bolivia, Brazil, Peru
<i>Saguinus fuscicollis crandalli</i>	DD	Peru (?)
<i>Saguinus tripartitus</i>	LR	Ecuador, Peru
<i>Saguinus mystax mystax</i>	LR	Brazil, Peru
<i>Saguinus labiatus labiatus</i>	LR	Bolivia, Brazil, Peru
<i>Saguinus imperator imperator</i>	VU	Brazil, Peru
<i>Saguinus imperator subgriseus</i>	LR	Bolivia, Brazil, Peru
<i>Callimico goeldii</i>	VU	Bolivia, Brazil, Colombia, Peru
Family Cebidae		
<i>Aotus vociferans</i>	LR	Colombia, Brazil, Ecuador, Peru
<i>Aotus miconax</i>	VU	Peru
<i>Aotus nigriceps</i>	LR	Brazil, Colombia, Peru
<i>Aotus azarai boliviensis</i>	LR	Bolivia, Peru
<i>Aotus nancymae</i>	LR	Brazil, Colombia, Peru
<i>Callicebus oenanthe</i>	VU	Peru
<i>Callicebus brunneus</i>	LR	Brazil, Peru
<i>Callicebus cupreus cupreus</i>	LR	Brazil, Peru
<i>Callicebus cupreus discolor</i>	LR	Colombia, Ecuador, Peru
<i>Callicebus caligatus</i>	LR	Brazil, Peru
<i>Callicebus torquatus lucifer</i>	LR	Brazil, Colombia, Peru
<i>Saimiri boliviensis boliviensis</i>	LR	Bolivia, Brazil, Peru
<i>Saimiri boliviensis peruviansis</i>	LR	Peru
<i>Saimiri sciureus macrodon</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Cebus apella macrocephalus</i>	LR	Brazil, Peru
<i>Cebus apella maranonis</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Cebus apella pallidus</i>	LR	Bolivia, Peru
<i>Cebus apella peruanus</i>	LR	Brazil, Peru
<i>Cebus albifrons unicolor</i>	LR	Colombia, Bolivia, Brazil, Peru, Venezuela
<i>Cebus albifrons cuscinus</i>	DD	Bolivia, Brazil, Peru
<i>Cebus albifrons yuracus</i>	DD	Colombia, Ecuador, Peru
<i>Pithecia monachus monachus</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Pithecia monachus milleri</i>	VU	Colombia
<i>Pithecia irrorata irrorata</i>	LR	Bolivia, Brazil, Peru
<i>Pithecia aequatorialis</i>	LR	Colombia (?), Ecuador, Peru
<i>Cacajao calvus ucayalii</i>	VU	Brazil (?), Peru
<i>Alouatta seniculus seniculus</i>	LR	Colombia, Bolivia, Brazil, Ecuador, Peru, Venezuela
<i>Alouatta seniculus juara</i>	DD	Brazil, Peru
<i>Alouatta palliata aequatorialis</i>	LR	Colombia, Ecuador, Panama, Peru

continued ...

Table 26 (continued)

<i>Ateles belzebuth belzebuth</i>	VU	Brazil, Colombia, Ecuador, Peru, Venezuela
<i>Ateles chamek</i>	LR	Bolivia, Brazil, Peru
<i>Lagothrix lagotricha lagotricha</i>	LR	Brazil, Colombia, Ecuador, Peru
<i>Lagothrix lagotricha cana</i>	VU	Brazil, Peru
<i>Lagothrix lagotricha poeppigii</i>	VU	Brazil, Ecuador, Peru
<i>Lagothrix flavicauda</i>	CR	Peru

SURINAME

Table 27. The IUCN Mace-Lande Categories for the conservation status of the primates of Suriname.

Species	Category	Distribution
Family Callitrichidae		
<i>Saguinus midas midas</i>	LR	Brazil, French Guiana, Guyana, Suriname
Family Cebidae		
<i>Saimiri sciureus sciureus</i>	LR	Brazil, French Guiana, Guyana, Suriname
<i>Cebus apella apella</i>	LR	Colombia, Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Cebus olivaceus castaneus</i>	LR	French Guiana, Suriname
<i>Pithecia pithecia pithecia</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Chiropotes satanas chiropotes</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Alouatta seniculus macconnelli</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Ateles paniscus</i>	LR	Brazil, French Guiana, Guyana, Suriname

TRINIDAD

Table 28. The IUCN Mace-Lande Categories for the conservation status of the primates of Trinidad. Endemic subspecies are in bold.

Species	Category	Distribution
Family Cebidae		
<i>Cebus albifrons trinitatis</i>	CR	Trinidad
<i>Alouatta seniculus insulanus</i>	LR	Trinidad

URUGUAY

Table 29. The IUCN Mace-Lande Categories for the conservation status of the primates of Uruguay.

Species	Category	Distribution
Family Cebidae		
<i>Alouatta caraya</i>	LR	Argentina, Brazil, Paraguay, Uruguay (?)

VENEZUELA

Table 30. The IUCN Mace-Lande categories for the conservation status of the primates of Venezuela. Endemic taxa are in bold.

Species	Category	Distribution
Family Cebidae		
<i>Aotus trivirgatus</i>	LR	Brazil, Colombia, Venezuela
<i>Callicebus torquatus lugens</i>	LR	Brazil, Colombia, Venezuela
<i>Saimiri sciureus cassiquiarensis</i>	LR	Brazil, Colombia, Venezuela
<i>Cebus apella apella</i>	LR	Colombia, Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Cebus apella margaritae</i>	CR	Venezuela
<i>Cebus albifrons unicolor</i>	LR	Colombia, Bolivia, Brazil, Peru, Venezuela
<i>Cebus albifrons adustus</i>	DD	Venezuela
<i>Cebus albifrons leucocephalus</i>	DD	Venezuela
<i>Cebus olivaceus olivaceus</i>	LR	Brazil, Guyana, Venezuela,
<i>Cebus olivaceus apiculatus</i>	LR	Venezuela
<i>Cebus olivaceus brunneus</i>	LR	Venezuela
<i>Cebus olivaceus ssp.</i>	DD	Venezuela
<i>Pithecia pithecia pithecia</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Chiropotes satanas chiropotes</i>	LR	Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Cacajao melanocephalus melanocephalus</i>	LR	Brazil, Venezuela
<i>Alouatta seniculus seniculus</i>	LR	Colombia, Bolivia, Brazil, Ecuador, Peru, Venezuela
<i>Alouatta seniculus stramineus</i>	LR	Brazil, Venezuela
<i>Alouatta seniculus macconnelli</i>		Brazil, French Guiana, Guyana, Suriname, Venezuela
<i>Alouatta seniculus ssp.</i>	LR	Venezuela
<i>Alouatta arctoidea</i>	LR	Venezuela
<i>Ateles belzebuth belzebuth</i>	VU	Brazil, Colombia, Ecuador, Peru, Venezuela
<i>Ateles belzebuth hybridus</i>	EN	Colombia, Venezuela
<i>Lagothrix lagotricha lagotricha</i>	LR	Brazil, Colombia, Ecuador, Peru, Venezuela
<i>Lagothrix lagotricha lugens</i>	CR	Colombia, Venezuela

Table 31. A summary of the numbers of Callitrichidae and Cebidae in each of 20 South American countries. Also shown is the number of endemic species and taxa, and the number of threatened taxa in the IUCN Mace Lande categories of Critically Endangered (CR), Endangered (EN) and Vulnerable (VU).

Country	Callitrichidae		Cebidae		Total		Endemic	
	Species	Taxa	Species	Taxa	Species	Taxa	Species	Taxa
Argentina	-	-	4	5	4	5	-	-
Belize	-	-	3	3	3	3	-	-
Bolivia	6	6	11	15	17	21	3	4
Brazil	31	44	45	84	76	128	38	69
Colombia	8	10	23	41	31	51	4	18
Costa Rica	1	1	5	8	6	9	-	2
Ecuador	4	4	12	14	16	18	-	2
El Salvador	-	-	1	1	1	1	-	-
French Guiana	1	1	7	7	8	8	-	-
Guatemala	-	-	3	4	3	4	-	-
Guyana	1	1	7	7	8	8	-	-

continued ...

Table 31 (continued)

Honduras	-	-	3	3	3	3	-	-
Mexico	-	-	3	4	3	4	-	-
Nicaragua	-	-	3	3	3	3	-	-
Panama	1	1	7	11	8	12	1	3
Paraguay	1	1	4	4	5	5	-	-
Peru	8	16	24	35	32	51	3	7
Suriname	1	1	7	7	8	8	-	-
Trinidad	-	-	2	2	2	2	-	2
Uruguay	-	-	1(?)	1(?)	1(?)	-	-	-
Venezuela	-	-	13	24	13	24	1	7

Table 32. The numbers of threatened taxa and threatened endemic taxa in each country according to the Mace-Lande System (IUCN 1995). Critically Endangered (CR), Endangered (EN), and Vulnerable (VU).

Country	Threatened Taxa				Threatened Endemic Taxa			
	CR	EN	VU	Total	CR	EN	VU	Total
Argentina	-	-	1	1	-	-	-	-
Belize	-	-	1	1	-	-	-	-
Bolivia	-	-	1	1	-	-	-	-
Brazil	8	11	19	38	8	10	12	30
Colombia	1	7	10	18	-	4	6	10
Costa Rica	1	2	3	6	1	-	1	2
Ecuador	1	-	2	3	1	-	-	1
El Salvador	-	-	-	-	-	-	-	-
French Guiana	-	-	-	-	-	-	-	-
Guatemala	-	-	2	2	-	-	-	-
Guyana	-	-	-	-	-	-	-	-
Honduras	-	-	-	-	-	-	-	-
Mexico	-	-	2	2	-	-	-	-
Nicaragua	-	-	1	1	-	-	-	-
Panama	2	4	2	8	2	1	-	3
Paraguay	-	-	-	-	-	-	-	-
Peru	1	-	9	10	1	-	2	3
Suriname	-	-	-	-	-	-	-	-
Trinidad	1	-	1	2	1	-	1	2
Uruguay	-	-	-	-	-	-	-	-
Venezuela	2	1	1	4	-	-	-	-

Regional Primate Diversity

Here we present an analysis of the diversity of primate species and subspecies in seven phylogeographic regions identified by Gentry (1982): Middle America, Northern Andes, Southern Andes, Amazonia (Hylaea), Cerrado/Caatinga/Chaco, and Atlantic Forest (see Figs. 2 and 3, and Tables 33-39).

The analysis of the known or supposed distributions of the 202 primate species and subspecies indicates the following numbers in each of the regions: Middle America - 22; Northern Venezuela-Colombia - 24; Northern Andes - 13; Southern Andes - 6; Amazonia (Hylaea) - 121, Cerrado/Caatinga/Chaco - 11, and Atlantic Forest - 23 (Table 40). Table 41 presents a summary of the number of threatened taxa and the

number of threatened taxa endemic to each region.

From this synthesis it is possible to state the following:

1. There are 22 primates species and subspecies in the Middle American region, 18 of which (82%) are endemic. Thirteen (59%) of the primates occurring in Middle America are threatened. Eleven of the 18 endemic primates (61%) are threatened.
2. There are 24 primates species and subspecies in, 19 of which (79%) are endemic. Ten (42%) of the primates occurring in Northern Venezuela-Colombia are threatened. Eight of the 19 endemic primates (42%) are threatened.

Figure 2. Major phytogeographic regions in the Neotropics [Gentry, 1982] (map by R. B. Machado)



3. There are 13 primate species and subspecies in the Northern Andean region, eight of which (61%) are endemic. Seven (54%) of the primates occurring in the Northern Andes are threatened. Five of the eight endemic primates (62%) are threatened.
4. There are six primate species and subspecies in the Southern Andean region, two of which (33%) are endemic. Three (50%) of the primates occurring in the Southern Andes are threatened. Both of the two endemic primates are threatened.
5. There are 123 primate species and subspecies in the Amazonian region, 112 of which (91%) are endemic. Twenty-two (18%) of the primates occurring in Amazonia are threatened. Twenty-one of the 112 endemic primates (19%) are threatened.

6. There are 11 primate species and subspecies in the Cerrado/Caatinga/Chaco region, five of which (45%) are endemic. None of the primates occurring in the Cerrado/Caatinga/Chaco are considered threatened.

7. There are 23 primate species and subspecies in the Atlantic forest region, 17 of which (74%) are endemic. Eighteen (78%) of the primates occurring in the Atlantic forest are threatened. All of the 18 endemic primates are threatened.



Figure 3. Number of Neotropical primates species and genera in each major phytogeographic region, with number of endemics indicated (map by R. B. Machado).

MIDDLE AMERICA

Table 33. Primates occurring in the Middle America phytogeographic region as defined by Gentry (1982). Endemic primates are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Saguinus geoffroyi</i>	LR	Middle America, Northern Andes
Family Cebidae		
<i>Aotus lemurinus lemurinus</i>	VU	Middle America, Northern Andes
<i>Saimiri oerstedii oerstedii</i>	EN	Middle America
<i>Saimiri oerstedii citrinellus</i>	CR	Middle America
<i>Cebus capucinus limitaneus</i>	LR	Middle America
<i>Cebus capucinus imitator</i>	LR	Middle America
<i>Alouatta palliata palliata</i>	LR	Middle America
<i>Alouatta palliata mexicana</i>	VU	Middle America
<i>Alouatta palliata aequatorialis</i>	LR	Middle America, Northern Andes
<i>Alouatta coibensis coibensis</i>	EN	Middle America
<i>Alouatta coibensis trabeata</i>	CR	Middle America
<i>Alouatta pigra</i>	LR	Middle America
<i>Ateles geoffroyi geoffroyi</i>	LR	Middle America
<i>Ateles geoffroyi azuerensis</i>	CR	Middle America
<i>Ateles geoffroyi frontatus</i>	VU	Middle America
<i>Ateles geoffroyi grisescens</i>	EN	Middle America
<i>Ateles geoffroyi pan</i>	DD	Middle America
<i>Ateles geoffroyi panamensis</i>	EN	Middle America
<i>Ateles geoffroyi ornatus</i>	VU	Middle America
<i>Ateles geoffroyi vellerosus</i>	LR	Middle America
<i>Ateles geoffroyi yucatanensis</i>	VU	Middle America
<i>Ateles fusciceps robustus (= rufiventris)</i>	VU	Middle America, Northern Venezuela-Colombia

NORTHERN VENEZUELA-COLOMBIA

Table 34. Primates occurring in the Northern Venezuela-Colombia phytogeographic region as defined by Gentry (1982). Endemic primates are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Saguinus oedipus</i>	EN	Northern Venezuela-Colombia
Family Cebidae		
<i>Aotus lemurinus griseimembra</i>	EN	Northern Venezuela-Colombia
<i>Aotus brumbacki</i>	VU	Northern Venezuela-Colombia
<i>Callicebus cupreus ornatus</i>	VU	Northern-Venezuela-Colombia
<i>Saimiri sciureus albigena</i>	LR	Northern Venezuela-Colombia, Amazonia
<i>Cebus apella margaritae</i>	CR	Northern Venezuela- Colombia
<i>Cebus albifrons albifrons</i>	LR	Northern Venezuela- Colombia
<i>Cebus albifrons adustus</i>	DD	Northern Venezuela- Colombia
<i>Cebus albifrons cesarae</i>	DD	Northern Venezuela- Colombia
<i>Cebus albifrons hypoleucus</i>	DD	Northern Venezuela- Colombia
<i>Cebus albifrons malitiosus</i>	DD	Northern Venezuela- Colombia
<i>Cebus albifrons trinitatis</i>	CR	Northern Venezuela- Colombia
<i>Cebus albifrons leucocephalus</i>	DD	Northern Venezuela- Colombia

continued ...

Table 34 (continued)

<i>Cebus capucinus capucinus</i>	LR	Northern Venezuela- Colombia
<i>Cebus olivaceus apiculatus</i>	LR	Northern Venezuela- Colombia
<i>Cebus olivaceus brunneus</i>	LR	Northern Venezuela- Colombia
<i>Cebus olivaceus</i> ssp.	DD	Northern Venezuela-Colombia
<i>Alouatta seniculus seniculus</i>	LR	Northern Venezuela-Colombia, Amazonia
<i>Alouatta seniculus insulanus</i>	VU	Northern Venezuela-Colombia
<i>Alouatta seniculus</i> ssp.	LR	Northern Venezuela-Colombia
<i>Alouatta arctoidea</i>	LR	Northern Venezuela-Colombia
<i>Ateles fusciceps robustus</i> (= <i>rufiventris</i>)	VU	Northern Venezuela-Colombia, Middle America
<i>Ateles belzebuth hybridus</i>	EN	Northern Venezuela-Colombia, Northern Andes
<i>Ateles belzebuth brunneus</i>	EN	Northern Venezuela-Colombia

NORTHERN ANDES

Table 35. Primates occurring in the Northern Andean phytogeographic region as defined by Gentry (1982). Endemic primates are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Saguinus leucopus</i>	VU	Northern Andes
<i>Saguinus geoffroyi</i>	LR	Northern Andes, Middle America
Family Cebidae		
<i>Aotus lemurinus lemurinus</i>	VU	Northern Andes, Middle America
<i>Aotus vociferans</i>	LR	Northern Andes, Amazonia
<i>Aotus hershkovitzii</i>	DD	Northern Andes
<i>Callicebus torquatus medemi</i>	VU	Northern Andes
<i>Cebus albifrons aequatorialis</i>	DD	Northern Andes
<i>Cebus albifrons versicolor</i>	DD	Northern Andes
<i>Cebus capucinus curtus</i>	VU	Northern Andes
<i>Alouatta palliata aequatorialis</i>	LR	Northern Andes, Middle America
<i>Ateles fusciceps fusciceps</i>	CR	Northern Andes
<i>Ateles belzebuth hybridus</i>	EN	Northern Andes, Northern Venezuela-Colombia
<i>Lagothrix lagothricha lugens</i>	CR	Northern Andes

SOUTHERN ANDES

Table 36. Primates occurring in the Southern Andean phytogeographic region as defined by Gentry (1982). Endemic primates are in bold.

Species	Category	Distribution
Family Cebidae		
<i>Aotus miconax</i>	VU	Southern Andes, Amazonia
<i>Callicebus oenanthe</i>	VU	Southern Andes
<i>Cebus apella maranonis</i>	LR	Southern Andes, Amazonia
<i>Cebus albifrons yuracus</i>	DD	Southern Andes, Amazonia
<i>Alouatta seniculus seniculus</i>	LR	Southern Andes, Northern Venezuela-Colombia, Amazonia
<i>Lagothrix flavicauda</i>	CR	Southern Andes

AMAZONIA

Table 37. Primates occurring in the Amazonian phytogeographic region as defined by Gentry (1982). Endemic primates are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Cebuella pygmaea</i>	LR	Amazonia
<i>Callithrix argentata</i>	LR	Amazonia
<i>Callithrix leucippe</i>	VU	Amazonia
<i>Callithrix melanura</i>	LR	Amazonia, Chaco
<i>Callithrix intermedia</i>	LR	Amazonia
<i>Callithrix emiliae</i>	LR	Amazonia
<i>Callithrix nigriceps</i>	VU	Amazonia
<i>Callithrix marcai</i>	LR	Amazonia
<i>Callithrix humeralifera</i>	LR	Amazonia
<i>Callithrix chrysoleuca</i>	VU	Amazonia
<i>Callithrix mauesi</i>	LR	Amazonia
<i>Callithrix saterei</i>	DD	Amazonia
<i>Saguinus nigricollis nigricollis</i>	LR	Amazonia
<i>Saguinus nigricollis graellsii</i>	LR	Amazonia
<i>Saguinus nigricollis hernandezi</i>	VU	Amazonia
<i>Saguinus fuscicollis fuscicollis</i>	LR	Amazonia
<i>Saguinus fuscicollis fuscus</i>	LR	Amazonia
<i>Saguinus fuscicollis avilapiresei</i>	LR	Amazonia
<i>Saguinus fuscicollis cruzlimai</i>	DD	Amazonia
<i>Saguinus fuscicollis illigeri</i>	LR	Amazonia
<i>Saguinus fuscicollis leucogenys</i>	LR	Amazonia
<i>Saguinus fuscicollis nigrifrons</i>	LR	Amazonia
<i>Saguinus fuscicollis lagonotus</i>	LR	Amazonia
<i>Saguinus fuscicollis weddelli</i>	LR	Amazonia
<i>Saguinus fuscicollis primitivus</i>	LR	Amazonia
<i>Saguinus fuscicollis melanoleucus</i>	LR	Amazonia
<i>Saguinus fuscicollis crandalli</i>	DD	Amazonia
<i>Saguinus tripartitus</i>	LR	Amazonia
<i>Saguinus mystax mystax</i>	LR	Amazonia
<i>Saguinus mystax pileatus</i>	LR	Amazonia
<i>Saguinus mystax pluto</i>	LR	Amazonia
<i>Saguinus labiatus labiatus</i>	LR	Amazonia
<i>Saguinus labiatus thomasi</i>	LR	Amazonia
<i>Saguinus imperator imperator</i>	VU	Amazonia
<i>Saguinus imperator subgriseus</i>	LR	Amazonia
<i>Saguinus inustus</i>	LR	Amazonia
<i>Saguinus midas midas</i>	LR	Amazonia
<i>Saguinus midas niger</i>	LR	Amazonia
<i>Saguinus bicolor bicolor</i>	EN	Amazonia
<i>Saguinus bicolor ochraceus</i>	LR	Amazonia
<i>Saguinus bicolor martinsi</i>	LR	Amazonia
<i>Callimico goeldii</i>	VU	Amazonia
Family Cebidae		
<i>Aotus vociferans</i>	LR	Amazonia, Northern Andes
<i>Aotus trivirgatus</i>	LR	Amazonia
<i>Aotus miconax</i>	VU	Amazonia, Southern Andes
<i>Aotus nigriceps</i>	LR	Amazonia
<i>Aotus infulatus</i>	LR	Amazonia, Cerrado
<i>Aotus azarai boliviensis</i>	LR	Amazonia, Chaco

continued ...

Table 37 (continued)

<i>Aotus nancymaae</i>	LR	Amazonia
<i>Callicebus modestus</i>	LR	Amazonia
<i>Callicebus donacophilus donacophilus</i>	LR	Amazonia
<i>Callicebus olallae</i>	DD	Amazonia
<i>Callicebus cinerascens</i>	LR	Amazonia
<i>Callicebus hoffmannsi hoffmannsi</i>	LR	Amazonia
<i>Callicebus hoffmannsi baptista</i>	LR	Amazonia
<i>Callicebus moloch</i>	LR	Amazonia
<i>Callicebus brunneus</i>	LR	Amazonia
<i>Callicebus cupreus cupreus</i>	LR	Amazonia
<i>Callicebus cupreus discolor</i>	LR	Amazonia
<i>Callicebus caligatus</i>	LR	Amazonia
<i>Callicebus dubius</i>	VU	Amazonia
<i>Callicebus torquatus torquatus</i>	LR	Amazonia
<i>Callicebus torquatus lugens</i>	LR	Amazonia
<i>Callicebus torquatus lucifer</i>	LR	Amazonia
<i>Callicebus torquatus purinus</i>	LR	Amazonia
<i>Callicebus torquatus regulus</i>	LR	Amazonia
<i>Saimiri boliviensis boliviensis</i>	LR	Amazonia, Chaco
<i>Saimiri boliviensis peruviansis</i>	LR	Amazonia
<i>Saimiri boliviensis pluvialis</i>	LR	Amazonia
<i>Saimiri boliviensis jaburuensis</i>	LR	Amazonia
<i>Saimiri vanzolinii</i>	VU	Amazonia
<i>Saimiri sciureus sciureus</i>	LR	Amazonia
<i>Saimiri sciureus macrodon</i>	LR	Amazonia
<i>Saimiri sciureus cassiquiarensis</i>	LR	Amazonia
<i>Saimiri sciureus albigena</i>	LR	Amazonia, Northern Venezuela-Colombia
<i>Saimiri ustus</i>	LR	Amazonia
<i>Cebus apella apella</i>	LR	Amazonia
<i>Cebus apella macrocephalus</i>	LR	Amazonia
<i>Cebus apella maranonis</i>	LR	Amazonia, Southern Andes
<i>Cebus apella pallidus</i>	LR	Amazonia
<i>Cebus apella peruanus</i>	LR	Amazonia
<i>Cebus albifrons unicolor</i>	LR	Amazonia
<i>Cebus albifrons cuscinus</i>	DD	Amazonia
<i>Cebus albifrons yuracus</i>	DD	Amazonia, Southern Andes
<i>Cebus olivaceus olivaceus</i>	LR	Amazonia
<i>Cebus olivaceus castaneus</i>	LR	Amazonia
<i>Cebus kaapori</i>	VU	Amazonia
<i>Pithecia pithecia pithecia</i>	LR	Amazonia
<i>Pithecia pithecia chrysocephala</i>	LR	Amazonia
<i>Pithecia monachus monachus</i>	LR	Amazonia
<i>Pithecia monachus milleri</i>	VU	Amazonia
<i>Pithecia irrorata irrorata</i>	LR	Amazonia
<i>Pithecia irrorata vanzolinii</i>	LR	Amazonia
<i>Pithecia albicans</i>	LR	Amazonia
<i>Pithecia aequatorialis</i>	LR	Amazonia
<i>Chiropotes albinasus</i>	LR	Amazonia
<i>Chiropotes satanas satanas</i>	EN	Amazonia
<i>Chiropotes satanas chiropotes</i>	LR	Amazonia
<i>Chiropotes satanas utahicki</i>	VU	Amazonia
<i>Cacajao calvus calvus</i>	EN	Amazonia
<i>Cacajao calvus ucayalii</i>	VU	Amazonia
<i>Cacajao calvus novaesi</i>	EN	Amazonia

continued ...

Table 37 (continued)

<i>Cacajao calvus rubicundus</i>	EN	Amazonia
<i>Cacajao melanocephalus melanocephalus</i>	LR	Amazonia
<i>Cacajao melanocephalus ouakary</i>	LR	Amazonia
<i>Alouatta seniculus seniculus</i>	LR	Amazonia, Northern Venezuela-Colombia
<i>Alouatta seniculus stramineus</i>	LR	Amazonia
<i>Alouatta seniculus macconnelli</i>	LR	Amazonia
<i>Alouatta seniculus amazonica</i>	DD	Amazonia
<i>Alouatta seniculus juara</i>	DD	Amazonia
<i>Alouatta seniculus puruensis</i>	DD	Amazonia
<i>Alouatta sara</i>	LR	Amazonia, Chaco
<i>Alouatta belzebul belzebul</i>	LR	Amazonia
<i>Alouatta belzebul nigerrima</i>	LR	Amazonia
<i>Alouatta belzebul discolor</i>	LR	Amazonia
<i>Alouatta belzebul ululata</i>	CR	Amazonia
<i>Ateles paniscus</i>	LR	Amazonia
<i>Ateles belzebuth belzebuth</i>	VU	Amazonia
<i>Ateles chamek</i>	LR	Amazonia
<i>Ateles marginatus</i>	EN	Amazonia
<i>Lagothrix lagotricha lagotricha</i>	LR	Amazonia
<i>Lagothrix lagotricha cana</i>	VU	Amazonia
<i>Lagothrix lagotricha poeppigii</i>	VU	Amazonia

CERRADO/CAATINGA/CHACO

Table 38. Primates occurring in the Cerrado/Caatinga/Chaco phytogeographic region as defined by Gentry (1982). Endemic primates are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Callithrix melanura</i>	LR	Chaco, Amazonia
<i>Callithrix jacchus</i>	LR	Caatinga, Atlantic forest
<i>Callithrix penicillata</i>	LR	Cerrado, Atlantic forest
Family Cebidae		
<i>Aotus infulatus</i>	LR	Cerrado, Amazonia,
<i>Aotus azarai azarai</i>	LR	Chaco
<i>Aotus azarai boliviensis</i>	LR	Chaco, Amazonia
<i>Callicebus donacophilus pallescens</i>	LR	Cerrado/Chaco
<i>Cebus apella libidinosus</i>	LR	Cerrado/Caatinga/Chaco
<i>Cebus apella paraguayanus</i>	LR	Chaco
<i>Alouatta sara</i>	LR	Chaco, Amazonia
<i>Alouatta caraya</i>	LR	Cerrado/Caatinga/Chaco

ATLANTIC FOREST

Table 39. Primates occurring in the Atlantic forest phytogeographic region as defined by Gentry (1982). Endemic primates are in bold.

Species	Category	Distribution
Family Callitrichidae		
<i>Callithrix jacchus</i>	LR	Atlantic forest, Caatinga
<i>Callithrix penicillata</i>	LR	Atlantic forest, Cerrado
<i>Callithrix kuhli</i>	LR	Atlantic forest
<i>Callithrix geoffroyi</i>	VU	Atlantic forest

continued ...

Table 39 (continued)

<i>Callithrix flaviceps</i>	EN	Atlantic forest
<i>Callithrix aurita</i>	EN	Atlantic forest
<i>Leontopithecus rosalia</i>	CR	Atlantic forest
<i>Leontopithecus chrysomelas</i>	EN	Atlantic forest
<i>Leontopithecus chrysopygus</i>	CR	Atlantic forest
<i>Leontopithecus caissara</i>	CR	Atlantic forest
Family Cebidae		
<i>Callicebus personatus personatus</i>	VU	Atlantic forest
<i>Callicebus personatus nigrifrons</i>	VU	Atlantic forest
<i>Callicebus personatus melanochir</i>	VU	Atlantic forest
<i>Callicebus personatus barbarabrownae</i>	CR	Atlantic forest
<i>Callicebus</i> sp.	CR	Atlantic forest
<i>Cebus apella nigritus</i>	LR	Atlantic forest
<i>Cebus apella robustus</i>	VU	Atlantic forest
<i>Cebus xanthosternos</i>	CR	Atlantic forest
<i>Alouatta belzebul belzebul</i>	LR	Atlantic forest, Amazonia
<i>Alouatta fusca fusca</i>	CR	Atlantic forest
<i>Alouatta fusca clamitans</i>	VU	Atlantic forest
<i>Brachyteles arachnoides</i>	EN	Atlantic forest
<i>Brachyteles hypoxanthus</i>	EN	Atlantic forest

Table 40. A summary of the numbers of Callitrichidae and Cebidae in each of the seven phylogeographic regions as defined by Gentry (1982). Also shown is the number of endemic species and taxa.

Region	Callitrichidae		Cebidae		Total		Endemic Taxa	
	Species	Taxa	Species	Taxa	Species	Taxa	Species	Taxa
Middle America	1	1	7	21	8	22	4	18
Northern Venezuela-Colombia	1	1	12	23	13	24	2	19
Northern Andes	2	2	10	11	12	13	2	8
Southern Andes	-	-	3	6	3	6	2	2
Amazonia	22	42	43	81	65	123	48	112
Cerrado/Caatinga/Chaco	3	3	6	8	9	11	1	5
Atlantic Forest	10	10	8	13	18	23	14	17

Table 41. The numbers of threatened taxa and threatened endemic taxa in each region according to the Mace-Landé System (IUCN 1995). Critically Endangered (CR), Endangered (EN), and Vulnerable (VU).

Region	Threatened Taxa				Threatened Endemic Taxa			
	CR	EN	VU	Total	CR	EN	VU	Total
Middle America	3	4	6	13	3	4	4	11
Northern Venezuela-Colombia	2	4	4	10	2	3	3	8
Northern Andes	2	1	4	7	2	-	3	5
Southern Andes	1	-	2	3	1	-	1	2
Amazonia	-	6	16	22	-	6	15	21
Cerrado/Caatinga/Chaco	-	-	-	-	-	-	-	-
Atlantic Forest	7	5	6	18	7	5	6	18

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