CONSERVATION ASSESSMENT AND MANAGEMENT PLAN FOR

MEXICAN PRIMATES

WORKSHOP REPORT

UNIVERSIDAD VERACRUZANA

XALAPA, VERACRUZ

OCTOBER 16TH - 17TH 2006

MEXICAN PRIMATES' CONSERVATION ASSESSMENT AND MANAGEMENT PLAN

UNIVERSIDAD VERACRUZANA, XALAPA, VERACRUZ, MEXICO
OCTOBER 16TH – 17TH 2006

WORKSHOP REPORT

Compiled by workshop's participants

Edited by: Rodríguez-Luna E., Solórzano-García B., Shedden A., Rangel-Negrín A., Dias P.A.D., Cristóbal-Azkárate J., Cortés-Ortiz L., Dunn J.C., Domingo-Balcells C., Sánchez S., Vea-Baró J., Cornejo J.

Organized by Centro de Investigaciones Tropicales, Universidad Veracruzana
Facilitated by CBSG México

Workshop organized by Universidad Veracruzana

Workshop financed by Universidad Veracruzana and Mexican National Commission of Natural Protected Areas (CONANP)

Workshop facilitated by: Conservation Breeding Specialist Group, Mexico (CBSG, México www.cbsg.org).

(eds.). 2009. Mexican primates' Conservation Assessment and Management Plan. Workshop report. IUCN/SSC Conservation Breeding Specialist Group.

Citar: Rodríguez-Luna E., Solórzano-García B., Shedden A., Rangel-Negrín A., Dias P.A.D., Cristóbal-Azkárate J., Cortés-Ortiz L., Dunn J.C., Domingo-Balcells C., Sánchez S., Vea-Baró J., Cornejo J. 2009. Taller de Conservación, Análisis y Manejo planificado para los primates mexicanos, 2006. Universidad Veracruzana. CBSG.

CONTENT

PARTICIPANTS

Ernesto Rodríguez Luna
Centro de Investigaciones Tropicales
Universidad Veracruzana
Email: errodriguez@uv.mx

Edith Carrera Sánchez
Instituto de Neuroetología
Universidad Veracruzana
Email: edithcarrera@yahoo.com.mx

Aralisa Shedden González
Centro de Investigaciones Tropicales
Universidad Veracruzana
Email: arazitl@hotmail.com

Ariadna Rangel Negrín
Universidad de Barcelona
Email: ari_rangel@hotmail.com

Edward Ellis
Centro de Investigaciones Tropicales
Universidad Veracruzana
Email: eellis@uv.mx

Liliana Cortés Ortiz
Museum of Zoology & Department of
Ecology and Evolutionary Biology
University of Michigan
Email: lcortes@umich.edu

Sonia Sánchez
Universidad de Barcelona
Email: soniasl@hotmail.com

Pedro Américo D. Dias
Instituto de Neuroetología
Universidad Veracruzana
Email: pilantra24@hotmail.com

Guadalupe Medel Palacios
Instituto de Neuroetología
Universidad Veracruzana
Email:

Jurgi Cristóbal Azkarate
Centro de Investigaciones Tropicales
Universidad Veracruzana
Email: jurgic@yahoo.com

Cristina Domingo Balcells
Universidad de Barcelona
Email: aloma_cris@hotmail.com

Joaquim Vea Baró
Universidad de Barcelona
Email: joaquim@veabaro.info

Juan Cornejo
UICN/CBSG México
Email: jcornejo@africamsafari.com.mx

Sanjay Molur
Deputy Director, ZOO
Founder/Secretary, WILD
Email: herpinvert@vsnl.com

Perla Cifuentes Calderón
Zoológico de Chapultepec
Cuidad de México
Email: cifugato@yahoo.com.mx

Pedro Aguilar Aragón
ZOOMAT, Chiapas
Email: aguilararagon@yahoo.com

Victor Arroyo Rodríguez
INECOL A.C.
Xalapa, Veracruz
Email:
victorarroyo_rodriguez@hotmail.com

Brenda Solórzano García
Centro de Investigaciones Tropicales
Universidad Veracruzana
Email:
brenda_solorzano@yahoo.com.mx

Olivia Rendón
Secretaría de Recursos Naturales y Ambiente
Gobierno de Honduras
Email: sansaraom@yahoo.com

Marleny Rosales Meda
Instituto Internacional de Conservación y Manejo de Vida Silvestre
Universidad Nacional, Costa Rica
Email: marleny_rm@yahoo.com.mx

Kimberly Williams
School of Natural Resources & Environment
University of Michigan
Email: kimwilliamsg@gmail.com

Ariel Rodríguez
Fac. Ciencias Naturales Exactas y Tecnología
Universidad de Panamá
Email: arielrod@ancon.up.ac.pa

Gabriela Ponce
Centro de Investigaciones en Ecosistemas
UNAM
Email: gabrielamasaii@yahoo.com

REVIEWERS

Jorge Martínez Contreras
Departamento de Filosofía
Universidad Autónoma Metropolitana
Iztapalapa
Ex–presidentes de la Asociación Mexicana de Primatología A.C.
Email: pascalo69@yahoo.com

Alejandro Estrada
Estación de Biología Tropical Los Tuxtlas
Instituto de Biología
Universidad Nacional Autónoma de México
Ex–presidentes de la Asociación Mexicana de Primatología A.C.)
Email: aestrada@primatesmx.com

José Luis Vera
Dirección de Análisis y Seguimiento de Proyectos
Secretaría Técnica
Instituto Nacional de Antropología e Historia
Ex–presidentes de la Asociación Mexicana de Primatología A.C.)
Email: zeluismx@yahoo.com

Juan Carlos Serio Silva
Departamento de Biodiversidad y Ecología Animal
Instituto de Ecología A.C.
Ex–presidentes de la Asociación Mexicana de Primatología A.C.)
Email: juan.serio@inecol.edu.mx

Francisco García Orduña
Dirección Instituto de Neuroetología
Universidad Veracruzana
Email: fragarcia@uv.mx

EXECUTIVE SUMMARY

Currently, biodiversity loss is one of the most important challenges we face in our country as well as on a worldwide scale. This loss is associated with unsustainable human activities, which threatens all life forms, particularly those that have difficulties to adapt to perturbed habitats because of their feeding and environmental requirements, as is the case of Mexican primates.

In Mexico, in spite of having federal laws like the NOM-059-SEMARNAT-2001 for wild species protection, these have not been sufficient and it is necessary to provide complementary efforts to diminish the pressures that affect these organisms. Because of this, primatologists who are concerned about the situation of primate populations in the country, have studied life history, ecology, behavior and other relevant aspects, in order to generate the necessary knowledge that allows the development of conservation strategies.

In 1995, the first Mexican Primate CAMP was developed, and in the final document that derived from it included recommendations for the study and conservation of these species (Rodríguez-Luna *et al.,* 1995). The 16th and 17th of October of 2006 the second Mexican primate CAMP workshop took place, with the purpose of bringing each species status up to date, generating recommendations for conservation and evaluating the impact the first workshop had on primate conservation, during the eleven years since this first evaluation.

This second workshop was organized and financed by the Universidad Veracruzana, in collaboration with the National Commission of Natural Protected Areas (CONANP), and facilitated by the Conservation Breeding Specialist Group (CBSG-Mexico). Nearly 25 specialists, representing several national and international institutions, participated.

For this specific workshop, the participants convened during its development that further meetings would be necessary, in order to thoroughly review the information that was used for the species` evaluation. During these post-workshop meetings, certain inconsistencies were detected and corrected, resulting in changes in the status that had originally been assigned to each sub-species. Furthermore, the resulting document was distributed amongst all the participants and after assembling their inputs, the document was re distributed, though not only amongst participants, but specialists with important primatological trajectories who were unable to assist to the workshop. The objective of this alternative methodology was to enhance the final report and ensure it would be a useful tool for developing conservation plans that focus on Mexican primates and their habitat.

The CAMP Process

The CAMP process was developed by the CBSG initially to assist zoos to prioritize species for conservation breeding but now as a tool of IUCN for assessing species for the Red List of Threatened Animals and as a means of assisting the regional and national biodiversity planning process. A CAMP workshop brings together a broad spectrum of experts and stakeholders including wildlife managers, biologists, representatives of the

academic community or private sector, researchers, government officials and captive managers, in order to a) evaluate the threats for a specific taxon in a particular geographic region or country, b) assign a IUCN Red List's category to the specie or subspecie, c) make recommendations for specific conservation-oriented research and management, and d) formulate management actions needed for species conservation, both *in situ* and *ex situ*. The results of the initial CAMP workshops are reviewed by workshop participants in varying iterations before the final report is published.

The 2001 IUCN Red List Criteria

The CAMP workshop process employs the IUCN Red List Criteria as a tool in assessing species status in a group of taxa. The structure of the categories includes extinct, threatened, non-threatened, data deficient and not evaluated divisions. In the last decade IUCN has improved the method of assessment of species by incorporating numerical values attached to the different criteria for threat categories. The 2001version of the Red List threatened categories are derived through a set of 5 criteria (population reduction, restricted distribution, continuing decline and fluctuation; restricted population and probability of extinction) based on which the threatened category is assigned. The term "threatened" according to the 2001 IUCN categories means Critically Endangered (CR), Endangered (EN) or Vulnerable (VU).

The workshop

CAMP workshops are composed of group sessions combined with plenary sessions. In this workshop the groups were organized by species/sub species: *Ateles geoffroyi yucatanensis, Ateles geoffroyi vellerosus, Alouatta palliata mexicana* and *Alouatta pigra*. All four species/subspecies (Table 1) were evaluated according to the IUCN Red List system, based on the data provided by the experts; the national risk category (Table 2) was also included for each taxa.

Results

Several recommendations were oriented to investigation and management of Mexican primates, and were derived from the Taxon Sheets filled during the workshop. The most important recommendations are described below:

Alouatta pigra:

Categorized as Endangered in the Red List 2003: this same category was maintained at the end of the workshop.

It is recommended that field studies in habitats with varying degrees of perturbation are carried out, as well as population censuses, research on habitat preferences and life history that allow the necessary information to be obtained, in order to estimate with greater precision the number of mature individuals, demographic tendencies, quality and quantity of available habitat, current distribution range and the effect of the main threats on the species. It is also important to conduct research on the possible hybridizations with *Alouatta palliata mexicana* in the areas in which these two species coincide.

Furthermore, activities related to habitat management and population monitoring should also be carried out, to ensure their future viability, both within and outside of natural protected areas.

Alouatta palliata mexicana:

Categorized as Critically Endangered in the Red List 2003; in this workshop it was placed in the Endangered category (A4cd).

It is necessary to do field work such as censuses, geographic location of populations, monitoring populations found in habitats with varying degrees of perturbation and pressures, as well as those that have been translocated or reintroduced. It is also important to develop genetic and taxonomy studies to determine the hybridization degree with *Alouatta pigra* and the possible implications for conservation strategies. Further research is needed to determine illegal traffic of the species and the effects on its wild populations.

Ateles geoffroyi yucatanensis:

Categorized as Vulnerable in the Red List 2003; recategorization to Endangered (A4cd) recommended during the workshop.

It is necessary to carry out long term studies related to the effects that fragmentation and other threats (such as hunting and illegal trade, diseases, habitat loss) have on this specie´s populations. Additionally, field research that permits identification of populations in the localities within the historical distribution range should also be conducted to determine current distribution. Genetic investigation is crucial to clarify taxonomic issues, in order to develop adequate conservation strategies. It is also important to obtain more data on illegal trade and capture of this species and the implications of this for conservation

Ateles geoffroyi vellerosus:

Categorized as Critically Endangered in the Red List 2003; this category was maintained at the end of the workshop.

During this workshop a reduced number of specialists that work with this species were present. Due to this the information for this taxa was limited. Nevertheless, a general evaluation of the specie´s status was conducted through bibliographic references and the specialist´s inputs, and it was determined that studies related to the effects of deforestation and fragmentation on wild populations of this primate are necessary. It is also important to determine the repercussions of illegal trade on wild populations and generate studies that provide data on current distribution and population sizes.

Table 1. 2003 Categorization
[ii] of the mexican primates (included in the IUCN Red List)

SPECIES	IUCN CATEGORY	CRITERIOS
Alouatta palliata mexicana	Critically Endangered	A4c; B1ab(i,ii,iii)
Alouatta pigra	Endangered	A4c
Ateles geoffroyi vellerosus	Critically Endangered	A4c
Ateles geoffroyi yucatanensis	Vulnerable	A4c

Table 2. Status of the Mexican primates (NOM-059-SEMARNAT-2001)

SPECIES	NOM-059-SEMARNAT-2001 CATEGORY
Alouatta palliata	Endangered[iii]
Alouatta pigra	Endangered
Ateles geoffroyi	Endangered

[ii] The Red List evaluations available during the time the workshop was conducted (2006) correspond to the 2003 Red List; nevertheless, the most recent evaluation (2008) presented by the Taxon Authorities, places these taxa in the same categories, excepting *A.g.yucatanensis,* recategorized as Endangered in 2008.

[iii] Endangered: those species whose area of distribution or the size of their populations in national territory have diminished drastically, placing their biological viability at risk, in all their natural habitat, due to destruction or modification of their habitat, non sustainable development, diseases or depredation, amongst others (NOM-059-SEMARNAT-2001).

INTRODUCTION

In recent decades, wild populations of the four primate taxa found in Mexico have suffered a drastic reduction in their numbers, principally owing to the loss, transformation and fragmentation of their habitat (Cuarón *et al.,* 2008; Marsh *et al.,* 2008). The loss in the quantity and quality of available habitat is the result of a series of factors, including environmental, social, economical and political issues. These issues are all interrelated and are reflected in the way that natural resources are managed, in the territorial organization of the towns and communities, as well as in the socioeconomic pressures that can be observed at different levels, from different origins. As a consequence, in some regions, marginalized local communities are forced to subsist from unsustainable activities, incompatible with the conservation of ecosystems in which many threatened species are found, including primates.

In Mexico, the fourth most biodiverse country in the world, the loss of biodiversity is a serious crisis as a result of widespread environmental deterioration, despite wide ranging efforts dedicated to the protection of species and the conservation of natural areas (CONABIO, 2006). In the last 30 years, the Mexican primates have lost a large part of their natural habitat, with some regions losing more than 80% of the original habitat. Such is the case in the Los Tuxtlas region, where 84% of the original rainforest habitat has been destroyed (Dirzo, 1992).

This situation is particularly worrying for species such as *Ateles geoffroyi* that have a diet based principally on fruits and, hence, have greater requirements in terms of the quantity and quality of their habitat. Conversely, the primates of the genus *Alouatta* have been observed to adapt to live in small forest patches, using the leafy resources available to them (Asensio *et al.,* 2007; Cristóbal-Azkarate *et al.,* 2007; Veá y Cristóbal-Azkarate*,* 2006).

A large part of the habitat available for Mexican primates is found within fragmented landscapes, where, in many cases, the distance between patches of vegetation is enough to impede the dispersion of individuals, isolating populations that are unlikely to be viable in the long-term (Estrada y Coates-Estrada, 1996; Gómez-Marin *et al.,* 2001; González-Picazo *et al.,* 2001; Mandujano *et al.,* 2005; Domingo-Balcells, 2008).

Primates, like all animals in their habitat, carry-out specific functions within their ecosystem. Owing to their eating-habits, primates are important dispersers of seeds, and distribute the seeds of key species for the regeneration of ecosystems (Estrada y Coates-Estrada, 1986; Domínguez-Domínguez *et al.,* 2006; Morales-Mávil *et al.,* 2007) and, therefore, essential species in the regeneration of rainforests. Primates are also charismatic species of great importance to the success of conservation programs both locally and internationally. Mexico contains four species and subspecies of the 21 primate taxa present in Mesoamerica and represents the most northerly distribution of the Neotropical primates (PSG, 2007).

The concern over the conservation status of Mexican primates is not new and more than 25 years ago biologists began the first systematic studies of these species in the wild (Estrada, 1982; Rodríguez-Luna, *et al.* 1987; Silva-López, *et al.* 1988). Indeed, a group of researchers from the Universidad Veracuzana, the Asociación Mexicana de Primatología A.C. and several different environmental authorities, carried out a workshop for the Conservation, Assessment and Management Plan (CAMP) for Mexican

primates, during which the conservation status of the Mexican primates was evaluated.

Eleven years later, a specialist group made up of some of the same primatologists, as well as some more recent additions, repeated the exercise, meeting on the 16th and 17th of October 2006 at the Universidad Veracruzana (Xalapa, Veracruz) to perform the second CAMP workshop for Mexican primates. The principal goals of the second evaluation of the status of the primates in Mexico was to generate more-recent data which could be compared with the results of the first workshop, as well as to evaluate the availability and quantity of the information available, follow up on the suggestions and recommendations made in the first workshop, and analyze the value that CAMP workshops have had as a tool for facilitating the development of conservation action for primates.

CONSERVATION BREEDING SPECIALIST GROUP

The conservation breeding specialist group (CBSG) forms part of the Species Survival Commission (SSC) of the International Union for the Conservation of Nature (IUCN). CBSG is composed of more than 900 voluntary members from 92 countries all over the world. Their mission is to "*conserve and establish viable populations of threatened native species through reproduction programs for the intensive conservation, management and protection of wild plant and animal populations, especially those that are small or fragmented*"

The reduction and fragmentation of the habitat of wildlife has resulted in reduced and isolated populations, increasing their risk of extinction. These threatened populations can be managed using different strategies, including: habitat restoration, the intensive collection of data regarding the biology of the species and, possibly, reproduction in captivity. It is for this reason that CBSG considers it vitally important to use the available resources to develop adequate and effective strategies for management and conservation.

CBSG has nearly 30 years experience in the management and conservation of threatened species both *in situ* and *ex situ*. The organization has developed, over a period of 12 years, a series of innovative tools, models and workshops for the evaluation and management of the risk and status of threatened species. These tools have evolved and have been used in more than 180 workshops over the last 8 years, with around 7000 participants.

THE CAMP PROCESS

The Conservation, Assessment and Management Plan (CAMP) workshop for Mexican primates was carried out on the 16th and 17th of October 2006 in the Universidad Veracruzana (Xalapa, Veracruz, Mexico). Around 25 specialists participated, representing a diverse range of academic institutions, research centers, and zoological gardens from around the country, although in total around 60 people were involved, including researchers, experts and representatives of governmental bodies associated with the management of natural resources and the conservation of biodiversity. Primatologists from a variety of Central American countries were also present, with the idea that they would gain experience with the methodologies used during the workshop and that a collaborative strategy of information exchange would be developed so that, in

the future, a second CAMP workshop for Mesoamerican primates could be organized (the first was carried out in 1997).

CAMP workshops bring together a group of experts in order to a) evaluate the threats for a given taxon in a particular geographical region or country, b) assign to each species and subspecies a category from the IUCN red list, c) formulate recommendations for management and research directed towards conservation, and d) put forward management and recuperation programs for species *in situ* and/or *ex situ*.

The participants use the quantitative system from the IUCN Red List to categorize the Category of Threat for each taxon based on the information available with respect to the size and location of populations, number of mature individuals, distribution range and available habitat. Computer databases are used to collect and summarize the data, which also help in the production of the workshop report and allow the participants to analyze and discuss the data after the event.

By making recommendations for research and management, the CAMP process identifies the most important activities into which limited resources should be invested for the conservation and study of the species in question.

The objectives of the workshop were:

- Review the present status of the Mexican primates and compare this with the results of the CAMP workshop carried out in 1995.

- Analyze the CAMP methodology as a tool for evaluating the status of species and as an instrument to facilitate the development of conservation activities.

- Establish the formation of a network of primatologists both Mexican and from the Mesoamerican region in general, to facilitate the exchange of information and collaboration between institutions.

- Include those primatologists and conservationists working with Mexican primates in the process of determining the status of these species, using the Criteria and Categories set out in the IUCN Red List.

- Assign an IUCN Category of Threat to all of the Mexican primates based on the available information – published or not – and produce the necessary paperwork as required by the protocol set out in the IUCN Red List.

- Establish recommendations for research and management for the conservation of these species.

Methodology for evaluation

A few weeks prior to the start of the workshop a Biological Information Questionnaire was given to each of the participants, which contained questions about the biology, ecology and conservation status of each of the species and subspecies which would later be considered in the workshop. These questionnaires bring together all of the most recent and relevant information for each of the species and subspecies and were later used during the workshop to complete the Taxon Sheets for each taxon. The Biological Information Questionnaires become even more important if and when any of the specialists are unable to attend the workshop. In this way, their input can still be

integrated into the Taxon Sheets.

During the CAMP workshop the majority of the work was carried out in “working groups” and later revised during plenary sessions. In this workshop the groups were organized by species/subspecies (*Ateles geoffroyi vellerosus, Ateles geoffroyi yucatanensis, Alouatta pigra, Alouatta palliata mexicana*), depending on the particular experience of the participants.

For the evaluation of the taxa, Taxon Sheets were used, which were divided into the following sections:

Part 1: General information, including taxonomy, habitats, habitat distribution, localities, threats, population, commerce, field studies, data quality, certainty/uncertainty and data qualifier.

Part 2: Evaluation of the status of each species based on the information gathered during Part 1. Partly using the Criteria from the IUCN Red List, as well as considering the CITES list, national legislation, presence of species in National Protected National Areas (administrated by the Mexican National Commission of Natural Protected Areas – CONANP) and previous evaluations. Further, in this part considerations were included with respect to data quality, data qualifiers and the dynamics of the groups carrying out the evaluation.

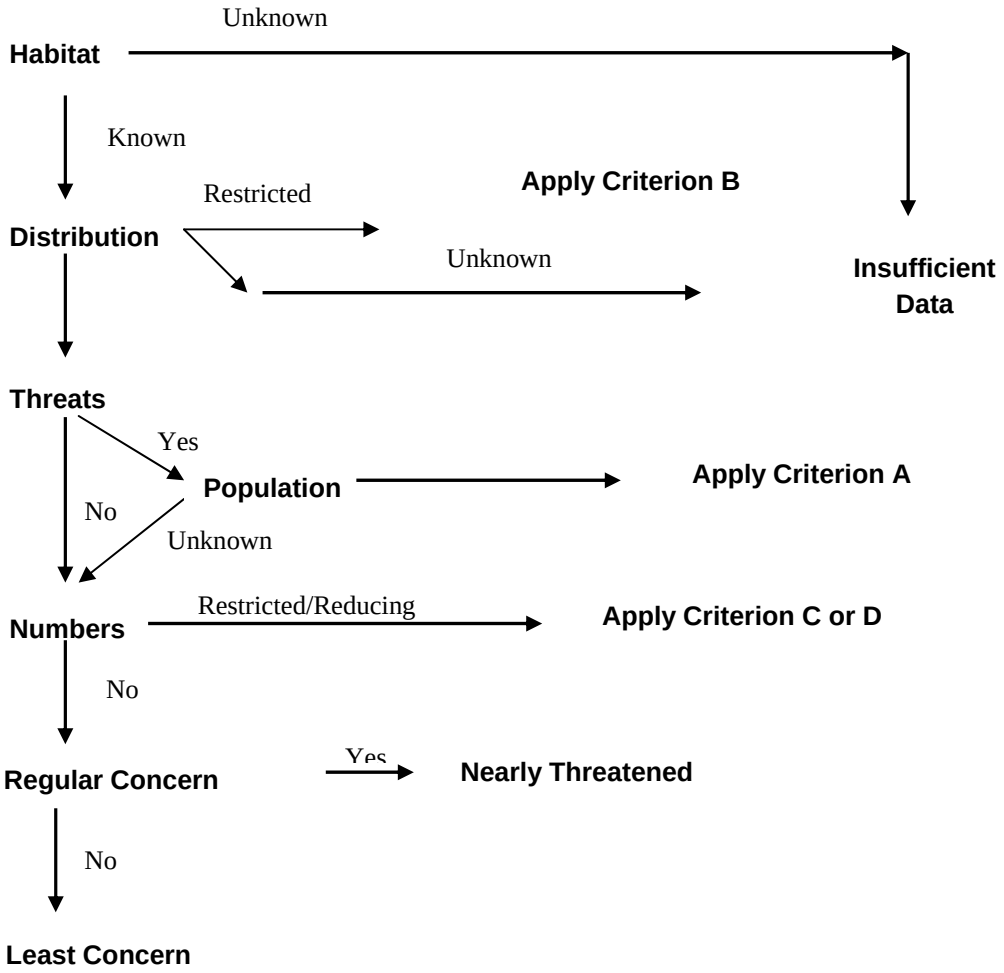
Part 3: Research recommendations, monitoring, captive breeding, education, population and habitat viability analyses, and comments on species.

Part 4: Comments and sources.

Part 5: Compilers of the work groups, reviewers of the data and sources of information published or not. Information about migration between adjacent populations, threats, colonization effects, amongst others. An evaluation of the relationships between populations resident in different countries is also carried out.

The information compiled in these datasheets was implemented, using logical deductions, to determine the status of each species based on the global Criteria and Categories of the IUCN Red List.

The following diagram illustrates how the information and criteria were used to derive the status of each taxon:



Finally, the writing of the final report is carried out through the compilation of all the information and results generated during the workshop. In the specific case of this workshop, the final document was submitted for revision by specialists with particular experience in Mexican primatology, who were unable to attend or participate in the workshops. This process was carried out in order to improve the final report and strengthen the workshop as a tool for the development of conservation plans focused on these species and their habitats.

RESULTS

In this workshop, the majority of the information supplied by the researchers was based on direct field observations made during recent expeditions. The participants of the workshop also used information from previous studies for comparison, in order to estimate any reduction in the populations and habitats. Equally, both the field researchers and zoo experts based their results on direct experience of trafficking, subsistence hunting and other threats faced by these taxa.

During the workshop, big gaps in the available information became evident for all four of the taxa evaluated. In general, more precise data is required with respect to population

size and tendencies, the effect of the threats on population structure and behavior, and the present distribution of the species. It is worth highlighting that the majority of primatological studies in Mexico have been carried out repeatedly in the same locations and, hence, there are various regions within the distribution range of each species where their presence has not been confirmed. This hinders the estimation of the area and extension occupied by each species (see the maps at the end of each Taxon Sheet).

The evaluation of the status of Mexican primates carried out during this workshop places each of the four taxa within a risk category of the IUCN Red List. Based on the criterion of reduction in population size, for *Alouatta palliata mexicana* a loss of over 50% of the total population within the last 30 years was calculated; whilst for *Alouatta pigra* and *Ateles geoffroyi yucatanensis* a loss of over 60% of the population within the last 30 years was calculated. In the case of *Ateles geoffroyi vellerosus*, owing to the lack of data, the reduction in population was calculated on the basis of habitat loss, giving an 80% loss during the last 30 years.

Comparing these results with those of the CAMP workshop for Mexican primates carried out in 1995, we see that all of the taxa were raised to a higher risk category than that assigned in 1995, which indicates that the situation of the primate populations in Mexico continues to get worse (Table 3). Another aspect which is worth pointing out is that both the gaps in information detected in the CAMP workshop in 1995 and the recommendations given at the same workshop, are practically identical to those presented in this second edition of the CAMP for Mexican primates, 11 years on from the first workshop. This situation makes quite clear the necessity to direct greater efforts towards the development of research directed towards useful information on the conservation status of these species, especially in those locations within the distribution range where little attention has been received.

The Categories of Threat in which the four taxa are presently found in the IUCN Red List and those assigned in this workshop are very similar: *Alouatta pigra* and *Ateles geoffroyi vellerosus* are maintained in the same category, while *Alouatta palliata mexicana* and *Ateles geoffroyi yucatanensis* were recommended to be re-categorized as Endangered (Table 3).

Table 3. Comparison between the evaluations of CAMP 1995, IUCN Red List 2003 and CAMP 2006.

	CAMP 1995		**IUCN 2003**		**CAMP 2006**	
SPECIES	**Category**	**Criteria**	**Category**	**Criteria**	**Category**	**Criteria**
Alouatta palliata mexicana	Vulnerable (VU)	Mace y Stuart, (1994)	Critically Endangered (CR)	A4c; B1ab	Endangered (EN)	A4cd
Alouatta pigra	Lower Risk (LR)		Endangered (EN)	A4c	Endangered (EN)	A4cd
Ateles geoffroyi yucatanensis	Vulnerable (VU)		Vulnerable (VU)	A4c	Endangered (EN)	A4cd
Ateles geoffroyi vellerosus	Vulnerable (VU)		Critically Endangered (CR)	A4c	Critically Endangered (CR)	A4c

In the case of *Alouatta palliata mexicana*, the categorization as Critically Endangered by the IUCN Red List Taxon Authorities (Cuarón *et al.,* 2003[1]), is consistent with factors such as the reduction in population size, greater than or equal to 80% in the last 10 years, and the occupied area being both less than 100 km^2 and severely fragmented. Despite the fact that, with the aim of conservation, it was agreed that the taxon should be considered as Critically Endangered, the percentage reduction in the population calculated during this workshop ($\geq$ 60%) coincides with the criteria for the category Endangered. On the other hand, the reduction in the population calculated for *Ateles geoffroyi yucatanensis* during this workshop was greater than that considered by the Taxon Authorities of the IUCN, suggesting the elevation of this taxon to a higher risk category.

Throughout the workshop some aspects of the CAMP methodology were identified which should be critically revised and, in some cases, reconsidered. Some of these aspects are:

a) A great deal of information is managed over a very limited timeframe and therefore there is very little time available for analyses. The information used over the course of the workshop comes from field research carried out with a diverse range of methods, in differing locations, in such a way that, on occasions, putting together the data so that it is compatible and comparable between studies can require more time than that available. Similarly, only a small amount of time is available for searching for and gathering information which may suddenly be required during the workshop.

b) For some of the assessments, very precise data is required (such as the number of mature individuals) for which, a lot of the time, it is necessary to speculate. This is as no methodological strategy is available with which to orientate research projects as to how to collect useful information for the evaluation of the conservation status of the species.

c) In the analysis of the tendencies in habitat transformation, socioeconomic factors of the local communities which interact directly with the species and their habitats were not considered. The immediate threats are cited without considering the overall multi-causality of the threats (of social, economic, political and cultural origins) and without considering those involved and their responsibilities.

d) There is no clear supervision by central CBSG, in either the development of the workshops or the publication and diffusion of the reports, which secures that all the workshops are carried out to a similar standard and that the final document reaches the appropriate organizations.

Similarly, the participants of this workshop suggested that CBSG should add a new section within the CAMP methodology, in which existing conservation strategies on the national agenda and departmental programs of the federal, state and municipal government are analyzed, with the aim of identifying those in which the species in question may be included. In this way the academic and political sectors may be directly

[1] In 2008, Taxon Authorities ratify this category and its criteria for *Alouatta palliata mexicana* (Cuarón, *et al.* 2008).

linked, increasing the viability and application of the recommendations developed in CAMP workshops.

THREATS TO MEXICAN PRIMATES

None of the Mexican primates are exempt from threats. Table 4 lists the different pressures identified during the workshop. The list is very similar for each of the species and subspecies, with habitat loss and transformation being the principal threats affecting the primate populations in Mexico, both within and outside of Protected Natural Areas.

The continued growth of agricultural and urban boundaries is reflected in the loss of natural vegetation and, consequently, the reduction in habitat available for primates. Currently in Mexico, wild populations of wild primates are only found in the southeast of the country, where the highest percentage loss in natural vegetation is also found; particularly in the states of Veracruz, Tabasco and Chiapas (SEMARNAT, 2005). The remaining vegetation in these states is now largely composed of pastoral land dedicated to cattle farming (Table 5).

Table 4. Threats to Mexican primates (in accordance with the IUCN threat list used by the Taxon Authority of the Red List)

Species	Threats
*Ateles geoffroyi vellerosus**	Hunting, illegal pet trade, deforestation, hurricanes and fires, loss and transformation of habitat, inbreeding
*Ateles geoffroyi yucatanensis**	
Alouatta palliata mexicana	
*Alouatta pigra**	

*No studies are available on the effect of these threats on populations of this taxon

In the same way, comparing the data on vegetation loss, land use and marginalization, we find that the states with the highest incidences of marginalization and poverty coincide with those which have the highest rates of deforestation (Table 6). Similarly, the states with the highest grades of natural vegetation loss are also those with the highest surface area dedicated to cattle farming. This demonstrates that, despite the high levels of habitat loss and transformation in these states, the socio-economic situation for the human population has not improved. Therefore, the pressure for them to continue to transform the remaining conserved areas of vegetation is high, threatening wild primate populations in these areas.

Analysis of the preceding data reveals that throughout the distribution range of the Mexican primates, threats such as habitat loss and fragmentation vary in intensity depending on the location, region and socio-economical context, in such a way that the states with the greatest threats are Veracruz, Tabasco and Chiapas. This indicates that conservation efforts and actions should be different in different places, directed towards addressing particular problems and designed in accordance with the social and ecological characteristics of the place in question.

Table 5. Percentage of land use and vegetation in Mexican states where primates are found

	Agriculture	Pasture	Rain forest	Urban	Natural vegetation lost 1993-2002	Primates
Campeche	4	14	16	0.3	2.5	*A. palliata/ A. pigra/ A.geoffroyi yucatanensis*
Chiapas	18	26	10	0.5	8	*A. palliata/ A. pigra/ A.geoffroyi vellerosus/ A.geoffroyi yucatanensis*
Oaxaca	16	15	14	0.4	6	*A.geoffroyi vellerosus*
Quintana Roo	2	3	26	0.5	0.7	*A. pigra/ A.geoffroyi yucatanensis*
Tabasco	16	51	3	0.5	11	*A. palliata/ A. pigra/ A.geoffroyi vellerosus*
Veracruz	32	45	2	1.0	19	*A. palliata/ A.geoffroyi vellerosus*
Yucatán	6	17	1	1.1	0.7	*A. pigra/ A.geoffroyi yucatanensis*

Sources: SEMARNAT, 2005; INEGI, 2005

Table 6. Annual rates of deforestation and population growth, as well as levels of marginalization in the states of Mexico where primates are found.

	Deforestation (1973-1993)	Population Growth (2000-2005)	Marginalization*	
			Level	National Rank
Campeche	0.2-0.5%	1.6	High	8
Chiapas	0.6-0.9%	1.6	Very High	2
Oaxaca	0.2-0.5%	0.4	Very High	3
Quintana Roo	< 0.1%	4.7	Low	19
Tabasco	1-2%	0.9	High	9
Veracruz	1-2%	0.5	Alto	4
Yucatán	< 0.1%	1.6	High	11

Sources: Aguilar *et al*. 2000; INEGI, 2005; CONAPO, 2006. * Data from 2005

In addition, it is important to mention that only a small proportion of the remaining habitat for Mexican primates is currently protected (Table 7). The different Natural Protected Natural Areas (PNA) within the distribution ranges of the Mexican primate species contain important primate populations. However, corridors within and between Protected Natural Areas do not exist, which would allow for the movement of individuals and gene flow between populations and help secure the conservation of the species. Similarly, on many occasions, the pressures and threats that occur outside of Natural Protected Areas also exist with them, limiting their potential as a conservation strategy for Mexican primates.

It is important to emphasize that the different pressures that threaten the persistence of

Mexican primate populations and their habitats are the result of the joint actions of socioeconomic, political and environmental factors and involves people within the private and governmental sectors as well as the local community (CONABIO, 2006).

Table 7. Area covered by Natural Protected Areas within the distribution range of Mexican primates

		A. palliata mexicana	*A. pigra*	*A. geoffroyi vellerosus*	*A. geoffroyi yucatanensis*
	Geographic Range Size (Km^2)*	40,576	124,735	83,856.82	118,971.60
Percentage of distribution range state protected	Campeche	17.4	13.7		14.4
	Chiapas		3.3	11.4	0.1
	Oaxaca				
	Quintana Roo		5.5		5.2
	Tabasco	7.5	2.4		
	Veracruz	3.8		1.8	
	Yucatán		1.7		2.3
	Area Protected	11,640.78 km^2	33,298.27 km^2	11,141.95 km^2	26,178.93 km^2
		28.7 %	26.7 %	13.3 %	22 %

*Area calculated during the workshop using ArcView 3.2. See maps at the end of the datasheet for each taxon. Source: CONANP, 2008

The establishment and application of public policy for economic development play an important role in the processes which result in the loss and transformation of habitat for primates and other species. For example, the policies of colonization and resettlement for human communities have been amongst the most important factors leading to accelerated deforestation of large extensions of vegetation, such as in the states of Veracruz, Yucatán, Quintana Roo, Chiapas and Campeche, where, in 1940 and 1960, the national authorities, trying to resolve the problems associated with a lack of land available, granted 4.5 million hectares of tropical forest to farmers (Revel-Mouroz, 1980).

Similarly, some government initiatives promoting alternative crops have resulted in the development of inadequate production projects that are sometimes suspended at the end of only the first stages. An example of this is what happened in one “ejido” (a community in which communal land is shared by the people of the community) in the south of the region of Los Tuxtlas (Veracruz), where in 1982 the government financed the establishment of rubber (*Hevea brasiliensis*) plantations, but suspended the project just months later when 200 hectares of rainforest had already been cut down, equivalent to 25% of the community’s land. Likewise, plantation programs for eucalyptus and African palm oil, developed by the former Secretaría de Desarrollo Agropecuario y Pesquero (SEDAP - Secretary for the Development of Agriculture, Fisheries, and Forests), also failed (Lazos y Paré, 2000).

The increased intensity of agricultural activities has undoubtedly been the principal cause of habitat loss and transformation. The conversion of forests for cattle farming can be attributed to the strong socioeconomic pressures on the habitants of rural communities, who identify in cattle farming the opportunity to better their quality of life

(Lazos, 2001). However, the situation can also be understood as a result of public policy and government programs that have supported this agricultural activity (Masera *et al.,* 1997; Durand y Lazos, 2004; Porter-Bolland *et al.,* 2006).

In the 1970's, various government initiatives were put into action for agricultural development. Amongst these were: the Plan Nacional Ganadero (National Plan for Cattle Farming), the objective of which was to channel funds towards this sector of agriculture, the Programa de Inversiones Públicas para el Desarrollo Rural (Program of Public Investment for Rural Development), through which areas of rainforest and subhumid forest were given to farmers, and the Comisión Nacional de Desmontes (National Commission for Forest Clearing), who between 1972 and 1977, promoted the cutting and clearing of more than 400,000 ha of rainforest in Mexico. Furthermore, in the same period, there was an increase in the availability of credit from the World Bank and Inter-American Development Bank for the development of this activity (Toledo *et al.,* 1985; Guevara *et al.,* 2006).

These examples demonstrate the lack of concordance between the policies of economic development and the policies of conservation, and the necessity that institutions such as SAGARPA and its programs PROCAMPO and PROGAN, along with CONAFOR, SEDESOL and SEMARNAT[2], work together to achieve compatible objectives, directed towards sustainable development and the conservation of biodiversity.

On the other hand, forest fragmentation, deforestation, changes in land use and certain ecotourism practices, amongst other processes, have all led to a reduction in the quality of habitats. This also affects primate populations, as it can reduce the availability of resources for feeding and rest, and increase the exposure to infectious agents. Further, in a highly fragmented landscape, where the patches are highly isolated, the movement of primate groups between patches and the migration of individuals is limited, which in the long-term can lead to problems associated with the increase in population density in fragments and the effects of genetic isolation and inbreeding.

Another important threat for Mexican primates is the trafficking of illegal pets. Rodríguez-Luna *et al.* (1996) presented a case in which 29 spider monkeys were confiscated, and only 12 survived. The authorities estimate that to obtain a group of 29 spider monkeys, at least another 60 would have died in the capture, in the temporary cages, or in transport. Moreover, given that for every infant captured a female is killed and other members of the group can be negatively affected, an important part of the adult population can be lost, which makes the recovery of wild populations more difficult. In a study of one market in Mexico City, over just 5 months, 19 primates were identified (17 spider monkeys and 2 howler monkeys) as being illegally sold (Cantú y Sánchez, 1996).

It is worth mentioning that in Mexico there are no specialized centers for the rehabilitation of rescued and confiscated primates from the pet trade, which could provide an important tool for strategic conservation projects, related to the maintenance of germplasm, reintroduction programs and repopulation, as well as for the development of research aimed towards increasing our understanding of the mechanisms of social,

[2] SAGARPA: Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food. PROCAMPO: Direct support to crop fields program. PROGAN: Livestock program. CONAFOR: National Forestry Commission. SEDESOL: Ministry of Social Development. SEMARNAT: Ministry of Environment and Natural Resources.

behavioral and ecological rehabilitation of each species.

We still do not fully understand how disease may be affecting the population dynamics of wild Mexican primates. In one study carried out in the region of Los Tuxtlas, 9 different species of endoparasites were found in groups of *Alouatta palliata mexicana*; and 100% of the individuals studied were infected with at least one parasite (Hervier, *et al.* in press). These authors suggest that habitat fragmentation can favor the transmission of parasites such as *Ascaris* sp. from humans to primates. Similarly, Trejo-Macías, *et al.* (2007) reported higher levels of gastrointestinal parasites in groups of primates that inhabited forest fragments than in others in continuous forest.

RECOMMENDATIONS FOR RESEARCH AND MANAGEMENT

Research

The lack of information identified during this workshop is similar for each of the four Mexican primate taxa, which is why the research recommendations are centered on the need to collect more recent and useful data for the estimation of the state of conservation of each of these species and subspecies.

For all of the taxa, it was deemed necessary to carry out long-term field studies related to monitoring populations. Such studies would help us understand demographic tendencies and the factors that regulate the dispersal patterns, as well as the effects of different threats on the population dynamics of the different primate taxa.

Even when governmental departments such as the Mexican Commission for the Knowledge and Use of Biodiversity (CONABIO) exist, that are in charge of promoting studies of this kind, it is important to draw attention to the fact that the majority of information about the primate species in Mexico is provided by academic institutions and research centers. For this reason, there should be an explicit declaration and a clear definition of programs, with financial resources assigned, on the part of CONABIO and SEMARNAT (INE) for carrying out such research (not just with primates, but with all threatened species), in conjunction with research centers and universities.

This research will require a common strategy and methodology to be used by all collaborating parties, as well as a timetable with clearly defined goals. Such a strategy should consider research within both Protected Natural Areas and non-protected areas.

Within the distinct programs run by CONABIO is the National System for Information about Biodiversity (SNIB), that aims to collect and distribute relevant information about the biological diversity in Mexico. With the establishment of SNIB in Mexico, CONABIO contribute important elements for decision making within SEMARNAT and other State Secretaries (CONABIO, 2008).

In this context, to be able to provide more clear information about the Mexican primate species, and direct the resources towards practical conservation actions, we consider that it is necessary to direct research efforts towards the collection of key data about the species. This information should be homologous between participating institutions, to allow for easier management and implementation of the information within the different strategies. Therefore, it would be within the interests of CONABIO to promote the use of

common methods directed towards obtaining the required field data, integrating this data with previous data, and later following up on and updating the data in the databases of CONABIO.

On the other hand, even considering that primates are amongst the most studied of animal species in Mexico, and that, especially for howler monkeys (*Alouatta palliata*), hundreds of studies have been carried out, it is important to highlight the fact that during the CAMP workshop difficulties were encountered related to the large gaps that are still present in basic information. Because of this situation, we conclude that without a frame of reference for the structuring of research, some fields are over-saturated, whilst others are severely lacking in even basic research. Within its program of Regionalization and State Strategies, CONANP could include specific lines of research that direct studies towards collecting the most relevant data, and that allow for the adequate evaluation of each taxa in each locality.

Efforts to unify strategies for the study and conservation of threatened species and their habitat also correspond to government entities such as the National Institute of Ecology (INE–SEMARNAT). Within the Department of Ecosystems Conservation, the INE have a sub-department called Biodiversity and Species Conservation, that carry out studies into the conservation, monitoring and evaluation of the status of some species (INE, 2008).

However, these studies are limited and not representative of the situation of the vast majority of species found in Mexico. Within this framework, a study of Mexican primates could be integrated, and the methodology developed for such a project could serve as a base for the study of other species in the country. Given that primates are considered as indicator species for the state of ecosystems, studying the four Mexican primate species and subspecies could offer important information about the different ecological-biological-behavioral levels that should be considered in order to carry out conservation work.

Having methodological guidelines that allow us to obtain adequate information for the development and application of conservationist actions would strengthen proposals and allow us to influence the policies related to conservation, so the INE could mount the structure here developed as part of the their Mexican Initiative of Learning for Conservation's website, as an example of multidisciplinary and multi-institutional work.

Encouraging universities and research centers to carry out studies for the evaluation of the status of species, and to develop research for conservation in a systematic way, could be one of the most important tools for conservation on a national level. These institutions provide stability to long-term projects, maintaining them independent of the changes that may occur in the political arena. By incorporating the conservation of biodiversity in education programs as well as including this as a priority within their research projects, universities and research centers would be contributing, not only to conservation of biodiversity, but also to improving the quality of life for human populations, through the valuation and use of the natural heritage in Mexico.

It is also important to carry out more studies, ideally in collaboration with PROFEPA (Federal Attorney for Environmental Protection), regarding the trafficking networks of Mexican primates and the effects that this activity may have for their conservation.

SPECIFIC RESEARCH

For *Alouatta palliata* it is recommended that studies are carried out at sites that are within their distribution range, but where, to date there have been no field research carried out, such as in the region of Uxapanapa – Chimalapas, as well as studies that objectively verify and describe the historic distribution of this species. It is also necessary to carry out research into the migration of individuals between populations and subpopulations in order to know more about migration rates, distances travelled, and differences between sexes. Further, more information is needed with regard to the level of hybridization of *A. palliata* with *A. pigra* throughout the area where the distribution of these species meet, principally in the states of Campeche and Tabasco. Cortés-Ortiz, *et al.* (2007) analyzed samples of mitochondrial DNA from 36 individuals collected in a sympatric region of *A. palliata mexicana* and *A. pigra,* in the state of Tabasco and found 13 cases of hybridization. In the same study, hybridization was reported to produce fertile females and infertile males.

For *Alouatta pigra*, more detailed studies were recommended into the effects of fragmentation and other threats on the species, as well as research into the distribution and habitat preferences within and outside of Protected Natural Areas. As in the case of *A. palliata mexicana*, it is important to carry out research into the effects and frequency of hybridization between species.

For *Ateles geoffroyi yucatanensis*, it was recommended that studies that quantify the effects of habitat loss and other threats on the populations are carried out, as well as studies of habitat preference and current distribution.

For *Ateles geoffroyi vellerosus*, long term studies aimed at gathering data on demography and genetics were specifically recommended. Further, the number of studies into the distribution of this subspecies should be increased, particularly in areas of the states of Oaxaca, Chiapas, and the border with Guatemala, which have not been studied systematically. Similarly, it is important to better understand the dispersion patterns of this subspecies in fragmented habitats.

It is vital that integrated genetic and morphological studies that evaluate the taxonomic distinctions between the subspecies of *Ateles geoffroyi* are carried out. These studies, combined with population censuses, will allow us to identify more precisely the limits to the geographical ranges of each subspecies.

Finally, it is important that we carry out physiological studies from which the underlying hormonal bases of reproductive activity are documented in wild populations of all four taxa, including reproductive phenology. This would allow us to better understand the relationships between demography, ecology, social dynamics and reproductive success, which are relevant aspects when considering programs for conservation and management.

Also, it is also necessary to evaluate the pressures that result from the accelerated growth of human populations, as well as to diagnose the impact of the agricultural industry within the distribution areas of the 4 primate taxa in Mexico (Table 6).

Workshops for Population and Habitat Viability Analysis (PHVA) were recommended for three of the four taxa (*Alouatta pigra*, *Alouatta palliata mexicana* y *Ateles geoffroyi*

yucatanesis), as and when sufficient data is available to develop a model of extinction risk.

Management

Actions of habitat management and monitoring were recommended for all taxa, however, it should be noted that, despite the fact that in some regions two species of primates coexist (e.g. *Alouatta palliata* and *Ateles geoffroyi*, *Alouatta pigra* and *A. geoffroyi*), each species has different environmental requirements and responds differently to pressure, so that mechanisms for habitat management and monitoring must be designed based on the characteristics of each particular species.

Like their habitat, the development and implementation of monitoring programs for both populations of primates is of paramount importance in determining population behavior and adaptation to different situations and scenarios. So far, only certain specific populations of Mexican primates have been monitored continuously. This has been conducted by various research centers and universities (UNAM, UV, INECOL, and University of Barcelona).

Recently (2001), CONANP adopted the System of Information, Monitoring and Evaluation for Conservation (SIMEC), the primary purpose of which is to analyze the efficacy of public policies in regions of priority for conservation. This system is considered as an indicator of good management of Natural Protected Areas, and of the populations of target species they maintain or improve. The establishment of a monitoring subsystem is also intended, wherein species population trends may be analyzed. Due to the characteristics of Mexican primates (species under a category of protection in the NOM-059-SEMARNAT-2001, flagship species for forest ecosystems, and easy to locate), we consider that these species should be included in the SIMEC monitoring projects, thereby establishing partnerships with universities and research centers for their implementation and monitoring.

With regard to the habitat of Mexican primates, management of the highly fragmented landscape is a priority for their conservation. Based on the studies of primates and fragments that have been conducted so far (among which we can cite Estrada and Coates-Estrada, 1996, Silva-López and Portilla-Ochoa, 2002, Bicca-Marques, 2003, Gonzalez and Mandujano, 2003; Cristóbal-Azkarate *et al*., 2005, Mandujano *et al*., 2005, Arroyo-Rodríguez *et al*., 2008), it is apparent that strategies need to be developed which will increase the chances of survival of these primate populations in fragmented habitats.

Increasing connectivity between habitat fragments is a widely suggested strategy to improve dispersal opportunities and avoid the potential negative effects of inbreeding and genetic depression, and thereby promoting the socio-ecological dynamics of each primate species. Depending on the scale at which this management strategy chooses to operate; it would benefit a local subpopulation or national population. Therefore, the preparation of proposals at a local, regional and national scale is recommended. These should be mutually compatible, and should ultimately converge within one single project.

Throughout the country there are islands of vegetation of varying size and importance, which support groups of primates. The identification of key sites is therefore an essential element, as from these the projects for connectivity will be conducted, including the creation of corridors and the addition of PNAs. Los Tuxtlas, Uxpanapa, Los Chimalapas, southern Yucatan peninsula, the southeast of Campeche, and the Lacandon Jungle,

amongst others, are some regions to be considered in projects of primate habitat connectivity, as these are the last moderately preserved habitat relics. Some of these have relatively low rates of deforestation, and have already implemented practices of sustainable management of natural resources (Porter-Bolland *et al*., 2007, Barton *et al*., 2004, de Jong *et al*., 2000; Turner II *et al*., 2001).

It is necessary that such proposals have the support of relevant government bodies. Provided within the National Plan for Protected Natural Areas (2007-2012), are objectives of restoration and ecological connectivity within the PNAs. The information already held, regarding primates, could be utilized in the pursuit of these objectives; for the development of pilot plans, methodological prototypes and for testing testing the efficacy of the conservation management.

Similarly, the implementation of agroforestry systems as an alternative productive activity, and which can serve as biological and habitat connectors for these primate species, may be an effective strategy to help conserve these organisms and their habitat (Muñoz *et al*., 2005; Shedden - González, 2007).

For this reason, it is proposed that CONANP considers the planting of corridors, between patches of primate habitat, to be a strategy that will meet the goal of sustainable management (National Program of PNA (2007-2012), and promote greater conservation of ecosystems and their biodiversity through the implementation of sustainable use practices in federal PNAs.

Considering that Mexico has a long tradition of extraction and use of non-timber forest products (NTFP) (Vázquez and Montes, 2006), the development of proposals to promote conservation of primary forest and secondary vegetation, where use can be made of NTFPs to help alleviate the economic problems of local communities, could reduce the pressures of deforestation and fragmentation (Neumann and Hisch, 2000).

It is noteworthy that the successful practice of agroforestry systems and cultivation and extraction of NTFP requires detailed preliminary studies, where usable species, consumers and potential markets are identified, as well as considering the ecological and social implications that this activity will bring (Shackleton *et al*, 2007).

Knowledge of production systems and management techniques is essential to achieve the sustainable use of each NTFP, preventing detrimental results for both environment and society, and ensuring that these systems provide economic incentives for local communities (Belcher *et al*., 2005). It is of utmost importance to remember that many of the ethnic and cultural groups have been making use of natural resources around their communities, and therefore they can present characteristic extraction systems and utilization schemes, besides having important knowledge regarding the exploited species and their uses (Velásquez-Runke, *et al*. 2004).

In the same way, adding value to products (e.g. through certification), as well as reducing supply chains and adhering to domestic and export markets, can result in a positive stimulus giving viability to the establishment of these systems (Te Velde *et al*., 2005). Constant monitoring and assessment is required to appreciate the real effects over time, both on human communities, and on biodiversity and the landscape.

Finally, one of the objectives of CONANP is to achieve conservation of species at risk, therefore the development of a PACE (Program of Action for the Conservation of Species) is recommended for Mexican primates. This program could integrate, expand and develop the proposals suggested in this document and involve both academic and governmental bodies, assigning duties and responsibilities.

It is important to note that, in developing a conservation strategy, consideration must be given to those political decisions and socio-economic factors which may influence primates. Universities and research centers can form the academic and institutional base for program and conservation strategy development. This can be achieved through a multidisciplinary approach, which will allow the analysis of challenges from various different angles and the proposal of complete and viable solutions with a greater likelihood of success. This will be possible provided that the necessary funding is provided and influence can be exerted over the design and implementation of coherent public policies.

The negligible influence of conservation-oriented recommendations requires a deeper analysis of the relationships between policies of biodiversity conservation and those of national and regional economic development, both at macro and micro level.

With regard to *ex situ* management, programs of captivity were not considered to be an immediate tool for the long-term conservation of Mexican primates. This is not for a lack of intrinsic importance but because, given the critical and urgent situation of the wild populations of Mexican primates, most participants thought it more profitable to invest in protection and *in situ* programs for wildlife. In the particular case of *Alouatta palliata mexicana*, given the high fragmentation and accumulated experience in this task, the development of translocation and reintroduction programs are recommended when the situation and challenges demand such action.

Table 8, presented below, summarizes the research and management recommendations proposed by participants of the workshop for Mexican primates, following the format presented in the pages of each Taxon Sheet.

Table 8. Research and management recommendations for Mexican primate species

Specie	PHVA	Census	Monitoring	Traslocation	Distribución	*Inv. limit. fact	Habitat management	Genetic Inv.	Edu-ca-tion
A. geoffroyi vellerosus		✓	✓		✓	✓	✓	✓	✓
A. geoffroyi yucatanensis	✓	✓	✓		✓	✓	✓	✓	✓
A. palliata mexicana	✓	✓	✓	✓	✓		✓	✓	✓
A. pigra	✓	✓	✓		✓	✓	✓	✓	✓

*Inv. limit. Fact: Investigation of limiting factors

Status of the taxa in captivity

There are a large number of Mexican primates in captivity, especially *Ateles geoffroyi*. In the last census (Table 6), reported by the Association of Zoos, Aquariums and Hatcheries in Mexico, 56 males, 83 females and 8 juveniles were reported for this species, 10 males and 26 females for *Ateles geoffroyi vellerosus*, and 12 males, 12 females and 3 juveniles for *Ateles geoffroyi yucatanensis*, which shows the difficulties of correct taxonomic identification of both subspecies. This situation can result in cases of hybridization without the knowledge of the handlers, and therefore with no adequate record. These two subspecies have been maintained in captivity with relative success, reporting reproductive activity. Their maintenance is facilitated by their resilience and the fact that they have no special biological or nutritional requirements.

Conversely, there are very few captive specimens of the genus *Alouatta*. There are difficulties in maintaining captive populations due to the nutritional and environmental requirements of these taxa. Xcaret Park has a group (12.8.3) of *Alouatta pigra* in semi-captivity, in which reproductive activity has been recorded; in the Yumka Zoo, three troops of *Alouatta palliata* of approximately 20-25 individuals each are maintained in semi-captivity, where reproduction has also been observed, in total there are 7.6.0. individuals of the latter species in zoos.

It is important to highlight that the size of captive populations of Mexican primates cannot be estimated in its entirety, since many individuals are under private ownership, many of them kept as pets. Sánchez-Olmos (2006), along with his team, conducted a census of primates in captivity in the Mexican territory in 2004. This study included circuses and pet monkeys, and found a total of 743 individuals of three native species, and noted that the most abundant species in captivity in Mexico is *Ateles geoffroyi*.

Tables 9 and 10 show the number and sex of specimens of Mexican primates in captivity, or semi-captivity, in AZCARM zoos.

INSTITUTION	*Alouatta pigra*	*Alouatta palliata*	*Alouatta palliata mexicana*
Chapultepec Zoo	2.1.0		2.2.0
San Juan de Aragón Zoo	1.1.0		1.2.0
XCARET Park	12.8.3	0.0.0	0.0.0
Yumká	0.0.0	3 troops of 20 - 25 ind. each	0.0.0
Zoofari	0.0.0	0.0.1	0.0.0
Zacango Zoo	1.1.0	0.0.0	0.0.0
Guadalajara Zoo	0.0.0	0.1.0	0.0.0
Wamerú Zoo	1.0.0	0.0.0	0.0.0
MiguelÁlvarez del Toro Zoo	2.3.0	1.0.0	0.0.0

Table 9. Primates of the genus *Alouatta* kept in AZCARM institutions.

Source: Survey conducted by CBSG Mexico in September, 2006. Note: The groups kept at Xcaret and Yumka are in semi-captivity. Data: males.females.juveniles

Table 10. Primates of the genus *Ateles* kept in AZCARM institutions

INSTITUTIÓN	*Ateles geoffroyi*	*A. geoffroyi vellerosus*	*A. geoffroyi yucatanensis*
Africam Safari	4.8.2	0.0.0	0.0.0
Ecological Center of Sonora	2.2.0	0.0.0	0.0.0
Chapultepec Zoo	2.7.0	0.0.0	0.0.0
San Juan de Aragón Zoo	4.8.0	0.0.0	0.0.0
Mini Safari El Puerto	1.1.0	0.0.0	0.0.0
XCARET Park	6.15.0*	0.0.0	2.2.0
Benito Juárez Zoo	3.3.0	0.0.0	0.0.0
Irapuato Zoo	3.4.0	0.0.0	0.0.0
Tlaxcala Zoo	1.4.0	0.0.0	0.0.0
Centenario Zoo	0.0.0	0.0.0	10.10.3
Yumká	8.10.2	0.0.0	0.0.0
Zoofari	2.8.0	0.0.0	0.0.0
León Zoo	6.6.2	0.0.0	0.0.0
Zacango Zoo	7.6.1	0.0.0	0.0.0
Guadalajara Zoo	0.0.0	2.5.0	0.0.0
La Pastora Zoo	3.4.0	0.0.0	0.0.0
Moroleón Zoo “Green Spaces”	1.2.0	0.0.0	0.0.0
Loro Park Zoo	1.3.1	0.0.0	0.0.0
Sahuatoba Zoo	2.2.0	0.0.0	0.0.0
Wamerú Zoo	2.2.0	0.0.0	0.0.0
Tamatán Zoo and Recreational Park	3.3.0	0.0.0	0.0.0
MiguelÁlvarez del Toro Zoo	0.0.0	10.21.0	0.0.0

* Data supplied by Francisco García Orduña. Source: Survey conducted by CBSG Mexico in September, 2006. Data: males.females.juveniles

MEXICAN PRIMATES CAMP
TAXON SHEET

FIRST PART

1. Nombre Científico (con la autoridad y fecha) **: *Alouatta palliata mexicana* (Merriam 1902)**

1A. Sinónimos:

1B. Familia: **Atelidae, Subfamilia Alouattinae**

1C. Nombre común: **Saraguato, Mono Aullador, Mono Zambo, Mexican mantled howler monkey (english)**

1D. Nivel taxonómico de evalución: □ Especies **X** Sub-especies □ Población

Comentarios/Justificaciones/Referencias:

2. DISTRIBUCIÓN DEL TAXON

2A. Hábito del Taxon: **arbóreo, folivoro - frugívoro, diurno**

2B. Hábitat del taxon habitat (definido por la Autoridad): **1.6.1 Bosque tropical perennifolio, 1.6.10 Bosque tropical degradado, 1.6.9 Bosque tropical**

2C. Hábitat (en sus propias palabras): **Selva alta perennifolia, selva mediana subcaducifolia, acahual, sistemas agroforestales (cacaotales, cafetales)**

2D. Nicho/Hábitat específico: **dosel medio y alto**

2E. Elevación (rango): **0 a 700 msnm**

2F. Distribución Histórica (Global – en los últimos 100 años descrito en el país): s**ureste de Veracruz; Istmo de Tehuantepec; algunas regiones de Tabasco; sureste de Chiapas hacia el sur de Guatemala (Sureste de México y Guatemala)**

2G. Distribución actual (listada por país): **México y Guatemala**

2H. La evaluación es global: □ Local (endémico de México) **X** Regional (distribuido en varios países)

2I. Información de la localidad de distribución en países del rango:

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	San Andrés Tuxtla	Los Tuxtlas. Estación de Biología UNAM (Zona Núcleo I y Zona de Amortiguamiento, R.B. Tuxtlas)		18°25'N	95°09'W			Estrada 1984

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Tatahuicapan	Zona Amortiguamiento Reserva de la Biosfera Los Tuxtlas	Magallanes	18°26'N	94°55'W	Fragmentos de selva alta perennifolia y vegetación secundaria	Deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Arroyo Rodríguez 2003-2005

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Tatahuicapan	Zona Amortiguamiento Reserva de la Biosfera Los Tuxtlas	Fdo. López Arias	18º20'' 42' N	94º46' 40'' W	Fragmentos de selva alta perennifolia y vegetación secundaria	Pérdida de hábitat, fragmentación	Rodríguez – Toledo, 2002

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Tatahuicapan	Zona Amortiguamiento Reserva de la Biosfera Los Tuxtlas	Mirador Pilapa	18º22'N	94º45'01' W	Fragmentos de selva alta perennifolia y vegetación secundaria	Pérdida de hábitat, fragmentación	Rodríguez – Toledo, 2002

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Tatahuicapan	Zona Núcleo Reserva de la Biosfera Los Tuxtlas	Guadalupe Victoria	18°21' 49''N	94°48' 20''W	Fragmentos de selva alta perennifolia y vegetación secundaria	Pérdida de hábitat, fragmentación	Rodríguez – Toledo, 2002

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Mecayapan	Zona Amortiguamiento Reserva de la Biosfera Los Tuxtlas	Perla del Golfo	18°29'N	94°49'W	Fragmentos de selva alta perennifolia y vegetación secundaria	Deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Arroyo Rodríguez 2003-2005

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	San Andres Tuxtla	Zona Amortiguamiento Reserva de la Biosfera Los Tuxtlas	Montepío	18° 37'N 18° 35'N	95°03'W 95°05'W	Fragmentos de selva alta perennifolia y vegetación secundaria	Deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Arroyo Rodríguez 2003-2005 Domingo Balcells 2004-2005 Cristóbal-Azkárate, 2005

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	San Andres Tuxtla		Cuauhte-moc	18° 33' 07'' N, 18° 29' 08'' N, 18° 31' 30'' N	95° 05' 51'' W, 95° 06' 02'' W 95° 05' 40'' W		Deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Cristóbal-Azkárate, 2000

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco		Parque La Venta		18°20'N	93°18'W			Estrada *et al.* 2003

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco		Parque Yumka		17°45'N 18° 00'N	92°45'W 93° 00'W	Selva alta perennifolia	Protegida	Munoz et. al. 2002

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			El Jobo	1963720	547319	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Carlos Green 2	1955583	536351	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Calicanto 1	1952786	535707	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Arroyo Cajete	2040125	533437	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica,	Rodríguez Luna et. al. 1998-1999 (sin publicar)

							consaguinidad, enfermedades	

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Canal Cajete	2040828	531529	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Calicanto 2	1954161	531345	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Bar. Amate	1984671	526473	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Tabasquillo	2033101	522240	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Tacotalpa	1945721	513233	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			El Limon	2033800	513232	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Santa Anita	2032601	513145	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			La Florida	1949775	509222	Fragmentos de	Caza,	Rodríguez

						selva	deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Guarda Costa	1965600	496466	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Carlos Green 3	1954570	537000	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Alvaro Obregon 1	1959189	536219	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Alvaro Obregon 2	1955912	535710	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Carlos Green 8	1953120	536875	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Arroyo del Coco	2043490	531946	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Rancho A. Martinez	1990965	558717	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad	Rodríguez Luna et. al. 1998-1999 (sin publicar)

							demográfica, consaguinidad, enfermedades	

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Rancho Bosch	2037666	527832	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Acachapan 2a.	1995115	521571	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			La Isla	1987064	551956	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Pozo Saraguato	1982808	565030	Fragmentos de selva	Caza, deforestación, fragmentación, actividades humanas, estocasticidad demográfica, consaguinidad, enfermedades	Rodríguez Luna et. al. 1998-1999 (sin publicar)

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco	Macuspana		La Palmilla	1959191	536 222	Fragmentos de selva mediana perennifolia y vegetación riparia	Deforestación	Cortés-Ortiz , 2000

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Acayucan		Cascajal del Río	17º 59' 45" N	95º 09' 92" W	Fragmentos de selva mediana perennifolia (originalmente selva alta)	Perdida de hábitat, cacería, captura para mascotas	Cortés-Ortiz, 1994

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Villa Isla					Fragmentos de selva alta perennifolia	Perdida de hábitat, cacería	Cortés-Ortiz, 1997

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Camarón			17º 58' 79" N	95º 11' 57" W	Fragmentos de selva mediana perennifolia (originalmente selva alta)	Perdida de hábitat, cacería, captura para mascotas	Cortés-Ortiz , 2000

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	San Juan Evangelista		Ixtal			Selva alta perennifolia (fragmentada)	Deforestación y perturbación del hábitat	Cortes-Ortiz , 2003

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che			Conquista campesina	18°11' N	91°17' W			Serio-Silva et al. 2005

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che			Rancho el Alamo	18°48' N	90°54' W			Serio-Silva et al. 2005

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas		Norte de Chiapas		17°48' 35'' N 17°45' 15'' N	93°18' 20''W 93°08' W			Anzures et al. 2006

3. EXTENSIÓN DE OCURRENCIA del taxon en México (Extensión de ocupación es definido como el área contenida en la frontera imaginaria continua más pequeña que se conozca, inferida o proyectada del área actual de ocupación del taxón):

□ <100km^2 □ 101-5,000km^2 □ 5,001-20,000km^2 **X** >20,000km^2 Rango: **aprox. 40, 576 km^2** Real:

DQ: **X** Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal □ Información indirecta **X** Literatura □ Museo □ Rumor

Calificador: **X** Observado **X** Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Estimado con ArcView, en relación a los sitios en donde se tienen avistamientos de la especie (ver mapa *Registros y distribución*)

4. ÁREA DE OCUPACIÓN aproximada del taxón en México (Área de ocupación es definida como el área ocupada por el taxón dentro del "Área de ocurrencia"):

□ <10km2 □ 11-500km^2 □ 501-2,000km^2 **X** >2,000km^2 Rango:**14, 063.79 Km^2** Real:

DQ: **X** Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal □ Información indirecta □ Literatura □ Museo □ Rumor

Calificador: **X** Observado **X** Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Estimado con ArcView utilizando los mapas de vegetación de CONABIO y sumando las áreas de hábitat potencial en base los tipos de vegetación en donde se tienen registros de avistamiento de la especie dentro del polígono de extensión de ocurrencia.

5. Número de Localidades o Sub-poblaciones en las cuales se distribuye el taxón en México:

5A. Número de sub-poblaciones 5B. Número de localidades

5C. Los emplazamientos o subpoblaciones son: □ Continuas **X** Fragmentadas

5D. Se sabe si los machos/ hembras migran entre localidades severamente fragmentados? **X** Si □ No □ No sé

5E. Hay una disminución continua del número de localidades o sub-poblaciones? **X** Si □ No □ No sé

5F. Si es afirmativo, cuál ha sido la tasa de disminución? Porcentaje disminuido_____ en_____ años

5G. Hay una fluctuación extrema en el número de localidades o sub-poblaciones? □ Si **X** No □ No sé

5H. Todos los individuos están en una sola población? □ Si **X** No

5I. Una sub-población contiene **X** <90% □ >90% □ >95% de la población total.

DQ: **X** Censos/Monitoreo **X** Estudio de campo **X** Avistamiento informal □ Información indirecta □ Literatura □ Museo □ Rumor

Calificador: **X** Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: 95% confiabilidad □ Mínimo/máximo **X** Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Se necesitan datos de números de sub- poblaciones, número de localidades y tasas de disminución de sub- poblaciones. Realizar estudios en sitios que se encuentran dentro del área de distribución reportado, pero en donde hasta el momento, no existen reportes de campo, como por ejemplo en la región de Chimalapas. Se necesitan también trabajos que verifique distribución histórica, así como tasas de deforestación dentro de esta distribución. Por otra parte es necesario realizar trabajos sobre dispersión de individuos entre poblaciones y subpoblaciones, para conocer tasas migratorias, distancias abarcadas y proporción de sexos en dispersión, entre otros.

6. Estatus del hábitat:

6A.Ha habido algún cambio en el hábitat donde ocurre el taxón: **X** Si No Si es afirmativo, es una

X Disminución del área □ Incremento del área □ Estable □ Desconocido

6B. Si está Disminuyendo, cuál ha sido la disminución aproximada de hábitat (en porcentaje) con el paso de los años?:

□ <10% □ >10% □ >20% >30% □ >40% □ >50% □ >60% >70% **X** >80% □ >90% en los últimos **30** años

6C. Predice una disminución del hábitat (aproximadamente, en porcentaje) con el paso de los años?:

□ <10% □ >10% □ >20% >30% □ >40% □ >50% □ >60% **X** >70% □ >80% □ >90% en los próximos **30** anos

6D. Diga la causa principal de este cambio: **Ganadería, apertura de campos para el cultivo, explotación forestal, desarrollo de infraestructura urbana y de comunicaciones, incendios forestales**

6E Hay algún cambio en la calidad del hábitat donde ocurre el taxón: **X** Si No Si es afirmativo,

X Disminución en calidad □ Incremento en calidad □ Estable en calidad □ Desconocido

6F. Describa los cambios en la calidad de hábitat (p.ej. pérdida de árboles frutales, alteración del hábitat, disminución de la población de insectos):

Pérdida de fuentes de alimento y sitios de descanso, incremento de borde en sitios donde se encuentran los primates y mayor densidad de agentes infecciosos, por mencionar algunos.

6G. Diga la causa principal de estos cambios: **tala selectiva de especies alimenticias para los monos, incremento en densidad de monos en fragmentos, mayor exposición a agentes infecciosos.**

DQ: □ Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal **X** Información indirecta **X** Literatura □ Museo □ Rumor

Calificador: **X** Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: 95% confiabilidad **X** Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Partiendo del caso particular de Los Tuxtlas, en donde ha existido una tasa de deforestación anual de 4.3% (Dirzo y García, 1992) aún siendo Área Natural Protegida, se considera que el hábitat de estos primates se encuentra en constante declive. Se necesita conocer el dato exacto sobre las tasas de deforestación y transformación de hábitat en toda el área de distribución.

7. Amenazas:

7A. Liste las amenazas que han afectado al taxon en el pasado (refer to the Threat Authority File): **1.1 Agricultura, 1.1.4 Ganadería, 1.4.1 Fragmentación, 1.4.2 Deforestación, 3.3.5 Perdida de Hábitat, 2.2 Comercio, 2.1.1.1 Caza**

7B. Liste las amenazas que afectan al taxón en el presente (refer to the Threat Authority File): **1.4.2 Deforestación, 1.4.1 Fragmentación, 2.1.1.1 Caza, 3.2.4 Patógenos y parásitos**

7C. Liste las amenazas que pueden afectar al taxón en el futuro (refer to the Threat Authority File):**1.4.2 Deforestación, 1.4.1 Fragmentación, 2.1.1.1 Caza, 7.2 Empobrecimiento del reclutamiento, reproducción y regeneración, 7.1 Empobrecimiento de la dispersión, 7.3 Alta mortalidad de juveniles, 7.4 Consanguinidad, 4.2 Sequía, 5.1 Calentamiento Global 3.2.4 Patógenos y parásitos**

7D. Estas amenazas son resultantes de (percibidas o inferidas) o puede resultar en (predicho) disminución de la población?: **X** Si No

7E. Se comprenden bien los factores anteriores que influencian el estado del taxon? **X** Si No

pueden ser reversibles? **X** Si **X** No y han cesado de ser una amenaza? Si **X** No

DQ: □ Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal **X** Información indirecta **X** Literatura □ Museo □ Rumor

Calificador: **X** Observado **X** Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: **X** 95% confiabilidad □ Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Las Amenazas descritas son comunes para la mayoría de las especies de primates, y se ha determinado que mediante la implementación de estrategias adecuadas algunas pueden mitigarse e incluso revertirse, como la desconectividad entre fragmentos. Sin embargo, en el panorama general, la deforestación a gran escala es irremediable, dado que la pérdida de bosques se ha dado de manera continua durante décadas. Los distintos problemas que esto causa, tanto al hábitat como a los primates que lo habitan, sólo podrán ser solucionados en cierto nivel.

8. Comercio:

8A. El taxón se caza por subsistencia**?** **X** Si □ No Si es afirmativo, dónde? **Áreas rurales de Tabasco, Chiapas**

8B. El taxón se comercializa?: **X** Si □ No Si es afirmativo, esto es a nivel

□ Trueque **X** Local **X** Nacional □ Comercial □ Internacional

8C. Partes comercializadas: **X** Todo el animal □ Piel □ Garras □ Huesos □ Cerebro □ Carne □ Cola □ Manos/Patas

Otras, por favor especifique

8D. Razón por la cual se comercializa: **Mascota** Comida Medicina Colección científica Investigación Zoológicos Circos

Otras, por favor especifique

8E. Qué forma de tráfico resulta en una disminución de la población percibida o inferida?:**venta para mascotas**

DQ: □ Censos/Monitoreo □ Estudio de campo **X** Avistamiento informal □ Información indirecta **X** Literatura **X** Museo □ Rumor

Calificador: **X** Observado □ Inferido □ Sospechado □ Estimado □ Proyectado

Incertidumbre: **X** 95% confiabilidad □ Mínimo/máximo □ Subjetivo Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: las observaciones fueron hechas con registros del Zoomat para la especie, y se infiere que son subestimaciones ya que se desconoce la situación en otros centros receptores de fauna. Por este motivo, es de gran importancia realizar más estudios acerca de las redes de tráfico de esta especie y los efectos que esta actividad tiene sobre su conservación.

9. Poblaciones:

9A. Número de animales en México: **aprox. 14,000**

9B. Número de **Individuos Maduros** (en México): □ <50 □ <250 <2,500 □ <10,000 **X** >10,000 □ Real : **X** Rango

9C. El número de individuos maduros ha disminuido en el pasado? **X** Si No Si es afirmativo, un **25%** por ciento en **30** años

9D. Es probable la disminución del número de individuos maduros en el futuro? **X** Si No Si es afirmativo, un __ por ciento en __ años

9E. Tiempo de generación (Definido acá como el promedio de edad de los parentales en la población): **11 o 12 anos**

DQ: **X** Censos/Monitoreo **X** Estudio de campo X Avistamiento informal □ Información indirecta □ Literatura □ Museo □ Rumor

Calificador: **X** Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: 95% confiabilidad □ Mínimo/máximo **X** Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: La disminución de individuos depende de la intensidad de las amenazas; edad de primera reproducción 3.5 años para hembras y 4 años para machos.

10. Tendencias de la población:

10A. El tamaño de la población del taxón está:

X Disminuyendo □ Incrementando □ Estable □ Desconozco

10B. Si está Disminuyendo, cuál ha sido la tasa percibida o inferida de disminución de la población:

□ <10% □ >10% □ >20% □ >30% >40% **X** >50% □ >60% □ >70% □ >80% □ >90% en los últimos **30** años.

10C. Usted predice una disminución de la población en el futuro. **X** Si No

Si es afirmativo, por favor especifique la tasa y los factores ej, pérdida de hábitat, amenazas, comercio, etc. **pérdida de hábitat, fragmentación, caza_(ver 7. amenazas)**

□ <10% □ >10% □ >20% □ >30% **X** >40% □ >50% □ >60% □ >70% □ >80% □ >90% en los próximos **30** años.

10D. Las amenazas están influyendo la estructura de la población: esto está bien entendido? **X** Si □ No

se conoce que puede revertirse? **X** Si No y han cesado de ser un amenaza? □ Si **X** No

DQ: **X** Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal □ Información indirecta □ Literatura □ Museo □ Rumor

Calificador: **X** Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: □ 95% confiabilidad □ Mínimo/máximo □ Subjetivo □ Hipotético **X** Rango de opinión

Comentarios/Justificación/Referencias: La tasa de disminución de la población se calculó a partir de la hoja de información de IUCN 2003 para la especie y tomando en cuenta que la mayor perdida de vegetación ocurrió en los 70s y en total queda menos del 30% de la vegetación original

11. Investigaciones de campo recientes (desde 1990). Indique año(s) del estudio, no año de publicación.

Nombre del investigador	Localidad, país	Fecha del estudio	Fecha publicación	Tópico	Publicación
Anzures-Dadda A. y Manson RH			2007	Distribución y abundancia en fragmentos	Animal Conservation
Aguilar Cucurachi MS	México	2003- 2005	2005	Conducta	Congreso
Aguilar Cucurachi MS	México		2005	Fragmentos	Congreso
Arroyo Rodríguez V	México		2003	Fragmentos	Neotropical primates
Arroyo Rodríguez, V. y	Playa Escondida,	1996- 2006	2006	Demografia de un grupo	American J. Primatology

N. Asensio	Los Tuxtlas				
Arroyo- Rodríguez, V. y S. Mandujano	Santa Marta, Los Tuxtlas	2003-2004	2006	Efecto fragmentacion sobre la calidad de habitat	International J. Primatology
Arroyo Rodríguez, V., S. Mandujano, J. Benítez-Malvido	3 paisajes Los Tuxtlas	2003- 2005	2006	factores que determinan la distribucion de monos aulladores	Ecography
Arroyo-Rodríguez, V. y J.C. Serio Silva	Playa Escondida, Los Tuxtlas	2000 y 2001	2006	Distancia Social madre-inmaduros	American J. Primatology
Asensio N	México		2002	Ecología	Primates
Baltisberger C	México		2003	Comunicación	Folia Primatológica
Barrueta Rath T	México		2003	Poblaciones	Neotropical primates
Boscarol G	México		2004	Comunicación	Folia Primatológica
Bravo Xicotencatl M	México		2005	Conducta	Folia Primatológica
Canales Espinosa D	México		2005	Conservación	Congreso
Carrera-Sánchez, E	México		2003	Conducta	Neotropical primates
Crissey SD	México		2003	Dieta	American J. Primatology
Cristóbal Azcárate, J.	México	2000-2001	2005	Ecofisiología	Hormones and behavior
Cristóbal Azcárate, J.	México	2000-2001	2005	Distribución y demografía en fragmentos	American J. Primatology
Cristóbal Azkárate, J	México	2000-2001	2004	Conducta	International J. Primatology
Dias PAD	México	1998	2005	Conducta	American J. Primatology
Dias PAD	México	2001	2005	Conducta	Folia Primatológica
Dias PAD	México	1998- 2001	2003	Conducta	Neotropical primates
Domingo-Balcells C	México		2003	Conducta	Neotropical primates
Domínguez- Domínguez LE	México		2002	Conducta	Congreso
Dunn JC,	México	2006-2007	2007	Conducta, Fragmentos	Folia Primatológica
Escobar Aliaga M	México		2005	Conducta	Folia Primatológica
Estrada A	México		2005	Fragmentos	Congreso
Estrada A	México		2004	Conducta	American J. Primatology
Estrada A	México		2003	Conservación	Neotropical primates
Estrada A	México		2003	Dieta	Neotropical primates
Fernández EN	México		2003	Ecología, distribución	Biología Tropical
Fuentes E	México		2003	Dieta	Neotropical primates
García del Valle Y	México		2001	Dieta	Neotropical primates
García Hernández J	México		2005	Conducta, Conservación	Congreso
García Orduña F	México	1990- 2001	2005	Distribución	Congreso
Gomara Castano A	México	2004	2005	Comunicación	Folia Primatológica
Gómez Marin FJ	México		2001	Dieta	Neotropical primates
Gómez Marin FJ	México		2001	Conducta	Folia Primatológica
Landau K	México		2001	Conducta	American J. Primatology
Mandujano S	México	2003	2005	Fragmentos	Congreso
Mandujano S	México		2004	Conservación	American J. Primatology
Mandujano S	México		2002	Biología	Lab primate Newsletter
Martínez Mota	México		2000	Ecología	American J. Primatology
Méndez Cárdenas MG	México		2000	Comunicación	Lab primate Newsletter
Morales Mavil J	México		2003	Ecología	Congreso
Muñoz D	México		2002	Conducta	Neotropical primates
Navarro Fernández E	México		2003	Distribución	Biología Tropical
Pastor Nieto R	México		2000	Conservación	Lab primate Newsletter

Piazza S	México		2004	Comunicación	Folia Primatolóica
Quintana Morales	México		2005	Conducta	Folia Primatológica
Rico Hernández G	México		2003	Parasitología	Congreso
Rico Hernández G	México		2005	Parasitología	ASP Boletin
Rodríguez Luna E	México	1994- 2000	2003	Conducta	Primates in fragments
Rodríguez Toledo, E. M.	México	2001	2003	Fragmentos	Primates in fragments
Serio-Silva, J.C.	México		2002	Ecología	Interciencia
Serio-Silva, J.C.	México		2002	Ecología	Journal of Tropical Ecology
Serio-Silva, J.C.	México		2002	Dieta	Journal of Tropical Ecology
Serio-Silva, J. C.	México		2003	Fragmentos	Primates in fragments
Serio-Silva, J. C.	México		2003	Distribución	American J. Primatology
Serio-Silva, J. C.	México		2000	Ecología	American J. Primatology
Serio-Silva, J. C.	México		2000	Conducta	Southwestern Naturalist
Shedden Gonzales A	México	2003- 2005	2005	Conservación	Congreso
Solano J.	México		2000	Conducta	Neotropical primates
Solano SJ	México		2000	Dieta	ASP Boletín
Urquiza Haas TR	México		2001	Dieta	Lab primate Newsletter

PARTE DOS

12. Estatus:

12A. IUCN: **EN** 12B. Criterio basado en: A4cd

12C. 2006 Red List: **2003 CR** 12D. Criterio: **A 4 C; B 1 a b (i, ii, iii)**

12E. Justificación para cambio de categoría de la IUCN y/o criterio de la evaluación previa (2000 Red List)

□ Mejor / nueva información disponible actualmente □ Cambio en especies / sub-especies taxonomía

□ Interpretación incorrecta / aplicación de la Lista Roja anteriormente □ Incorrecta información disponible / usada anteriormente

□ Cambios genuinos en el estatus de especies / sub-especies □ Otros

12F. CITES: **Apéndice I**

12G. Listas Rojas nacionales (país, estatus y fuente): **México; peligro de extinción NOM-059-SEMARNAT-2001; Diario Oficial de la Federación, 2002**

12H.Leyes nacionales sobre Vida Silvestre (país y ley): **Ley General de Vida Silvestre; Ley General para el Equilibrio Ecológico y la Protección del Ambiente**

12I. Otras leyes (especifique):

12J. Presencia conocida en áreas protegidas (liste):

PAÍS	NOMBRE ANP	ESTADO / MUNICIPIO	ID MAPA
México	Yumka	Tabasco	
México	Los Tuxtlas	Veracruz	1
México	Pantanos de Centla	Tabasco-Campeche	2
México	Laguna de Términos	Campeche	3

12K. Plan de protección nacional o regional aprobado:

Comentarios/ Justificación: En la reunión revisora del documento se encontró que la estimación de la reducción del tamaño de la población fue subestimada durante el taller, por lo que originalmente la especie fue clasificada como VU. Después de corregir el dato la categoría asignada es EN.

Las ANPs se seleccionaron con base en el polígono de extensión de ocurrencia

13. Incertidumbre

13A. La evaluación de la Lista Roja para este taxón está basada en un grupo de valores creíbles? **X** Si □ No

13B.la evaluación de la Lista Roja para el taxón está basada en: **X** Evidencia? **X** Precaución?

13C. La evaluación de la Lista Roja para este taxón se deriva de un consenso de todo el grupo de trabajo? **X** Si □ No

Si la respuesta es negativa, las opiniones diferentes deben colocarse en una hoja aparte.

13D. La evaluación para este taxón durante el taller resulta de un consenso por parte de todos los participantes? **X** Si □ No

Si la respuesta es negativa, las opiniones diferentes deben colocarse en una hoja aparte.

Comentarios/ Justificación: Gran parte de los valores utilizados para este ejercicio fueron estimaciones realizadas por los investigadores participantes, dado que no existen datos concretos basados en estudios.

TERCERA PARTE

14. Se recomienda **Investigación de apoyo** para este taxón: **X** Si □ No Si es afirmativo, debe ser

X Muestreo **X** Investigación genética **X** Investigación de taxonomía **X** Estudios de historia de vida

□ Investigación de factores limitantes □ Epidemiología □ Otros (específicos del taxón) **Distribución, calidad y cantidad de hábitat, dispersión entre fragmentos, tasas de deforestación.**

14A. Se recomienda un taller de Análisis de Viabilidad de la Población y del Hábitat: **X** Si No Pendiente

15. Recomendaciones de manejo del taxón:

X Manejo del hábitat **X** Manejo de la población silvestre **X** Monitoreo **X** Translocación

□ Uso sostenible **X** Conocimiento del público/Educación **X** Banco de Genes **X** Manejo de factor limitante

□ Reproducción en cautiverio **X** Otros **_Manejo de poblaciones en semicautiverio- semilibertad**

16. Si se recomienda la **reproducción en cautiverio**, esto es por:

□ Recuperación de la especie □ Educación □ Reintroducción □ Introducción benigna

□ Investigación □ Cuidado □ Preservación del genoma vivo □ Comercial/ sustentabilidad

17. Existen actualmente **grupos reproductivos cautivos**: □ Si **X** No Si es afirmativo

17A. Nombre de las instituciones:

17B. Número de animales: Machos_____ Hembras_____ Sexo indeterminado_____ Total _____ Se desconoce □

17C. Existe un **Programa de Manejo de Especie** para esta especie: □ Si □ No Si es afirmativo, en qué países:_____

17D. Se recomienda un **Programa de Manejo de Especie** para México? **X** Si □ No

18. Nivel recomendado de reproducción en cautiverio:

□ A. Intensificar o incrementar el programa actual □ B. Disminuir el programa actual

X C. Iniciar un programa en los próximos 3 años □ D. Iniciar un programa después de pasar 3 años

19. Se conocen las técnicas adecuados para propagar el taxón?:

□ Se conocen técnicas para el taxón o un taxa □ Se conocen algunas técnicas para el taxón o un taxa similar

X No se conoce ninguna técnica □ No hay información disponible para este grupo de compiladores

CUARTA PARTE

20. Otros comentarios: Referente al número17, existen individuos cautivos en El Zoológico de Chapultepec y San Juan de Aragón en México D. F. pero no se reproducen; así mismo Zoofari, Morelos con un individuo joven. Existe una población de *Alouatta palliata* que fue trasladada por personas del ZOOMAT a un hotel de la Riviera maya, en donde actualmente permanecen; es importante resaltar que estos monos salen y entran en contacto con poblaciones silvestres de de *A. pigra*. Otra ubicación a considerar es la zona de Nautla, Veracruz, en donde fueron liberados individuos de *A.palliata*, los cuales en fechas recientes se han desplazado a los ranchos adyacentes donde son sacrificados por los lugareños, quienes no están familiarizados con este tipo de fauna.

Entre las recomendaciones se destacan: Estudios a largo plazo (demografía, flujo génico); distribución en Oaxaca, Chiapas, Tabasco y Guatemala; capacidad de dispersión; grado de hibridación con Alouatta pigra en Campeche y Tabasco; un programa de manejo para individuos recuperados (decomisados); manejo del hábitat para aumentarlo, mejorar su calidad y su conectividad

21. Fuentes:

QUINTA PARTE

22. Compiladores: Víctor Arroyo Rodríguez, Cristina Domingo Balcells, Guadalupe Medel Palacios, Olivia Rendón Thompson, Kimberly Williams-Guillen, Ariel Rodríguez Vargas, Ernesto Rodríguez Luna, Pedro Noel Aguilar Aragón, Liliana Cortes- Ortiz

23. Revisores: Ernesto Rodríguez-Luna, Joaquim Vea Baró, Edith Carrera Sánchez, Pedro A.D. Dias, Ariadna Rangel Negrín, Jurgi Cristóbal Azkárate, Jacob Dunn, Aralisa Shedden y Brenda Solórzano

24. Describa amenazas, comercio, estatus en localidades específicas, estado del hábitat, continuidad o efectos de fragmentación en una localidad, composición de grupos, comportamientos, etc.

The threats to *Alouatta palliata mexicana* are those that affect all Mesoamerican primates: deforestation, habitat loss and fragmentation. Despite their adaptability, the howler monkeys need forest to forage and move. Current data suggest that the amount of forest in the Southeast of Mexico is declining and suffering from high levels of fragmentation. It is true that these processes have a negative impact on Mexican howler monkey populations. If the fragmentation of remaining forest continues, the result will be further isolation of subpopulations because of lack of dispersal and gene flow. In certain areas such as Los Tuxtlas, there is already evidence of high mortality in juveniles and other demographic problems associated with the inability to disperse between fragments in landscapes dominated by pasture and livestock. With more fragmentation, further demographic changes can be expected. The decrease in population size, resulting from fragmentation and habitat destruction, may increase the probability of extinction of populations due to stochastic processes. Moreover, processes associated with fragmentation can affect the arboreal community and result in a decrease in habitat quality within the remaining patches of forest. This may cause long-term nutritional problems and increased susceptibility to infectious diseases and parasitism.

Directions for research: Even with a well-studied subspecies, in a country with several research programs, we still have insufficient data to fully assess the status of *Alouatta palliata mexicana*. Based on a review of currently available data, we suggest that further research of this subspecies be carried out. Specifically, we suggest the promotion of long-term studies with a focus on acquiring demographic and genetic data. Furthermore, we must expand the number of studies concentrated on the distribution of the subspecies - with particular emphasis on the areas of Oaxaca, Chiapas and Guatemala, which have hitherto not been studied in depth. More information is required regarding the degree of hybridization with *A. pigra* throughout the area of confluence of both species, mainly in the states of Campeche and Tabasco, where this has not yet been studied. Finally, it is critical that we have more information about patterns of dispersal in fragmented habitats, and the key characteristics of those areas that serve as corridors for dispersal of monkeys within anthropogenic landscapes. For this, we propose the use of telemetry techniques or fine genetic analysis.

Proposals for management and performance:It is clear that we must protect those forests that still support populations of monkeys, with the aim of increasing the available habitat that has been so heavily impacted, so that the population can recover and increase. Furthermore, it is necessary to improve the quality of remaining habitat, particularly in fragmented forests which suffer from high levels of ecological transformation. It is also necessary to increase connectivity between fragments and subpopulations of monkeys to improve opportunities for dispersal, to avoid the possible effects of inbreeding and genetic depression, and to foster the socio-ecological dynamics typical of the species such as male and female emigration from natal groups. Promoting greater cooperation with agronomists, NGOs, and governmental agencies must be possible to improve the management of agroforestry systems. These may then serve as corridors and alternative habitats for monkeys; given that howler monkey use of these environments has already been reported. It is important to work at a socioeconomic level in the municipalities, to replace ranching with alternative activities. In addition, reforestation projects that are performed for other purposes (e.g. protection of rivers.) can be utilized to improve habitat quality by incorporating native species that serve as sources of food for monkeys and other wildlife. We do not however recommend captive management, due to difficulties of maintenance and because no institutions have achieved successful reproduction to date. Therefore, to preserve genetic diversity, the creation of a gene bank is proposed. This is of particular importance as the subspecies *A. palliata mexicana* shows very little genetic variability compared with other species of the genus, making it susceptible to sudden or severe changes in the environment. However, management of the species in captivity is suggested in the case of confiscated individuals (economic use of this species in the pet trade has been reported). Foster institutions must promote recovery of these individuals, study in captivity, education and outreach, and finally, release to their natural habitat. In specific cases, translocation of individuals may also be applicable.

25. Comentarios adicionales:

Evaluación Nacional

1. ¿Qué proporción de la poblacional global esta en México? **70%**

2. ¿Las poblaciones entre México y Guatemala son continuas? **No**

3. ¿Hay alguna posibilidad que las poblaciones de Guatemala recolonicen México? **No**

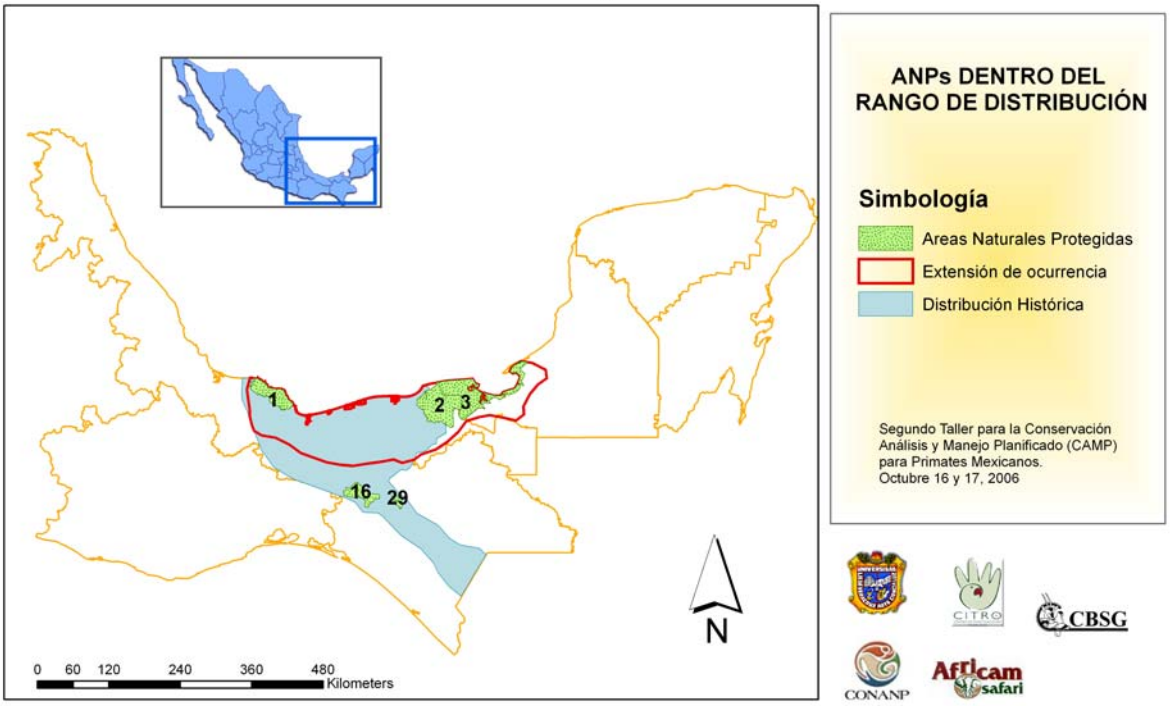
4. ¿Es similar la situación de Guatemala que en México? **Similar**

5. ¿Es la población de México un sumidero? **No**

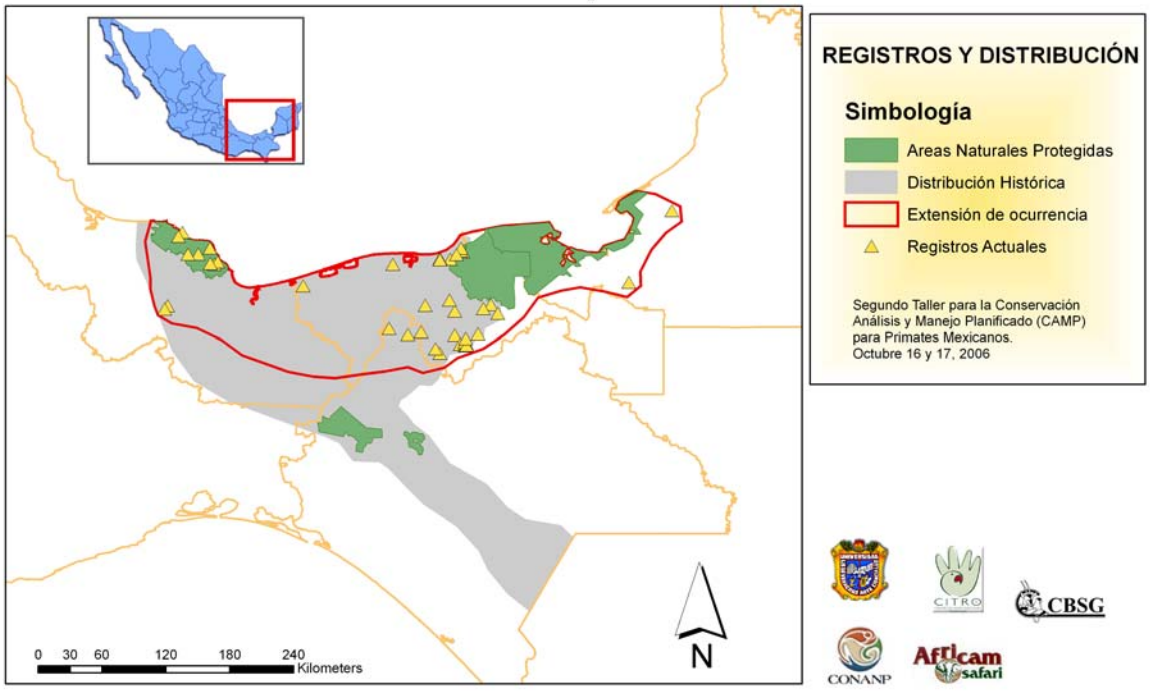
Resultado Evaluación Nacional= En Peligro A4 cd

MAPAS

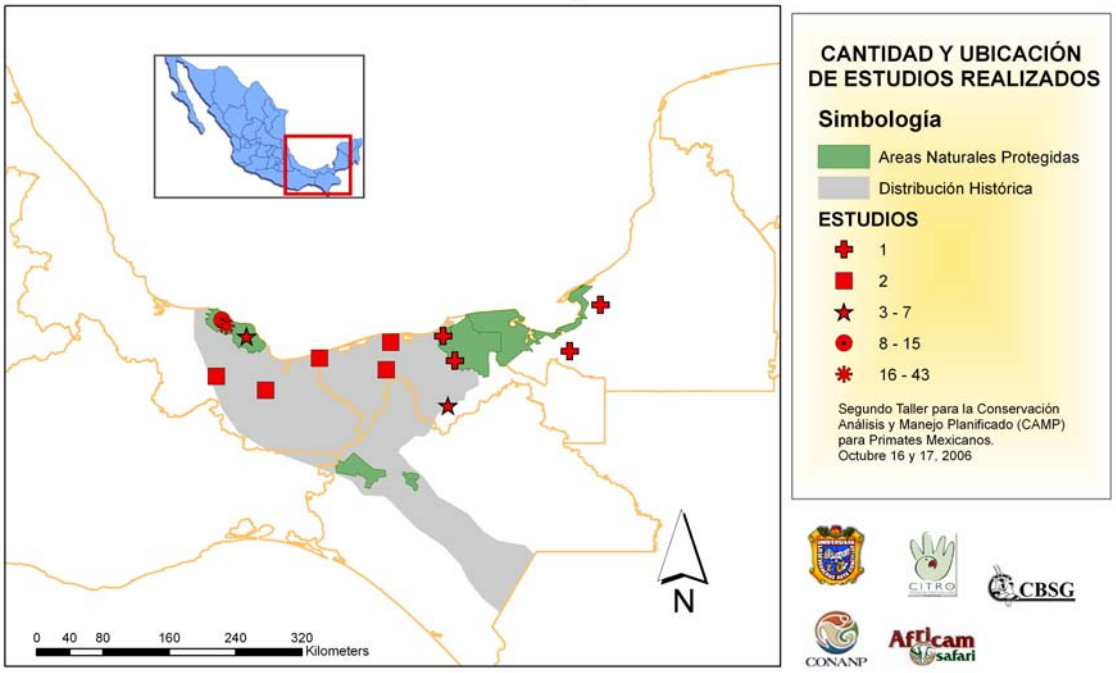
Alouatta palliata



Alouatta palliata



Alouatta palliata



MEXICAN PRIMATES CAMPS
TAXON SHEETS

PRIMERA PARTE

1. Nombre científico (con la autoridad y fecha): **Alouatta pigra** (**Lawrance 1933)**

1A. Sinónimos: *Alouatta villosa* (Smith, 1970) *Alouatta palliata pigra* (Lawrence 1933, Hill, 1962, Smith 1970)

1B. Familia: **Atelidae**

1C. Nombre (s) común (es) (indique el idioma): **Saraguate (Guatemala), Saraguato**, **Mono Aullador Negro, Baboon (Belice)**

1D. Nivel taxonómico de evaluación: **X** Especies □ Sub-especies □ Población

Comentarios/Justificaciones/Referencias: Lawrence 1933; Hill, 1962; Smith 1970; Rylands, 2005

2. Distribution of the taxon

2A. Hábito del taxon: **arborícola, folívoro-frugívoro, diurno**

2B. Hábitat del taxon (definido por la Autoridad): **Bosque tropical lluvioso**

2C. Hábitat (en sus propias palabras): **Selva alta y mediana perennifolia y subperennifolia con distintos grados de perturbación y algunos agrosistemas**

2D. Nicho/Hábitat específico: **Estrato medio-alto de selvas altas y medianas perennifolia y subperennifolia con distintos grados de perturbación, selva mediana subcaducifolia, manglares y popales.**

2E. Elevación (rango): **Menos de 500 msnm (**Reid 1997)

2F. Distribución histórica (Global – en los últimos 100 años descrito en el país): **Yucatán, Quintana Roo, Campeche, Chiapas, Tabasco**

2G. Distribución actual (listada por país): **México, Guatemala, Belice**

2H. La evaluación es global: □ Local (endémico de México) **X** Regional (distribuido en varios países)

2I. Información de la localidad de distribución en países del rango:

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	Carrillo Puerto	4 mill ha	Petcacab	351199	2125115	Selva mediana subperennifo-lia	Fragmentación, cacería	Cristobal-Azká-rate, S/Pub González-Kirch ner JP. 1998 Serio- Silva et al. 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	Carrillo Puerto	4 mill ha	Xmejía	247859	2122066	Selva alta	Modificación del hábitat	Cristobal-Azká-rate. 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	Carrillo Puerto	< 50 ha	Punta Laguna	20° 44 44'' N	87° 41' 42'' W	Selva mediana	Fragmentación, huracanes	Rangel-Negrín 2003. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Pacchen	20.733	87.533			Serio Silva et al. 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Chacmuchuc	20.283	86.867			Serio.Silva et al. 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	Othon P. Blanco		Bacalar	18.583	88.450			Serio Silva *etal*, 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	Othon P. Blanco		Tres Garantías	18,183	89.083			Serio Silva et al. 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			La Camiseta	18.117	89.000			Serio Silva et al. 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			El Diez	21.017	87.283			Serio Silva et al. 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	Soliralidad		Sian Ka'an	19.950	87.617			Serio.Silva *etal*, 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Dos Bocas	17.933	88.867			Serio Silva et al. 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	Carrillo Puerto		Punta Laguna	20.633	87.717			Serio Silva et al. 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas	Pico de Oro	5,573 ha	Boca de Chapul	15724555	1781106	Selva alta	Fragmentación	Ponce, G. 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas	Pico de Oro	300 000 ha	Montes Azules	15721408	1783443	Selva alta perennifolia	Fragmentación, cacería	Ponce, G. 2006. s/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas	Pico de Oro	17.12 ha	Playón de Gloria	15724356 15726134	1786828 1786041	Selva alta perennifolia, agrosistema	Fragmentación, pérdida de hábitat	Ponce-Santizo, 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas	Márquez de Comillas		Montes Azules	15^{o} 72' 14 N	17^{o} 83'44 W	Selva alta perennifolia	Cacería furtiva, catástrofes	Ponce- Santizo G. et al, 2006. Aguilar Aragón P., 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Carmen	< 10ha	Oxcaball	2087327	714660	Selva mediana, acahual	Fragmentación	Dias, P.A.D. y Rangel-Negrín, 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campec he	Carmen	<1 ha	Nuevo Ontario	2090836	722458	Agrosistema	Fuego, depredación por perros	Rangel-Negrín y Coyohua. 2006

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Carmen	96 ha	Rancho Alamo	2080946	172746	Selva mediana	Fragmentación	Dias, P.A.D. y Rangel-Negrín, 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Hopelchen	4 mill ha	Xmaben	259494	2113968	Selva mediana subperennifo-lia	Deforestación, fragmentación	Cristobal-Azkárate

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Carmen	< 5ha	Chekubul	2081328	710847	Selva mediana	Fragmentación	Dias, P.A.D. y Rangel-Negrín, 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Carmen	< 5ha	Chichul	2077785	717309	Selva mediana	Fragmentación	Dias, P.A.D. y Rangel-Negrín, 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Carmen	< 2 ha	Carretera Sabamuy-Escárcega	2079021	714964	Selva mediana	Fragmentación	Dias, P.A.D. y Rangel-Negrín, 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Carmen	115 ha	Pino Suárez	2074561 2074063	715487 715245	Selva mediana subcaducifo-lia	Fragmentación	Dias, P.A.D. 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Escárcega	10 ha	Independenci a	2067576	713142	Selva mediana	Fragmentación	Dias, P.A.D. 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente

Campe-che	Escárcega	< 10 000 ha	La Cristalina	2071260	704322	Manglar y selva alta perennifolia	Cacería y destrucción del hábitat	Dias, P.A.D. 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Carmen	< 10 000 ha	A.P. Puerto Rico			Manglar	Cacería	Dias, P.A.D. 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Calakmul	700 000 ha	Km 27 Km 9	2027515	198000	Selva mediana	Fragmentación	Rangel-Negrín y Coyohua. 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Champeton	> 1400 ha	Monte Bravo			Selva mediana	Fragmentación	Rangel-Negrín y Coyohua. 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campe-che	Escárcega	1400 ha	El Tormento	18°16'25''	90°43'55''	Selva mediana		Rangel-Negrín 2006. S/Pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Cental	546112	2050570			Vea J. et al. 1997 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Pasa Monos	539357	1939762			Vea J. et al. 1997 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Tortuguero	538495	1958568			Vea J, et al. 1998 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Arroyo Negro 1,2	537996 537791	1957953 1957123			Vea J. et al. 1999 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Puxcatan	536907	1957121			Vea J. et al. 1999 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Rancho Nuevo 1,2,3	535403 536235 536589	1958132 1957083 1957319			Vea J. et al. 1999 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Sierra Poana	525825	1939525			Vea J. et al. 1999 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Francisco Madero	552319	1960157			Vea J, et al. 2000 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Carlos Green 3,5,6,7	537000 536686 536031 536608	1954570 1957490 1956116 1953392			Vea J, et al. 2000 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Clemente Reyes	570302	1961111			Vea J, et al. 2000 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			El Chicontal	551000	1959000			Vea J, et al. 2000 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Grijalba	536745	2032913			Vea J, et al. 2001 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Tabasco			Arroyo Naranjo	568175	2004552			Vea J, et al. 2001 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente

Tabasco			Biztal	574794	2004749			Vea J, et al. 2001 s/pub

3. EXTENSIÓN DE OCURRENCIA del taxon en México (Extensión de ocupación es definido como el área contenida en la frontera imaginaria continua más pequeña que se conozca, inferida o proyectada del área actual de ocupación del taxon):

□ <100km^2 □ 101-5,000km^2 □ 5,001-20,000km^2 **X** >20,000km^2 Rango: **124,735 Km^2 aprox** Real: _____

DQ: **X** Censos/Monitoreo **X** Estudio de campo **X** Avistamiento informal □ Información indirecta **X** Literatura □ Museo □ Rumor
Calificador: □ Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado
Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: La extensión de ocurrencia fue determinada con ayuda de Arc View en base al polígono de registros actuales. El polígono de distribución histórica contempla todo el estado de Yucatán, sin embargo para la zona norte del estado no se tienen registros actuales por lo que no se consideró esta área para calcular la extensión de ocurrencia. (*ver mapa Registros y distribución)*

4. ÁREA DE OCUPACIÓN aproximada del taxón en México (Área de ocupación es definida como el área ocupada por el taxon dentro del "Área de ocurrencia"):

□ <10km2 □ 11-500km^2 □ 501-2,000km^2 **X** >2,000km^2 Rango: **90,712.30 km^2 aprox** Real: _____

DQ: **X** Censos/Monitoreo **X** Estudio de campo **X** Avistamiento informal □ Información indirecta **X** Literatura □ Museo □ Rumor
Calificador: □ Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado
Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo **X** Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Estimado con ArcView utilizando los mapas de vegetación de CONABIO y sumando las áreas de hábitat potencial en base los tipos de vegetación en donde se tienen registros de avistamiento de la especie dentro del polígono de extensión de ocurrencia.

5. Número de Emplazamientos o Sub-pobalciones en las cuales se distribuye el taxón en México:

5A. Número de sub-poblaciones: **Más de 65** 5B. Número de emplazamientos: **Más de 14**

5C. Los emplamientos o subpoblaciones son: **X** Continuas **X** Fragmentadas

5D. Se sabe si los machos migran entre emplazamientos severamente fragmentados? □ Si **X** No □ No sé

5E. Hay una disminución continua del número de emplazamientos o sub-poblaciones? X Si □ No □ No sé

5F. Si es afirmativo, cuál ha sido la tasa de disminución? Porcentaje disminuido_____No se sabe_____ en_____ años

5G. Hay un fluctuación extrema en el número de emplazamientos o sub-poblaciones? □ Si **X** No □ No sé

5H. Todos los individuos están en una sola población? □ Si **X** No

5I. Una sub-población contiene **X** <90% □ >90% □ >95% de la población total.

DQ: **X** Censos/Monitoreo **X** Estudio de campo **X** Avistamiento informal **X** Información indirecta **X** Literatura □ Museo □ Rumor
Calificador: **X** Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado
Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo **X** Hipotético **X** Rango de opinión

Comentarios/Justificación/Referencias: El criterio utilizado se basó en la suma de los números estimados de subpoblaciones de cada lugar en que los compiladores trabajaron y en los datos reportados en la literatura. Las hembras de esta especie también migran, lo que dificulta diferencias y definir las subpoblaciones. Se tomaron en cuenta las diferencias geográficas para inferir las localidades. No todos los compiladores estuvieron de acuerdo con la definición utilizada por IUCN para localidad.

6. Estatus del taxón:

6A.Ha habido algún cambio en el hábitat donde ocurre el taxón: **X** Si □ No Si es afirmativo, es una

X Disminución del área □ Incremento del área □ Estable □ Desconocido

6B. Si está Disminuyendo, cuál ha sido la disminución aproximada de hábitat (en porcentaje) con el paso de los años?:

□ <10% □ >10% □ >20% □ >30% □ >40% □ >50% **X** >60% >70% □ >80% □ >90% en los últimos ____30___ años

6C. Predice una disminución del hábitat (aproximadamente, en porcentaje) con el paso de los años?:

□ <10% □ >10% **X** >20% □ >30% □ >40% □ >50% □ >60% □ >70% □ >80% □ >90% en los próximos ___30____ años

6D. Diga la causa principal de este cambio: **Ganado, Apertura de campos para el cultivo, explotación forestal, desarrollo de infraestructura urbana y de comunicaciones, incendios forestales y huracanes en algunos casos**

6E Hay algún cambio en la calidad del hábitat donde ocurre el taxón: **X** Si □ No Si es afirmativo,

X Disminución en calidad □ Incremento en calidad □ Estable en calidad □ Desconocido

6F. Describa los cambios en la calidad de hábitat (p.ej. pérdida de árboles frutales, alteración del hábitat, disminución de la población de insectos):

Disminución de la diversidad, tamaño y estructura vegetal. Pérdida de fuentes de alimento y sitios de descanso, incremento de borde en sitios donde se encuentran los primates y mayor densidad de agentes infecciosos, por mencionar algunos.

6G. Diga la causa principal de estos cambios: **tala selectiva de especies alimenticias para los monos, incremento en densidad de monos en fragmentos, mayor exposición a agentes infecciosos.**

DQ: □ Censos/Monitoreo **X** Estudio de campo **X** Avistamiento informal **X** Información indirecta **X** Literatura □ Museo □ Rumor
Calificador: **X** Observado **X** Inferido □ Sospechado □ Estimado □ Proyectado
Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo **X** Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: La determinación del estatus del hábitat se basó en el cálculo de tasas de deforestación en los estados mexicanos en que la especie está presente. Cairns *et al*. (2000) reportaron una tasa de deforestación del 1.9% anual para ocho estados del sureste mexicano entre 1977 y 1992, mientras que Velázquez *et al.* (2002) calculó una tasa de deforestación anual para selvas de 2.06% entre 1993 y 2000 (pregunta 6B). Sin embargo las tasas regionales varían ampliamente reportándose para Tabasco y la zona Lacandona en Chiapas una tasa del 2%,Calakmul en Campeche 0.7%, y Yucatán y Quintana Roo del 0.1% anual (Aguilar *et al.* 2000; De Jong *et al.* 2000, Porter-Bolland *et al.* in press,)(pregunta 6C).

7. Amenazas:

7A. Liste las amenazas que han afectado al taxón en el pasado (refer to the Threat Authority File): **2.1.1.1 Caza, 1.4.2 Deforestación, 3.2.4 Patógenos y Parásitos, huracanes, 3.3.5 Pérdida de hábitat, 1.4.1 Fragmentación**

7B. Liste las amenazas que afectan al taxón en el presente (refer to the Threat Authority File) **2.1.1.1 Caza, 1.4.2 Deforestación, 3.2.4 Patógenos y Parásitos, huracanes, 3.3.5 Pérdida de hábitat, 1.4.1 Fragmentación**

7C. Liste las amenazas que pueden afectar al axón en el futuro (refer to the Threat Authority File) **2.1.1.1 Caza, 1.4.2 Deforestación, 3.2.4 Patógenos y Parásitos, huracanes, 3.3.5 Pérdida de hábitat, 1.4.1 Fragmentación**

7D. Estas amenazas son resultantes de (percibidas o inferidas) o puede resultar en (predicho) disminución de la población?: **X** Si No

7E. Se comprenden bien los factores anteriores que influencian el estado del taxón? **X** si (excepto enfermedades) No

pueden ser reversibles? **X** si **X** no (enfermedades, huracanes) y han cesado de ser una amenaza? Si **X** NO

DQ: □ Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal □ Información indirecta **X** Literatura □ Museo □ Rumor
Calificador: **X** Observado **X** Inferido □ Sospechado □ Estimado **X** Proyectado
Incertidumbre: **X** 95% confiabilidad □ Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: No hay estudios específicos para el taxón pero el efecto de estas amenazas sobre otras especies del mismo género está bien documentado.

8. Comercio:

8A. El taxón se caza por subsistencia? **X** Si □ No Si es afirmativo, dónde? **En Montes Azules, Chiapas**

8B. El taxón se comercializa?: **X** Si □ No Si es afirmativo, esto es a nivel

□ Trueque **X** Local **X** Nacional □ Comercial □ Internacional

8C. Partes comercializadas: **X** Todo el animal □ Piel □ Garras □ Huesos □ Cerebro □ Carne □ Cola □ Manos/Patas

Otras, por favor especifique

8D. Razón por la cual se comercializa: ***Mascota*** Comida Medicina Colección científica Investigación Zoológicos Circos

Otras, por favor especifique

8E. Qué forma de tráfico resulta en una disminución de la población percibida o inferida?: Comercial

DQ: □ Censos/Monitoreo □ Estudio de campo **X** Avistamiento informal **X** Información indirecta **X** Literatura □ Museo **X** Rumor
Calificador: **X** Observado □ Inferido **X** Sospechado □ Estimado □ Proyectado
Incertidumbre: **X** 95% confiabilidad □ Mínimo/máximo □ Subjetivo **X** Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: El hipotético se refiere al caso de caza por subsistencia, ya que es un rumor.

9. Poblaciones:

9A. Número de animales en México: **Contados 2815 (adultos e inmaduros)**

9B. Número de **Individuos Maduros** (en México): □ <50 □ <250 □ <2,500 □<10,000 **X** >10,000 □ Real_____ **X** Rango:**1900**

9C. El número de individuos maduros ha disminuido en el pasado? Xsi No Si es afirmativo, un **__38___** por ciento en **__30___** años

9D. Es probable la disminución del número de individuos maduros en el futuro? Xsi No Si es afirmativo, un **_22____** por ciento en **_30____** años

9E. Tiempo de generación (Definido acá como el promedio de edad de los parentales en la población): **10 años**

DQ: **X** Censos/Monitoreo □ Estudio de campo **X** Avistamiento informal □ Información indirecta **X** Literatura □ Museo □ Rumor
Calificador: **X** Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado
Incertidumbre: □ 95% confiabilidad **X** **Mínimo**/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Conteo basado en censos y avistamientos informales no publicados. Se calculó la cifra mínima del número de individuos basada en reportes publicados y observaciones de campo. Sin embargo, se estima que este valor representa solamente 1/3 o 1/4 de la población total, por lo que el número total de individuos se aproximaría a 10000.

No hay estudios para determinar la disminución de individuos a lo largo del tiempo.

10. Tedencias de la población:

10A. El tamaño de la población del taxón está:

X Disminuyendo □ Incrementando □ Estable □ Desconozco

10B. Si está Disminuyendo, cuál ha sido la tasa percibida o inferida de disminución de la población:

□ <10% □ >10% □ >20% □ >30% □ >40% □ >50% **X** >60% □ >70% □ >80% □ >90% en los últimos __30_años/gener.

10C. Usted predice una disminución de la población en el futuro. **X** si No

Si es afirmativo, por favor especifique la tasa y los factores e.g. pérdida de hábitat, amenazas, comercio, etc.

□ <10% □ >10% **X** >20% □ >30% □ >40% □ >50% □ >60% □ >70% □ >80% □ >90% en los últimos _30__años/gener.

10D. Las amenazas están influyendo la estructura de la población (sí): esto está bien entendido? □ Si **X** No

se conoce que puede revertirse? Xsi (para las amenazas) Xno (para los cambios en la estructura de la población) y han cesado de ser un amenaza? □ Si **X** No

DQ: □ Censos/Monitoreo **X** Estudio de campo **X** Avistamiento informal **X** Información indirecta **X** Literatura □ Museo □ Rumor
Calificador: **X** Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado
Incertidumbre: □ 95% confiabilidad □ Mínimo/máximo □ Subjetivo **X** Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: La tasa de disminución de la población se basó en los datos de deforestación vaciados en la pregunta 6, asumiendo que la pérdida de hábitat tiene un impacto directo en las poblaciones de esta especie. No hay estudios que den este dato con claridad

11. Investigaciones de campo recientes (desde 1990). Indique año(s) del estudio, no año de publicación.

Nombre del investigador	Localidad, país	Fechas del estudio	Tópicos
Canales-Espinosa D.		2005	Translocaciones
Cristóbal-Azkarate, J.	Campeche y Quintana Roo	2006	Distribución y preferencias de hábitat
Dias, P.A.D.,	Campeche, Quintana	A partir de 2005	Conducta, demografía, ecología,

Rangel-Negrín A.	Roo		fisiología
Estrada A.	Chiapas, Campeche	2001-2002	Demografía
García Y.	Chiapas	2004	Genética
González Di Piero A.	Chiapas	2001, 2004	Demografía, parásitos
González-Kirchner JP.	Muchukux, Quintana Roo	1998	Demografía
Lueke L.	Sur de México	2002, 2005	Tráfico, ecología, alimentación
Pozo-Montuy G.	Tabasco	2000, 2003, 2006	Alimentación, Conducta
Rivera A.	Calakmul	2004	Alimentación
Serio Silva J.C.	Yucatán, Campeche, Quintana Roo	2001	Demografía
Vea J., Rodríguez Luna E.	Tabasco	1999-2001	Censo

PARTE DOS

12. Estatus:

12A. IUCN: **EN** 12B. Criterio basado en: **A4 cd**

12C. 2000 Red List: **2003 EN** 12D. Criterio:**A4c**

12E. Justificación para cambio de categoría de la IUCN y/o criterio de la evaluación previa (2000 Red List)

□ Mejor / nueva información disponible actualmente □ Cambio en especies / sub-especies taxonomía

□ Interpretación incorrecta / aplicación de la Lista Roja anteriormente □ Incorrecta información disponible / usada anteriormente

□ Cambios genuinos en el estatus de especies / sub-especies □ Otros

12F. CITES: **Apéndice 1**

12G. Listas Rojas nacionales (país, estatus y fuente): **México; peligro de extinción NOM-059-SEMARNAT-2001; Diario Oficial de la Federación, 2002**

12H.Leyes nacionales sobre Vida Silvestre (país y ley): **Ley General de Vida Silvestre; Ley General para el Equilibrio Ecológico y la Protección del Ambiente**

12I. Otras leyes (especifique):

12J. Presencia conocida en áreas protegidas (liste):

PAÍS	NOMBRE ANP	ESTADO / MUNICIPIO	ID MAPA
México	Pantanos de Centla	Tabasco	2
México	Laguna de Términos	Campeche	3
México	Los Petenes	Campeche	4
México	Sian Ka'an	Quintana Roo	6
México	Balaan Kaax	Yucatán	8
México	Calakmul	Campeche	9
México	Montes Azules	Chiapas	22
México	Lacantún	Chiapas	23
México	Palenque	Chiapas	28
México	Yaxchilan	Chiapas	30
México	Ría Celestum	Yucatán-Campeche	32
México	Otoch Ma ax yetel kooh	Quintana Roo	33
México	Yum-Balam	Quintana Roo	34
México	Bonampak	Chiapas	36
México	Tulum	Quintana Roo	37

12K. Plan de protección nacional o regional aprobado:

Comentarios/Justificación: Las ANPs se seleccionaron en base al polígono de extensión de ocurrencia

13. Incertidumbre

13A. La evaluación de la Lista Roja para este taxon está basada en un grupo de valores creíbles? **X** Si □ No

13B.la evaluación de la Lista Roja para el taxon está basada en: **X** Evidencia? □ Precaución?

13C. La evaluación de la Lista Roja para este taxon se deriva de un consenso de todo el grupo de trabajo? **X** Si □ No

Si la respuesta es negativa, las opiniones diferentes deben colocarse en una hoja aparte.

13D. La evaluación para este taxon durante el taller resulta de un consenso por parte de todos los participantes? **X** Si □ No

Si la respuesta es negativa, las opiniones diferentes deben colocarse en una hoja aparte.

Comentarios/Justificación: Gran parte de los valores utilizados para este ejercicio fueron estimaciones realizadas por los investigadores participantes, dado que no existen datos concretos basados en estudios, especialmente en cuestiones referentes a tamaño y tendencias poblacionales

TERCERA PARTE

14. Se recomienda **Investigación de apoyo** para este taxon: **X** Si □ No Si es afirmativo, debe ser

X Muestreo □ Investigación genética □ Investigación de taxonomía **X** Estudios de historia de vida

X Investigación de factores limitantes □ Epidemiología □ Otros (específicos del taxon)

14A. Se recomienda un taller de Análisis de Viabilidad de la Población y del Hábitat: **X**Si □ No □ Pendiente

15. Recomendaciones de manejo del taxon:

X Manejo del hábitat □ Manejo de la población silvestre **X** Monitoreo □ Translocación

□ Uso sostenible **X** Conocimiento del público/Educación □ Banco de Genes **X** Manejo de factor limitante

□ Reproducción en cautiverio □ Otros

16. Si se recomienda la **reproducción en cautiverio**, esto es por:

□ Recuperación de la especie □ Educación □ Reintroducción □ Introducción benigna

□ Investigación □ Cuidado □ Preservación del genoma vivo □ Comercial/ sustentabilidad

17. Existen actualmente **grupos reproductivos cautivos**: □ Si **X** No SI es afirmativo

17A. Nombre de las instituciones

17B. Número de animales: Machos_____ Hembras_____ Sexo indeterminado_____ Total _____ Se desconoce □

17C. Existe un **Programa de Manejo de Especie** para esta especie: **X** Si □ No Si es afirmativo, en qué países: México DF

17D. Se recomienda un **Programa de Manejo de Especie** para México? □ Si **X** No

18. Nivel recomendado de reproducción en cautiverio:

□ A. Intensificar o incrementar el programa actual □ B. Disminuir el programa actual

□ C. Iniciar un programa en los próximos 3 años □ D. Iniciar un programa después de pasar 3 años

19. Se conocen las técnicas adecuados para propagar el taxon?:

□ Se conocen técnicas para el taxon o un taxa □ Se conocen algunas técnicas para el taxon o un taxa similar

□ No se conoce ninguna técnica □ No hay información disponible para este grupo de compiladores

Cualquier investigación que ayude a contestar esta hoja con mayor confiabilidad y datos precisos en cuestión de reducción de hábitat, disminución de poblaciones e individuos maduros etc..

CUARTA PARTE

20. Otros comenatrios: Although the species has a large amount of potential habitat (high and medium tropical evergreen and semi-evergreen forest) as found in the reserves of Sian Kaan, Calakmul and the Mesoamerican Biological Corridor, evidence suggests that the species shows preferences for particular habitats, which results in a large variation in their densities. Higher densities would be found associated with “ramon tree” and upland forests with evergreen trends. This means that the majority of individuals are found in the northeast of Campeche, Tabasco and Chiapas, where the habitat is highly fragmented. For these reasons, we recommend study of the effects of fragmentation on the species and, if necessary, the development of management plans for this landscape, and the execution of studies on distribution and habitat preference, both inside and outside the Protected Natural Areas, and the monitoring of groups under various threats.

21. Fuentes: Alfredo Cuarón, Alejandro Estrada, Juan C. Serio Silva, Liliana Cortés-Ortiz, Domingo Canales Espinosa

QUINTA PARTE

22. Compiladores: Marleny Rosales, Gabriela Ponce, Jurgi Cristobal-Azkárate, Pedro A.D. Días, Ariadna Rangel Negrín.

23. Revisores: Ernesto Rodríguez-Luna, Joaquim Vea Baró, Pedro A.D. Dias, Ariadna Rangel Negrín, Jurgi Cristóbal Azkárate, Jacob Dunn, Aralisa Shedden y Brenda Solórzano

24. Describa amenazas, comercio, estatus en localidades específicas, estado del hábitat, continuidad o efectos de fragmentación en una localidad, composición de grupos, comportamientos, etc.

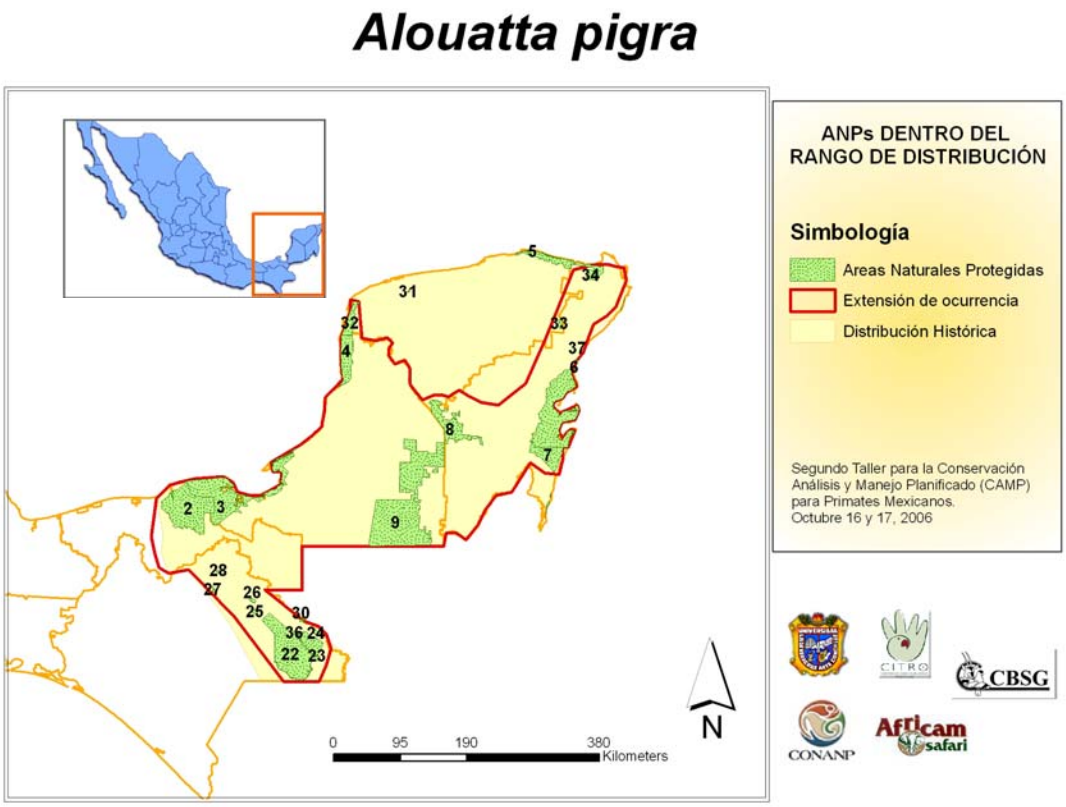
25. Comentarios adicionales: The distribution of *A. pigra* is heterogeneous, and has been associated with tropical rainforest dominated by "ramon tree" and "zapote tree". Low densities (significant) have been reported in large areas of medium height forests, in those of over 18m, and in forests located near bodies of water, and high densities are related to tall evergreen forests and forest fragments in northeast of Campeche. The species has been observed in mangroves, as well as in cocoa, banana, and pepper plantations.

Evaluación Nacional

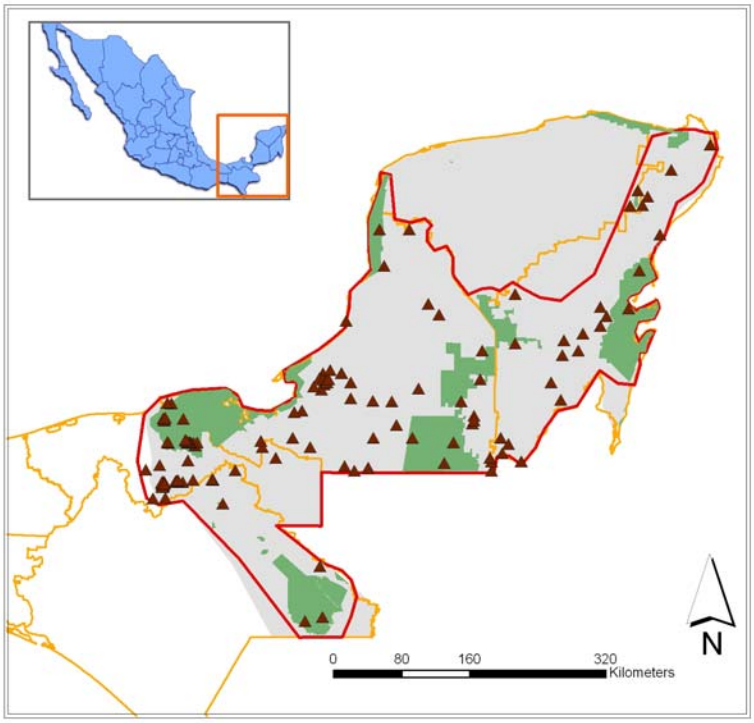
1. ¿Qué proporción de la población global está en México? **70%**
2. ¿Las poblaciones entre México, Guatemala y Belice son continuas? **SI**
3. ¿Hay alguna posibilidad que las poblaciones de Guatemala y Belice recolonicen México? **SI**
4. ¿Es similar la situación de Guatemala y Belice a la de México? **Similar**
5. ¿Es la población de México un sumidero? **NO**

Resultado Evaluación Nacional = En Peligro A4cd

MAPAS



Alouatta pigra



REGISTROS Y DISTRIBUCIÓN

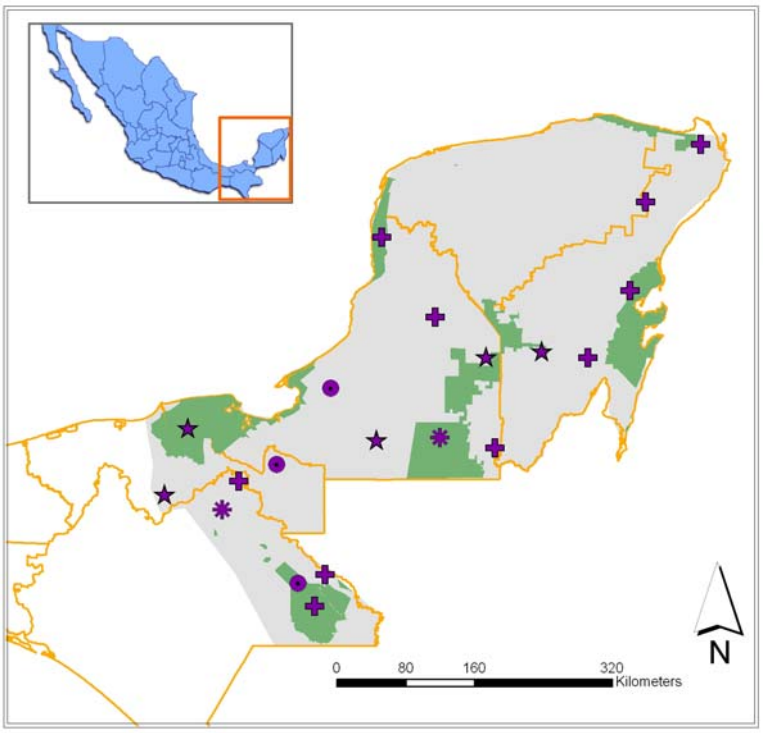
Simbología

- Registros actuales
- Areas Naturales Protegidas
- Extensión de ocurrencia
- Distribución Histórica

Segundo Taller para la Conservación Análisis y Manejo Planificado (CAMP) para Primates Mexicanos. Octubre 16 y 17, 2006

CONANP

Alouatta pigra



CANTIDAD Y UBICACIÓN DE ESTUDIOS REALIZADOS

Simbología

- Areas Naturales Protegidas
- Distribución Histórica

ESTUDIOS

- 1
- 2 - 3
- 4 - 5
- 6 - 10

Segundo Taller para la Conservación Análisis y Manejo Planificado (CAMP) para Primates Mexicanos. Octubre 16 y 17, 2006

CONANP

TAXON SHEET

PRIMERA PARTE

1. Nombre científico (con la autoridad y fecha): **Ateles geoffroyi yucatanensis (Kellog & Goldman 1944)**

1A. Sinónimos: **Anteriormente no se reconocía la subespecie yucatanensis**

1B. Familia**: Atelidae**

1C. Nombre (s) común (es) (indique el idioma)**: chango, mono araña, mico y tucha (Guatemala)**

1D. Nivel taxonómico de evaluación: □ Especies **X** Sub-especies □ Población

Comentarios/Justificaciones/Referencias:

2. Distribution of the taxon

2A. Hábito del taxon**: arborícola, diurno, frugívoro, grupos multimacho con fisión-fusión. Braquiador**

2B. Hábitat del taxon (definido por la Autoridad): **Bosque Tropical**

2C. Hábitat (en sus propias palabras): **selva alta y mediana perennifolia y subperennifolia con distintos grados de perturbación, zonas inundables, petenes**

2D. Nicho/Hábitat específico: **estrato medio y alto de la selva alta y mediana.**

2E. Elevación (rango): **hay reportes de hasta 400 msnm**

2F. Distribución histórica (Global – en los últimos 100 años descrito en el país): **Campeche, Yucatán, Quintana Roo,**

2G. Distribución actual (listada por país): **México, Guatemala y Belice.**

2H. La evaluación es global: □ Local (endémico de México) **X** Regional (distribuido en varios países)

2I. Información de la localidad de distribución en países del rango:

Estado	**Municipio**	**Área**	**Localidad**	**Lat.**	**Long.**	**Hábitat**	**Amenazas**	**Fuente**
Chiapas	Frontera corozal	35,000ha	Yaxchilán	16°55’	90°57’	Selva alta perennifolia	Aislamiento	Estrada et al. 2002. New Perspectives in the Study of Mesoamerican primates, 2006

Estado	**Municipio**	**Área**	**Localidad**	**Lat.**	**Long.**	**Hábitat**	**Amenazas**	**Fuente**
Yucatán	Tulum	77km2	Punta laguna	20°44’44” 20°38’	87°41’42” 87°37’	Selva mediana perennifolia y en sucesión	Fragmentación y huracanes	Ramos y Ayala, 2003. Neotropical primates. Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	**Municipio**	**Área**	**Localidad**	**Lat.**	**Long.**	**Hábitat**	**Amenazas**	**Fuente**
Campeche	Carmen	300ha	Nvo. Ontario	2040836	722458	Selva mediana	Fuego, deforestación	Rangel-Negrín y Coyohua A. 2006. S/Pub.

Estado	**Municipio**	**Área**	**Localidad**	**Lat.**	**Long.**	**Hábitat**	**Amenazas**	**Fuente**
Campeche	Carmen	96ha	Alamo	2080446	7127460	Selva mediana	Fragmentación	Rangel-Negrín 2006. S/Pub.

Estado	**Municipio**	**Área**	**Localidad**	**Lat.**	**Long.**	**Hábitat**	**Amenazas**	**Fuente**
Campeche	Carmen	40ha	Oxcabal	2087327	714660	Selva mediana y acahual	Fragmentación	Dias P.A.D. y Rangel-Negrín, 2006. S/Pub

Estado	**Municipio**	**Área**	**Localidad**	**Lat.**	**Long.**	**Hábitat**	**Amenazas**	**Fuente**
Campeche	Calakmul	70,000ha	Km27			Selva mediana	Ninguna	Dias P.A.D. y Rangel-Negrín, 2006. S/Pub

Estado	**Municipio**	**Área**	**Localidad**	**Lat.**	**Long.**	**Hábitat**	**Amenazas**	**Fuente**
Campeche	Escárcega	400ha	Tormento	18°16’25”	90°45’45”	Selva mediana perennifolia y en sucesión	_	Barrueta et al. 2003.

Estado	**Municipio**	**Área**	**Localidad**	**Lat.**	**Long.**	**Hábitat**	**Amenazas**	**Fuente**
Campeche	Hopelchen	continuo	Xmaben	259761	2104689	Selva mediana	Pérdida de	Cristóbal-

					zona 16	subperennifolia y sucesión	calidad	Azkárate, 2005. S/ pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campeche			Escárcega	18°36’	90°40’	Selva mediana subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campeche			El Ramonal	17°50’	90°38’	Selva alta subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campeche			El Zapote	18°09’	91°37’	Selva alta perennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campeche			Conhuas	18°42’	89°57’	Selva mediana subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campeche			Calakmul	18°08’	89°35’	Selva alta perennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campeche			Arroyo Negro	17°50’	89°11’	Selva alta perennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campeche			Manuel Rejón	17°56’	89°11’	Selva alta perennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campeche			Calkini	20°23’	90°03’	Manglar		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campeche			Petenes	20°23’	90°22’	Manglar		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campeche			Tenabo-Hampolol	20°00’	90°19’	Selva baja caducifolia		Serio-Silva et al. 2005. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Campeche			El Suspiro	18°27’	91°16’	Selva mediana subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Pacchen	20°44’	87°32’	Selva mediana subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	José Carrillo Puerto	continuo	Petcacab	376187 367009 19°17’	212480 2130181 zona 16 88°13’	Selva mediana perennifolia subperennifolia y acahual	Pérdida de calidad de habitat	Cristobal-Azkárate et al. In press. Rangel-Negrín, 2003. Serio-Silva et al. 2006.

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Dos Ojos Dos Aguas	20°22’	87°24’	Selva mediana subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Carrillo Puerto	19°34’	88°02’	Selva mediana subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Bacalar	18°48’	88°19’	Selva alta subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Bacalar-Xula	18°35’	88°27’	Selva alta subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Ejido Tres Garantías	18°11’	89°05’	Selva alta subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Área de la “Camiseta”	18°07’	89°00’	Selva alta subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			El Diez	21°01’	87°17’	Selva alta subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Laguna Madera	20°48’	87°38’	Selva mediana subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Chunyaxche	19°57’	87°37’	Selva mediana subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	Soliralidad		Sian Kaan	19°33’	87°44’	Selva mediana subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	Othon P. Blanco		Bosque cercano Bacalar	18°46’	88°33’	Selva alta subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Tomás Garrido	18°01'	89°04'	Selva alta subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo			Dos Bocas	17°55'	88°52'	Selva mediana subperennifolia		Serio-Silva et al. 2006. New Perspectives in the Study of Mesoamerican Primates

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	Leona Vicario	selva continua		20° 51' 25'' N, 21° 12' 12'' N 21° 10' 42'' N,	87° 13' 33'' W 87° 13' 46'' W 87° 08' 19'' W	selva mediana subperennifolia	Deforesta-ción huracanes	Cristóbal-Azkarate 2008 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	José M. Morelos	continuo - Selva	Nuevo Cunduacán	298589	2128715 zona 16	Selva mediana subperennifolia y sucesión	Pérdida de Calidad de hábitat	Cristóbal-Azkarate 2005 s/pub

Estado	Municipio	Área	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Quintana Roo	José M. Morelos	continuo	San Isidro Poniente	293488	2139887 zona 16	Selva mediana subperennifolia y sucesión	Pérdida de Calidad de hábitat	Cristóbal-Azkarate 2005 s/pub

3. EXTENSIÓN DE OCURRENCIA del taxon en México (Extensión de ocupación es definido como el área contenida en la frontera imaginaria continua más pequeña que se conozca, inferida o proyectada del área actual de ocupación del taxon):

□ <100km^2 □ 101-5,000km^2 □ 5,001-20,000km^2 **X** >20,000km^2 Rango: **118, 971.60 Km^2** Real:

DQ: **X** Censos/Monitoreo **X** Estudio de campo X Avistamiento informal X Información indirecta X Literatura Museo □ Rumor

Calificador: □ Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Estimado con ArcView, en base al mapa propuesto por Estrada *et al* en New Perspectives in the Study of Mesoamerican Primates, pag 57; y en relación a los sitios en donde se tienen avistamientos de la especie (ver mapa *Registros y distribución*)

4. ÁREA DE OCUPACIÓN aproximada del taxon en México (Área de ocupación es definida como el área ocupada por el taxon dentro del "Área de ocurrencia"):

□ <10km2 □ 11-500km^2 □ 501-2,000km^2 **X**>2,000km^2 Rango: **81, 172.02 km^2** Real:

DQ: **X** Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal □ Información indirecta □ Literatura □ Museo □ Rumor

Calificador: □ Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Estimado con ArcView utilizando los mapas de vegetación de CONABIO y sumando las áreas de hábitat potencial en base los tipos de vegetación en donde se tienen registros de avistamiento de la especie dentro del polígono de extensión de ocurrencia.

5. Número de Emplazamientos o Sub-pobalciones en las cuales se distribuye el taxon en México:

5A. Número de sub-poblaciones: 13 5B. Número de emplazamientos: 14

5C. Los emplamientos o subpoblaciones son: **X** Continuas **X** Fragmentadas

5D. Se sabe si los machos migran entre emplazamientos severamente fragmentados? **X** Si □ No □ No sé

5E. Hay una disminución continua del número de emplazamientos o sub-poblaciones? **X** Si □ No □ No sé

5F. Si es afirmativo, cuál ha sido la tasa de disminución? Porcentaje disminuido_no saber _____ en_____ años

5G. Hay una fluctuación extrema en el número de emplazamientos o sub-poblaciones? □ Si **X** No □ No sé

5H. Todos los individuos están en una sola población? □ Si **X** No

5I. Una sub-población contiene **X** <90% >90% □ >95% de la población total.

DQ: **X**Censos/Monitoreo **X** Estudio de campo **X** Avistamiento informal **X** Información indirecta **X** Literatura □ Museo □ Rumor

Calificador: **X** Observado □ Inferido □ Sospechado □ Estimado □ Proyectado

Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo **X** Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Las poblaciones que se encuentran en las reservas Sian Ka´an y Calakmul, y en el corredor entre ambas son continuas, el resto están fragmentadas. Consideramos las carreteras principales como barreras migratorias. No se tienen datos precisos sobre la pérdida de subpoblaciones, solamente información general acerca de la pérdida de hábitat sin que existan trabajos en donde se cuantifique como esto afecta a las poblaciones. Faltan estudios longitudinales en el tiempo (monitoreo de poblaciones a largo plazo).

6. Estatus del hábitat: lo mismo para pigra

6A.Ha habido algún cambio en el hábitat donde ocurre el taxon: Si No Si es afirmativo, es una

X Disminución del área □ Incremento del área □ Estable □ Desconocido

6B. Si está Disminuyendo, cuál ha sido la disminución aproximada de hábitat (en porcentaje) con el paso de los años?:

□ <10% □ >10% □ >20% □ >30% □ >40% □ >50% **X** >60% □ >70% □ >80% □ >90% en los últimos 30 años

6C. Predice una disminución del hábitat (aproximadamente, en porcentaje) con el paso de los años?: si

□ <10% □ >10% **X** >20% □ >30% □ >40% □ >50% □ >60% □ >70% □ >80% □ >90% en los próximos 30 años

6D. Diga la causa principal de este cambio: **Ganado, Apertura de campos para el cultivo, explotación forestal, Desarrollo de Infraestructura Urbana y de Comunicaciones, incendios forestales y huracanes en algunos casos**

6E Hay algún cambio en la calidad del hábitat donde ocurre el taxon: Si No Si es afirmativo,

X Disminución en calidad □ Incremento en calidad □ Estable en calidad □ Desconocido

6F. Describa los cambios en la calidad de hábitat (p.ej. pérdida de árboles frutales, alteración del hábitat, disminución de la población de insectos):

Disminución de la diversidad, tamaño y estructura vegetal. Pérdida de fuentes de alimento y sitios de descanso, incremento de borde en sitios donde se encuentran los primates y mayor densidad de agentes infecciosos, por mencionar algunos.

6G. Diga la causa principal de estos cambios: **tala selectiva de especies alimenticias para los monos, incremento en densidad de monos en fragmentos, mayor exposición a agentes infecciosos.**

DQ: **X** Censos/Monitoreo **X** Estudio de campo **X** Avistamiento informal **X** Información indirecta **X** Literatura □ Museo □ Rumor

Calificador: **X** Observado **X** Inferido □ Sospechado □ Estimado □ Proyectado

Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo **X** Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: La determinación del estatus del hábitat se basó en el cálculo de tasas de deforestación en los estados mexicanos en que la especie está presente. Cairns *etal* (2000) reportaron una tasa de deforestación del 1.9% anual para ocho estados del sureste mexicano entre 1977 y 1992, mientras que Velázquez *etal* (2002) calculó una tasa de deforestación anual para selvas de 2.06% entre 1993 y 2000 (pregunta 6B). Sin embargo las tasas regionales varían ampliamente reportándose para Tabasco una tasa del 2%,Calakmul en Campeche 0.7%, y Yucatán y Quintana Roo del 0.1% anual (Aguilar etal, 2000; De Jong *etal*, 2000, Porter-Bolland *etal*, in press,)(pregunta 6C).

7. Amenazas:

7A. Liste las amenazas que han afectado al taxon en el pasado (refer to the Threat Authority File): **2.1.1.1 Caza, 1.4.2. Deforestación, 3.4.2. Patógenos y Parásitos, huracanes-incendios, modificación del hábitat, 1.4.1. Fragmentación**

7B. Liste las amenazas que afectan al taxon en el presente (refer to the Threat Authority File): **2.1.1.1 Caza, 1.4.2. Deforestación, 3.4.2. Patógenos y Parásitos, huracanes-incendios, modificación del hábitat, 1.4.1. Fragmentación**

7C. Liste las amenazas que pueden afectar al taxon en el futuro (refer to the Threat Authority File): **2.1.1.1 Caza, 1.4.2. Deforestación, 3.4.2. Patógenos y Parásitos, huracanes-incendios, modificación del hábitat, 1.4.1. Fragmentación**

7D. Estas amenazas son resultantes de (percibidas o inferidas) o puede resultar en (predicho) disminución de la población?: Si No

7E. Se comprenden bien los factores anteriores que influencian el estado del taxon? **X** Si No (excepto las enfermedades)

pueden ser reversibles? X Si (excepto enfermedades y huracanes) No y han cesado de ser una amenaza? Si **X** No

DQ: □ Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal □ Información indirecta **X** Literatura □ Museo □ Rumor

Calificador: **X** Observado **X** Inferido □ Sospechado □ Estimado **X** Proyectado

Incertidumbre: **X** 95% confiabilidad □ Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: No existen estudios específicos para el taxón, pero los efectos de estas amenazas están bien documentados para otras especies.

8. Comercio:

8A. El taxon se caza por subsistencia? □ Si **X** No Si es afirmativo, dónde

8B. El taxon se comercializa?: **X** Si □ No Si es afirmativo, esto es a nivel

□ Trueque **X** Local **X** Nacional □ Comercial □ Internacional

8C. Partes comercializadas: **X** Todo el animal □ Piel □ Garras □ Huesos □ Cerebro □ Carne □ Cola □ Manos/Patas

Otras, por favor especifique

8D. Razón por la cual se comercializa: **Mascota** Comida Medicina Colección científica Investigación Zoológicos Circos

Otras, por favor especifique

8E. Qué forma de tráfico resulta en una disminución de la población percibida o inferida?: **comercial**

DQ: □ Censos/Monitoreo □ Estudio de campo **X** Avistamiento informal **X** Información indirecta **X** Literatura □ Museo □ Rumor
Calificador: **X** Observado □ Inferido □ Sospechado □ Estimado □ Proyectado
Incertidumbre: **X** 95% confiabilidad □ Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Duarte-Quiroga y Estrada, 2003

9. Poblaciones:

9A. Número de animales en México:**Contados 1361 (adultos e inmaduros) pero creemos que estos conteos no cubre más del 20% de la población total**

9B. Número de Individuos Maduros (en México): □ <50 □ <250 □ <2,500 □ <10,000 **X** >10,000 □ Real □ Rango

9C. El número de individuos maduros ha disminuido en el pasado? **Si** No Si es afirmativo, un **35** por ciento en **30 años**

9D. Es probable la disminución del número de individuos maduros en el futuro? **Si** No Si es afirmativo, un **22** por ciento en 30 años

9E. Tiempo de generación (Definido acá como el promedio de edad de los parentales en la población):**10 años**

DQ: **X** Censos/Monitoreo **X** Estudio de campo **X** Avistamiento informal □ Información indirecta **X** Literatura □ Museo □ Rumor
Calificador: **X** Observado **X** Inferido **X** Sospechado **X** Estimado **X** Proyectado
Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo **X** Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Se emplearon las cifras mínimas basadas en reportes publicados y observaciones personales. La tasa de disminución basada en tasas de pérdida de hábitat (De Jong et al. 2000, Jong et al. 2000, Turner II et al. 2001, Ellis & Beck 2003 y SEMARNAT 1994: En Barton Bray et al. Land Use policy 21, 2004).

10. Tedencias de la población:

10A. El tamaño de la población del taxon está:

X Disminuyendo □ Incrementando □ Estable □ Desconozco

10B. Si está Disminuyendo, cuál ha sido la tasa percibida o inferida de disminución de la población:

□ <10% □ >10% □ >20% □ >30% □ >40% □ >50% **X** >60% □ >70% □ >80% □ >90% en los últimos 30 años/gener.

10C. Usted predice una disminución de la población en el futuro. **Si** No

Si es afirmativo, por favor especifique la tasa y los factores e.g. pérdida de hábitat, amenazas, comercio, etc.: **pérdida de hábitat, comercio**

□ <10% □ >10% **X** >20% □ >30% □ >40% □ >50% □ >60% □ >70% □ >80% □ >90% en los próximos 30 años/gener.

10D. Las amenazas están influyendo la estructura de la población: esto está bien entendido? **X** Si □ No

se conoce que puede revertirse? Si (las amenazas) No (estructura de la población) y han cesado de ser un amenaza? □ Si **X** No

DQ: □ Censos/Monitoreo **X** Estudio de campo **X** Avistamiento informal **X** Información indirecta **X** Literatura □ Museo □ Rumor
Calificador: □ Observado **X** Inferido □ Sospechado **X** Estimado □ Proyectado
Incertidumbre: □ 95% confiabilidad □ Mínimo/máximo □ Subjetivo **X** Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: La tasa de disminución de la población se basó en los datos de deforestación vaciados en la pregunta 6, asumiendo que la pérdida de hábitat tiene un impacto directo en las poblaciones de esta especie.

11. Investigaciones de campo recientes (desde 1990). Indique año(s) del estudio, no año de publicación.

Nombre del investigador	Localidad, país	Fecha del estudio	Tópico	Publicación
Barrueta	Reserva el Tormento	2002	Demografía	
Bonilla-Moheno	Península Yucatán	2001	Parasitología	
Cristóbal Azcárate, J.	Corredor Biológico Sian Ka'an-Calakmul	2006	Distribución y preferencia de hábitat	
Estrada A.	Sureste de México	2001	Demografía	
González-Kirchner JP.	Quintana Roo	1999	Demografía	*Folia Primatologica*
Ramos-Fernández G.	Punta Laguna	1998	Ecología y conducta	
Rangel-Negrín A.	Península Yucatán	2001	Cortisol	
Serio-Silva J.C.	Península Yucatán	2001	Distribución y demografía	

PARTE DOS

12. Estatus:

12A. IUCN:**EN** 12B. Criterio basado en: **A 4cd**

12C. 2000 Red List: **2003 VU** 12D. Criterio:**A 4cd**

12E. Justificación para cambio de categoría de la IUCN y/o criterio de la evaluación previa (2000 Red List)

□ Mejor / nueva información disponible actualmente □ Cambio en especies / sub-especies taxonomía

□ Interpretación incorrecta / aplicación de la Lista Roja anteriormente □ Incorrecta información disponible / usada anteriormente

□ Cambios genuinos en el estatus de especies / sub-especies □ Otros

12F. CITES: **Apéndice I**

12G. Listas Rojas nacionales (país, estatus y fuente): **México; peligro de extinción NOM-059-SEMARNAT-2001; Diario Oficial de la Federación, 2002**

12H.Leyes nacionales sobre Vida Silvestre (país y ley): **Ley General de Vida Silvestre; Ley General para el Equilibrio Ecológico y la Protección del Ambiente**

12I. Otras leyes (especifique):

12J. Presencia conocida en áreas protegidas (liste):

PAÍS	NOMBRE ANP	ESTADO / MUNICIPIO	ID MAPA
México	Laguna de Términos	Campeche	3
México	Los Petenes	Campeche	4
México	Río Lagartos	Yucatán	5
México	Sian ka'an	Quintana Roo	6
México	Uaymil	Quintana Roo	7
México	Balaan Kaax	Quintana Roo - Yucatán	8
México	Calakmul	Campeche	9
México	Yaxchilan	Chiapas	30
México	Ría Celestum	Yucatán	32
México	Otoch Maax Yetel Kooh	Quintana Roo	33
México	Parque Nacional Tulum	Quintana Roo	37

12I. Plan de protección nacional o regional aprobado:

Comentarios/Justificación: Las ANPs se seleccionaron en base al polígono de extensión de ocurrencia

13. Incertidumbre

13A. La evaluación de la Lista Roja para este taxon está basada en un grupo de valores creíbles? **X** Si □ No

13B.la evaluación de la Lista Roja para el taxon está basada en: X Evidencia? □ Precaución?

13C. La evaluación de la Lista Roja para este taxon se deriva de un consenso de todo el grupo de trabajo? X Si □ No

Si la respuesta es negativa, las opiniones diferentes deben colocarse en una hoja aparte.

13D. La evaluación para este taxon durante el taller resulta de un consenso por parte de todos los participantes? X Si □ No

Si la respuesta es negativa, las opiniones diferentes deben colocarse en una hoja aparte.

Comentarios/Justificación:

TERCERA PARTE

14. Se recomienda Investigación de apoyo para este taxon: X Si □ No Si es afirmativo, debe ser

X Muestreo X Investigación genética X Investigación de taxonomía X Estudios de historia de vida

X Investigación de factores limitantes □ Epidemiología □ Otros (específicos del taxon)

14A. Se recomienda un taller de Análisis de Viabilidad de la Población y del Hábitat: Si No X Pendiente

15. Recomendaciones de manejo del taxon:

X Manejo del hábitat □ Manejo de la población silvestre □ Monitoreo □ Translocación

□ Uso sostenible □ Conocimiento del público/Educación □ Banco de Genes X Manejo de factor limitante

□ Reproducción en cautiverio □ Otros

16. Si se recomienda la reproducción en cautiverio, esto es por:

□ Recuperación de la especie □ Educación □ Reintroducción □ Introducción benigna

□ Investigación □ Cuidado □ Preservación del genoma vivo □ Comercial/ sustentabilidad

17. Existen actualmente grupos reproductivos cautivos: X Si □ No, Si es afirmativo:

17A. Nombre de las instituciones

17B. Número de animales: Machos_____ Hembras_____ Sexo indeterminado_____ Total _____ Se desconoce □

17C. Existe un Programa de Manejo de Especie para esta especie: □ Si □ No Si es afirmativo, en qué países:

17D. Se recomienda un Programa de Manejo de Especie para México? □ Si □ No

Esta en el principio esta como especie poner nota

18. Nivel recomendado de reproducción en cautiverio:

□ A. Intensificar o incrementar el programa actual □ B. Disminuir el programa actual

□ C. Iniciar un programa en los próximos 3 años □ D. Iniciar un programa después de pasar 3 años

19. Se conocen las técnicas adecuados para propagar el taxon?:

□ Se conocen técnicas para el taxon o un taxa □ Se conocen algunas técnicas para el taxon o un taxa similar

□ No se conoce ninguna técnica □ No hay información disponible para este grupo de compiladores

CUARTA PARTE

20. Otros comenatrios:

21. Fuentes: Alejandro Estrada, Juan Carlos Serio Silva

QUINTA PARTE

22. Compiladores: Marleny Rosales, Gabriela Ponce, Jurgi Cristóbal Azkárate, Pedro A.D. Días, Ariadna Rangel Negrín.

23. Revisores: Ernesto Rodríguez-Luna, Joaquim Vea Baró, Pedro A.D. Dias, Ariadna Rangel Negrín, Jurgi Cristóbal Azkárate, Jacob Dunn, Aralisa Shedden y Brenda Solórzano

24. Describa amenazas, comercio, estatus en localidades específicas, estado del hábitat, continuidad o efectos de fragmentación en una localidad, composición de grupos, comportamientos, etc.

25. Comentarios adicionales:

Para realizar una correcta evaluación del estado de conservación de esta subespecie y sus riesgos, consideramos que son necesarios estudios sobre:

-Distribución, preferencia de hábitat y demografía

-Evaluación del impacto de la fragmentación sobre la demografía, conducta, forrajeo y fisiología de esta subespecie.

Evaluación Nacional agregar Belice en todos

1. ¿Qué proporción de la población global está en México? **70%**
2. ¿Las poblaciones entre México, Guatemala y Belice son continuas? **SI**
3. ¿Hay alguna posibilidad que las poblaciones de Guatemala y Belice recolonicen México? **SI**
4. ¿Es similar la situación de Guatemala y Belice a la de México? **Similar**
5. ¿Es la población de México un sumidero? **NO**

Resultado Evaluación Nacional = En Peligro A4cd

MAPAS: Al final de la hoja de taxón de *A. geoffroyi vellerosus*

MEXICAN PRIMATES CAMP
TAXON SHEET

PRIMERA PARTE

1. Nombre científico (con la autoridad y fecha): ***Ateles geoffroyi vellerosus* (Gray, 1866)**

1A. Sinónimos: **Anteriormente la subespecie *yucatanensis* no se distinguía de *vellerosus***

1B. Familia: **Atelidae**

1C. Nombre (s) común (es) (indique el idioma): **Chango, Mono araña, Mexican spider monkey (inglés)**

1D. Nivel taxonómico de evaluación: □ Especies **X** Sub-especies □ Población

Comentarios/Justificaciones/Referencias:

2. Distribución del taxón

2A. Hábito del taxón: **arbóreo, frugívoro, diurno**

2B. Hábitat del taxón (definido por la Autoridad): **1.6.1 Bosque Tropical Perennifolio, 1.6.10 Bosque Tropical degradado**

2C. Hábitat (en sus propias palabras): **selva alta perennifolia, selva mediana subcaducifolia, bosque mesófilo**

2D. Nicho/Hábitat específico: **Dosel medio y alto**

2E. Elevación (rango): **0- 1500 msnm**

2F. Distribución histórica (Global – en los últimos 100 años descrito en el país): **Sur de Tamaulipas; oeste de San Luis Potosí; Veracruz; Tabasco; Istmo de Tehuantepec; Chiapas**

2G. Distribución actual (listada por país): **México**

2H. La evaluación es global: □ Local (endémico de México) **X** Regional (distribuido en varios países)

2I. Información de la localidad de distribución en países del rango:

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Tatahuicapan	Magallanes	312600N 313200N	313200W 203500W	Fragmento de selva alta perennifolia	Destrucción del hábitat	S. Sánchez López, 2004

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Tatahuicapan	Sierra de Santa Marta			Selva alta perennifolia	aislamiento	Silva López y Jiménez Huerta 2000

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz		Los Tuxtlas			Bosque fragmentado	Fragmentación, perdida de hábitat	Righini (año desconocido)

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Tatahuicapan	Entre Sierra de Sta Marta y Volcán Sn.Martín			Fragmentos de bosque tropical	Fragmentación	Neotropical Primates 11(3): 172-175

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Veracruz	Las Choapas		17° 20' 06'' N 17° 21' 11'' N	94° 09' 04'' W 94° 08' 57'' W	Selva alta perennifolia	Deforestación	Cristóbal-Azkarate 2005

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas	Mapastepec	La Encrucijada	15° 06' 47 N	92° 48' 20 W	Selva mediana manglar	Cacería	Gordillo O. 2004: Jiménez Vásquez 1999

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas	Chiapa de Corzo		16° 58' 47 N	93° 16' 16 W	Selva mediana perennifolia	Cacería furtiva, aislamiento	Aguilar Aragón P., 2002

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas		Cañón del Sumidero			Selva Caducifolia y mediana perennifolia		Estrada y Coates Estrada 1984

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas		Palenque			Selva Perennifolia		Estrada y Coates Estrada 1984

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas	Cintalapa	Selva El Ocote	15° 55' 21N	93° 30' 32W	Selva mediana y alta caducifolia	Incendios forestales y cacería	Vásquez Sánchez 1988; Hernández Yánez 1993

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas	Mapastepec	El Triunfo	15° 26' 43 N	92° 36' 36 W	Selva de niebla y selva Perennifolia		González 1995

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Chiapas		Lacantun	16°27'33' N	90°47'55" W			Estrada et al. 2004

Estado	Municipio	Localidad	Lat.	Long.	Hábitat	Amenazas	Fuente
Oaxaca	Santa María Chimalapas		16° 59' 05 N	93° 59' 36 W	Selva alta perennifolia	Cacería, incendios, deforestación	Informales (consultar a Pedro Aguilar)

3. EXTENSIÓN DE OCURRENCIA del taxón en México (Extensión de ocupación es definido como el área contenida en la frontera imaginaria continua más pequeña que se conozca, inferida o proyectada del área actual de ocupación del taxon):

□ <100km^2 □ 101-5,000km^2 □ 5,001-20,000km^2 **X** >20,000km^2 Rango**: 83, 856.82 km^2** Real:

DQ: **X** Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal □ Información indirecta □ Literatura □ Museo □ Rumor

Calificador: □ Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: ArcView, en base al mapa propuesto por Estrada et al en New Perspectives in the Study of Mesoamerican Primates, pag 57; y en relación a los sitios en donde se tienen avistamientos de la especie (ver mapa *Registros y distribución*). En la parte norte de Veracruz y San Luis Potosí se comenta, existen poblaciones de monos araña, sin embargo no hay ningún registro formal que lo sustente.

4. ÁREA DE OCUPACIÓN aproximada del taxón en México (Área de ocupación es definida como el área ocupada por el taxon dentro del "Área de ocurrencia"):

□ <10km2 □ 11-500km^2 □ 501-2,000km^2 **X** >2,000km^2 Rango: **24, 348.35 km^2** Real:

DQ: **X** Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal □ Información indirecta □ Literatura □ Museo □ Rumor

Calificador: □ Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: □ 95% confiabilidad **X** Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Estimado con ArcView utilizando los mapas de vegetación de CONABIO y sumando las áreas de hábitat potencial en base los tipos de vegetación en donde se tienen registros de avistamiento de la especie dentro del polígono de extensión de ocurrencia.

5. Número de Emplazamientos o Sub-poblaciones en las cuales se distribuye el taxón en México:

5A. Número de sub-poblaciones_____ 5B. Número de emplazamientos_____

5C. Los emplazamientos o subpoblaciones son: □ Continuas **X** Fragmentadas

5D. Se sabe si las hembras migran entre emplazamientos severamente fragmentados? □ Si **X** No □ No sé

5E. Hay una disminución continua del número de emplazamientos o sub-poblaciones? **X** Si □ No □ No sé

5F. Si es afirmativo, cuál ha sido la tasa de disminución? Porcentaje disminuido_____ en_____ años

5G. Hay un fluctuación extrema en el número de emplazamientos o sub-poblaciones? □ Si **X** No □ No sé

5H. Todos los individuos están en una sola población? □ Si **X** No

5I. Una sub-población contiene **X** <90% □ >90% □ >95% de la población total.

DQ: **X** Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal □ Información indirecta **X** Literatura □ Museo □ Rumor

Calificador: □ Observado □ Inferido □ Sospechado □ Estimado □ Proyectado

Incertidumbre: □ 95% confiabilidad □ Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Durante el taller no se contó con la participación de un especialista en esta subespecie que pudiera contribuir con la información necesaria para llenar esta sección.

6. Estatus del hábitat:

6A.Ha habido algún cambio en el hábitat donde ocurre el taxón: **X** Si No Si es afirmativo, es una

X Disminución del área □ Incremento del área □ Estable □ Desconocido

6B. Si está Disminuyendo, cuál ha sido la disminución aproximada de hábitat (en porcentaje) con el paso de los años?:

□ <10% □ >10% □ >20% □ >30% □ >40% □ >50% □ >60% □ >70% **X** >80% □ >90% en los últimos **30** años

6C. Predice una disminución del hábitat (aproximadamente, en porcentaje) con el paso de los años?:

□ <10% □ >10% □ >20% □ >30% □ >40% □ >50% □ >60% **X** >70% □ >80% □ >90% en los próximos **30** anos

6D. Diga la causa principal de este cambio: **Creación de pastos para ganado, apertura de campos para el cultivo, explotación forestal, desarrollo de infraestructura urbana y de comunicaciones, incendios forestales, aumento de la población humana y por ende demanda de servicios**

6E Hay algún cambio en la calidad del hábitat donde ocurre el taxón: **X** Si No Si es afirmativo,

X Disminución en calidad □ Incremento en calidad □ Estable en calidad □ Desconocido

6F. Describa los cambios en la calidad de hábitat (p.ej. pérdida de árboles frutales, alteración del hábitat, disminución de la población de insectos): **Pérdida de fuentes de alimento y sitios de descanso, incremento de borde en sitios donde se encuentran los primates y mayor densidad de agentes infecciosos, por mencionar algunos.**

6G. Diga la causa principal de estos cambios: **tala selectiva de especies alimenticias para los monos, incremento en densidad de monos en fragmentos, mayor exposición a agentes infecciosos**

DQ: □ Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal **X** Información indirecta **X** Literatura □ Museo □ Rumor

Calificador: **X** Observado □ Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: 95% confiabilidad **X** Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Ya que no se tienen datos precisos y esta subespecie comparte gran parte de su rango de distribución con *A. palliata*, se tomaron las mismas cifras de pérdida que se ocuparon para el llenado de hoja de taxón de esta última.

7. Amenazas:

7A. Liste las amenazas que han afectado al taxón en el pasado (refer to the Threat Authority File): **1.1 Agricultura, 1.1.4 Ganadería, 1.4.1 Fragmentación, 1.4.2 Deforestación, 3.3.5 perdida de hábitat, 2.2 Comercio, 2.1.1.1 Caza**

7B. Liste las amenazas que afectan al taxón en el presente (refer to the Threat Authority File): **1.4.2 Deforestación, 1.4.1 Fragmentación, 2.1.1.1 Caza**

7C. Liste las amenazas que pueden afectar al taxón en el futuro (refer to the Threat Authority File): **1.4.2 Deforestación, 1.4.1 Fragmentación, 1.2.1.1.1 Caza, 7.2 Empobrecimiento del reclutamiento, reproducción y regeneración**

7D. Estas amenazas son resultantes de (percibidas o inferidas) o puede resultar en (predicho) disminución de la población?: **X** Si No

7E. Se comprenden bien los factores anteriores que influencian el estado del taxón? **X** Si No

pueden ser reversibles? **X** Si No y han cesado de ser una amenaza? Si **X** No

DQ: **X** Censos/Monitoreo **X** Estudio de campo □ Avistamiento informal **X** Información indirecta **X** Literatura □ Museo □ Rumor

Calificador: **X** Observado **X** Inferido □ Sospechado **X** Estimado □ Proyectado

Incertidumbre: **X** 95% confiabilidad □ Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: La reversibilidad de las amenazas depende de la intensidad de las mismas.

8. Comercio:

8A. El taxón se caza por subsistencia? **X** Si □ No Si es afirmativo, dónde? **Chiapas**

8B. El taxón se comercializa?: **X** Si □ No Si es afirmativo, esto es a nivel

□ Trueque **X** Local **X** Nacional □ Comercial □ Internacional

8C. Partes comercializadas: **X** Todo el animal □ Piel □ Garras □ Huesos □ Cerebro □ Carne □ Cola □ Manos/Patas

Otras, por favor especifique

8B. Razón por la cual se comercializa: **Mascota** Comida **Medicina** Colección científica Investigación Zoológicos **Circos**

Otras, por favor especifique _____

8C. Qué forma de tráfico resulta en una disminución de la población percibida o inferida?:**Venta para mascotas**

DQ: □ Censos/Monitoreo □ Estudio de campo □ Avistamiento informal □ Información indirecta **X** Literatura □ Museo □ Rumor

Calificador: □ Observado **X** Inferido □ Sospechado □ Estimado □ Proyectado

Incertidumbre: □ 95% confiabilidad □ Mínimo/máximo **X** Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Duarte-Quiroga y Estrada, 2003

9. Poblaciones:

9A. Número de animales en México: **31,653**

9B. Número de **Individuos Maduros** (en México): □ <50 □ <250 □ <2,500 □ <10,000 □ >10,000 □ Real__ □ Rango__

9C. El número de individuos maduros ha disminuido en el pasado? **X** Si No Si es afirmativo, un _____ por ciento en _____ años

9D. Es probable la disminución del número de individuos maduros en el futuro? **X** Si No Si es afirmativo, un __ por ciento en _ años

9E. Tiempo de generación (Definido acá como el promedio de edad de los parentales en la población):**15 años**

DQ: □ Censos/Monitoreo □ Estudio de campo **X** Avistamiento informal □ Información indirecta □ Literatura □ Museo □ Rumor

Calificador: □ Observado **X** Inferido □ Sospechado □ Estimado □ Proyectado

Incertidumbre: 95% confiabilidad □ Mínimo/máximo □ Subjetivo **X** Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Durante el taller no se contó con la participación de un especialista en la subespecie que pudiera aportar datos concretos. Se asumió una disminución en el número de individuos maduros, en base a la pérdida de hábitat y a la cacería directa. Además es probable que esta tendencia continúe si estos factores siguen operando. El número de animales en México se calculó en base a la densidad 1.3 ind/km^2 propuesta por Estrada (1994) y al área de ocupación.

10. Tendencias de la población:

10A. El tamaño de la población del taxón está:

X Disminuyendo □ Incrementando □ Estable □ Desconozco

10B. Si está Disminuyendo, cuál ha sido la tasa percibida o inferida de disminución de la población:

□ <10% □ >10% □ >20% □>30% □ >40% □ >50% □ >60% □ >70% **X** >80% □ >90% en los últimos **30** años.

10C. Usted predice una disminución de la población en el futuro. **X** Si No

Si es afirmativo, por favor especifique la tasa y los factores e.g. pérdida de hábitat, amenazas, comercio, etc. **pérdida de hábitat, amenazas, comercio, cacería, desastres naturales**

□ <10% □ >10% □ >20% □ >30% □ >40% **X** >50% □ >60% □ >70% □ >80% □ >90% en los últimos **10** años.

10D. Las amenazas están influyendo la estructura de la población: esto está bien entendido? x Si □ No

se conoce que puede revertirse? Si **X** No y han cesado de ser un amenaza? □ Si x No

DQ: □ Censos/Monitoreo □ Estudio de campo **X** Avistamiento informal **X** Información indirecta □ Literatura □ Museo □ Rumor

Calificador: **X** Observado □ Inferido □ Sospechado □ Estimado □ Proyectado

Incertidumbre: 95% confiabilidad □ Mínimo/máximo □ Subjetivo □ Hipotético □ Rango de opinión

Comentarios/Justificación/Referencias: Ya que durante el taller no se contó con la participación de un especialista en la subespecie que pudiera aportar datos concretos y esta subespecie comparte gran parte de su rango de distribución con *A. palliata*, se tomó como base las cifras de esta última en donde se consideró una disminución de la población del mayor del 50%. Si tomamos en cuenta que *A. g.vellerosus* no es una especie tan plástica como *A.p.mexicana*, entonces se sube la cifra de disminución de la población y se iguala con la de pérdida de hábitat.

11. Investigaciones de campo recientes (desde 1990). Indique año(s) del estudio, no año de publicación.

Nombre del investigador	Localidad, País	Fecha publicación	Tópico	Publicación
Canales Espinosa D	México	2005	Conservación	Congreso
Duarte Quiroga A	México	2003	Conservación	American Journal of Primatology
Estadra A	México	2001-2005	Fragmentos, Biología, Conducta, Conservación	Am. J. Prim., Primates, Neotropical Primates
Fernández EN	México	2003	Ecología	Biología Tropical
García Orduña F	México	2003, 2001	Conducta, Ecología	Congreso
González Zamora, Mandujano S	México	2003	Fragmentos	Neotropical primates
Mandujano S	México	2002	Biología	Laboratory Primate Newsletter
Mayagoita Novales	México	2003	Laboratorio	Boletín As. Pim. Española
Pastor Nieto R	México	2000	Conservación	Laboratory Primate Newsletter
Pérez Ruiz AL	México	2004, 2002	Conducta	Folia Primatológica
Righini N	México	2004	Parasitología	Laboratory Primate Newsletter
Schaffner C	México	2003	Conducta	American Journal of Primatology
Serio Silva	México	2003, 2000	Conservación	American Journal of Primatology
Silva López G	México	2000	Conducta	Neotropical primates
Slater KY	México	2005, 2004	Conducta	Primate report, Folia Prim

PARTE DOS

12. Estatus:

12A. IUCN: **CR** 12B. Criterio basado en:**A4c**

12C. 2000 Red List: **CR 2003** 12D. Criterio: **A4 c**

12E. Justificación para cambio de categoría de la IUCN y/o criterio de la evaluación previa (2000 Red List)

□ Mejor / nueva información disponible actualmente □ Cambio en especies / sub-especies taxonomía

□ Interpretación incorrecta / aplicación de la Lista Roja anteriormente □ Incorrecta información disponible / usada anteriormente

□ Cambios genuinos en el estatus de especies / sub-especies □ Otros

12F. CITES: **Apéndice I**

12G. Listas Rojas nacionales (país, estatus y fuente): **México; peligro de extinción NOM-059-ECOL-2001; Diario Oficial de la Federación, 2002**

12H.Leyes nacionales sobre Vida Silvestre (país y ley): **Ley General de Vida Silvestre; Ley General para el Equilibrio Ecológico y la Protección del Ambiente**

12I. Otras leyes (especifique)

12J. Presencia conocida en áreas protegidas (liste):

PAÍS	NOMBRE ANP	ESTADO / MUNICIPIO	ID MAPA
México	Los Tuxtlas	Veracruz	1
México	Selva del Ocote	Chiapas	16
México	La Sepultura	Chiapas	17
México	La Encrucijada	Chiapas	18
México	El Triunfo	Chiapas	19
México	Lacan-tun	Chiapas	23
México	Palenque	Chiapas	28
México	Cañón del Sumidero	Chiapas	29

12I. Plan de protección nacional o regional aprobado:

Comentarios/Justificación: Las ANPs se seleccionaron en base al polígono de extensión de ocurrencia

13. Incertidumbre

13A. La evaluación de la Lista Roja para este taxon está basada en un grupo de valores creíbles? **X** Si □ No

13B.la evaluación de la Lista Roja para el taxón está basada en: **X** Evidencia? **X** Precaución?

13C. La evaluación de la Lista Roja para este taxón se deriva de un consenso de todo el grupo de trabajo? **X** Si □ No

Si la respuesta es negativa, las opiniones diferentes deben colocarse en una hoja aparte.

13D. La evaluación para este taxón durante el taller resulta de un consenso por parte de todos los participantes? **X** Si □ No

Si la respuesta es negativa, las opiniones diferentes deben colocarse en una hoja aparte.

Comentarios/Justificación:

TERCERA PARTE

14. Se recomienda **Investigación de apoyo** para este taxón: **X** Si □ No Si es afirmativo, debe ser

X Muestreo **X** Investigación genética **X** Investigación de taxonomía **X** Estudios de historia de vida

X Investigación de factores limitantes **X** Epidemiología □ Otros (específicos del taxón)

14A. Se recomienda un taller de Análisis de Viabilidad de la Población y del Hábitat: **X** Si No Pendiente

15. Recomendaciones de manejo del taxón:

X Manejo del hábitat **X** Manejo de la población silvestre **X** Monitoreo **X** Translocación

X Uso sostenible **X** Conocimiento del público/Educación **X** Banco de Genes **X** Manejo de factor limitante

□ Reproducción en cautiverio □ Otros

16. Si se recomienda la **reproducción en cautiverio**, esto es por:

□ Recuperación de la especie □ Educación □ Reintroducción □ Introducción benigna

□ Investigación □ Cuidado □ Preservación del genoma vivo □ Comercial/ sustentabilidad

17. Existen actualmente **grupos reproductivos cautivos**: **X** Si □ No Si es afirmativo,

17A. Nombre de las instituciones: **Zoológico de Guadalajara, Zoomat**

17B. Número de animales: Machos **12** Hembras **24** Sexo indeterminado_____ Total **36** Se desconoce □

17C. Existe un **Programa de Manejo de Especie** para esta especie: □ Si **X** No Si es afirmativo, en qué países: _____

17D. Se recomienda un **Programa de Manejo de Especie** para México? **X** Si □ No

18. Nivel recomendado de reproducción en cautiverio:

□ A. Intensificar o incrementar el programa actual □ B. Disminuir el programa actual

X C. Iniciar un programa en los próximos 3 años □ D. Iniciar un programa después de pasar 3 años

19. Se conocen las técnicas adecuados para propagar el taxón?:

□ Se conocen técnicas para el taxón o un taxa □ Se conocen algunas técnicas para el taxón o un taxa similar

X No se conoce ninguna técnica □ No hay información disponible para este grupo de compiladores

CUARTA PARTE

20. Otros comentarios: Referente a la sección 2 distribución del taxón, actualmente se cuentan con reportes de A.g. vellerosus en localidadades en el estado de Oaxaca (Ortiz-Martínez *et al.,* 2008), los cuales no estaban disponibles cuando se realizó el taller (2006); por lo que dichas localidades no fueron incluidas en los mapas de distribución y registros.

Se recomiendan: Estudios a largo plazo (demografía, flujo génico), estudios de distribución en Chiapas, Tabasco, Guatemala; estudios para determinar la capacidad de dispersión

21. Fuentes:

QUINTA PARTE:

22. Compiladores: Víctor Arroyo Rodríguez, Cristina Domingo Balcells , Guadalupe Medel Palacios, Olivia Rendón Thompson, Kimberly Williams Guillen, Ariel Rodríguez Vargas, Ernesto Rodríguez Luna, Pedro Noel Aguilar Aragón, Liliana Cortes- Ortiz

23. Revisores: Ernesto Rodríguez-Luna, Joaquim Vea Baró, Pedro A.D. Dias, Ariadna Rangel Negrín, Jurgi Cristóbal Azkárate, Jacob Dunn, Aralisa

Shedden y Brenda Solórzano

24. Describa amenazas, comercio, estatus en localidades específicas, estado del hábitat, continuidad o efectos de fragmentación en una localidad, composición de grupos, comportamientos, etc.

The threats that most affect *Ateles geoffroyi vellerosus* are those which affect all species of Mesoamerican primates: deforestation, habitat loss and fragmentation. Current data suggest that the amount of forest in the southeast of Mexico is declining and suffering from high levels of fragmentation, and it is a fact that these processes have a negative impact on populations of the spider monkey. If fragmentation of the remaining forest continues, the result will be further isolation of subpopulations by lack of dispersal and gene flow. The decrease in population size and fragmentation resulting from habitat destruction may increase the probability of extinction of populations, due to stochastic processes. Furthermore, processes associated with fragmentation can affect the tree community and can result in a decrease in habitat quality within remaining patches of forest. The latter can lead to long-term nutritional problems and increased susceptibility to diseases and parasitism.

Research Directions Even with the existence of several research programs, we have insufficient data to fully assess the status of *A. g. vellerosus*. Based on a review of currently available data, we suggest that more research must be carried out on this subspecies, specifically to promote long-term studies with a focus on acquiring demographic and genetic information. Furthermore, we must expand the number of studies over the distribution of the subspecies, particularly in the areas of Oaxaca, Chiapas and Guatemala, which have not yet been studied in depth. More information is needed about the degree of hybridization with *A g. yucatanensis* throughout the area of confluence of both subspecies, especially in the states of Chiapas, Campeche and Tabasco, where this has not yet been studied. Finally, it is critical that we have more information regarding patterns of dispersal in fragmented habitats and the key characteristics of areas which serve as dispersal corridors for monkeys in anthropogenic landscapes. For these studies we suggest the use of telemetry techniques or fine genetic analysis.

Proposals for management and performance: It is clear that we must protect the forests that still support populations of monkeys, with the aim of *increasing* the available habitat that has been destroyed, so that populations can recover and expand. Furthermore, it is necessary to improve the quality of remaining habitat, especially in the fragmented forests that suffer high levels of ecological change. It is also imperative to increase connectivity between fragments and subpopulations of monkeys to improve opportunities for dispersal, avoid possible effects of inbreeding and genetic depression and promote socio-ecological dynamics. The promotion of greater cooperation with agronomists, NGOs, and government agencies is required to implement agroforestry systems that serve as corridors and alternative habitat for monkeys, as these have been reported as suitable environments. It is important to work at a socioeconomic level in the municipalities in order to replace ranching with alternative activities. Additionally, reforestation projects that are performed for other purposes (e.g. protection of rivers.) can be employed to improve habitat quality by incorporating native species that serve as sources of food for monkeys and other wildlife. To preserve genetic diversity we suggest the creation of a gene bank. We propose the management of species in captivity, in the case of confiscated individuals (seized from the pet trade). Foster institutions must promote the recovery of these individuals, their study in captivity, education and outreach.

Silva-Lopez (1995) recognizes that conservation of forest fragments is a complementary alternative of great importance to ensuring the survival of this species. A conservation strategy must consider the policy decisions and socioeconomic factors that have an influence in the area, including specific plans for environmental education and awareness of the value of forest fragments and biodiversity. Universities and research centers should be the main promoters of these proposals and strategies of conservation.

25. Comentarios adicionales:

Evaluación Nacional

1. ¿Qué proporción de la poblacional global esta en México?

2. ¿Las poblaciones entre México y Guatemala son continuas? **No**

3. ¿Hay alguna posibilidad que las poblaciones de Guatemala recolonicen México? **No**

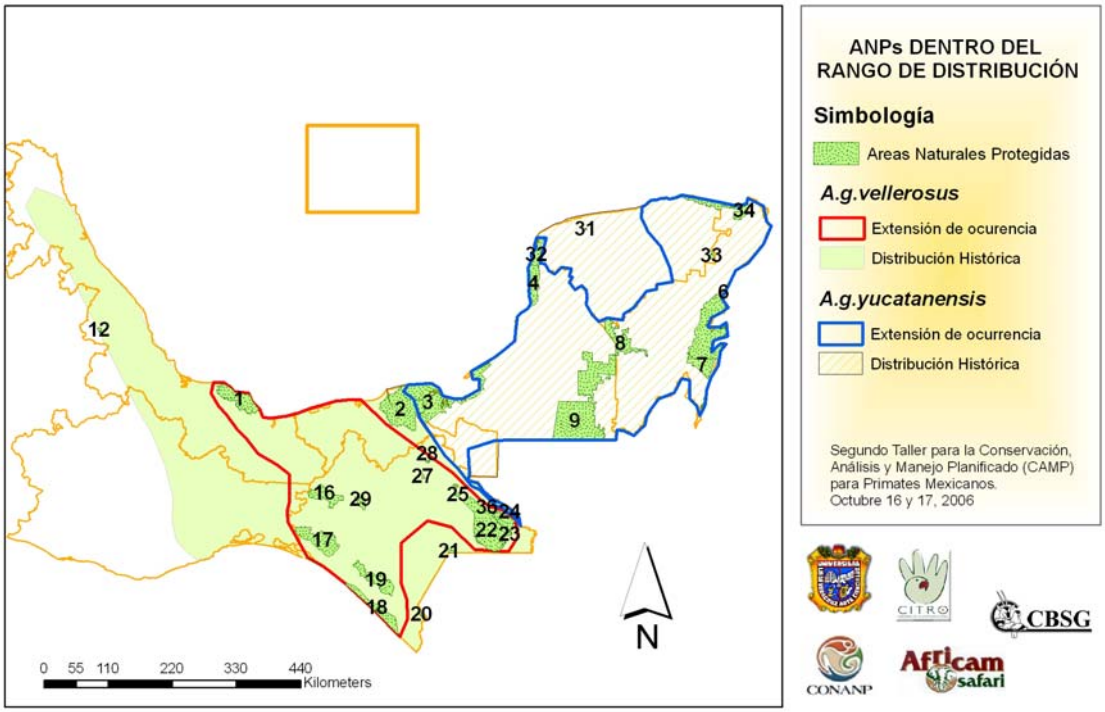
4. ¿Es similar la situación de Guatemala que en México? **Similar**

5. ¿Es la población de México un sumidero? **No**

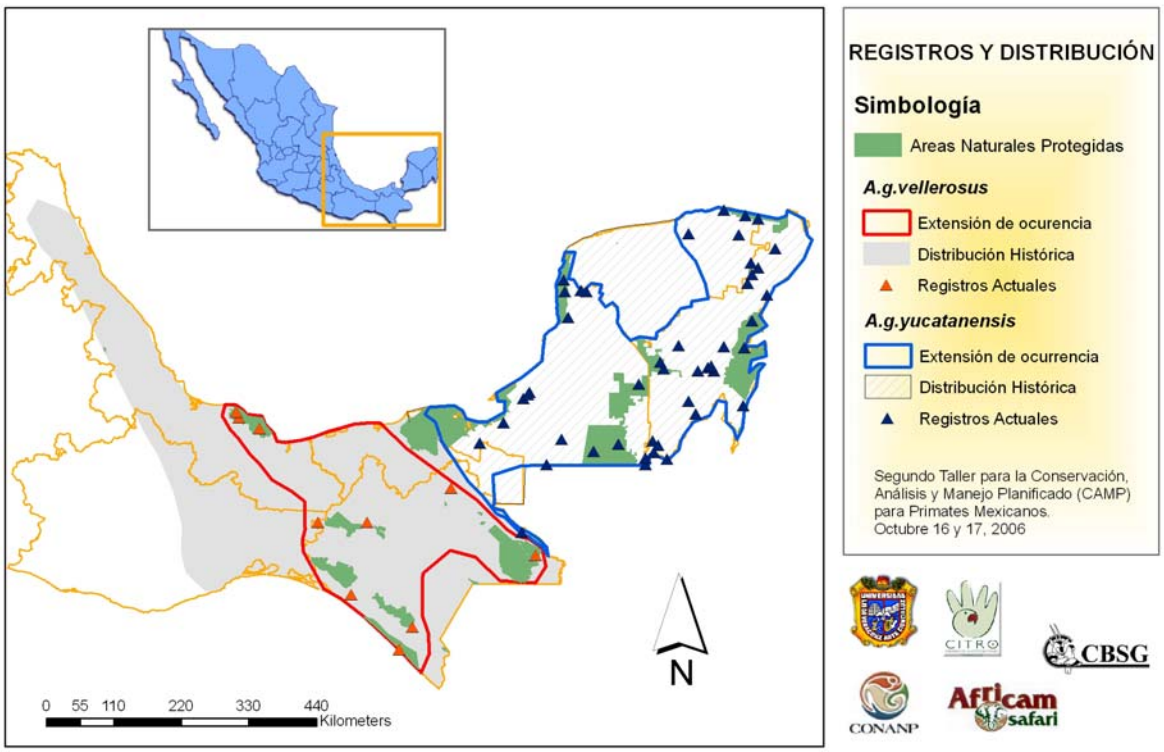
Resultado Evaluación Nacional= En Peligro Crítico A4 c

MAPAS

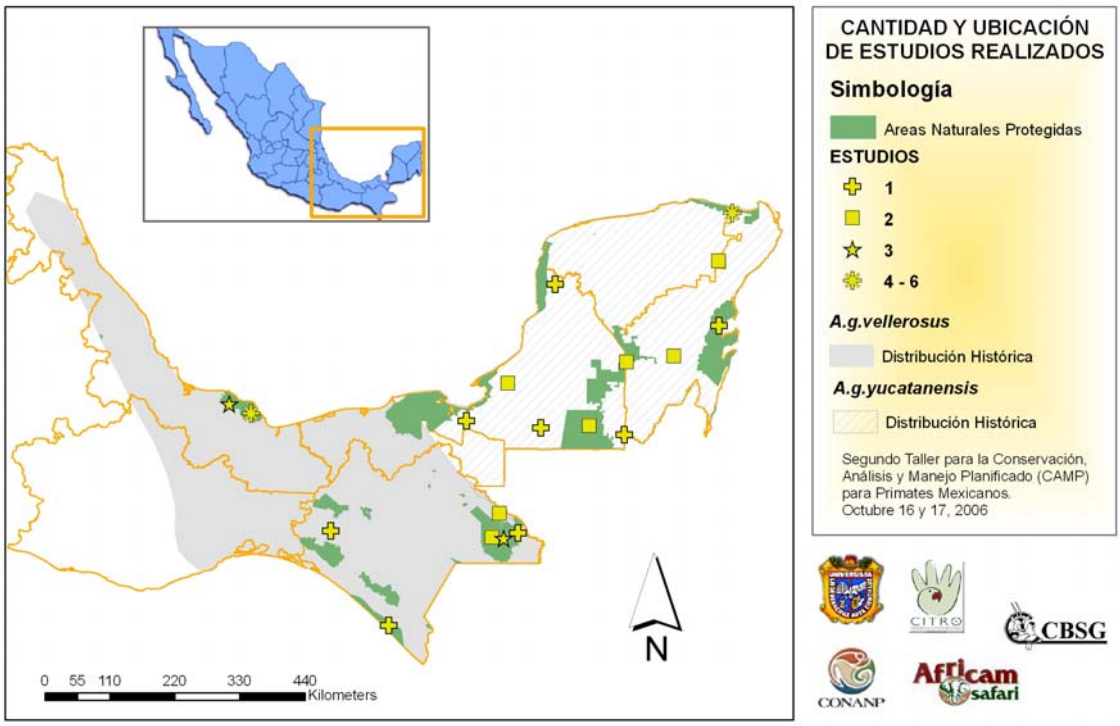
Ateles geoffroyi



Ateles geoffroyi



Ateles geoffroyi



REFERENCES

Aguilar C., E. Martínez y L. Arriaga. 2000. Deforestación y fragmentación de ecosistemas. En: Biodiversitas Año 5, No. 30.

Arroyo Rodríguez, V. y Mandujano S. 2006. Forest fragmentation modifies habitat quality for *Alouatta palliata.* En: International Journal of Primatology 27(4).

Asensio, N., Cristobal-Azkarate, J., Dias, P.A.D., Vea,J.J. y Rodríguez-Luna, E. 2007. Foraging habits of *Alouatta palliata mexicana* in three forest fragments. En: Folia Primatológica 78(3): 141-153.

Barrueta Rath, T., Estrada, A., Pozo, C. y Calmé, S. 2003. Reconocimiento demográfico de *Alouatta pigra* y *Ateles geoffroyi* en la reserva El Tormento, Campeche, México. En: Neotropical Primates 11(3): 163-167

Barton Bray, D., Ellis, E., Armijo,N. y Beck, C. 2004. The Drivers of Sustainable Landscapes: A Case Study of the "Mayan Zone" Quintana Roo, Mexico. En: Land Use Policy. 21:333-346.

Belcher, B., Ruíz-Pérez, M. y Achdiawan, R. 2005. Global patterns and trends in the use and management of comercial NTFPs: Implications for livelihoods and conservation. En: World Development 33(9): 1435-1452.

Bicca-Marques, J.C. 2003. How do howler monkeys cope with habitat fragmentation?. En: Primates in Fragments. L.K. Mash (ed). Kluwer Academic/Plenum Publishers, N.Y. Pags:283-303.

Cantú, J.C. y Sánchez, M.E. 1996. El mercado de Sonora de la Ciudad de México. En: Naturaleza y Tráfico 1(1): 10-26.

CONABIO. 2006. Base de datos de los registros de *Alouatta palliata, Ateles geoffroyi* y *Alouatta pigra.* Sistema Nacional de Información sobre Biodiversidad (SNIB). Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México.

CONABIO. 2006. Capital Natural y Bienestar Social. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México.

CONANP. 2006. Informe SIMEC, 2006. Comisión Nacional de Áreas Naturales Protegidas. Secretaría del Medio Ambiente y Recursos Naturales, México. 44 pp.

CONANP. 2008. Áreas Naturales Protegidas. Comisión Nacional de Áreas Naturales Protegidas. Secretaría del Medio Ambiente y Recursos Naturales, México. http://www.conanp.gob.mx/q_anp.html

CONAPO. 2006. Índice de marginación, 2005. Consejo Nacional de Población. http://www.conapo.gob.mx/publicaciones/inicios/004.htm

Cortés-Ortiz, L., Duda, T.F., Canales-Espinosa, D., García-Orduña, F., Rodríguez-Luna, E. y Bermingham, E. 2007. Hybridization in large-bodied new world primates. En: Genetics 176: 2421-2425.

Cristobla-Azkarate, J., Vea, J.J., Asensio, N. y Rodríguez-Luna, E. 2005. Biogeographical and floristic predictors of the abundance of mantled howlers (*Alouatta palliata mexicana)* in rainforest fragments at Los Tuxtlas, México. En: American Journal of Primatology 67(2): 209-222.

Cristobal-Azkarate, J. y Arroyo-Rodríguez, V. 2007. Diet and activity pattern of howler monkeys (*Alouatta palliata*) in Los Tuxtlas, México: effects of habitat fragmentation and implications for conservation. En: American Journal of Primatology 69(9): 1013-1029.

Cuarón, A.D., de Grammont, P.C., Cortés-Ortiz, L. Wong, G. y Silva, J.C.S. 2003. Alouatta pigra. En: IUCN 2006. 2006 IUCN Red List of Threatened Species. www.iucnredlist.org

Cuarón, A.D., de Grammont, P.C., Cortés-Ortiz, L. Wong, G. y Silva, J.C.S. 2003. Ateles geoffroyi ssp. vellerosus. En: IUCN 2006. 2006 IUCN Red List of Threatened Species. www.iucnredlist.org

Cuarón[1], A.D., Shedden, A., Rodríguez-Luna, E., de Grammont, P.C. y Link, A. 2008. *Alouatta palliata ssp. mexicana*. En: IUCN 2008. 2008 IUCN Red List of Threatened Species. www.iucnredlist.org

Cuarón[2], A.D., Morales, A., Shedden, A., Rodriguez-Luna, E. y de Grammont, P.C. 2008. *Ateles geoffroyi ssp. yucatanensis*. En: IUCN 2008. 2008 IUCN Red List of Threatened Species. www.iucnredlist.org

Cuarón[3], A.D., Morales, A., Shedden, A., Rodriguez-Luna, E. y de Grammont, P.C. 2008. *Ateles geoffroyi ssp. vellerosus*. En: IUCN 2008. 2008 IUCN Red List of Threatened Species. www.iucnredlist.org

de Jong, B.H.J., Ochoa-Gaona, S., Castillo-Santiago, M.A., Ramírez-Marcial, N. y Michael, A.C. 2000. Carbon flux and patterns of land-use/land-cover change in the selva Lacandona, México. En: Ambio 29: 504-511.

Dirzo, R. y García, M.C. 1992. Rates of deforestation in Los Tuxtlas, a neotropical area in southeast Mexico. En: Conservation Biology 6(1): 84-90

Domingo-Balcells, C. 2008. Efectos de la fragmentación del hábitat en la evolución demográfica del mono aullador (Alouatta palliata mexicana). Tesis doctoral. Universidad de Barcelona, España.

Dominguez-Dominguez, L.E., Morales-Mávil, J.E. y Alba-Landa J. 2006. Germination of *Ficus insípida* (Moraceae) sedes from toucan (*Ramphastos sulfuratus)* and spider monkey (*Ateles geoffroyi)* feces. En: Revista de Biología Tropical 54(2): 387-394.

Duarte, A. y Estrada, A. 2003. Primates as pets in Mexico city: an assessment of species involved, source of origin and general aspects of treatment. En: American Journal of Primatology 61: 53-60.

Durand, L. y Lazos, E. 2004. Colonization and tropical deforestation in the Sierra Santa Marta, southern Mexico. En: Environmental Conservation 31(1): 11-21.

Estrada, A. 1982. Survey and census of howler monkeys (Alouatta palliata) in the rain forest of Los Tuxtlas, Veracruz, Mexico. American Jorunal of Primatology. 2: 363-372.

Estrada, A. y Coates-Estrada, R. 1986. Frugivory by howling monkeys (*Alouatta palliata)* at Los Tuxtlas, México: dispersal and fate of seeds. En: Frugivores and seed dispersal. A. Estrada y T.H. Fleming (eds). Dr.W. Junk Publishers, Holanda. Pags: 93-104.

Estrada, A., Luecke, L., Van Belle, S., French, K., Muñóz, D., García, Y., Castellanos, L. y Mendoza, A. 2002. The black howler monkey (Alouatta pigra) and spider monkey (Ateles geoffroyi) in the mayan site of Yaxchilán, Chiapas, México: A preliminary survey. En: Neotropical Primates 10(2): 89-95.

Estrada, A., y Coates-Estrada, R. 1996. Tropical rain forest fragmentation and wild populations of primates at Los Tuxtlas, Mexico. En: International Journal of Primatology 5: 759-783.

Gómez-Marin, F., Vea, J.J., Rodríguez-Luna, E., García-Orduña, F., Canales-Espinosa, D., Escobar, M. y Asensio N. 2001. Food resources and the survival of a group of howler monkeys (*Alouatta palliata mexicana*) in disturbed and restricted habitat at Los Tuxtlas, Veracruz, México. En: Neotropical Primates 9: 60-67.

González-Picazo, H., Estrada, A., Coates-Estrada, R. y Ortíz-Martínez, T. 2001. Consistencias y variaciones en el uso de recursos alimenticios utilizados por una tropa de monos aulladores (*Alouatta palliata)* y deterioro del hábitat en Los Tuxtlas, Veracruz, México. En: Universidad y Ciencia 17: 27-36.

González, Z.A. y Mandujano, S. 2003. Uso de fragmentos por *Ateles geoffroyi* en el sureste de México. En: Neotropical Primates 11(3): 172-175.

Guevara, S.S., Sánchez-Ríos, G. y Landgrave, R. 2006. La deforestación. En: Los Tuxtlas: el paisaje de la sierra. Guevara S., J. Laborde y G. Sánchez-Ríos (eds). Instituto de Ecología A.C. Pags. 85-108.

Hervier, B., Cristobal-Azkarate, J., Vegas-Carrillo, S., Osorio-Sarabia, D., Rodríguez-Luna, E. y Vea, J.J. In Press. Parasitic infections of three mexican howler monkey groups (*Alouatta palliata mexicana)* exposed to differing degrees of habitat disturbance in fragmented forest. En: International Journal of Primatology. In press.

INEGI. 2005. Uso de Suelo y Vegetación. Instituto Nacional de Estadística y Geografía. http://www.inegi.org.mx/est/contenidos/espanol/cubos/default.asp?c=1413

INEGI. 2005. Población tasa anual 1995-2005. Conteo de población y vivienda, 2005. Instituto Nacional de Estadística y Geografía. http://www.inegi.org.mx/inegi/default.aspx?s=est&c=124

Lazos, E. y Paré, L. 2000. Miradas indígenas sobre una naturaleza entristecida: percepciones del deterioro ambiental entre nahuas del sur de Veracruz. Plaza y Valdez, 220pp.

Lazos, E. 2001. Ciclos y rupturas: dinámica ecológica de la ganadería en el sur de Veracruz. En: Historia ambiental de la ganadería en México. L.Hernández (comp.) Instituto de Ecología, A.C. Xalapa, Ver. México.

Mandujano, S., Escobedo-Morales,L.A., Palacios-Silva, R., Arroyo-Rodrígez, V. y Rodríguez-Toledo, E.M. 2005. A metapopulation approach to conserving the howler monkey in highly fragmented landscape in Los Tuxtlas, México. En: New perspectives in the study of Mesoamerican primates: Distribution, ecology, behavior and conservation. A. Estrada, P.A. Garber, M.S. Pavelka, L. Luecke (eds). Springer, New York. USA. Pags: 513-538.

Marsh, L.K., Cuarón, A.D., Cortés-Ortiz, L., Shedden, A., Rodríguez-Luna, E. y de Grammont, P.C. 2008. *Alouatta pigra*. En: IUCN 2008. 2008 IUCN Red List of Threatened Species. www.iucnredlist.org

Masera, O.R., Ordoñes, M.J. y Dirzo, R. 1997. Carbon emissions from mexican forests: current situation and long-term scenarios. En: Climatic Change 35(3): 265-295

Morales-Mávil, J.E., Dominguez-Dominguez, L.E., Hernández-Salazar, L.T. y Serio-Silva J.C. 2007. The spider monkey (*Ateles geoffroyi)* and the green iguana (*Iguana iguana)* as facilitators of germination of seeds of *Ficus tecolutensis.* En: Resumos XII Congreso Brasileiro de Primatologia. Melo, F.R, Hirsch, A., Costa, C.G., Dias, L.G., Mourthe, I.M.C., Tabacow, F.P. y Scoss, L.M. 75pp.

Muñóz, D., García del Valle, Y., Franco, B., Estrada, A. y Magaña M. 2002. Estudio del patrón de actividad general de monos aulladores (*Alouatta palliata)* en el parque Yumká, Tabasco, México. En: Neotropical Primates 10(1): 11-17.

Muñóz, D., Estada, A. y Naranjo, E. 2005. Monos aulladores (*Alouatta palliata)* en una plantación de cacao (*Theobroma cacao)* en Tabasco, México: Aspectos de la ecología alimentaria. En: Universidad y Ciencia. Número especial II: 35-44. Universidad Juárez Autónoma de Tabasco.

Neumann, R.P. y Hirsch, E. Commercialisation of non-timber forest products: review and analysis of research. Center for international forestry research, Bogor, Indonesia.

Ortiz-Martínez, T., Rico-Gray, V. y Martínez-Meyer, E. 2008. Predicted and verified distributions of *Ateles geoffroyi* and *Alouatta palliata* in Oaxaca, México. Primates 49: 186-194

Porter-Bolland, L., Drew, A.P.y Vergara-Tenorio, C. 2006. Analysis of a natural resources management system in the Calakmul biosphere reserve. En: Landscape and Urban Planning 74: 223-241.

PSG. 2007. Global Primate Biodiversity. Grupo Especialista en Primates (PSG). IUCN/SSC. En: http://www.primate-sg.org/diversity.htm

Ramos Fernández, G., Vick, L.G., Aureli, F., Schaffner, C. y Taub D.M. 2003. Behavioral Ecology and Conservation Status of Spider Monkeys in the Otoch Maax Yetel Kooh Protected Area. En: Neotropical Primates 11(3): 155-158

Revel-Mouroz, J. 1980. Aprovechamiento y colonización del trópico húmedo mexicano. Fondo de Cultura Económica, Distrito Federal, México. 391pp.

Rodríguez-Luna E., John E. Fa, García-Orduña F.,Silva-López G. y Canales-Espinoza D. 1987. Primate Conservation in Mexico. In: Primate Conservation (8): 114-118.

Rodríguez-Luna, E., Cortés-Ortiz, L., McCance, E. y Ellis S. 1995. Conservación, Análisis y Manejo Planificado para Primates Mexicanos. IUCN/SSC Conservation Breeding Specialist Group.

Rodríguez-Luna, E., Cortés-Ortíz, L. y Canales-Espinosa, D. 1996. El tráfico de monos araña en México: el estudio de un caso. En: Neotropical Primates 4(1): 8- 13.

Sánchez-Olmos, J.C. 2006. Contribuciones al estudio del comercio de monos en México. Boletín de la AMP (2): 4-7.

SEMARNAT (Secretaría del Medio Ambiente y Recursos Naturales). 2002. Norma Oficial Mexicana NOM-059-SEMARNAT-2001. Protección Ambiental- Especies Nativas de México de Flora y Fauna Silvestres. Categorías de Riesgo y Especificaciones para su Inclusión, Exclusión o Cambio – Lista de Especies en Riesgo. Diario Oficial de la Federación, 6 de marzo, 2002.

SEMARNAT. 2005. Sistema Nacional de Información y Recursos Naturales. El Medio Ambiente en México. Secretaría del Medio Ambiente y Recursos Naturales, México.

SEMARNAT (Secretaría de Medio Ambiente y Recursos Naturales). 2007. Ley General de Vida Silvestre y su Reglamento.

SEMARNAT/CONABIO. 2007. Programa Nacional de Áreas Naturales Protegidas, 2007-2012. Comisión Nacional de Áreas Naturales Protegidas. Secretaría del Medio Ambiente y Recursos Naturales, México. 50 pp.

Serio-Silva, J.C., Rico-Gray, V. y Ramos-Fernández, G. 2006. Mapping primate populations in Yucatan Peninsula, Mexico: A first assessment. En: New perspectives in the study of Mesoamerican primates: Distribution, ecology, behavior and conservation. A. Estrada, P.A. Garber, M.S. Pavelka, L. Luecke (eds). Springer, New York. USA. Pags: 489-511.

Shackelton, S., Shaley, P. y Ndoye, O. 2007. Invisible but viable: recognizing local markets for non-timber forest products. En: International forestry review 9(3): 697- 714.

Shedden-González, A. 2007. Estrategias de adaptación ecológica que despliega un grupo de monos aulladores (*Alouatta palliata*) translocado a un fragmento de hábitat de uso intensivo para cultivos. Tesis de Maestría. Instituto de Neuroetología, Universidad Veracruzana, México.

Silva-López G., García-Orduña F. y Rodríguez-Luna E. 1988. The status of *Ateles geoffroyi* and *Alouatta palliata* in disturbed forest areas of Sierra Santa Marta, Mexico. In: Primate Conservation (9): 53-61.

Silva López, G. y Jiménez Huerta, J. 2000. A study of spider monkeys (*Ateles geoffroyi vellerosus)* in the forest of the crater of Santa Marta, Veracruz, Mexico. En: Neotropical Primates 8(4): 148-150

Silva-López, G. y Portilla-Ochoa, E. 2002. Primates, lots and forest fragments: ecological planning and conservation in the Sierra de Santa Marta, Mexico. En: Neotropical Primates 10: 9-11.

te Velde, D.W., Rushton, J., Schreckenberg, K., Marshall, E., Edouard, F., Newton, A. y Arancibia, E. 2005. Entrepreneurship in value chains for non-timber forest products. En: Forest policy and economics. doi:10.1016/j.forpol.2005.06.010

Toledo, V.M., Carabias, J., Mapes, C. y Toledo, C. 1985. Ecología y autosuficiencia alimentaria. Siglo XXI Editores, México.

Trejo-Macías, G., Estrada, A., y Mosqueda-Cabrera, M. A. 2007. Survey of helminto parasites in populations of *Alouatta palliata mexicana* and *A. pigra* in continuous and fragmented habitat in southern Mexico. International Journal of Primatology 28: 931-945.

Turner II,B.L., Villar, S.C., Fostser, D., Geoghegan, J., Keys, E., Klepeis, P., Lawrence, D., Mendoza, P.M., Manson, S., Ogneva-Himmelberger, Y., Plotkin, A.B., Salicrup, C.P., Chowdhury, R.R., Savitsky, B., Schneider, L., Schmook, B. y Vance, C. 2001. Deforestation in the southern Yucatan península. En: Forest ecology and management 154: 353-370.

Vázquez García V. y M. Montes Estrada. 2006. Plantas Alimenticias no Cultivadas en la Sierra de Santa Marta, Veracruz. Relaciones de Género y Papel en la Dieta Cotidiana. Revista Agronuevo 1(13): 89-122.

Vea, J.J. y Cristobal-Azkarate, J. 2006. Energetic constraints in fragmented habitat: a carrying capacity model for *Alouatta palliata* populations. En: Folia Primatológica 77(4): 329-330.

Velázquez V., J.F. Mas, J.R. Díaz-Gallegos, R. Mayorga-Saucedo, P.C. Alcántara, R. Castro, T. Fernández, G. Bocco, E. Ezcurra y J.L. Palacio. 2002. Patrones y tasas de cambio de uso del suelo en México. En: Gaceta Ecológica No.62. INE-SEMARNAT.

Velásquez Runk, J., P. Mepaquito y F. Peña. 2004. Artisanal Non-Timber Forest Products in Darién Province, Panamá: The Importance of Context. En: Conservation and Society 2(2): 217-134.

APENDIX I. NATURAL PROTECTED AREAS WITHIN THE MEXICAN PRIMATES EXTENT OF OCURRENCE

NPA	*Alouatta palliata mexicana*	*Alouatta pigra*	*Ateles geoffroyi vellerosus*	*Ateles geoffroyi yucatanensis*	ID MAP
Reserva de la Biosfera Los Tuxtlas	✓		✓		1
Reserva de la Biosfera Pantanos de Centla	✓	✓			2
Área de Protección de Flora y Fauna Laguna de Términos	✓	✓		✓	3
Reserva de Biosfera Los Petenes		✓		✓	4
Reserva de Biosfera Ría Lagartos				✓	5
Reserva de la Biosfera Sian Ka'an		✓		✓	6
Área de Protección de Flora y Fauna Uaymil				✓	7
Área de Protección de Flora y Fauna Balaan Kaax		✓		✓	8
Reserva de la Biosfera Calakmul		✓		✓	9
Reserva de la Biosfera Selva del Ocote			✓		16
Reserva de la Biosfera La Sepultura			✓		17
Reserva de la Biosfera La Encrucijada			✓		18
Reserva de la Biosfera El Triunfo			✓		19
Reserva de Biosfera Volcan Tacana					20
Parque Nacional Lagunas de Montebello					21
Reserva de la Biosfera Montes Azules		✓	✓		22
Reserva de la Biosfera Lacan tun		✓	✓		23
Área de Protección de Flora y Fauna Chan-Kin		✓		✓	24
Área de Protección de Flora y Fauna Naha		✓	✓		25
Área de Protección de Flora y Fauna Metzabok		✓	✓		26
Zona de Protección Forestal Cascadas de Agua Azul		✓	✓		27
Parque Nacional Palenque		✓	✓		28

Parque Nacional Cañón del Sumidero			✓		29
Monumento Nacional Yaxchilan		✓		✓	30
Parque Nacional Dzibilchantun					31
Reserva de la Biosfera Ría Celestum		✓		✓	32
Área de Protección de Flora y Fauna Otoch Ma-ax Yetel kooh		✓		✓	33
Área de Protección de Flora y Fauna Yum Balam		✓			34
Monumento Nacional Bonampak		✓	✓		36
Parque Nacional Tulum		✓		✓	37
Reserva Ecológica Yumka	✓				

APENDIX II

IUCN Red List Categories and Criteria

Guidelines for the Application of the IUCN Red List Criteria at Regional Levels

IUCN Red List Categories and Criteria

Version 3.1

Prepared by the IUCN Species Survival Commission

As approved by the
51st meeting of the IUCN Council
Gland, Switzerland

9 February 2000

IUCN – The World Conservation Union
2001

Acknowledgements

IUCN gratefully acknowledges the dedication and efforts of the Red List Criteria Review Working Group (CRWG) in attending numerous workshops to discuss and debate the merits and demerits of the Red List Criteria. The members of the CRWG were: Resit Akçakaya, Jonathan Baillie, William Bond, Nigel Collar, Ulf Gärdenfors, Kevin Gaston, Craig Hilton-Taylor, Elodie Hudson, Bob Irvin, David Keith, Russell Lande, Charlotte Lusty, Nigel Leader-Williams, Georgina Mace, Michael Maunder, Larry Master, E.J. Milner-Gulland, Sanjay Molur, Howard Powles, André Punt, Jon Paul Rodríguez, Mary Seddon, Alison Stattersfield, Simon Stuart, John Wang, and Tetsukazu Yahara. Particular thanks must go to Dr Georgina Mace, who chaired the CRWG and who ably steered an extremely complex process through to a successful conclusion. The review process culminated in the adoption of this revised set of Red List Categories and Criteria by the IUCN Council.

The work of the CRWG and the hosting of the review workshops were made possible through generous financial support from the Canadian Wildlife Service; Federal Ministry for Economic Co-operation and Development, Germany (BMZ); Global Guardian Trust; New South Wales National Parks and Wildlife Service, Australia; New South Wales Scientific Committee, Australia; Ministry of the Environment, Finland; Ministry of the Environment, Sweden; Swedish Species Information Centre; and WWF Sweden. The review process was co-ordinated by the IUCN Red List Programme Officer funded by the UK Department for the Environment, Food and Rural Affairs (DEFRA); the Center for Applied Biodiversity Science at Conservation International; and WWF UK.

IUCN is indebted to the hundreds of scientists who participated in the criteria review workshops or who submitted comments and suggestions during the review process. This combined input has resulted in a far more robust, user friendly and widely applicable system.

As a result of the review process, several new topics have become the focus of active research and publication in the academic community. As greater clarity emerges on tricky and unresolved issues, these will be addressed in a comprehensive set of user guidelines. The intention is to keep this revised system stable to enable genuine changes in the status of species to be detected rather than to have such changes obscured by the constant modification of the criteria.

The Red List Categories and Criteria, Version 3.1 are available in booklet form in the following language versions: English, French and Spanish from the IUCN Publications Services Unit (see address on inside front cover).

They are also available on the SSC website in English, French and Spanish, at: http://www.iucn.org/themes/ssc/red-lists.htm

I. INTRODUCTION

1. The IUCN Red List Categories and Criteria are intended to be an easily and widely understood system for classifying species at high risk of global extinction. The general aim of the system is to provide an explicit, objective framework for the classification of the broadest range of species according to their extinction risk. However, while the Red List may focus attention on those taxa at the highest risk, it is not the sole means of setting priorities for conservation measures for their protection.

Extensive consultation and testing in the development of the system strongly suggest that it is robust across most organisms. However, it should be noted that although the system places species into the threatened categories with a high degree of consistency, the criteria do not take into account the life histories of every species. Hence, in certain individual cases, the risk of extinction may be under- or over-estimated.

2. Before 1994 the more subjective threatened species categories used in IUCN Red Data Books and Red Lists had been in place, with some modification, for almost 30 years. Although the need to revise the categories had long been recognized (Fitter and Fitter 1987), the current phase of development only began in 1989 following a request from the IUCN Species Survival Commission (SSC) Steering Committee to develop a more objective approach. The IUCN Council adopted the new Red List system in 1994.

The IUCN Red List Categories and Criteria have several specific aims:
- to provide a system that can be applied consistently by different people;
- to improve objectivity by providing users with clear guidance on how to evaluate different factors which affect the 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. Since their adoption by IUCN Council in 1994, the IUCN Red List Categories have become widely recognized internationally, and they are now used in a range of publications and listings produced by IUCN, as well as by numerous governmental and non-governmental organizations. Such broad and extensive use revealed the need for a number of improvements, and SSC was mandated by

the 1996 World Conservation Congress (WCC Res. 1.4) to conduct a review of the system (IUCN 1996). This document presents the revisions accepted by the IUCN Council.

The proposals presented in this document result from a continuing process of drafting, consultation and validation. The production of a large number of draft proposals has 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 become necessary, a system for version numbering has been adopted 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.

Version 2.3: IUCN (1994)
IUCN Council adopted this version, which incorporated changes as a result of comments from IUCN members, in December 1994. The initial version of this document was published without the necessary bibliographic details, such as date of publication and ISBN number, but these were included in the subsequent reprints in 1998 and 1999. This version was used for the *1996 IUCN Red List of Threatened Animals* (Baillie and Groombridge 1996), *The World List of Threatened Trees* (Oldfield *et al.* 1998) and the *2000 IUCN Red List of Threatened Species* (Hilton-Taylor 2000).

Version 3.0: IUCN/SSC Criteria Review Working Group (1999)
Following comments received, a series of workshops were convened to look at the IUCN Red List Criteria following which, changes were proposed affecting the criteria, the definitions of some key terms and the handling of uncertainty.

Version 3.1: IUCN (2001)
The IUCN Council adopted this latest version, which incorporated changes as a result of comments from the IUCN and SSC memberships and from a final meeting of the Criteria Review Working Group, in February 2000.

All new assessments from January 2001 should use the latest adopted version and cite the year of publication and version number.

4. In the rest of this document, the proposed system is outlined in several sections. Section II, the Preamble, presents basic information about the context and structure of the system, and the procedures that are to be followed in applying the criteria to species. Section III provides definitions of key terms used. Section IV presents the categories, while Section V details the quantitative criteria used for classification within the threatened categories. Annex I provides guidance on how to deal with uncertainty when applying the criteria; Annex II suggests a standard format for citing the Red List Categories and Criteria; and Annex III outlines the documentation requirements for taxa to be included on IUCN's global Red Lists. It is important for the effective functioning of the system that all sections are read and understood to ensure that the definitions and rules are followed. (**Note:** Annexes I, II and III will be updated on a regular basis.)

II. PREAMBLE

The information in this section is intended to direct and facilitate the use and interpretation of the categories (Critically Endangered, Endangered, etc.), criteria (A to E), and subcriteria (1, 2, etc.; a, b, etc.; i, ii, etc.).

1. Taxonomic level and scope of the categorization process

The criteria can be applied to any taxonomic unit at or below the species level. In the following information, definitions and criteria the term 'taxon' is used for convenience, and may represent species or lower taxonomic levels, including forms that are not yet formally described. There is 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 14. In presenting the results of applying the criteria, the taxonomic unit and area under consideration should be specified in accordance with the documentation guidelines (see Annex 3). The categorization process should only be applied to wild populations inside their natural range, and to populations resulting from benign introductions. The latter are defined in the IUCN *Guidelines for Re-introductions* (IUCN 1998) 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. This is a feasible conservation tool only when there is no remaining area left within a species' historic range'.

2. Nature of the categories

Extinction is 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 those 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.

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 categories form a part of the overall scheme. It will be possible to place all taxa into one of the categories (see Figure 1).

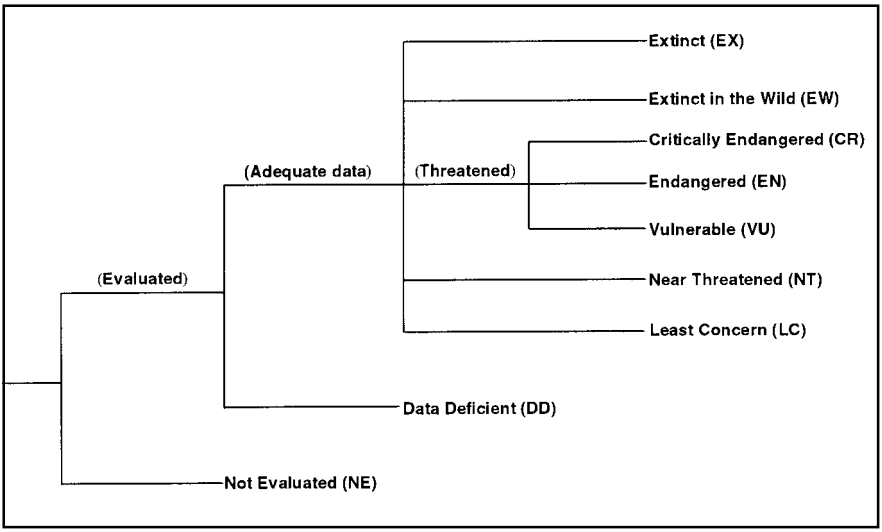


Figure 1. Structure of the categories.

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 taxon should be evaluated against all the criteria. 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. 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 in advance which criteria are appropriate for a particular taxon, each taxon should be evaluated against all the criteria, and *all* criteria met at the highest threat category must be listed.

4. Derivation of quantitative 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. 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. Broad consistency between them was sought.

5. 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. It is important to emphasise here that a taxon may require conservation action even if it is not listed as threatened. Conservation actions which may benefit the taxon are included as part of the documentation requirements (see Annex 3).

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 as being 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 the recent past, present or near future can be based on any of a series of related factors, and these factors should be specified as part of the documentation.

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 taken, because their effects are irreversible or nearly so (e.g., pathogens, invasive organisms, hybridization).

7. 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 the area will be that they are found to occupy, and the less likely it will be that range estimates (at least for 'area of occupancy': see Definitions, point 10) exceed the thresholds specified in the criteria. Mapping at finer scales reveals more areas in which the taxon is unrecorded. Conversely, coarse-scale mapping reveals fewer unoccupied areas, resulting in range estimates that are more likely to exceed the thresholds for the threatened categories. The choice of scale at which range is estimated may thus, itself, influence the outcome of Red List assessments and could be a source of inconsistency and bias. It is impossible to provide any strict but general rules for mapping taxa or habitats; the most appropriate scale will depend on the taxon in question, and the origin and comprehensiveness of the distribution data.

8. Uncertainty

The data used to evaluate taxa against the criteria are often estimated with considerable uncertainty. Such uncertainty can arise from any one or all of the following three factors: natural variation, vagueness in the terms and definitions used, and measurement error. The way in which this uncertainty is handled can have a strong influence on the results of an evaluation. Details of methods recommended for handling uncertainty are included in Annex 1, and assessors are encouraged to read and follow these principles.

In general, when uncertainty leads to wide variation in the results of assessments, the range of possible outcomes should be specified. A single category must be chosen and the basis for the decision should be documented; it should be both precautionary and credible.

When data are very uncertain, the category of 'Data Deficient' may be assigned. However, in this case the assessor must provide documentation showing that this category has been assigned because data are inadequate to determine a threat category. It is important to recognize that taxa that are poorly known can often be assigned a threat category on the basis of background information concerning the deterioration of their habitat and/or other causal factors; therefore the liberal use of 'Data Deficient' is discouraged.

9. 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, taxa listed in these categories should not be treated as if they were non-threatened. It may be appropriate (especially for Data Deficient forms) to give them the same degree of attention as threatened taxa, at least until their status can be assessed.

10. Documentation

All assessments should be documented. Threatened classifications should state the criteria and subcriteria that were met. No assessment can be accepted for the IUCN Red List as valid unless at least one criterion is given. If more than one criterion or subcriterion is met, then each should be listed. If a re-evaluation indicates that the documented criterion is no longer met, this should not result in automatic reassignment to a lower category of threat (downlisting). Instead, the taxon should be re-evaluated against all the criteria to clarify its status. The factors responsible for qualifying the taxon against the criteria, especially where inference and projection are used, should be documented

(see Annexes 2 and 3). The documentation requirements for other categories are also specified in Annex 3.

11. 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 extinction risk 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 other biological characteristics of the subject.

12. Re-evaluation

Re-evaluation of taxa against the criteria should be carried out at appropriate intervals. This is especially important for taxa listed under Near Threatened, Data Deficient and for threatened taxa whose status is known or suspected to be deteriorating.

13. Transfer between categories

The following rules govern the movement of taxa between categories:

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 five 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 Point 10 above).
C. Transfer from categories of lower to higher risk should be made without delay.

14. Use at regional level

The IUCN Red List Categories and Criteria were designed for global taxon assessments. However, many people are interested in applying them to subsets of global data, especially at regional, national or local levels. To do this it is important to refer to guidelines prepared by the IUCN/SSC Regional Applications Working Group (e.g., Gärdenfors *et al.* 2001). When applied at national or regional levels it must be recognized that a global category may not be the same as a national or regional category for a particular taxon. For example, taxa classified as Least Concern 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. Conversely, taxa classified as Vulnerable on the basis of their global declines in numbers or range might be

Least Concern within a particular region where their populations are stable. It is also important to note that taxa endemic to regions or nations will be assessed globally in any regional or national applications of the criteria, and in these cases great care must be taken to check that an assessment has not already been undertaken by a Red List Authority (RLA), and that the categorization is agreed with the relevant RLA (e.g., an SSC Specialist Group known to cover the taxon).

III. DEFINITIONS

1. Population and Population Size (Criteria A, C and D)

The term 'population' is used in a specific sense in the Red List Criteria that is different to its common biological usage. Population is here defined as the total number of individuals of the taxon. For functional reasons, primarily owing to differences between life forms, population size is measured 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 (Criteria B and C)

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

3. Mature individuals (Criteria A, B, C and D)

The number of mature individuals is 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:

- Mature individuals that will never produce new recruits should not be counted (e.g. densities are too low for fertilization).
- 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.
- Where the population size fluctuates, use a lower estimate. In most cases this will be much less than the mean.
- 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.
- Re-introduced individuals must have produced viable offspring before they are counted as mature individuals.

4. Generation (Criteria A, C and E)

Generation length is the average age of parents of the current cohort (i.e. newborn individuals in the population). Generation length therefore reflects the turnover rate of breeding individuals in a population. Generation length is greater than the

age at first breeding and less than the age of the oldest breeding individual, except in taxa that breed only once. Where generation length varies under threat, the more natural, i.e. pre-disturbance, generation length should be used.

5. Reduction (Criterion A)

A reduction is a decline in the number of mature individuals of at least the amount (%) stated under the criterion over the time period (years) specified, although the decline need not be continuing. A reduction should not be interpreted as part of a fluctuation unless there is good evidence for this. The downward phase of a fluctuation will not normally count as a reduction.

6. Continuing decline (Criteria B and C)

A continuing decline is a recent, current or projected future decline (which may be smooth, irregular or sporadic) which is liable to continue unless remedial measures are taken. Fluctuations will not normally count as continuing declines, but an observed decline should not be considered as a fluctuation unless there is evidence for this.

7. Extreme fluctuations (Criteria B and C)

Extreme fluctuations can be said to occur in a number of taxa when 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 (Criterion B)

The phrase 'severely fragmented' refers to the situation in which increased extinction risk to the taxon results from the fact that most of its individuals are found in small and relatively isolated subpopulations (in certain circumstances this may be inferred from habitat information). These small subpopulations may go extinct, with a reduced probability of recolonization.

9. Extent of occurrence (Criteria A and B)

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 (see Figure 2). 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', point 10 below). 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).

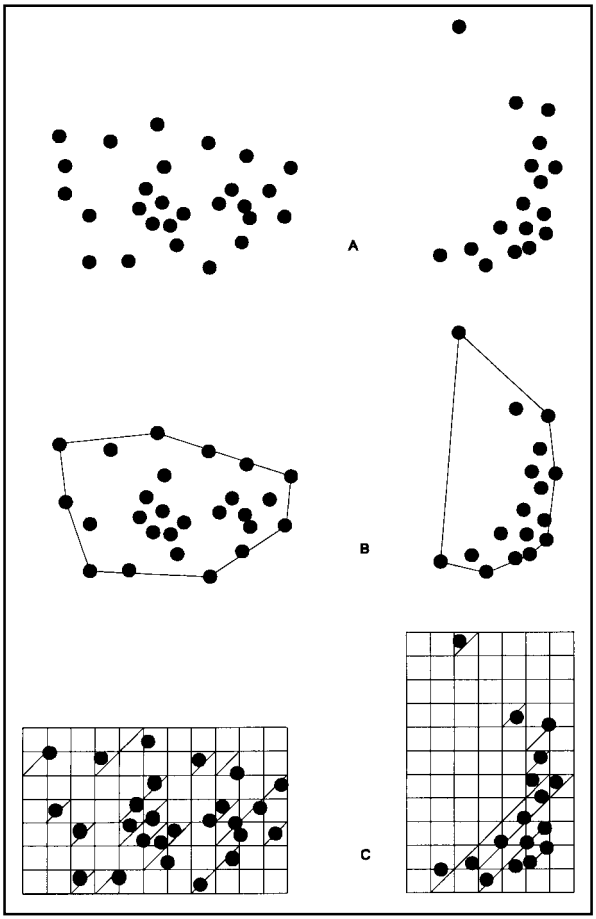


Figure 2. Two examples of the distinction between extent of occurrence and area of occupancy. (A) is the spatial distribution of known, inferred or projected sites of present occurrence. (B) shows one possible boundary to the extent of occurrence, which is the measured area within this boundary. (C)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

10. Area of occupancy (Criteria A, B and D)

Area of occupancy is defined as the area within its 'extent of occurrence' (see point 9 above) 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 contain unsuitable or unoccupied habitats. In some cases (e.g. irreplaceable colonial nesting sites, crucial feeding sites for migratory taxa) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon. 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 nature of

threats and the available data (see point 7 in the Preamble). To avoid inconsistencies and bias in assessments caused by estimating area of occupancy at different scales, it may be necessary to standardize estimates by applying a scale-correction factor. It is difficult to give strict guidance on how standardization should be done because different types of taxa have different scale-area relationships.

11. Location (Criteria B and D)

The term 'location' defines a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present. The size of the location depends on the area covered by the threatening event and may include part of one or many subpopulations. Where a taxon is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.

12. Quantitative analysis (Criterion E)

A quantitative analysis is defined here as any form of analysis which estimates the extinction probability of a taxon based on known life history, habitat requirements, threats and any specified management options. Population viability analysis (PVA) is one such technique. Quantitative analyses should make full use of all relevant available data. In a situation in which there is limited information, such data as are available can be used to provide an estimate of extinction risk (for instance, estimating the impact of stochastic events on habitat). In presenting the results of quantitative analyses, the assumptions (which must be appropriate and defensible), the data used and the uncertainty in the data or quantitative model must be documented.

IV. THE CATEGORIES [1]

A representation of the relationships between the categories is shown in Figure 1.

EXTINCT (EX)

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

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 naturalized 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 the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.

---

[1] *Note: As in previous IUCN categories, the abbreviation of each category (in parenthesis) follows the English denominations when translated into other languages (see Annex 2).*

NEAR THREATENED (NT)

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

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 are lacking. Data Deficient is therefore not a category of threat. 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 a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and 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 is has not yet been evaluated against the criteria.

V. THE CRITERIA FOR CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing an extremely high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥90% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
   (a) direct observation
   (b) an index of abundance appropriate to 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, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ≥80% over the last 10 years or three generations, whichever is the longer**,** where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible**,** based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥80%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥80% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 100 km^2, and estimates indicating at least two of a–c:

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

   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.

   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 10 km^2, and estimates indicating at least two of a–c:

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

   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.

   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.

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

1. An estimated continuing decline of at least 25% within three years or one generation, whichever is longer, (up to a maximum of 100 years in the future) OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a–b):

   a. Population structure in the form of one of the following:
      (i) no subpopulation estimated to contain more than 50 mature individuals, OR
      (ii) at least 90% of mature individuals in one subpopulation.

   b. Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or three generations, whichever is the longer (up to a maximum of 100 years).

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a very high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥70% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
   (a) direct observation
   (b) an index of abundance appropriate to 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, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ≥50% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥50%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥50% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 5000 km^2, and estimates indicating at least two of a–c:

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

   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.

   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 500 km^2, and estimates indicating at least two of a–c:

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

   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.

   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.

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

   1. An estimated continuing decline of at least 20% within five years or two generations, whichever is longer, (up to a maximum of 100 years in the future) OR

   2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a–b):

      a. Population structure in the form of one of the following:
         (i) no subpopulation estimated to contain more than 250 mature individuals, OR
         (ii) at least 95% of mature individuals in one subpopulation.

      b. Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer (up to a maximum of 100 years).

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥50% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are: clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
   (a) direct observation
   (b) an index of abundance appropriate to 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, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ≥30% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥30%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥30% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 20,000 km^2, and estimates indicating at least two of a–c:

a. Severely fragmented or known to exist at no more than 10 locations.

b. Continuing decline, observed, inferred or projected, in any of the following:
   (i) extent of occurrence
   (ii) area of occupancy
   (iii) area, extent and/or quality of habitat
   (iv) number of locations or subpopulations
   (v) number of mature individuals.

c. Extreme fluctuations in any of the following:
   (i) extent of occurrence
   (ii) area of occupancy
   (iii) number of locations or subpopulations
   (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 2000 km^2, and estimates indicating at least two of a–c:

   a. Severely fragmented or known to exist at no more than 10 locations.

   b. Continuing decline, observed, inferred or projected, in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) area, extent and/or quality of habitat
      (iv) number of locations or subpopulations
      (v) number of mature individuals.

   c. Extreme fluctuations in any of the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals.

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

   1. An estimated continuing decline of at least 10% within 10 years or three generations, whichever is longer, (up to a maximum of 100 years in the future) OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a–b):

    a. Population structure in the form of one of the following:
        (i) no subpopulation estimated to contain more than 1000 mature individuals, OR
        (ii) all mature individuals are in one subpopulation.

    b. Extreme fluctuations in number of mature individuals.

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

1. Population size estimated to number fewer than 1000 mature individuals.

2. Population with a very restricted area of occupancy (typically less than 20 km^2) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.

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

Annex 1: Uncertainty

The Red List Criteria should be applied to a taxon based on the available evidence concerning its numbers, trend and distribution. In cases where there are evident threats to a taxon through, for example, deterioration of its only known habitat, a threatened listing may be justified, even though there may be little direct information on the biological status of the taxon itself. In all these instances there are uncertainties associated with the available information and how it was obtained. These uncertainties may be categorized as natural variability, semantic uncertainty and measurement error (Akçakaya *et al*. 2000). This section provides guidance on how to recognize and deal with these uncertainties when using the criteria.

Natural variability results from the fact that species' life histories and the environments in which they live change over time and space. The effect of this variation on the criteria is limited, because each parameter refers to a specific time or spatial scale. Semantic uncertainty arises from vagueness in the definition of terms or lack of consistency in different assessors' usage of them. Despite attempts to make the definitions of the terms used in the criteria exact, in some cases this is not possible without the loss of generality. Measurement error is often the largest source of uncertainty; it arises from the lack of precise information about the parameters used in the criteria. This may be due to inaccuracies in estimating the values or a lack of knowledge. Measurement error may be reduced or eliminated by acquiring additional data. For further details, see Akçakaya *et al*. (2000) and Burgman *et al*. (1999).

One of the simplest ways to represent uncertainty is to specify a best estimate and a range of plausible values. The best estimate itself might be a range, but in any case the best estimate should always be included in the range of plausible values. When data are very uncertain, the range for the best estimate might be the range of plausible values. There are various methods that can be used to establish the plausible range. It may be based on confidence intervals, the opinion of a single expert, or the consensus opinion of a group of experts. Whichever method is used should be stated and justified in the documentation.

When interpreting and using uncertain data, attitudes toward risk and uncertainty may play an important role. Attitudes have two components. First, assessors need to consider whether they will include the full range of plausible values in assessments, or whether they will exclude extreme values from consideration

(known as dispute tolerance). An assessor with a low dispute tolerance would include all values, thereby increasing the uncertainty, whereas an assessor with a high dispute tolerance would exclude extremes, reducing the uncertainty. Second, assessors need to consider whether they have a precautionary or evidentiary attitude to risk (known as risk tolerance). A precautionary attitude will classify a taxon as threatened unless it is certain that it is not threatened, whereas an evidentiary attitude will classify a taxon as threatened only when there is strong evidence to support a threatened classification. Assessors should resist an evidentiary attitude and adopt a precautionary but realistic attitude to uncertainty when applying the criteria, for example, by using plausible lower bounds, rather than best estimates, in determining population size, especially if it is fluctuating. All attitudes should be explicitly documented.

An assessment using a point estimate (i.e. single numerical value) will lead to a single Red List Category. However, when a plausible range for each parameter is used to evaluate the criteria, a range of categories may be obtained, reflecting the uncertainties in the data. A single category, based on a specific attitude to uncertainty, should always be listed along with the criteria met, while the range of plausible categories should be indicated in the documentation (see Annex 3).

Where data are so uncertain that any category is plausible, the category of 'Data Deficient' should be assigned. However, it is important to recognize that this category indicates that the data are inadequate to determine the degree of threat faced by a taxon, not necessarily that the taxon is poorly known or indeed not threatened. Although Data Deficient is not a threatened category, it indicates a need to obtain more information on a taxon to determine the appropriate listing; moreover, it requires documentation with whatever available information there is.

Annex 2: Citation of the IUCN Red List Categories and Criteria

In order to promote the use of a standard format for citing the Red List Categories and Criteria the following forms of citation are recommended:

1. The Red List Category may be written out in full or abbreviated as follows (when translated into other languages, the abbreviations should follow the English denominations):

Extinct, EX	Near Threatened, NT
Extinct in the Wild, EW	Least Concern, LC
Critically Endangered, CR	Data Deficient, DD
Endangered, EN	Not Evaluated, NE
Vulnerable, VU	

2. Under Section V (the criteria for Critically Endangered, Endangered and Vulnerable) there is a hierarchical alphanumeric numbering system of criteria and subcriteria. These criteria and subcriteria (all three levels) form an integral part of the Red List assessment and all those that result in the assignment of a threatened category must be specified after the Category. Under the criteria A to C and D under Vulnerable, the first level of the hierarchy is indicated by the use of numbers (1–4) and if more than one is met, they are separated by means of the '+' symbol. The second level is indicated by the use of the lower-case alphabet characters (a–e). These are listed without any punctuation. A third level of the hierarchy under Criteria B and C involves the use of lower case roman numerals (i–v). These are placed in parentheses (with no space between the preceding alphabet character and start of the parenthesis) and separated by the use of commas if more than one is listed. Where more than one criterion is met, they should be separated by semicolons. The following are examples of such usage:

EX	CR A1cd	VU A2c+3c
EN B1ac(i,ii,iii)	EN A2c; D	VU D1+2
CR A2c+3c; B1ab(iii)	CR D	VU D2
EN B2ab(i,ii,iii)	VU C2a(ii)	
EN A1c; B1ab(iii); C2a(i)	EN B2b(iii)c(ii)	
EN B1ab(i,ii,v)c(iii,iv)+2b(i)c(ii,v)	VU B1ab(iii)+2ab(iii)	
EN A2abc+3bc+4abc; B1b(iii,iv,v)c(ii,iii,iv)+2b(iii,iv,v)c(ii,iii,iv)		

Annex 3: Documentation Requirements for Taxa Included on the IUCN Red List

The following is the **minimum** set of information, which should accompany every assessment submitted for incorporation into the *IUCN Red List of Threatened Species*™:

- Scientific name including authority details
- English common name/s and any other widely used common names (specify the language of each name supplied)
- Red List Category and Criteria
- Countries of occurrence (including country subdivisions for large nations, e.g. states within the USA, and overseas territories, e.g. islands far from the mainland country)
- For marine species, the Fisheries Areas in which they occur should be recorded (see http://www.iucn.org/themes/ssc/sis/faomap.htm for the Fisheries Areas as delimited by FAO, the Food and Agriculture Organization of the United Nations)
- For inland water species, the names of the river systems, lakes, etc. to which they are confined
- A map showing the geographic distribution (extent of occurrence)
- A rationale for the listing (including any numerical data, inferences or uncertainty that relate to the criteria and their thresholds)
- Current population trends (increasing, decreasing, stable or unknown)
- Habitat preferences (using a modified version of the Global Land Cover Characterization (GLCC) classification which is available electronically from http://www.iucn.org/themes/ssc/sis/authority.htm or on request from redlist@ssc-uk.org)
- Major threats (indicating past, current and future threats using a standard classification which is available from the SSC web site or e-mail address as shown above)
- Conservation measures, (indicating both current and proposed measures using a standard classification which is available from the SSC web site or e-mail address as shown above)
- Information on any changes in the Red List status of the taxon, and why the status has changed
- Data sources (cited in full; including unpublished sources and personal communications)
- Name/s and contact details of the assessor/s
- Before inclusion on the IUCN Red List, all assessments will be evaluated by

at least two members of a Red List Authority. The Red List Authority is appointed by the Chair of the IUCN Species Survival Commission and is usually a sub-group of a Specialist Group. The names of the evaluators will appear with each assessment.

In addition to the minimum documentation, the following information should also be supplied where appropriate:

- If a quantitative analysis is used for the assessment (i.e. Criterion E), the data, assumptions and structural equations (e.g., in the case of a Population Viability Analysis) should be included as part of the documentation.
- For Extinct or Extinct in the Wild taxa, extra documentation is required indicating the effective date of extinction, possible causes of the extinction and the details of surveys which have been conducted to search for the taxon.
- For taxa listed as Near Threatened, the rationale for listing should include a discussion of the criteria that are nearly met or the reasons for highlighting the taxon (e.g., they are dependent on ongoing conservation measures).
- For taxa listed as Data Deficient, the documentation should include what little information is available.

Assessments may be made using version 2.0 of the software package RAMAS® Red List (Akçakaya and Ferson 2001). This program assigns taxa to Red List Categories according to the rules of the IUCN Red List Criteria and has the advantage of being able to explicitly handle uncertainty in the data. The software captures most of the information required for the documentation above, but in some cases the information will be reported differently. The following points should be noted:

- If RAMAS® Red List is used to obtain a listing, this should be stated.
- Uncertain values should be entered into the program as a best estimate and a plausible range, or as an interval (see the RAMAS® Red List manual or help files for further details).
- The settings for attitude towards risk and uncertainty (i.e. dispute tolerance, risk tolerance and burden of proof) are all pre-set at a mid-point. If any of these settings are changed this should be documented and fully justified, especially if a less precautionary position is adopted.
- Depending on the uncertainties, the resulting classification can be a single category and/or a range of plausible categories. In such instances, the following approach should be adopted (the program will usually indicate this automatically in the Results window):
  - If the range of plausible categories extends across two or more of the threatened categories (e.g. Critically Endangered to Vulnerable) and no

preferred category is indicated, the precautionary approach is to take the highest category shown, i.e. CR in the above example. In such cases, the range of plausible categories should be documented under the rationale including a note that a precautionary approach was followed in order to distinguish it from the situation in the next point. The following notation has been suggested e.g. CR* (CR–VU).

  - If a range of plausible categories is given and a preferred category is indicated, the rationale should indicate the range of plausible categories met e.g. EN (CR–VU).

- The program specifies the criteria that contributed to the listing (see Status window). However, when data are uncertain, the listing criteria are approximate, and in some cases may not be determined at all. In such cases, the assessors should use the Text results to determine or verify the criteria and sub-criteria met. Listing criteria derived in this way must be clearly indicated in the rationale (refer to the RAMAS® Red List Help menu for further guidance on this issue).
- If the preferred category is indicated as Least Concern, but the plausible range extends into the threatened categories, a listing of 'Near Threatened' (NT) should be used. The criteria, which triggered the extension into the threatened range, should be recorded under the rationale.
- Any assessments made using this software must be submitted with the RAMAS® Red List input files (i.e. the *.RED files).

New global assessments or reassessments of taxa currently on the IUCN Red List, may be submitted to the IUCN/SSC Red List Programme Officer for incorporation (subject to peer review) in a future edition of the *IUCN Red List of Threatened Species*™. Submissions from within the SSC network should preferably be made using the Species Information Service (SIS) database. Other submissions may be submitted electronically; these should preferably be as files produced using RAMAS® Red List or any of the programs in Microsoft Office 97 (or earlier versions) e.g. Word, Excel or Access. Submissions should be sent to:
IUCN/SSC Red List Programme, IUCN/SSC UK Office, 219c Huntingdon Road, Cambridge, CB3 0DL, United Kingdom. Fax: +44 (0)1223-277845; Email: redlist@ssc-uk.org.

For further clarification or information about the IUCN Red List Criteria, documentation requirements (including the standards used) or submission of assessments, please contact the IUCN/SSC Red List Programme Officer at the address shown above.

References

Akçakaya, H.R. and Ferson, S. 2001. *RAMAS® Red List: Threatened Species Classifications under Uncertainty*. Version 2.0. Applied Biomathematics, New York.

Akçakaya, H.R., Ferson, S., Burgman, M.A., Keith, D.A., Mace, G.M. and Todd, C.A. 2000. Making consistent IUCN classifications under uncertainty. *Conservation Biology* 14: 1001–1013.

Baillie, J. and Groombridge, B. (eds). 1996. *1996 IUCN Red List of Threatened Animals*. IUCN, Gland, Switzerland.

Burgman, M.A., Keith, D.A. and Walshe, T.V. 1999. Uncertainty in comparative risk analysis of threatened Australian plant species. *Risk Analysis* 19: 585–598.

Fitter, R. and Fitter, M. (eds). 1987. *The Road to Extinction*. IUCN, Gland, Switzerland.

Gärdenfors, U., Hilton-Taylor, C., Mace, G. and Rodríguez, J.P. 2001. The application of IUCN Red List Criteria at regional levels. *Conservation Biology* 15: 1206–1212.

Hilton-Taylor, C. (compiler). 2000. *2000 IUCN Red List of Threatened Species*. IUCN, Gland, Switzerland and Cambridge, UK.

IUCN. 1993. *Draft IUCN Red List Categories*. IUCN, Gland, Switzerland.

IUCN. 1994. *IUCN Red List Categories*. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland.

IUCN. 1996. Resolution 1.4. Species Survival Commission. *Resolutions and Recommendations*, pp. 7–8. World Conservation Congress, 13–23 October 1996, Montreal, Canada. IUCN, Gland, Switzerland.

IUCN. 1998. *Guidelines for Re-introductions*. Prepared by the IUCN/SSC Re-introduction Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK.

IUCN/SSC Criteria Review Working Group. 1999. IUCN Red List Criteria review provisional report: draft of the proposed changes and recommendations. *Species* 31–32: 43–57.

Mace, G.M., Collar, N., Cooke, J., Gaston, K.J., Ginsberg, J.R., Leader-Williams, N., Maunder, M. and Milner-Gulland, E.J. 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 re-evaluation of IUCN threatened species categories. *Conservation Biology* 5: 148–157.

Mace, G.M. and Stuart, S.N. 1994. Draft IUCN Red List Categories, Version 2.2. *Species* 21–22: 13–24.

Oldfield, S., Lusty, C. and MacKinven, A. 1998. *The World List of Threatened Trees*. World Conservation Press, Cambridge.

Guidelines for Application of IUCN Red List Criteria at Regional Levels:

Version 3.0

Elaborated by the
IUCN Species Survival Commision

June 2003

I. INTRODUCTION

The IUCN Red List Categories and Criteria (IUCN 2001; see also http://www.iucn.org/themes/ssc/redlists/rlcategories2000.html) were developed for classifying species at high risk of global extinction, i.e. for assessment at the global level. At regional, national and local levels (hereafter referred to as regional level) there are essentially two options: (1) To publish an unaltered subset of the global Red List encompassing those species that reproduce in the region or at any stage regularly visit the region. This may be a feasible option, particularly when the region has a high number of endemics or threatened near endemics, or when there is currently a pronounced overall deficiency of data pertaining to species status within the region. (2) To assess species' extinction risk and publish Red Lists within the specific region. For the purposes of regional conservation assessments there are important reasons to assess species' extinction risk and publish Red Lists within specific geographically defined areas.

While the first option is straightforward, the second involves a number of issues not encountered at the global level, including the assessment of populations across geopolitical borders, non-breeding phases of populations and non-indigenous taxa. When making assessments at regional levels it is also particularly important to recognize that while IUCN Red List Categories reflect the relative extinction risk of species, the process of setting priorities for conservation actions may require several additional considerations. As a consequence, the following guidelines were produced to assist in the application of the IUCN Red List Categories and Criteria at regional levels.

Recognizing the need for coherent guidelines for the application of Red List Categories at regional levels, the First World Conservation Congress held in Montreal in 1996, adopted a resolution (WCC Res. D. 1.25) that "Requests the SSC, within available resources, to complete the development of guidelines for using the IUCN Red List Categories at the regional level as soon as it is practicable...".

As part of the process to resolve these issues, the Regional Application Working Group (RAWG) was formed under the auspices of the Species Survival Commission's (SSC) Red List Programme. The membership of RAWG included people with technical experience in the development of the IUCN Red List Criteria, as well as those with practical experience of producing Red Lists at

regional levels. The group has consulted many different regional and national groups, participated in regional Red List assessment workshops, published draft versions of the guidelines (Gärdenfors *et al*. 1999, 2001) and undertaken a process of ongoing modification and improvement to the earlier drafts.

The final guidelines are presented here. Some issues have proved especially difficult to resolve to everyone's satisfaction. The users of these guidelines will deal with a wide diversity of natural systems and taxa, within different political and social contexts. We have encountered many of these during the drafting phases and have tried to take into account these diverse circumstances. Following much deliberation, the guidelines presented here are based on sound general principles and we recommend them to anyone who wishes to undertake Red List assessments at the regional level.

II. PREAMBLE

1. Application of the guidelines

Any country or region using the IUCN Red List Categories and Criteria for listing species must follow these guidelines if they wish to state that their assessment follows the IUCN system.

2. The regional concept

The word *regional* is used here to indicate any subglobal geographically defined area, such as a continent, country, state, or province.

Within any region there will be taxa with different distribution histories, ranging from those that are indigenous (native to the area), and have been there since pre-human settlement, to those introduced more recently. There may also be breeding and non-breeding taxa. The latter are those that do not reproduce in the region but may still be dependent upon its resources for their survival. There may also be formerly native taxa that are now extinct in the region, but which are still extant in other parts in the world.

3. IUCN Red List Criteria versus Regional Guidelines

All the rules and definitions in the IUCN Red List Categories and Criteria Version 3.1 (IUCN 2001) apply at regional levels, unless otherwise indicated here. Similarly, the 'Guidelines for using the IUCN Red List Categories and Criteria' (Standards and Petitions Subcommittee of the IUCN SSC Red List Programme Committee 2003) as well as the *IUCN Guidelines for Re-introductions* (IUCN 1998) also apply at regional levels. Consequently, a careful study of all these documents is highly recommended before application of the regional guidelines, and they should be constantly referred to when using this document. The guidelines for regional application are hereafter referred to as the Guidelines.

4. Scale applicability

Provided that the regional population to be assessed is isolated from conspecific populations outside the region, the IUCN Red List Criteria (IUCN 2001) can be used without modification within any geographically defined area. The extinction risk for such an isolated population is identical to that of an endemic taxon. However, when the criteria are applied to part of a population defined by a geopolitical border, or to a regional population where individuals move to or from other populations beyond the border, the threshold values listed under each criterion may be inappropriate, because the unit being assessed is not the

same as the whole population or subpopulation. As a result, the estimate of extinction risk may be inaccurate. These guidelines present methods for adjusting the results from the first step in the assessment process to obtain a Red List Category that adequately reflects a taxon's risk of extinction within the region.

Although the Guidelines may in principle be applied at any geographical scale, application within very restricted geographical areas is strongly discouraged. The smaller the region, and the more wide-ranging the taxon under consideration, the more often the regional population will interchange individuals with neighbouring populations. Therefore the assessment of extinction risk becomes increasingly unreliable. It is not possible to provide any specific guidance on the precise lower limit for sensible application as this depends on the nature of the region, and especially the barriers to dispersal that exist.

5. Regionally determined applications and modifications

Certain definitions and applications of the Guidelines are left to the discretion of regional Red List authorities. For example, the delimitation of natural range, time limits for regional extinction, and the nature of an initial filter for breeding and/or non-breeding taxa, are left open for the regional Red List authorities to decide. Such regional decisions must be clearly recorded and documented, for example as part of an introductory text to the listings.

6. Taxonomy

Regional Red List authorities are encouraged to follow the same taxonomic checklists as used by the global IUCN Red List (see http://www.redlist.org/info/info_sources_quality.html). For other taxonomic groups or any deviations from the recommended lists, the differences and the taxonomic authorities followed should be specified.

7. Scaling up assessments

Red List assessments from several smaller regions, such as countries on a continent, cannot be combined or scaled-up in any way to provide Red List Categories for the entire larger region. Assessments of extinction risk for the larger region require new evaluations using the pooled data from across the entire region. Data collected from individual smaller regions may be essential for the assessment of the larger region, and are often important for conservation planning.

8. Red List versus priority for conservation action

Assessment of extinction risk and setting conservation priorities are two related but different processes. Assessment of extinction risk, such as the assignment of IUCN Red List Categories, generally precedes the setting of priorities. The purpose of the Red List categorization is to produce a relative estimate of the likelihood of extinction of the taxon. Setting conservation priorities, on the other hand, which normally includes the assessment of extinction risk, also takes into account other factors such as ecological, phylogenetic, historical, or cultural preferences for some taxa over others, as well as the probability of success of conservation actions, availability of funds or personnel to carry out such actions, and legal frameworks for conservation of threatened taxa. In the context of regional risk assessments, a number of additional pieces of information are valuable for setting conservation priorities. For example, it is important to consider not only conditions within the region but also the status of the taxon from a global perspective and the proportion of the global population that occurs within the region. Consequently, it is recommended that any publication that results from a regional assessment process should include at least three measures: (1) the regional Red List Category, (2) the global Red List Category, and (3) an estimate of the proportion (%) of the global population occurring within the region (see section V. Documentation and Publication).

Decisions on how these three variables, as well as other factors, are used for establishing conservation priorities is a matter for the regional authorities to determine. The authorities may also wish to consider other variables in setting priorities, which are to a large degree region-specific and therefore not covered by the Guidelines. However, one particular situation merits special attention. The application of the Red List Criteria, particularly criterion A, may under some circumstances result in a taxon qualifying for listing in a higher category at the global level than the regional level. This may be the case when the regional population is more or less stable but constitutes only a small percentage of the global population, which is experiencing a net decline. Such species should be given particular attention at the regional level because of their significance for global status.

Regional Red List authorities should be aware that the view that a Red List based on the IUCN criteria is not automatically a list of priorities for conservation actions, may conflict with current legislation in some regions.

III. DEFINITIONS

1. Benign introduction
An attempt to establish a taxon, for the purpose of conservation, outside its recorded distribution but within an appropriate habitat and ecogeographical area; a feasible conservation tool only when there is no remaining area left within a taxon's historic range (IUCN 1998).

2. Breeding population
A (sub)population that reproduces within the region, whether this involves the entire reproductive cycle or any essential part of it.

3. Conspecific population
Populations of the same species; here applied to any taxonomic unit at or below the species level.

4. Downgrading and upgrading
The process for adjusting the Red List Category of a regional population according to a decreased or increased risk of extinction; downgrading refers to a reduced extinction risk and upgrading to an increased extinction risk.

5. Endemic taxon
A taxon naturally found in any specific area and nowhere else; this is a relative term in that a taxon can be endemic to a small island, to a country, or to a continent.

6. Global population
Total number of individuals of a taxon. (See 10. Population.)

7. Metapopulation
A collection of subpopulations of a taxon, each occupying a suitable patch of habitat in a landscape of otherwise unsuitable habitat. The survival of the metapopulation is dependent on the rate of local extinctions of occupied patches and the rate of (re-)colonization of empty patches (Levins 1969, Hanski 1999).

8. Natural range
Range of a taxon, excluding any portion that is the result of an introduction to a region or neighbouring region. The delimitation between wild and introduced

populations within a region may be based on a preset year or event, but this decision is left to the regional Red List authority.

9. Not Applicable (NA)

Category for a taxon deemed to be ineligible for assessment at a regional level. A taxon may be NA because it is not a wild population or not within its natural range in the region, or because it is a vagrant to the region. It may also be NA because it occurs at very low numbers in the region (i.e., when the regional Red List authority has decided to use a "filter" to exclude taxa before the assessment procedure) or the taxon may be classified at a lower taxonomic level (e.g., below the level of species or subspecies) than considered eligible by the regional Red List authority. In contrast to other Red List categories, it is not mandatory to use NA for all taxa to which it applies; but is recommended for taxa where its use is informative.

10. Population

This term is used in a specific sense in the IUCN Red List Criteria (IUCN 2001), different from its common biological usage. *Population* is defined as the total number of individuals of the taxon. Within the context of a regional assessment, it may be advisable to use the term *global population* for this. In the Guidelines the term population is used for convenience, when reference is made to a group of individuals of a given taxon that may or may not interchange propagules with other such entities. (See 15. Regional population and 18. Subpopulations.)

11. Propagule

A living entity capable of dispersal and of producing a new mature individual (e.g., a spore, seed, fruit, egg, larva, or part of or an entire individual). Gametes and pollen are not considered propagules in this context.

12. Region

A subglobal geographical area, such as a continent, country, state, or province.

13. Regional assessment

Process for determining the relative extinction risk of a regional population according to the Guidelines.

14. Regionally Extinct (RE)

Category for a taxon when there is no reasonable doubt that the last individual potentially capable of reproduction within the region has died or has disappeared from the wild in the region, or when, if it is a former visiting taxon, the last

individual has died or disappeared in the wild from the region. The setting of any time limit for listing under RE is left to the discretion of the regional Red List authority, but should not normally pre-date 1500 AD.

15. Regional population
The portion of the global population within the area being studied; which may comprise one or more subpopulations.

16. Rescue effect
Process by which immigrating propagules result in a lower extinction risk for the target population.

17. Sink
An area where the local reproduction of a taxon is lower than local mortality. The term is normally used for a subpopulation experiencing immigration from a source where the local reproduction is higher than the local mortality (see Pulliam 1988).

18. Subpopulations
Geographically or otherwise distinct groups in the (global) population between which there is little demographic or genetic exchange (typically one successful migrant individual or gamete per year or less; IUCN 2001); a subpopulation may or may not be restricted to a region.

19. Taxon
A species or infraspecific entity whose extinction risk is being assessed.

20. Vagrant
A taxon that is currently found only occasionally within the boundaries of a region. (See 21. Visitor.)

21. Visitor (also, visiting taxon)
A taxon that does not reproduce within a region but regularly occurs within its boundaries either now or during some period of the last century. Regions have several options on how to decide the boundaries between visitors and vagrants, e.g., using a preset percentage of the global population found in the region or predictability of occurrence.

22. Wild population

A population within its natural range in which the individuals are the result of natural reproduction (i.e., not the result of human-mediated release or translocation); if a population is the result of a benign introduction that is now or has previously been successful (i.e., self-sustaining), the population is considered wild.

IV. THE ASSESSMENT

1. Taxa to be assessed

The categorization process should be applied only to wild populations inside their natural range and to populations resulting from benign introductions (IUCN 1998, 2001). Taxa only marginally within the region should also enter the assessment process (unless excluded by an optional filter, see below). But a taxon that occasionally breeds under favourable circumstances in the region but regularly becomes (regionally) extinct should not be considered. Similarly, a taxon that is currently expanding its distributional range outside the region and appears to be in a colonization phase within the region should not be considered for regional assessment until the taxon has reproduced within the region for several years (typically for at least 10 consecutive years).

Taxa formerly considered Regionally Extinct (RE) that naturally re-colonize the region may be assessed after the first year of reproduction. Re-introduced, formerly RE taxa may be assessed as soon as at least a part of the population successfully reproduces without direct support and the offspring are shown to be viable.

Visiting taxa may be assessed against the criteria, but vagrant taxa should NOT be assessed.

The regional Red List authority may decide to apply a filter, e.g., a preset threshold of global or continental population share, to the assessment of breeding and/or visiting taxa. For instance, a region may decide that they will not assess species that occur or have occurred within the last century in the region with less than 1% of the global population. All filters applied must be clearly specified in the supporting documentation.

2. The categories

The IUCN Red List Categories (IUCN 2001) should be used unaltered at regional levels, with three exceptions or adjustments.

1. Taxa extinct within the region but extant in other parts of the world should be classified as *Regionally Extinct* (RE). A taxon is RE when there is no reasonable doubt that the last individual potentially capable of reproduction within the region has died or disappeared from the region or, in the case of a former visiting taxon, individuals no longer visit the region. It is not possible to set any general rules for a time period since the last observation before species are classified as

RE. This will depend on how much effort has been devoted to searches for the taxon, which in turn will vary, both with organism and region. If the regional authority decides to adopt any time frames for RE assessments, these should be clearly specified.

Populations of long-lived individuals that have ceased to reproduce within the region (for example, as a result of a deteriorating environment) should be regarded as potentially capable of reproduction and consequently should not be classified as RE. On the other hand, vagrant individuals of a formerly regionally breeding taxon that reach the region should not be regarded as potentially capable of reproduction.

2. The category of *Extinct in the Wild* (EW) should be assigned only to taxa that are extinct in the wild across their entire natural range, including the region, but that are extant in cultivation, in captivity, or as a naturalized population (or populations) outside the past range. If a taxon is (globally) EW but extant as a naturalized population within the region, the regional population should be treated as being the result of a benign introduction and consequently should be assessed according to the Red List Criteria. The rationale for the latter exception

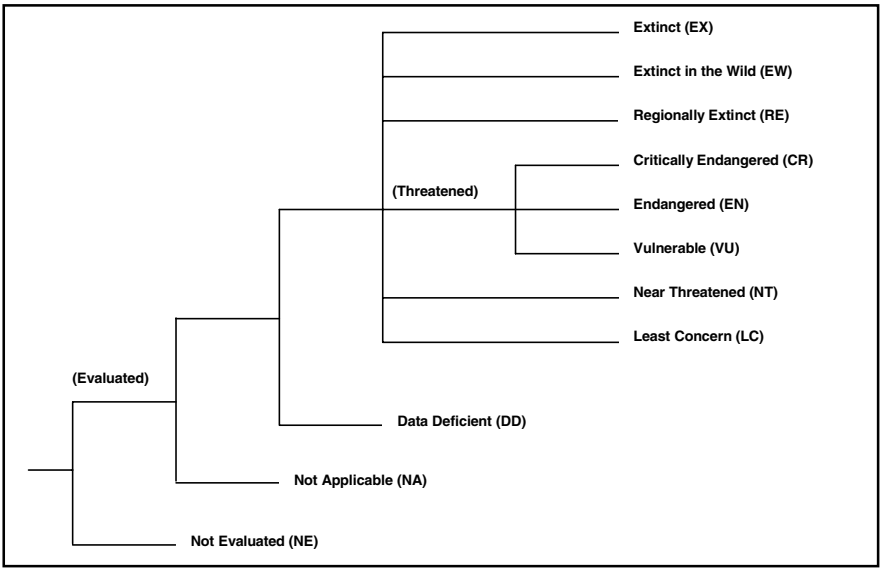


Figure 1. Structure of the categories at regional level.

is that if a taxon is extinct over its entire natural range the presence of the taxon within the region must be considered important to highlight and preserve even though the region is not part of the taxon's natural range.

3. Taxa not eligible for assessment at the regional level (mainly introduced taxa and vagrants) should be assigned the category *Not Applicable* (NA).

3. The Assessment Procedure

Regional assessments should be carried out in a two-step process that is slightly different for breeding and non-breeding populations (Table 1; Fig. 2).

Breeding populations

In step one, the IUCN Red List Criteria are applied to the regional population of the taxon (as specified by IUCN 2001), resulting in a preliminary categorization. All data used in this initial assessment – such as number of individuals and

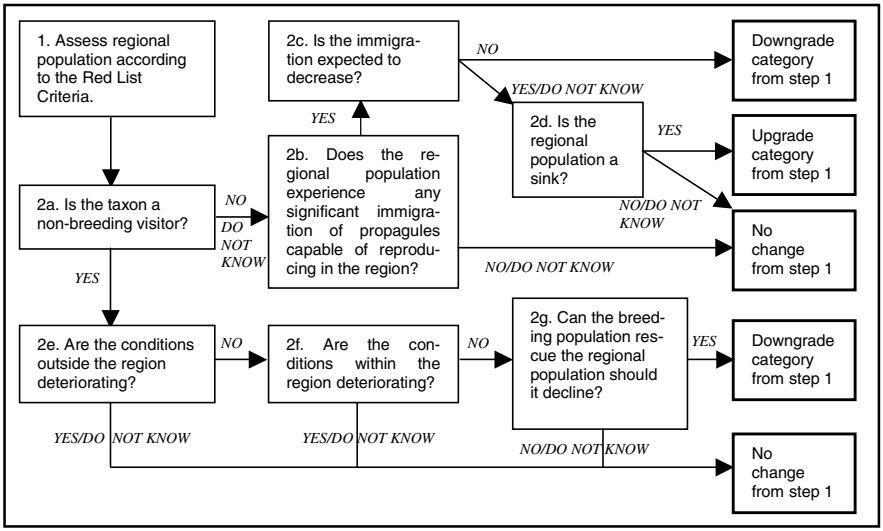


Figure 2. Conceptual scheme of the procedure for assigning an IUCN Red List Category at the regional level. In step 1 all data used should be from the regional population, not the global population. The exception is when evaluating a projected reduction or continued decline of a non-breeding population, in such cases conditions outside the region must be taken into account in step 1. Likewise, breeding populations may be affected by events in, e.g., wintering areas, which must be considered in step 1. See Table 1 for further details on the procedures to follow, especially for the second step.

parameters relating to area, reduction, decline, fluctuations, subpopulations, locations, and fragmentation – should be from the regional population, NOT the global population. However, it must be noted that taxa migrating to other regions during part of the year may be affected by conditions there. It may be essential to take such conditions into account, particularly when applying criteria pertaining to decline and area (A, B and C).

In step two, the existence and status of any conspecific populations outside the region that may affect the risk of extinction within the region should be investigated. If the taxon is endemic to the region or the regional population is isolated, the Red List Category defined by the criteria should be adopted unaltered. If, on the other hand, conspecific populations outside the region are judged to affect the regional extinction risk, the regional Red List Category should be changed to a more appropriate level that reflects the extinction risk as defined by criterion E (IUCN 2001). In most cases, this will mean downgrading the category obtained in step one, because populations within the region may experience a "rescue effect" from populations outside the region (Brown and Kodric-Brown 1977, Hanski and Gyllenberg 1993). In other words, immigration from outside the region will tend to decrease extinction risk within the region.

Normally, such a downgrading will involve a one-step change in category, such as changing the category from Endangered (EN) to Vulnerable (VU) or from VU to Near Threatened (NT). For expanding populations, whose global range barely touches the edge of the region, a downgrading of the category by two or even more steps may be appropriate. Likewise, if the region is very small and not isolated by barriers from surrounding regions, downgrading by two or more steps may be necessary.

Conversely, if the population within the region is a demographic sink (Pulliam 1988) that is unable to sustain itself without immigration from populations outside the region, AND if the extra-regional source is expected to decrease, the extinction risk of the regional population may be underestimated by the criteria. In such exceptional cases, an upgrading of the category may be appropriate. If it is unknown whether or not extra-regional populations influence the extinction risk of the regional population, the category from step one should be kept unaltered.

Visiting populations

The distinction between a visitor and a vagrant should be noted because the latter cannot be assessed.

Table 1. Checklist for judging whether extra-regional populations may affect the extinction risk of the regional population (the question numbers refer to the boxes in Fig. 2).

Questions	Comments
2a. Is the taxon a non-breeding visitor? Is the taxon reproducing within the region, or is it a visitor utilizing resources within the region?	If the answer to the headline question is both yes and no, then there are two distinct subpopulations, with one being a non-reproducing migrant and the other being a reproducing subpopulation. In such cases each subpopulation should be treated as different taxa and should be assessed separately.
2b. Likelihood of propagule migration Are there any conspecific populations outside the region within a distance from which propagules could reach the region? Is the regional population part of a larger metapopulation involving extra-regional patches? Are there any effective barriers preventing dispersal to and from neighbouring populations? Is the taxon capable of long-distance dispersal? Is it known to do so?	If there are no conspecific populations in neighbouring regions or if propagules are not able to disperse to the region, the regional population behaves as an endemic and the category should be left unchanged.
2b. Evidence for the existence of local adaptations Are there any known differences reflecting local adaptations between regional and extra-regional populations (i.e., is it probable that individuals from extra-regional populations are adapted to survive within the region)?	If it is unlikely that individuals from extra-regional populations would be able to survive and reproduce within the region, the category should be left unchanged.
2b. Availability of suitable habitat Are current conditions of habitats and/or other environmental (including climatological) requirements of the taxon in the region such that immigrating propagules are able to establish themselves successfully (i.e., are there habitable areas?), or has the taxon disappeared from the region because conditions were not favourable?	If there is not enough suitable habitat and if current conservation measures are not leading to an improvement in the habitat within the foreseeable future, immigration from outside the region will not decrease extinction risk and the category should be left unchanged.
2c. Status of extra-regional populations How abundant is the taxon in neighbouring regions? Are the populations there stable,	If the taxon is relatively common outside the region and there are no signs of population

Table 1. ...cont'd.

Questions	Comments
increasing, or decreasing? Is it Red Listed in any of those regions? Are there any important threats to those populations? Is it probable that they produce an appreciable amount of emigrants and will continue to do so for the foreseeable future?	decline, and if the taxon is capable of dispersing to the region and there is (or soon will be) available habitat, downgrading the category is appropriate. If the taxon is currently decreasing in neighbouring regions, the "rescue effect" is less likely to occur, so downgrading the category may not be appropriate.
2d. Degree of dependence on extra-regional sources Are extant regional populations self-sustaining, showing a positive reproductive rate over the years, or are they dependent on immigration for long-term survival, i.e., are the regional populations sinks?	If there is evidence that a substantial number of propagules regularly reach the region and the population still has a poor chance of survival, the regional population may be a sink. If so, AND if there are indications that the immigration will soon cease, upgrading the category may be appropriate.
2e. Environmental conditions outside the region Are the habitat or other conditions of the taxon deteriorating, or projected to do so, in the breeding area or in other areas that the taxon utilizes resources?	If yes, the taxon will experience a reduction or continuing decline, either current or projected, which will affect the classification in step one. Consequently, such conditions should not be accounted for once again in the second step, thus leaving the category unchanged.
2f. Environmental conditions inside the region Are the habitat or other conditions of the taxon deteriorating, or projected to do so, within the region?	If yes, the taxon will experience a reduction or continuing decline, either current or projected, which will affect the classification in step one. Consequently, such conditions should not be accounted for once again in the second step, thus leaving the category unchanged.
2g. Plausible rescue effect? Is the taxon globally very sparse, e.g., classified as threatened according to criterion D; or Near Threatened because it almost meets VU D; or globally Not Evaluated but judged to meet criterion D?	If the breeding population is very restricted, the regional population visiting the region cannot expect a rescue, thus leaving the category unchanged. If, on the other hand, the breeding population is quite substantial and the conditions are not deteriorating neither within nor outside the region, the probability of regional extinction is less likely than suggested by the criteria in step one, consequently, a downgrading may be appropriate.

As with breeding populations, data used in the initial step (box 1, Fig. 2) – such as number of individuals and parameters relating to area, reduction, decline, fluctuations, subpopulations, and locations – should be from the regional population, not the global population. To be able to correctly project a population reduction (criteria A3 and A4) or a continued decline (criteria B and C) it may, however, be necessary to examine the conditions outside the region, and particularly in the population's breeding area. It is also essential to distinguish true population changes and fluctuations from transient changes, which may be due to unsuitable weather or other factors and may result in visitors temporarily favouring other regions. Observed population numbers will expectedly fluctuate more in non-breeding than in breeding populations. This must be carefully considered when evaluating the parameters of reduction, continuing decline and extreme fluctuations.

In the second step, the environmental conditions outside (box 2e, Fig. 2) and inside (box 2f) the region should be examined. Because past or projected population reductions outside the region, as well as deteriorating environmental conditions inside the region, have already been accounted for in the first step, such changes will not lead to any adjustments in the second step. There may be reasons to downgrade the category met in step one only when environmental conditions are stable or improving. Note that taxa which are globally very rare, for example if Red Listed under criterion D, should not be downgraded because a very small global population would not be expected to produce any notable rescue effect within the region.

Adjustments to categories

Adjustments can be made to all the categories except for Extinct (EX), Extinct in the Wild (EW), Regionally Extinct (RE), Data Deficient (DD), Not Evaluated (NE), and Not Applicable (NA), which cannot logically be up- or downgraded.

V. DOCUMENTATION AND PUBLICATION

1. IUCN Red List Criteria and guidelines must be followed in order to facilitate the exchange of information between assessors in different regions and between regional and taxonomic Red List Authorities, it is recommended that all regional (and global) assessment exercises should follow global documentation standards (IUCN 2001 Annexes 2–3). See Annex 1 for shortened examples.

2. The introductory sections should include a list of the taxonomic groups that have been evaluated against the Red List Criteria as well as what taxonomic standards have been followed. It should also clearly report any regionally determined settings, filters, etc.

3. Taxa that have been up- or downgraded in the regional Red List should be clearly indicated, for example by a dot after the category (VU$^{\cdot}$). The category of such a species should be interpreted as being equivalent to the same category that has not been changed (i.e., VU$^{\cdot}$=VU). The dot is comparable to a footnote and is merely to flag the special history of the categorization process. Any up- or downgrading must be fully accounted for in the documentation, where the number of steps up or down also must be stated.

4. A printed regional Red List should present at least the scientific name and the authorship of the taxon, the regional Red List Category (using the English abbreviated forms) and criteria met, the global IUCN Red List Category and Criteria, and the proportion (%) of the global population occurring within the region (Table 2). If the proportion of the global population is unknown, this should be noted with a question mark. The region may also wish to present the proportion (%) of other geographical scales (e.g., a continent), or any other additional data fields; this is up to the regional Red List authority to decide. It should be noted that the taxonomic classification level of a taxon, i.e., whether an entire species or a single subspecies with a more restricted distribution is under consideration, will influence the proportion occurring within a region. If possible, the vernacular name (in the national language) and a short summary of the supporting documentation for each taxon should also be included. Visiting taxa should preferably be listed in a separate section, but if they are included in a list of breeding taxa, it should be clearly indicated that they are visitors.

Taxon name	Breeder Visitor	Regional Red List Category	Global Red List Category	Proportion (%) of Global Population
Aus australis (Linnaeus, 1759) Eastern angel	B	*CR* D	*VU* D1	7
Bus borealis Smith, 1954 Northern boxer	V	*NT*•	–	?
Cus communis (Alvarez, 1814) Common clipper	B	*EN* A3c; B1ab(iii)+2ab(iii)	*NT*	15
Dus domesticus Liu, 1888 Native delta	B	*NT*	–	2
Dus domesticus Liu, 1888 Native delta	V	*VU* A2bc	–	6

Table 2. Example of a regional Red List, presenting fictive species. The region may wish to present additional information, like proportion at other geographical scales or conditions pertaining to legislation or international conventions. Visiting taxa should preferably be listed in a separate section; if, as in this example, they are included in the same list as the breeding taxa, it should be clearly indicated that they are visitors. The data and rationale behind each listing should be fully documented according to IUCN 2001, Annex 3. Such documentation can easily be presented for example on the World Wide Web.

5. The global Red List Category should follow published IUCN Red Lists (for the current *IUCN Red List of Threatened Species* see http://www.redlist.org; and for plants also refer to Walter and Gillett 1998). If a globally Red Listed taxon is endemic to the region and the regional assessors have come to a different conclusion about the category than the global assessors, then the appropriate authority on the global Red List should be contacted and the status of the taxon re-examined (contact details are available from http://www.iucn.org/themes/ssc/sgs/sgs.htm or contact the Red List Programme Office at redlist@ssc-uk.org). If agreement is reached to change the global assessment, the new global category may be used in the regional Red List even if it will be published before the next update of the global IUCN Red List (updated annually from 2002). If no agreement is reached, the regional authority may submit an appeal based on the Red List Criteria (to redlist@ssc-uk.org) for judgment by the SSC Red List Programme Standards and Petitions Subcommittee (for further details see http://www.iucn.org/themes/

ssc/redlists/petitions.html). If no conclusion is reached before the finalization of the regional Red List, the category determined by the regional assessment may be used as the regional category, and the IUCN global Red List category should be used as the global category. In all three cases, the issues must be documented under the listing for the taxon concerned.

6. The application of the Red List Criteria, particularly criterion A, may under some circumstances result in a taxon qualifying for listing at the global but not at the regional level (see Preamble, point 8). Such taxa should be included (in the main list or in an annex) in the regional Red List, and their regional category should be denoted as LC. The inclusion of globally Red Listed taxa is important, not the least, in the process of setting priorities for conservation action at the regional level.

7. In addition to a printed Red List, which is normally written in the national language(s), publication on the World Wide Web in English (and the national language) is recommended. The web version could include the full documentation (according to IUCN 2001, Annex 3 and information about up- and downgrading), which could be difficult in the printed version unless it is published as a full Red Data Book. A web version may also include the extensive listing and documentation of taxa assessed as LC. A publication on the web may be a particularly important tool in the process of transferring information from the regional to the global scale (Rodríguez *et al.* 2000).

VI. REFERENCES

Brown, J.H. and Kodric-Brown, A. 1977. Turnover rates in insular biogeography: effect of immigration on extinction. *Ecology* 58: 445–449.

Gärdenfors, U. 1995. The regional perspective. In: J. Baillie, D. Callahan and U. Gärdenfors (eds). A closer look at the IUCN Red List Categories, pages 34–36. *Species* 25: 30–36.

Gärdenfors, U. 1996. Application of IUCN Red List categories on a regional scale. In: J. Baillie and B. Groombridge (compilers and editors) *1996 IUCN Red List of Threatened Animals*, pages 63–66. IUCN, Gland, Switzerland and Cambridge, UK.

Gärdenfors, U. 2001. Classifying threatened species at a national versus global level. *Trends in Ecology and Evolution* 16: 511–516.

Gärdenfors, U., Hilton-Taylor, C., Mace, G. and Rodríguez, J.P. 2001. The application of IUCN Red List Criteria at Regional levels. *Conservation Biology* 15(5): 1206–1212.

Gärdenfors, U., Rodríguez, J.P., Hilton-Taylor, C., Hyslop, C., Mace, G., Molur, S. and Poss, S. 1999. Draft guidelines for the application of IUCN Red List criteria at national and regional levels. *Species* 31–32: 58–70.

Hanski, I. 1999. *Metapopulation Ecology*. Oxford University Press, Oxford.

Hanski, I. and Gyllenberg, M. 1993. Two general metapopulation models and the core-satellite species hypothesis. *The American Naturalist* 142: 17–41.

IUCN 1998. *IUCN Guidelines for Re-introductions*. Prepared by the IUCN Species Survival Commission Re-introduction Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK.

IUCN 2001. *IUCN Red List Categories and Criteria: Version 3.1*. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.

Levins, R. 1969. Some demographic and genetic consequences of environmental heterogeneity for biological control. *Bulletin of the Entomological Society of America* 15: 237–240.

Pulliam, H.R. 1988. Sources, sinks, and population regulation. *The American Naturalist* 132: 652–661.

Rodríguez, J.P., Ashenfelter, G., Rojas-Suárez, F., García Fernández, J.J., Suárez, L. and Dobson, A.P. 2000. Local data are vital to worldwide conservation. *Nature* 403: 241.

Standards and Petitions Subcommittee of the IUCN SSC Red List Programme Committee 2003. Guidelines for using the IUCN Red List Categories and Criteria (May 2003). Available from: http://www.iucn.org/themes/ssc/red-lists.htm.

Walter, K.S. and Gillett, H.J. (eds). 1998. *1997 IUCN Red List of Threatened Plants*. Compiled by the World Conservation Monitoring Centre. IUCN, Gland, Switzerland, and Cambridge, UK.