SMALL CARNIVORE CONSERVATION ASSESSMENT AND MANAGEMENT PLAN

Final Review Draft Report
10 May 1994

Edited and compiled by

Roland Wirth, Angela Glatston, Onnie Byers, Susie Ellis, Pat Foster-Turley, Paul Robinson, Harry Van Rompaey, Don Moore, Ajith Kumar, Roland Melisch, and Ulysses Seal

Prepared by the participants of
a workshop held in Rotterdam, The Netherlands
11-14 February 1993

A Collaborative Workshop

IUCN/SSC MUSTELID, VIVERRID, AND PROCYONID SPECIALIST GROUP

IUCN/SSC OTTER SPECIALIST GROUP

IUCN/SSC CAPTIVE BREEDING SPECIALIST GROUP

Sponsored by

The Rotterdam Zoo

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United Kingdom Small Carnivore Taxon Advisory Group

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CONSERVATION ASSESSMENT AND MANAGEMENT PLAN FOR SMALL CARNIVORES

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SMALL CARNIVORE CONSERVATION ASSESSMENT AND MANAGEMENT PLAN EXECUTIVE SUMMARY

Small Carnivore taxa were reviewed taxon-by-taxon to assign a category of threat and to recommend intensive conservation action. The recommendations contained in the Small Carnivore Conservation Assessment and Management Plan are based only on conservation criteria; adjustments for political and other constraints will be the responsibility of regional plans.

For this exercise, 201 distinct taxa (subspecies or species if no subspecies are contained therein) of Small Carnivores (Procyonidae, Mustelidae, Viverridae, and Herpestidae) were considered. 89 of the 201 taxa (44%) were assigned to one of three categories of threat, based on the Mace-Lande criteria:

Critical	12 taxa
Endangered	29 taxa
Vulnerable	48 taxa

88 taxa were assigned to the Secure category, according to Mace-Lande criteria. An additional 20 taxa were not assigned to a category of threat because of insufficient information. Four taxa were listed as Extinct.

36 of the 201 taxa (18%) were recommended for Population and Habitat Viability Assessment workshops.

Research Management was recommended in the following categories:

Survey	82 taxa
Monitoring	61 taxa
Life history research	15 taxa
Limiting factors research	56 taxa
Limiting factors management	7 taxa
Habitat management	33 taxa
Taxonomic research	93 taxa
Husbandry research	6 taxa
Translocation	3 taxa

37 of the 201 taxa (18%) were recommended for one of two time-frames for development of captive programs (based in part on Mace-Lande criteria):

Initiate within 0-3 years	22 taxa
Initiate in the future (>3 years)	15 taxa

An additional 68 taxa were not currently recommended for captive programs, but may be reconsidered following a formal Population and Habitat Viability Assessment or when further data become available. 84 taxa were not recommended for captive programs.

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SECTION 1

CONSERVATION ASSESSMENT AND MANAGEMENT PLAN OVERVIEW

SMALL CARNIVORE CONSERVATION ASSESSMENT AND MANAGEMENT PLAN

Introduction.

Reduction and fragmentation of wildlife populations and habitat is occurring at a rapid and accelerating rate. For an increasing number of taxa, the results are small and isolated populations at the risk of extinction. A rapidly expanding human population, now estimated at 5.25 billion, is expected to increase to 8 billion by the year 2025. This expansion and concomitant utilization of resources has momentum that will not be quelled, and which will lead to a decreased capacity for all other species on the planet.

As wildlife populations diminish in their natural habitat, wildlife managers realize that management strategies must be adopted that will reduce the risk of extinction. These strategies will be global in nature and will include habitat preservation, intensified information gathering, and in some cases, scientifically managed captive populations that can interact genetically and demographically with wild populations.

The successful preservation of wild species and ecosystems necessitates development and implementation of active management programs by people and governments living within the range area of the species in question. The recommendations contained within this document are based on conservation need only; adjustments for political and other constraints are the responsibility of regional governmental agencies charged with the preservation of flora and fauna within their respective countries.

Conservation Assessment and Management Plans (CAMPs).

Within the Species Survival Commission (SSC) of IUCN-The World Conservation Union, the primary goal of the Captive Breeding Specialist Group (CBSG) is to contribute to the development of holistic and viable conservation strategies and management action plans. Toward this goal, CBSG is collaborating with agencies and other Specialist Groups worldwide in the development of Conservation Assessment and Management Plans (CAMPs), both on a global and a regional basis, with the goal of facilitating an integrated approach to species management for conservation.

CAMPs provide strategic guidance for the application of intensive management techniques that are increasingly required for survival and recovery of threatened taxa. CAMPs are also one means of testing the applicability of the Mace-Lande criteria for threat as well as the scope of its applicability. Additionally, CAMPs are an attempt to produce ongoing summaries of current data for groups of taxa, providing a mechanism for recording and tracking of species status.

In addition to management in the natural habitat, conservation programs leading to viable populations of threatened species may sometimes need a captive component. In general,

captive populations and programs, or the use of captive technologies, can serve several roles in holistic conservation: 1) as genetic and demographic reservoirs that can be used to reinforce wild populations wither by revitalizing populations that are languishing in natural habitats or by re-establishing by translocation populations that have become depleted or extinct; 2) by providing scientific resources for information and technology that can be used to protect and manage wild populations; and 3) as living ambassadors that can educate the public as well as generate funds for *in situ* conservation.

It is proposed that, when captive populations or captive technology can assist species conservation, captive and wild populations should, and can be, intensively and interactively managed with interchanges of animals occurring as needed and as feasible. Captive populations should be a support, not a substitute for wild populations. There may be problems with interchange between captive and wild populations with regard to disease, logistics, and financial limitations. In the face of the immense extinction crisis facing many insular taxa, these issues must be addressed and resolved within the next several years.

The CAMP Process.

The CAMP process assembles expertise on wild and captive management for the taxonomic group under review in an intensive and interactive workshop format. The purpose of the Small Carnivore Conservation Assessment and Management Plan (CAMP) workshop was to assist in the development of a conservation strategy for these taxa, and to continue to test the applicability of the Mace-Lande criteria. On 12-14 February, 1993, 23 individuals met in Rotterdam to review, refine, and develop further conservation strategies for Small Carnivores. This group represented field biologists, wildlife experts, conservation biologists, academic scientists, and captive managers. Participants are listed in Section 7. Participants worked together in five taxon-based groups, Procyonidae, Mustelidae (excluding Lutrinae), Lutrinae, Viverridae and Herpestidae, to: 1) determine best estimates of the status of all Small Carnivores; 2) assign each taxon to a Mace-Lande category of threat; and 3) identify areas of action and information needed for conservation and management purposes.

The assessments and recommendations of each of the working groups for each taxon were circulated to the entire group prior to final consensus by all participants, as represented in this document. Summary recommendations concerning research management, assignment of all taxa to threatened status, and captive breeding were supported by the workshop participants.

CAMP Workshop Goals.
The goals of the Small Carnivore CAMP workshop were:

1) To review the population status and demographic trends for Small Carnivores, to test the applicability of the Mace-Lande criteria for threat, and to discuss management options for Small Carnivore taxa.

2) To provide recommendations for *in situ* and *ex situ* management, research and information-gathering for all Small Carnivore taxa, including: recommendations for PHVA workshops; more intensive management in the wild; taxonomic research, survey, monitoring, investigation of limiting factors, taxonomy, or other specific research.

3) Produce a discussion draft Conservation Assessment and Management Plan for Small Carnivores, presenting the recommendations from the workshop, for distribution to and review by workshop participants and all parties interested in Small Carnivore conservation.

Assignment to Mace-Lande Categories of Threat.
All Small Carnivore taxa were evaluated on a taxon-by-taxon basis in terms of their current and projected status in the wild to assign priorities for conservation action or information-gathering activities. The workshop participants applied the criteria proposed for the redefinition of the IUCN Red Data Categories proposed by Mace and Lande in their 1991 paper (Section 9). These categories are in the process of a second revision within IUCN. The Mace-Lande scheme assesses threat in terms of a likelihood of extinction within a specified period of time (Table 1). The system defines three categories for threatened taxa:

Critical 50% probability of extinction within five years or two generations, whichever is longer.

Endangered 20% probability of extinction within 20 years or 10 generations, whichever is longer.

Vulnerable 10% probability of extinction within 100 years.

Definitions of these criteria are based on population viability theory. To assist in making recommendations, participants in the workshop were encouraged to be as quantitative or numerate as possible for two reasons: 1) Conservation Assessment and Management Plans ultimately must establish numerical objectives for viable population sizes and distributions; 2) numbers provide for more objectivity, less ambiguity, more comparability, better communication, and hence cooperation. During the workshop, there were many attempts to estimate if the total population of each taxon was greater or less than the numerical thresholds for the three Mace-lande categories of threat. In many cases, current population estimates for

small carnivore taxa were not available or were available for taxa within a limited part of their distribution. In all cases, conservative numerical estimates were used. **Where population numbers are estimated, these estimates represent first-attempt, order-of-magnitude guesstimates that are hypotheses for falsification. As such, the workshop participants emphasize that these guesstimates should not be used as an authoritative estimate for any other purpose than was intended by this process.**

Table 1. MACE-LANDE CATEGORIES AND CRITERIA FOR THREAT

POPULATION TRAIT	CRITICAL	ENDANGERED	VULNERABLE
Probability of extinction	50% within 5 years or 2 generations, whichever is longer	20% within 20 years or 10 generations, whichever is longer	10% within 100 years
	OR	**OR**	**OR**
	Any 2 of the following criteria:	Any 2 of following criteria or any 1 CRITICAL criterion	Any 2 of following criteria or any 1 ENDANGERED criterion
Effective population N_e corresponding to Total population N	$N_e < 50$ $N < 250$	$N_e < 500$ $N < 2,500$	$N_e < 2,000$ $N < 10,000$
Subpopulations	≤ 2 with $N_e > 25$, $N > 125$ with immigration < 1/generation	≤ 5 with $N_e > 100$, $N > 500$ or ≤ 2 with $N_e > 250$, $N > 1,250$ with immigration < 1/gen.	≤ 5 with $N_e > 500$, $N > 2,500$ or ≤ 2 with $N_e > 1,000$, $N > 5,000$ with immigration < 1/gen.
Population Decline	$> 20\%$/yr. for last 2 yrs. or $> 50\%$ in last generation	$> 5\%$/yr. for last 5 years or $> 10\%$/gen. for last 2 years	$> 1\%$/yr. for last 10 years
Catastrophe: rate and effect	$> 50\%$ decline per 5-10 yrs. or 2-4 generations; subpops. highly correlated	$> 20\%$ decline/5-10 yrs, 2-4 gen $> 50\%$ decline/10-20 yrs, 5-10 gen with subpops. highly correlated	$> 10\%$ decline/5-10 yrs. $> 20\%$ decline/10-20 yrs. or $> 50\%$ decline/50 yrs. with subpops. correlated
OR			
Habitat Change	resulting in above pop. effects	resulting in above pop. effects	resulting in above pop. effects
OR			
Commercial exploitation or Interaction/introduced taxa	resulting in above pop. effects	resulting in above pop. effects	resulting in above pop. effects

In assessing threat according to Mace-Lande criteria, workshop participants also used information on the status and interaction of habitat and other characteristics. Information about population trends, fragmentation, range, and environmental stochasticity, real and potential, were also considered.

Numerical information alone was not sufficient for assignment to one of the Mace-Lande categories of threat. For example, based solely on numbers, a taxon might be assigned to the Vulnerable or Safe category. Knowledge of the current and predicted threats or fragmentation of remaining natural habitat, however, may lead to assignment to a higher category of threat.

In several cases, there was not enough information available for assignment to one of the three categories of threat; these taxa are listed as unknown or questionable. Assignment to Mace-Lande categories of threat for the 184 taxa examined during this CAMP exercise are presented in Table 2. Specific taxa within each category are presented in Section 2. Summary tables for each taxonomic group can be found in Section 3. Taxon data sheets, geographically arranged, are presented in Sections 4-7.

Table 2. Threatened Small Carnivore Taxa - Mace-Lande Categories of Threat.

MACE-LANDE CATEGORY	NUMBER OF TAXA	PERCENT OF TOTAL
Critical	12	6
Endangered	29	14
Vulnerable	48	24
Secure	88	44
Unknown/ Questionable/Extinct	24	12
TOTAL	201	100

One of the goals of the CAMP workshop was to test the applicability of the Mace-Lande criteria for threat, which were designed in an attempt to redefine the current IUCN categories of threat. A comparison of Mace-Lande and IUCN classification results is presented in Table 3. Thirty-three of the Small Carnivore taxa assigned to a Mace-Lande category of threat are listed as threatened under IUCN classification; 61 taxa assigned to Mace-Lande categories of threat are not listed in the *1990 IUCN Red List of Threatened Animals*.

Table 3. Threatened Small Carnivores of the world - comparison of Mace-Lande and current IUCN categories of threat.

MACE-LANDE	END	VUL	RARE	INDET	K	NOT	TOTAL
Critical	2	0	0	1	2	7	12
Endangered	1	5	1	1	4	17	29
Vulnerable	3	4	1	4	9	27	48
TOTAL	6	9	2	6	15	51	89

Regional Distribution of Threatened Taxa.
Regional distribution of threatened taxa is presented in the taxon reports. Thirty percent of threatened Small Carnivore taxa are found in the African region. Detailed spreadsheets for all taxa, arranged in taxonomic order according to Walker's Mammals of the World, fifth edition, are presented in Section 2. Summary tables for each taxonomic group are presented in Section 3. Detailed taxon data sheets, organized geographically, are presented in Sections 4-6.

Threats to Small Carnivores.
For the purposes of the CAMP process, threats were defined as "immediate or predicted events that are or may cause significant population declines." Workshop participants outlined the following threats for Small Carnivores:

1. **Habitat destruction** is a main threat to most declining taxa.

2. Inadvertent or advertent **introduction of predatory animals**, have also led in part or in total to the demise or decline of some species.

3. **Subsistence hunting** in some areas, notably when firearms are available to the populace.

4. **Sport hunting**, if populations are not managed, may lead to the demise of species. This may be the result, for example, hunting during the breeding season or over-hunting.

5. **Pet-trade** in some regions, notably for the economically valuable species.

6. The possibility of introducing **diseases transmitted by introduced species**.

7. **Critical habitat may sometimes be privately owned**, so that monitoring and/or

protection of populations in those areas may not be possible.

8. **Pollution**, such as pesticides in the environment, may lead to the decline of species either directly (due to poisoning) or indirectly.

9. **Catastrophic events**, for example, hurricanes, tsunamis, fires, earthquakes, volcanic eruptions, flash floods, may directly or indirectly affect populations.

10. **Ecotourism** may be beneficial to species as it may encourages preservation of habitat, but if uncontrolled, may lead to the demise of species due to excessive human disturbance.

Island Forms: Conservation Implications and Threats

Much of the diversity of the Small Carnivores derives from their extensive radiation on islands. Some of the most diverse groups are virtually restricted to islands.

The particular factors affecting island populations include the following:

1. Introduced predators.

2. Habitat loss and fragmentation in small geographic areas.

3. Lack of remote areas providing refugia from over-hunting.

4. Susceptibility to natural disasters.

5. Lack of genetic diversity.

Because island populations are typically small, they must be monitored regularly to assess their status. Island environments also impose particular problems on wildlife managers. For example, the acquisition of large wilderness areas to protect endangered island animals is usually impossible because of other pressing demands on limited land. Thus conservation programs must be designed to accommodate wildlife populations within a multiple-use landscape. The size and vulnerability of many island populations mean that captive breeding programs will often be a required part of conservation programs.

Recommendations for Intensive Management and Research Actions.

For all taxa, recommendations were generated for the kinds of intensive action necessary, both in terms of management and research, that were felt to be necessary for conservation. These recommendations, summarized in Table 6, were: Population and Habitat Viability

Assessment (PHVA) workshops; wild management and research; and captive programs. PHVA workshops provide a means of assembling available detailed biological information on the respective taxa, evaluating the threats to their habitat, development of management scenarios with immediate and 100-year time-scales, and the formulation of specific adaptive management plans with the aid of simulation models. In many cases, workshop participants determined that the current level of information for a taxon was not adequate for conduction of a PHVA; in those cases, recommendations are listed as "PHVA Pending."

Workshop participants attempted to develop an integrated approach to management and research actions needed for the conservation of Small Carnivore taxa. In all cases, an attempt was made to make management and research recommendations based on the various levels of threat impinging on the taxa.

With minimal understanding of underlying causes for decline in some taxa, it was sometimes difficult to clearly define specific management actions needed for the conservation. Therefore, "research management" must become a component of conservation and recovery activities. Research management can be defined as a management program which includes a strong feedback between management activities and an evaluation of the efficacy of the management, as well as response of the taxa to that activity. Seven basic categories of research management activities were identified: survey (e.g., search and find); monitoring; translocation; taxonomic research or clarification; management of limiting factors; limiting factors research; and life history research. The frequent need for survey information to evaluate population status, especially for those taxa listed as Critical, emphasizes the need to quickly implement intensive methodologies for determining the existence of at least 13 taxa. Research management recommendations are summarized in Table 4.

Table 4. Small Carnivore research management recommendations.

MACE-LANDE	PHVA	SURV	MONITR	LIFE HISTORY RESRCH	LIMITING FACTORS RESRCH	LIMITING FACTORS MGMT	HABITAT MGMT	TAXON RESRCH	HUSBANDRY	TRNSLOC
Critical	9	11	2	2	7	0	3	8	0	1
Endangered	12	21	15	4	13	0	10	9	2	2
Vulnerable	14	21	17	6	24	2	17	19	2	0
Secure	1	14	24	3	6	3	3	45	1	0
Unknown	0	15	3	0	6	2	0	12	1	0
TOTAL	36	82	61	15	56	7	33	93	6	3

Captive Program Recommendations.
For a few of the Small Carnivore taxa, it was determined that a captive component would be necessary to contribute to the maintenance of long-term viable populations. It is proposed that, when captive populations can assist species conservation, captive and wild populations should be intensively and interactively managed with interchanges of animals occurring as needed and as feasible. There may be problems with interchange between captive and wild populations with regard to disease, logistics, and financial limitations.

It is essential to note that the establishment of self-sustaining captive populations is not the only management option available for some species. Incorporating "captive propagation technology" or "field application of captive propagation techniques" and field management techniques (e.g., into long-term conservation programs) is also valuable, and for some cases, more feasible than establishing new captive programs with the more en dangered species. One of the best examples of this is the case of the Black-footed ferret (*Mustela nigripes*), where the application of captive technologies have been central to prevention of extinction and species recovery to date.

Today, as more and more Small Carnivore species are threatened with population declines, cooperative recovery programs provide the only avenue for survival. This cooperation must include support for field research, habitat conservation, as well as public education, and must provide for active and integrated communication between these facets.

During the CAMP workshop, all Small Carnivore taxa were evaluated relative to their current need for captive propagation. Recommendations were based upon a number of variables, including: immediate need for conservation (population size, Mace-Lande status, population trend, type of captive propagation program), need for or suitability as a surrogate species, current captive populations, and determination of difficulty as mentioned above. Based on all

of the above considerations, in addition to threats, trends, and Mace-Lande assessment, recommendations for captive programs were made. These recommendations, by category of threat, are presented in Table 5. Recommendations for levels of programs are presented in the spreadsheets in Section 2. Information concerning the current populations of Small Carnivores in captivity (according to the International Species Information System) are presented in Section 9. There were several workshop participants with expertise in captive breeding of Small Carnivores; these individuals were able to assess the degree of difficulty of propagation for each of the taxa considered (see Tables 6-11 in Section 2 for spreadsheets on all taxa).

Table 5. Captive program recommendations for Small Carnivores by Mace-Lande threat category.

MACE-LANDE	Initiate immediately 0-3 yrs	Initiate future > 3 yrs	Not currently recommended pending data or PHVA	Not currently recommended
Critical	8	0	4	0
Endangered	6	2	21	0
Vulnerable	6	2	23	14
Safe	2	9	9	65
Unknown	0	2	11	5
TOTAL	22	15	68	84

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SECTION 2

CONSERVATION ASSESSMENT AND MANAGEMENT PLAN SPREADSHEET CATEGORIES AND SPREADSHEETS

SMALL CARNIVORE CAMP WORKSHOP
CONSERVATION ASSESSMENT AND MANAGEMENT PLAN (CAMP)
SPREADSHEET CATEGORIES

(12 February 1993)

The Conservation Assessment and Management Plan (CAMP) spreadsheet is a working document that provides information that can be used to assess the degree of threat and recommend conservation action.

The first part of the spreadsheet summarizes information on the status of the wild and captive populations of each taxon. It contains taxonomic, distributional, and demographic information useful in determining which taxa are under greatest threat of extinction. This information can be used to identify priorities for intensive management action for taxa.

TAXON
SCIENTIFIC NAME: Scientific names of extant taxa: genus, species, subspecies.

WILD POPULATION
IMPORTANT Estimates of population and numbers of sub-populations followed by "?" are guesses, and should not be viewed otherwise. Similarly many species geographic distribution areas are also guesses. Area codes followed by a "?" are based on old distribution information.

RANGE: Geographical area where a species and its subspecies occur.

EST #: Estimated numbers of individuals in the wild. If specific numbers are unavailable, estimate the general range of the population size.

DQ (Data Quality):
1 = Recent (<8 years) census or population monitoring
2 = Recent (<8 years) general field study
3 = Recent (<8 years) anecdotal field sightings
4 = Indirect information (trade numbers, habitat availability).

Any combination of above = different data quality in parts of range.

SUB-POP: Number of populations within the taxonomic unit. Ideally, the number of populations is described in terms of boundary conditions as delineated by Mace-Lande and indicates the degree of fragmentation. The designation "F" stands for fragmented population without information about exact number of subpopulations.

TRND: Indicates whether the natural trend of the species/subspecies/population is currently (over the past 3 generations) increasing (I), decreasing (D), or stable (S). Note that trends should NOT reflect supplementation of wild populations. A + or - may be indicated to indicate a rapid or slow rate of change, respectively.

AREA: A quantification of a species' geographic distribution.
AAA:> 5,000 sq km; geographic island
AA:< 5,000 sq km; geographic island
AA-1:< 1,000 sq km; geographic island
AA-2:< 100 sq km; geographic island
AA-3:< 10 sq km; geographic island
B:5,000 - 9,999 sq km
C:10,000 - 49,999 sq km
D:50,000 - 99,999 sq km
E:> 100,000 sq km
F:500,000 - 999,999 sq km
G:> 1,000,000 sq km

M/L STS: Status according to Mace/Lande criteria (see attached explanation).
C = Critical
E = Endangered
V = Vulnerable
U = Unknown
S = Secure
EXT = Extinct

THREATS: Immediate or predicted events that are or may cause significant population declines.
A = Aircraft
C = Climate
D = Disease
Dr = Drought
F = Fishing
G = Genetic problems
H = Hunting for food or other purposes
Hp = Illegal hunting (poaching)
Hyb = Hybridization

I = Human interference or disturbance
Ic = Interspecific competition
Ice = Interspecific competition from exotics
L = Loss of habitat
La = Loss of habitat because of exotic/domestic animals
Lf = Loss of habitat because of fragmentation
Lp = Loss of habitat because of exotic/domestic plants
M = Marine perturbations, including ENSO and other shifts
P = Predation
Pe = Predation by exotics
Ps = Pesticides
Pl = Powerlines
Po = Poisoning
Pu = Pollution
S = Catastrophic events
    f: fire
    h: hurricane
    t: tsunami
    v: volcano
T = Trade for the live animal market
W = War

PHVA/WKSP: Is a Population and Habitat Viability Assessment Workshop recommended? Yes or No? NOTE**A detailed model of a species' biology is frequently not needed to make sound management decisions.
Yes or No/Pending: pending further data from surveys or other research

Research Management:

It should be noted that there is (or should be) a clear relationship between threats and subsequent outlined research/management actions. The "Research/Management" column provides an integrated view of actions to be taken, based on the listed threats. Research management can be defined as a management program which includes a strong feedback between management activities and an evaluation of the efficacy of the management, as well as response of the species to that activity. The categories within the column are as follows:

T	=	Taxonomic and morphological genetic studies
TL	=	Translocations
S	=	Survey - search and find
M	=	Monitoring - to determine population information
HM	=	Habitat management - management actions primarily intended to protect

and/or enhance the species' habitat (e.g., forest management)

LM = Limiting factor management - "research management" activities on known or suspected limiting factors. Management projects have a research component that provide scientifically defensible results.

LR = Limiting factor research - research projects aimed at determining limiting factors. Results from this work may provide management recommendations and future research needs.

LH = Life history studies

CAPTIVE PROGRAMS

REC: Level of Captive Program

I-1 = **Intensive - 1.** Captive population should be developed and managed that is sufficient to preserve 90% of the genetic diversity of a population for 100 years (90%/100). Program should be developed within 3 years. This is an emergency program based on the present availability of genetically diverse founders.

I-2 = **Intensive - 2.** Initiate a captive program in the future, within 3 or more years. Captive population should be developed and managed that is a nucleus (smaller than that needed for the Intensive level of management) organized with the aim to represent as much of the wild gene pool as possible. This program may require periodic importation of individuals from the wild population to maintain this high level of genetic diversity in a limited captive population. This type of program should be viewed as protection against potential extirpation of wild populations.

P = **Pending.** A captive program is not currently recommended but may be reconsidered pending further data

N = **No.** A captive program is not currently recommended

DIFF: This column represents the level of difficulty in maintaining the species in captive conditions.

1 = Techniques are in place for capture, maintenance, and propagation of similar taxa in captivity, which ostensibly could be applied to the taxon. Least difficult.

2 = Techniques are only partially in place for capture, maintenance, and propagation of similar taxa in captivity, and many captive techniques still need refinement. Moderate difficulty.

3 = Techniques are not in place for capture, maintenance, and propagation of similar taxa in captivity, and captive techniques still need to be developed. Very difficult.

NUM: Number of individuals in captivity (These figures are generally ISIS data which is somewhat inaccurate for small carnivores.)

Table 6. Critical Small Carnivore Taxa.

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
1	**PROCYONIDAE**														
11	PROCYON	INSULARIS	MARIAS IS	< 250	4	2	??	AA-2	C	?PETS?	Y	T,S,LR	I-1	1	0
12	PROCYON	MAYNARDI	BAHAMAS	< 500	3	2	D	AA	C?	I,TOURS	Y	T,S	I-1	1	0
13	PROCYON	PYGMAEUS	COZUMEL	< 500	2	0	D	AA-1	C?	I,L,T	Y	T,S	I-1	1	0
14	PROCYON	MINOR	GUADALUPE	< 500	3	?0	D	AA	C?	H,I,L	Y	T,S	I-1	1	0
18	NASUA	NELSONI	COZUMEL IS	250	2	0	D?	AA-1	C	I,L,T	Y	T,S,LR	I-1	1	0
23	BASSARICYON	PAULI ?	W.PANAMA	< 250	3	0	D?	AA-3?	C	L,H	YIII	T,S,LR	N-PEND	2-3	
24	BASSARICYON	LASIUS ?	COSTA RICA	< 250	3	0	D?	AA-3?	C	L,H	YIII	T,S*,LR	N-PEND	2-3	
27	**MUSTELIDAE**														
28	**MUSTELINAE**														
29	MUSTELA	FELIPEI	COLUMBIA, ECUADOR	100-5000	4	F	D	B	C/E	H, PU	N	HM,S,LR, LH	N-PEND		0
37	MUSTELA	LUTREOLA TUROVI	CAUCASUS	<1000	3	0	D+	D	C	I,ICE,L,H,	Y	T,S,M,HM, LR,LH	I-1	2	0
47	MUSTELA	NIGRIPES	CANADA-USA	<50	1		I	AA-1	C	D	N	TL,M,HM	I-1	1	>400
124	**VIVERRIDAE**														
125	**VIVERRINAE**														
129	VIVERRA	CIVETTINA	W GHATS, INDIA	100-500	2/4	F	D	AA-1	C	H,LF,D?, PS	Y	S	I-1	2	0
156	**PARADOXURINAE**														
159	ARCTOGALIDIA	TRIVIRGATA TRILINEATA	W.JAVA, INDON.	100-2000	4	F	D/S	AA	C/E	G?,H,SV, L	N	S,LR	N-PEND		0

Table 7. Endangered Small Carnivore Taxa.

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
1	**PROCYONIDAE**														
2	**AILURIDAE**														
3	AILURUS	FULGENS													
4	AILURUS	FULGENS FULGENS	NEPAL-MYANMAR	<5,000	>5		D	D	E	I,L,LF	Y	T,S,M,LH	I-1	E	+200
5	AILURUS	FULGENS STAYARI	MYANMAR-CHINA	<5,000	>5		D	D	E	I,L,LF	Y	T,S,M,LH	I-1	E	+200
7	BASSARISCUS	SUMICHRASTI	MEX-PANAM	2,500-10,000	2	>5	D?	D	E/V	LF,L,H?	YIII	S,HR,M	N-PEND	3	1.2
9	PROCYON	LOTOR INCAUTUS	FL. KEYS	??	3	1	D?	AA-1	E?	L	N	M	N-PEND	1	0
10	PROCYON	LOTOR AUSPITATUS	FL. KEYS	??	3	1	D?	AA-1	E?	L	N	M	N-PEND	1	0
22	BASSARICYON	GABBII	NICURAGUA, W.EQUADOR	1,000-10,000	3	>4	D?	F	E/V	L,(H)	YIII	T,S*,LR,M	N-PEND	2-3	1.2
27	**MUSTELIDAE**														
28	**MUSTELINAE**														
36	MUSTELA	LUTREOLA	EUROPE	<30000	2	5	D+	F	E	I,ICE,L,PU,H	Y	T,S,M,HM,LR,LH	I-1	2	<70
62	MARTES	FLAVIGULA ROBINSONI	JAVA	50-1,000	4	F	D?	AA-1	E/C?	SV,G?	N	S, LR,HM	N-PEND	2	0
65	EIRA	BARBARA SENEX	MEX,GUATEMALA, BELIZE	10,000-35,000	1	>5	D	D	E	L	Y	S,LR	I-1	3	<20
67	GALICTIS	VITTATA CANASTER	MEX-CENTRAL AMERICA	<10,000	3	F	D	E	E/V	L	N	S,HR,LR	N-PEND	3	<30

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
78	**MELINAE**														
84	TAXIDEA	TAXUS BERLANDIERI	MEXICO, SW USA	?	3	F	D	G	E/V	L	N	S	N-PEND	2	
99	**LUTRINAE**														
111	LUTRA	PROVOCAX	ARGENTINA, CHILE	1,000-10,000	2/4	F	D	E	E/V	L, PU	N	S,M,LR	N-PEND		0?
112	LUTRA	FELINA	PERU-CHILE	<10,000	2/4	F	D?	C	E/V	F, PU, I	Y?	S,M,LR	N-PEND		
113	PTERONURA	BRASILIENSIS	AMAZON BASIN	5,000-50,000	2/4	F	D	G	E/C	L,PR,H	N	S, LR	I-2	3	<30
120	AONYX	CINEREA (Palawan Pop.)	PALAWAN	50-200	4	F	D	AA-1	E/C	L, PU, PE, H?	-	M,S,HM,LR	N-PEND	-	-
124	**VIVERRIDAE**														
125	**VIVERRINAE**														
133	GENETTA	ABYSSINICA	ETHIOPIA, DJIB. & SOMAL.?	100-1000	4	F	D	AA-2	E/C	L	N	S,M	N-PEND	2	0
146	GENETTA	CRISTATA	SE NIGERIA, WEST CAMEROON	500-2,000	4	1	D	AA	E	L,H	N	S,M,T	N-PEND	2	0
152	POIANA	RICHARDSONI LIBERIENSIS: = R. LEIGHTONI	LIBERIA, COTE D'IVOIRE	<1500	3	1	D	B	E	L	N	S,M,T	N-PEND	3	0
156	**PARADOXURINAE**														
166	MACROGALIDIA	MUSCHEN-BROEKII	SULAWESI, INDON.	500-5,000	3/4	F	D	D	E/V	L,ICE?, H	Y	HM,TL	N-PEND		0
170	ARCTICTIS	BINTURONG WHITEI	PALAWAN, PHILIPPINES	1,000-5000	3	F	D	AAA	E/V	L, H	Y	HM	I-1	1	<20

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
169	**HEMIGALINAE**														
171	DIPLOGALE	HOSEI	SARAWAK & SABAH, MALAY.	1,000-10,000	4	F	D	AAA?	E/V	L, H?	N	S,HM,LR	N-PEND		0
172	CHROTOGALE	OWSTONI	C+N VIETNAM, N LAOS, CHINA	1,000-10,000	3/4	F	D	D	E/V	H, L	N	HM,TL, LH	N-PEND		2?
173	CYNOGALE	BENNETTII	BORNEO, SUMATRA, MALAY.	1,000-10,000	3/4	F	D	D	E	L, PO	Y	HM, LR, S	N-PEND		0
177	**EUPLERINAE**														
179	EUPLERES	GOUDOTII GOUDOTII	NE MADAGASCAR	1000-3000	3	F	D	C	E	L,H	Y	HM,LR	N-PEND		0
180	EUPLERES	GOUDOTII MAJOR	NW MADAGASCAR	250-2000	3	F	D	B	E/C	L,H	Y	HM,LR	I-1	2	0
181	**HERPESTIDAE**														
212	CROSSARCHUS	ANSORGEI ANSORGEI	ANGOLA	?	4	1	?	AA-2	E/C?	L,H	N	S,M,T	N-PEND		0
214	LIBERIICTIS	KUHNI	CE LIBERIA, & IVORY C.	500-2,000	2	1	D	AA	E	L,H	N	HM	I-2		1
217	DOLOGALE	DYBOWSKII	NE ZAIRE, SUDAN, UGANDA, CAR	?	4	1	D	D	E?	L	N	S,M,T	N-PEND	2	0
221	BDEOGALE	JACKSONI	C KENYA, SE UGANDA	<1,000	4	1	D	B	E	L	N	S,M,T	N-PEND		

Table 8. Vulnerable Small Carnivore Taxa.

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
1	**PROCYONIDAE**														
25	BASSARICYON	BEDDARDI	VEN-BRAZIL	5,000-25,000	3	>5	S?	E	V?	L,H	N	T,S*,LR,M	N-PEND	2-3	
27	**MUSTELIDAE**														
28	**MUSTELINAE**														
30	MUSTELA	AFRICANA	AMAZONIA	500-50,000	4	F	D	E	V/E?	H, PU	N	S, LR, LM	N-PEND		0
39	MUSTELA	LUTREOLINA	S SUMATRA, JAVA	500-5,000	3/4	F	D/S ?	AA-2	V/E	L, LF, SV	N	LR, HM	N		0
41	MUSTELA	STRIGIDORSA	E. HIMALAYAS, NORTHERN SE ASIA	2,000-25,000	4	F	D	E	V?	?	N	LR, LH	N		0
46	MUSTELA	EVERSMANNI AMURENSIS	NE ASIA	1,000 - 10,000	3	0	D+	C	V	H,L	N	T,M,LR	N-PEND	?	0
48	VORMELA	PEREGUSNA	AS, EU	50 000	2	5	D	G	V	L	Y	T,S,HR,LR,LH	I-2	3	15
49	VORMELA	PEREGUSNA PEREGUSNA	SE EUROPE	1000?	2	0	D+	C	V	L	Y	M,LH,LR	I-2	3	2?
52	MARTES	MARTES LATINORUM	SARDINIA	>500?	4	1	S	B	V	D,SF	N	T	N	2	0
53	MARTES	MARTES MINORICENSIS	MINORCA	500 - 2000	2	1	S	AA-1	V	D,SF	N	T	N	2	0
54	MARTES	ZIBELLINA BRACHYURA	HOKKAIDO	<2,000	4	NF?	D?	AAA	V/E?	H, ICE	N	LR, E	N	2	?

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
58	MARTES	MELAMPUS TSUENSIS	TSUSHIMA ISL, JAPAN	500-5,000	3	NF	D/S?	AA-1	V	?	N	M, HM	N-PEND	2	0
60	MARTES	GWATKINSI	W GHATS	5,000-15,000	3	F	D/S	C	V	L, HD	Y	HM, LH	N	2	0
72	POECILICTIS	LIBYCA	C SAHARA	5,000-250,000	4	F	S?	E	V?	L?	N	LR	N-PEND		0
74	GULO	GULO GULO	EUROPE	10,000	2	2	D	F	V	H,I,L	Y	T,M, LR,LH	I-1	3	<25
78	**MELINAE**														
82	MYDAUS	MARCHEI	CALAMIAN IS, PALAWAN	1,000-10,000	4	F	D	AAA	V	L, H?	N	HM, LR	N-PEND		0
87	MELOGALE	EVERETTI	NE BORNEO	?	4	?	S?	AA-1	V/S	?	N	T, HM, S	N		0
88	MELOGALE	ORIENTALIS	JAVA, BALI	2,000-15,000	3	F	D/S?	C	V/S	?	N	LR	N		<10
89	**MEPHITINAE**														
98	CONEPATUS	HUMBOLDTII	ARGENTINA	?	4	NF	S/D?	F	V?	TRADE?	N	S, M, TRADE	N		0
99	**LUTRINAE**														
100	LUTRA	LUTRA	EUROPE, N. AFRICA, and throughout ASIA to SE ASIA	100,000-200,000	1/2	F	D-	C	V	P,PU,H,I C,F	Y(UK)	S,HR,LH, T,LR,HM, M,LM	N-PEND		>100
104	LUTRA	MACULICOLLIS	SUBSAHARAN AFRICA	10,000-100,000	2/4	F	D	G	V	L,PU,PE			N		
105	LUTROGALE	PERSPICILLATA	INDIA, SE ASIA, IRAQ	20,000-200,000	2/4	F	D	G	V/S	PU,PS,L, H,F	-	S,LR,T,M	N-PEND		50+

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
109	LUTRA	LONGICAUDIS ANNECTENS	MEXICO, PANAMA	<10,000?	3/4	F	D	F	V?	L,PU	N	S,T,LR,H M	N-PEND	2	>30?
114	AONYX	CAPENSIS	SUBSAHARAN AFRICA	10,000-100,000	2/4	F	D	G	V	L,PR,PV		S,M,T,HM	N		
117	AONYX	CONGICA	C. AFRICA	1,000-10,000	4	?	D?	G	V	L,PS,PU	N	S,M,T,LR	N		
118	AONYX	CINEREA	S + SE ASIA	5,000-50,000	3/4	F	D	F	V/S	PU, PS, H, L, F	-	T,S,HM,M	N	2	200+
119	AONYX	CINEREA NIRNAI	SOUTH INDIA	200-1,000		F	D	AA	V/E	?	Y	S,LR,HM, M	N-PEND	-	-
123	ENHYDRA	LUTRIS NEREIS	CALIFORNIA, MEXICO	2,500±	1	NF	S	AA-1	V	PU, F	N	S-(MEX)	I-1	2	20±
124	**VIVERRIDAE**														
125	**VIVERRINAE**														
128	VIVERRA	MEGASPILA	NE INDIA MYANMAR TO V'NAM TO MALAY	1000-50,000	4	?	D	E	V/U	H?,D?,L? ,PS?	N	S	I-1	1/2	<10
134	GENETTA	JOHNSTONI	LIBERIA, GUINEA	100-1000	4	1	D	AA	V/E	L	N	S, M	N-PEND	2	0
137	GENETTA	VICTORIAE	NE ZAIRE	<5,000	4	1	D	AAA	V	L	N	LH	N-PEND		0
139	GENETTA	GENETTA ISABELAE	IBIZA I, SPAIN	<700	2	1	S	AA-1	V	H,L,LF,D, SF	N	T	N		0
145	GENETTA	RUBIGINOSA INSULARIS	BIOKO I, EQ.GUINEA	100-500	4	1	UNK	AA-2	V/E	S,M?,T	N	T	N-PEND	1	0
150	OSBORNICTIS	PISCIVORA	NE ZAIRE	<3,000	2/4	1	D	AAA	V	L	N	S,M	I-1		2

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
151	POIANA	RICHARDSONI RICHARDSONI	CAMEROON, BIOKO, GABON, EQUAT. GUINEA	<5,000	4	1	D	E	V	L	N	T	N	3	0
155	PRIONODON	PARDICOLOR	CHINA, INDIA E NEPAL TO N VIETNAM	1000-50,000	3/4	F	D	D	V	LF,H	N	LR	N-PEND		<10
156	**PARADOXURINAE**														
161	PARADOXURUS	ZEYLONENSIS	SRI LANKA	2,000-10,000	3/4	F	D	AA	V	L	N	S,HM	N-PEND		<5
162	PARADOXURUS	JERDONI	W GHATS, INDIA	5,000-10,000	2	2+	S	AA	V	L,D	Y	T,TL,LR	N		1
163	PARADOXURUS	LIGNICOLOR	SIBERUT, MENTAWI ISL	500-10,000	4	2+	D	AA	V/E	L,H,PO?	N	HM,LR	N-PEND		0?
175	**FOSSINAE**														
176	FOSSA	FOSSANA	E&N MADAGASCAR	1000-3000	3	F	D	C	V/E	L,H,ICE	Y	HM	N-PEND		0
181	**HERPESTIDAE**														
183	GALIDICTIS	FASCIATA	E. MADAGAS	1,000-5,000	3/4	F	D	C	V/E	L,H?	Y	HM,LR	N-PEND		0
184	GALIDICTIS	GRANDIDIERI	SW MADAGAS	500-3,000	3	1	S?	AA	V?	NONE?	Y	HM	N-PEND		0
185	MUNGOTICTIS	DECEMLINEATA	SW MADAGAS	1,000-5,000	3	F	D	B	V/E	L	Y	HM,LR	I-1		0
186	SALANOIA	CONCOLOR	E MADAGASCAR	1,000-5,000	3/4	F	D	B/C	V/E	L	Y	HM,LR	N-PEND		0
191	HERPESTES	SMITHII	W. GHATS & NORTHERN INDIA	5,000-20,000	4	F	D	B	V/S	L, H	Y	S	N		>5

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
206	MUNGOS	GAMBIANUS	LOCALISED W AFRICA	<10,000	4	1	D	F	V	L	N	S,M,	N-PEND		0
218	BDEOGALE	CRASSICAUDA	ZANZIBAR, KENYA, MOZAMB, E. TANZANIA, E. ZAMBIA, AND S. ZAIRE	<10,000	4	F	?	G	V	L	N	S,M,T	N-PEND	3	0
220	BDEOGALE	NIGRIPES	NIGERIA, CAMEROON, GABON, CONGO, ZAIRE, CAR	<10,000	4	1	D	G	V	L,H	N	S,M,T	N-PEND		
228	**CRYPTOPROCTINAE**														
229	CRYPTOPROCTA	FEROX	MADAGASCAR	1000-5000	3	F	D?	E	V?	L?,H	Y	LR	I-1	1	>25

Table 9. Secure Small Carnivore Taxa.

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
1	**PROCYONIDAE**														
6	BASSARISCUS	ASTUTUS	OR/US-MEX	>10000	2-3	>5	D?	G	S**	H	N	S,M	I-2	2	17.14
8	PROCYON	LOTOR	N. AMERICA	>1,000,000	4	F	S	G	S	NONE	N	N	I-2	1	>700
16	PROCYON	CANCRIVORUS	CR-ARG./TR	>10000	3	?	S	G	S	I,L	N	S,M	I-2	1	70
17	NASUA	NASUA	EANDES-S.	25,000-70,000	2	>5	D?	G	S	H	N	N,LR,T?	I-2	1	150+
19	NASUA	NARICA	WANDES-AZ.	10,000-50,000	2	>5	D?	G	S?	L,I,H,D	YIII	S,M,LR,T?	I-2	1	95
21	POTOS	FLAVUS	MEX-BOLIV & BRAZIL	10,000-50,000	2	>5	D	G	S	LF	N	S,T,M	I-2	2	100+
26	BASSARICYON	ALLENI	ECU-PERU	10,000-50,000	3	>5	S?	G	S	L,H	N	T,S,LR	I-1	3	0
27	**MUSTELIDAE**														
28	**MUSTELINAE**														
31	MUSTELA	ERMINEA (42)	EUROPE, ASIA, N. AMERICA	>1,000,000	2	?	S	G	S	H?	N	T	N		200
32	MUSTELA	NIVALIS* (20)	EUROPE, ASIA	>1,000,000	2		S	G	S	NONE	N	T	N		200
33	MUSTELA	FRENATA (42)	CANADA-BOLIVIA	>1,000,000			S	G	S	?	N	NNE	N		
34	MUSTELA	ALTAICA	ASIA	500 000	2	2	D-	G	S	H, L?	N		N		20
38	MUSTELA	SIBIRICA	ASIA	500,000-1,000,000	2	3-4	S	G	S	H	N	M,T	N		30

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
42	MUSTELA	VISON (15)	CANADA-USA	>10,000,000	1		I	G	S	NONE	N	LR*	N		
43	MUSTELA	PUTORIUS (15)	EU	500,000-1,000,000	2	10	D	G	S	C,L,LF, HYB	N	T(HYB)	N		200
45	MUSTELA	EVERSMANNI	ASIA,EUROPE	>1,000,000	2	3-5	S	G	S		N	T	N		60
50	MARTES	FOINA (11)	EU, AS	>1,000,000	2	?	I-	G	S	H?	N	T, S(IS)	N		20
51	MARTES	MARTES	EU,AS	500,000	2	?	S	G	S	L	N	NNE	N		60
54	MARTES	M. NOTIALIS	SOUTH ABRUZZI	<5,000	4	1	S	C	S	I	N	T	N		0
55	MARTES	ZIBELLINA (19)	ASIA	1,000,000-1,200,000	2	?	D-	G	S	H,L	N	T, M	N		?
57	MARTES	M. MELAMPUS	JAPAN	10,000-100,000	3	F	S?	E	S	?	N	M	N		?
59	MARTES	AMERICANA (24)	CANADA-N USA	>100,000	2	F	S	G	S	H	N	M,LM,S(INSULAR)	N-PEND	3	?
60	MARTES	PENNANTI	USA, CANADA	>100,000	2	F	S	G	S	H	N	M,LM,HR	I-2	3	>20
61	MARTES	FLAVIGULA	E. RUSSIA TO INDONESIA	25,000-100,000	3/4	F	D/S?	G	S	H, L	N	M,LR,T	I-1	2	>20
64	EIRA	BARBARA	MEXICO, N.ARGENTINA	>50,000		F	D	G	S	L	N	S	N-PEND		50
68	GALICTIS	V. VITTATA	SOUTH AMERICA	>50,000	3	?	D	G	S	L?N	N	S	N	3	28
71	ICTONYX	STRIATUS (21)	SUBSAHARAN AFRICA	>100,000	3/4	NF	S	G	S	NONE	N	N	N		>20
73	POECILOGALE	ALBINUCHA	SUBSAHARAN AFRICA	20,000-100,000	2/4	NF	D	G	S	L	N	N	N		
75	GULO	GULO SSP	N. AMERICA	>10,000	3	F	S	G	S	L,H	N	M,LM	I-2	3	?

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
76	**MELLIVORINAE**														
77	MELLIVORA	CAPENSIS (15)	INDIA, SW ASIA M.EAST,AFRIC A	50,000-250,000	3/4	F	D	G	S	L, H	N	M, T	N-PEND		>20
78	**MELINAE**														
79	MELES	MELES (19)	EU, AS	>1,000,000	2	?	S	G	S	H, PO	N	T	N		100
80	ARCTONYX	COLLARIS	E + SE ASIA	20,000-100,000	4	F	D	G	S?	H, L	N	HM	N		<20
81	MYDAUS	JAVANENSIS	SUMATRA, BORNEO, JAVA	>10,000	4	F	D	F	S?	L	N	HM	N		0
83	TAXIDEA	TAXUS	CANADA-MEXICO	>10,000	3	F		G	S	SEC. POISON?	N	S	N		
85	MELOGALE	MOSCHATA	SE + E ASIA	>50,000	4	3+	S?	F	S	H?	N	N	N		<20
86	MELOGALE	PERSONATA	SE ASIA	>50,000	4	NF?	S?	F	S	?	N	N	N		<20
89	**MEPHITINAE**														
91	SPILOGALE	PUTORIUS (17)	BRIT COLUM-COSTA RICA	>100,000	3	NF	S?	G	S	NONE	N	M,T	N		<10
92	MEPHITIS	MEPHITIS (15)	CANADA-MEXICO	>1,000,000	3	NF	S/I	G	S	NONE	N	M,T	N		>100
93	MEPHITIS	MACROURA	USA-NICURAGUA	>100,000	3	NF	S?	G	S	?	N	M,T	N		
94	CONEPATUS	MESOLEUCUS (10)	USA-NICURAGUA	>50,000		NF	S?	G	S	NNE	N	M, TRADE	N		
95	CONEPATUS	LEUCONOTUS	USA-MEXICO	?	3	NF	S/D?	E	S?	TRADE?	N	T,M, TRADE	N		0

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
96	CONEPATUS	SEMISTRIATUS	MEXICO-PANAMA	>50,800+	3	NF	S?	?	S	?	N	T,M, TRADE	N		1
97	CONEPATUS	CHINGA	SOUTHERN S. AMERICA	>50,000	4	NF	S?	G	S?	TRADE?	N	M, TRADE	N		0
99	**LUTRINAE**														
107	LUTRA	CANADENSIS	CANADA-MEXICO	>1,000,000	1	NF	S	G	S	F	N	M, S(MEX)	N		>1000
108	LUTRA	LONGICAUDIS	MEXICO, N. ARGENTINA	100,000-500,000	3/4	F	D?	G	S	L, PU	N	S,T	N-PEND	2	>50
122	ENHYDRA	LUTRIS LUTRIS	ALASKA-RUSSIA	>50,000	1	NF	S	G	S	-	N	-	N-PEND	2	>100
124	**VIVERRIDAE**														
125	**VIVERRINAE**														
126	VIVERRA	ZIBETHA	E+SE ASIA	>100,000	3	1	S?	G	S	H,L	N	N	N		>20
127	VIVERRA	TANGALUNGA	SE ASIA	>50,000	3/4	1	S	F	S	NONE	N	N	N		>10
130	CIVETTICTIS	CIVETTA	SUB-SAHARAN AFRICA	>100,000	4	F	S	G	S		N	N	N		>15
131	VIVERRICULA	INDICA	S+SE ASIA	>500,000	2/3	1	S	G	S	NONE	N	N	N		
132	GENETTA	THIERRYI	NORTHERN WEST AFRICA	>5,000	4	1	S	F	S	?	N	S,M	N		0
135	GENETTA	SERVALINA SERVALINA	ZAIRE, CONGO, CAMEROON, GABON, CAR	>50,000	4	1	D	F	S	L	N	LH	N		0
136	GENETTA	SERVALINA BETTONI	UGANDA, E ZAIRE	>10,000	4	F	D	D	S/V	L	N	M,T	N		0

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
138	GENETTA	GENETTA	EUROPE, AFR	>1,000,000	2	2	S	F	S	NONE	N		N		>200
140	GENETTA	G.FELINA	S. AFRICA	>50,000	4	1	S	F	S	NONE	N	T	N		>10
141	GENETTA	ANGOLENSIS	ZAIRE, ANGOLA	>50,000	4	1	S	G	S	NONE	N	T	N		0
142	GENETTA	TIGRINA	COASTAL SOUTH AFRICA	>10,000	4	1?	S	F	S	?	N	N	N		>10
144	GENETTA	MACULATA: CHANGE TO G. RUBIGNOSA SPP.	SUB-SAHARAN AFRICA	>100,000	4	1	S	F	S	NONE	N	T	N		>20
153	POIANA	RICHARDSONI OCHRACEA	ZAIRE, CAR	10,000-50,000	4	1	D	F	S	L	N	T	N	3	0
154	PRIONODON	LINSANG	MYANMAR, THAILAND, MALAYSIA, INDONESIA	10,000-100,000	4	4	D	F	S?	L	N	T	N-PEND		<20
156	**PARADOXURINAE**														
157	NANDINIA	BINOTATA	SUB-SAHARAN FOREST EXCEPT SOUTHERN SOUTH AFRICA.	>100,000	2	3	D	G	S	L	N	T	N		>10
158	ARCTOGALIDIA	TRIVIRGATA	SE ASIA	10,000-100,000	4	10+	D	F	S	L	N	T	N		>20
160	PARADOXURUS	HERMAPHRODITUS	SE,E,S ASIA	>1,000,000	3/4	10+	S	G	S	NONE	N	T	N		>100
164	PAGUMA	LARVATA	E, SE ASIA	>1,000,000	3/4	10+	D	G	S?	H,PO	N	T, M	N		+100

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
167	ARCTICTIS	BINTURONG	NEPAL TO INDONESIA	20,000-200,000	3/4	F	D	F	S?	L,T	N	T	N		>100
169	**HEMIGALINAE**														
170	HEMIGALUS	DERBYANUS	S. THAILAND TO INDONESIA	10,000-100,000	4	F	D	F	S?	L,PS,PO	N	T, S	N-PEND		<10
181	**HERPESTIDAE**														
182	GALIDIA	ELEGANS	MADAGASCAR	5,000-25,000	3	1	S?	E	S?	L?	N	M	N		>5
187	HERPESTES	ICHNEUMON	PAN-AFRICAN, SW EUROPE	>100,000	4	F	S	G	S	?	N	T	N		>10
188	HERPESTES	JAVANICUS	SE ASIA	>100,000	3	F	S	G	S	NONE	N	N	N		>5
189	HERPESTES	AUROPUNCTATUS	S ASIA	>100,000	3	F	S	G	S	NONE	N	N	N		>5
190	HERPESTES	EDWARDSI	C. ARABIA TO INDIA TO SRI LANKA, S. EUROPE	>100,000	3	1	S	G	S	NONE	N	N	N		>20
192	HERPESTES	FUSCUS	W. GHATS + SRI LANKA	5,000-50,000	4	F	S	B	S	L	N	S	N		0
193	HERPESTES	VITTICOLLIS	SW INDIA + SRI LANKA	10,000-20,000	3	F	S?	C	S?	NONE	N	HM	N		0?
194	HERPESTES	URVA	SE ASIA	>50,000	3/4	F	S?	G	S	NONE	N	N	N		<20
195	HERPESTES	BRACHYURUS	SE ASIA	>50,000	4	F	S	G	S	NONE	N	T	N		?
199	HERPESTES	NASO	E.G., GABON, CAR, NIGERIA, CAMEROON, ZAIRE	>100,000	4	3	D	G	S	L	N	T,LR	I-2		0

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
200	HERPESTES	PULVERULENTUS	SOUTHERN AFRICA	>50,000	4	1	S	E	S	NONE	N	T	N		0
201	HERPESTES	SANGUINEUS	SUB-SAHARAN EXCEPT S.A.	>100,000	4	1	S	G	S	NONE	N	T,LH	N-PEND		0
207	MUNGOS	MUNGO	SUB-SAHARAN TO EAST AND SOUTH	>50,000	4	1	S	G	S	?	N	T	N		>50
208	CROSSARCHUS	OBSCURUS	WEST AFRICA	>10,000	3	1	S	E	S	L	N				>15
209	CROSSARCHUS	PLATYCEPHALUS	WEST AFRICA	>10,000	4	1	S	E	S	L	N	T			0
210	CROSSARCHUS	ALEXANDRI	ZAIRE	>100,000	2	1	S	G	S	L	N	T			0
213	CROSSARCHUS	ANSORGEI NIGRICOLOR	ZAIRE	>50,000	2	1	D	G	S	L	N	LH	N		0
215	HELOGALE	PARVULA	SUB-SAHARAN EASTERN TO S.A.	>50,000	4	1	S	G	S	NONE?	N	N	N		>100
222	RHYNCHOGALE	MELLERI	ZAMBIA, ZAIRE, TANZANIA, ZIMBABWE, MOZAMBIQUE, S. AFRICA	>10,000	4	U	S	F	S	?	N	S	N-PEND		
223	ICHNEUMIA	ALBICAUDA	SUB-SAHARAN	>50,000	4	1	S	G	S	NONE	N	T	N		
224	ATILAX	PALUDINOSUS	SUB-SAHARAN	>100,000	4	1	S	G	S	NONE	N	T	N		>5

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
225	CYNICTIS	PENICILLATA	NAMIBIA, BOTSWANA, S.A.	25,000-50,000	4	1	S	G	S	NONE	N	T	N		>10
227	SURICATA	SURICATTA	NAMIBIA, BOTSWANA, ANGOLA, S.A.	>50,000	4	1	S	G	S	?	N	T	N		>300

Table 10. Unknown Small Carnivore Taxa.

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
1	**PROCYONIDAE**														
20	NASUELLA	OLIVACEA	NO. ANDES	??	1	?	??	AAA	U	LF	N	S,LR	N-PEND	3	0
27	**MUSTELIDAE**														
28	**MUSTELINAE**														
35	MUSTELA	KATHIAH	HIMALAYAS, CHINA, MYANMAR	10,000-500,000	4	?	?	F	U	?	N	S	N		0
40	MUSTELA	NUDIPES	S THAILAND, MALAYSIA, INDONESIA	5,000-50,000	4	F	?	?	U	?	N	LM, T	N		0
69	GALICTIS	CUJA	NO. S. AMERICA	?	4	?	?	G	U	L?		S,HR	N-PEND	2	31
70	LYNCODON	PATAGONICUS	ARGENTINA, CHILE	?	4	?	?	E	U	L?	N	S	N-PEND	?	?
90	SPILOGALE	PYGMAEA	MEXICO	20,000-30,000?	3	F	?	D	U	?	N	S, LR	I-2	?	0
101	LUTRA	LUTRA	ASIA	?	4	F	D	?	U	PU,P,L,H		LR,S,LM,T	N-PEND		
103	LUTRA	SUMATRANA	SE ASIA	?	4	F	D	?	U			S, LR, T	N-PEND		
106	LUTRA	P.MAXWELLI	IRAQ	?	4	?	D	AA-1	U	H,L,PU, WAR	-	S,LR,T,M	N-PEND		
124	**VIVERRIDAE**														
125	**VIVERRINAE**														
143	GENETTA	TIGRINA METHI	S. AFRICA	?	4	1	?	?	U	?	N	S,M,T	N-PEND		0
147	GENETTA	[?] BINI	S NIGERIA	UNK	4	?	UNK	UNK	U	?		S, T,M	N-PEND		0

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
148	[?]GENETTA	DEORUM: TAX.?	S&C SOMALIA	?	4	?	?	?	U	?		S, T	N-PEND		
149	[?]GENETTA	AEQUATORIALIS: TAX?	S SUDAN, SW C.A.R.	?	4	?	?	?	U	?		T	N		
181	**HERPESTIDAE**														
197	HERPESTES	SEMITORQUATUS UNIFORMIS	SUMATRA, INDON.	?	4	?	D?	C/D?	U	?	N	S	N-PEND		0
198	HERPESTES	SEMITORQUATUS SEMITORQUATUS	BORNEO	1,000-50,000	4	?	D?	D	U	?	N	S	N		0
203	HERPESTES	NIGRATUS	KAOKOVELD, NAMIBIA	?	2	?	?	AA	U	?	N	T,S	N		
204	[?]HERPESTES	SWALIUS(VALID ?)	S&C NAMIBIA	?	4	?	?	?	U		N	T			0
205	[?]HERPESTES	SWINNYI(VALID ?)	SOUTH AFRICA, TRANSKEI	?	4	?	?	?	U		N	T			0
219	BDEOGALE	CRASSICAUDA OMNIVORA	KENYA COAST	?	4	F	D?	AA	U	?	N	S,T	N-PEND		0
226	PARACYNICTIS	SELOUSI	EASTERN S.A.	>10,000	4	1	U	E	U	?	N	LR	I-2		0

Table 11. All Small Carnivore Taxa.

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
1	**PROCYONIDAE**														
2	**AILURIDAE**														
3	AILURUS	FULGENS													
4		FULGENS FULGENS	NEPAL-MYANMAR	<5000	>5		D	D	E	I,L,LF	Y	T,S,M,LH	I-1	E	±200
5		FULGENS STAYARI	MYANMAR-CHINA	<5000	>5		D	D	E	I,L,LF	Y	T,S,M,LH	I-1	E	±200
6	BASSARISCUS	ASTUTUS	OR/US-MEX	>10000	2-3	>5	D?	G	S**	H	N	S,M	I-2	2	17.14
7	BASSARISCUS	SUMICHRASTI	MEX-PANAM	2,500-10,000	2	>5	D?	D	E/V	LF,L,H?	YIII	S,HR,M	N-PEND	3	1.2
8	PROCYON	LOTOR	N. AMERICA	>1,000,000	4	F	S	G	S	NONE	N	N	I-2	1	>700
9	PROCYON	LOTOR INCAUTUS	FL. KEYS	??	3	1	D?	AA-1	E?	L	N	M	N-PEND	1	0
10	PROCYON	LOTOR AUSPITATUS	FL. KEYS	??	3	1	D?	AA-1	E?	L	N	M	N-PEND	1	0
11	PROCYON	INSULARIS	MARIAS IS	< 250	4	2	??	AA-2	C	?PETS?	Y	T,S,LR	I-1	1	0
12	PROCYON	MAYNARDI	BAHAMAS	< 500	3	2	D	AA	C?	I,TOURS	Y	T,S	I-1	1	0
13	PROCYON	PYGMAEUS	COZUMEL	< 500	2	0	D	AA-1	C?	I,L,T	Y	T,S	I-1	1	0
14	PROCYON	MINOR	GUADALUPE	< 500	3	?0	D	AA	C?	H,I,L	Y	T,S	I-1	1	0
15	PROCYON	GLOVERALLENI	BARBADOS	EXTINCT					EXT						
16	PROCYON	CANCRIVORUS	CR-ARG./TR	>10000	3	?	S	G	S	I,L	N	S,M	I-2	1	70
17	NASUA	NASUA	EANDES-S.	25,000-70,000	2	>5	D?	G	S	H	N	M,LR,T?	I-2	1	150+

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
18	NASUA	NELSONI	COZUMEL IS	250	2	0	D?	AA-1	C	I,L,T	Y	T,S,LR	I-1	1	0
19	NASUA	NARICA	WANDES-AZ.	10,000-50,000	2	>5	D?	G	S?	L,I,H,D	YIII	S,M,LR,T?	I-2	1	95
20	NASUELLA	OLIVACEA	NO. ANDES	??	1	?	??	AAA	U	LF	N	S,LR	N-PEND	3	0
21	POTOS	FLAVUS	MEX-BOLIV & BRAZIL	10,000-50,000	2	>5	D	G	S	LF	N	S,T,M	I-2	2	100+
22	BASSARICYON	GABBII	NICURAGUA, W.EQUADOR	1,000-10,000	3	>4	D?	F	E/V	L,(H)	YIII	T,S*,LR,M	N-PEND	2-3	1.2
23	BASSARICYON	PAULI ?	W.PANAMA	< 250	3	0	D?	AA-3?	C	L,H	YIII	T,S,LR	N-PEND	2-3	
24	BASSARICYON	LASIUS ?	COSTA RICA	< 250	3	0	D?	AA-3?	C	L,H	YIII	T,S*,LR	N-PEND	2-3	
25	BASSARICYON	BEDDARDI	VEN-BRAZIL	5,000-25,000	3	>5	S?	E	V?	L,H	N	T,S*,LR,M	N-PEND	2-3	
26	BASSARICYON	ALLENI	ECU-PERU	10,000-50,000	3	>5	S?	G	S	L,H	N	T,S,LR	I-1	3	0
27	**MUSTELIDAE**														
28	**MUSTELINAE**														
29	MUSTELA	FELIPEI	COLUMBIA, ECUADOR	100-5000	4	F	D	B	C/E	H, PU	N	HM,S,LR, LH	N-PEND		0
30	MUSTELA	AFRICANA	AMAZONIA	500-50,000	4	F	D	E	V/E?	H, PU	N	S,LR,LM	N-PEND		0
31	MUSTELA	ERMINEA (42)	EUROPE, ASIA, N. AMERICA	>1,000,000	2	?	S	G	S	H?	N	T	N		200
32	MUSTELA	NIVALIS* (20)	EUROPE, ASIA	>1,000,000	2		S	G	S	NONE	N	T	N		200
33	MUSTELA	FRENATA (42)	CANADA-BOLIVIA	>1,000,000			S	G	S	?	N	NONE	N		
34	MUSTELA	ALTAICA	ASIA	500 000	2	2	D-	G	S	H, L?	N		N		20

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
35	MUSTELA	KATHIAH	HIMALAYAS, CHINA, MYANMAR	10,000-500,000	4	?	?	F	U	?	N	S	N		0
36	MUSTELA	LUTREOLA	EUROPE	<30000	2	5	D+	F	E	I,ICE,L,PU,H	Y	T,S,M,HM, LR,LH	I-1	2	<70
37	MUSTELA	LUTREOLA TUROVI	CAUCASUS	<1000	3	0	D+	D	C	I,ICE,L,H,	Y	T,S,M,HM, LR,LH	I-1	2	0
38	MUSTELA	SIBIRICA	ASIA	500,000-1,000,000	2	3-4	S	G	S	H	N	M,T	N		30
39	MUSTELA	LUTREOLINA	S SUMATRA, JAVA	500-5,000	3/4	F	D/S ?	AA-2	V/E	L, LF, SV	N	LR,HM	N		0
40	MUSTELA	NUDIPES	S THAILAND, MALAYSIA, INDONESIA	5,000-50,000	4	F	?	?	U	?	N	LT, T	N		0
41	MUSTELA	STRIGIDORSA	E. HIMALAYAS, NORTHERN SE ASIA	2,000-25,000	4	F	D	E	V?	?	N	LR, LH	N		0
42	MUSTELA	VISON (15)	CANADA-USA	>10,000,000	1		I	G	S	NONE	N	LR*	N		
43	MUSTELA	MACRODON	CANADA	EXTINCT	1				EXT						
44	MUSTELA	PUTORIUS (15)	EU	500,000-1,000,000	2	10	S	G	S	HYB	N	T(HYB)	N		200
45	MUSTELA	EVERSMANNI	ASIA,EUROPE	>1,000,000	2	3-5	S	G	S		N	T	N		60
46	MUSTELA	EVERSMANNI AMURENSIS	NE ASIA	1,000 - 10,000	3	0	D+	C	V	H, L	N	T,M,LR	N-PEND	?	0
47	MUSTELA	NIGRIPES	CANADA-USA	<50	1		I	AA-1	C	D	N	TL,M,HM	I-1	1	>400

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
48	VORMELA	PEREGUSNA	AS, EU	50 000	2	5	D	G	V	L	Y	T,S,H,LR, LH	I-2	3	15
49	VORMELA	PEREGUSNA PEREGUSNA	SE EUROPE	1000?	2	0	D+	C	V	L	Y	M,LH,LR	I-2	3	2?
50	MARTES	FOINA (11)	EU, AS	1,000,000?	2	?	I-	G	S	H?	N	T,S(IS)	N	2	20
51	MARTES	MARTES	EU,AS	500 000	2	?	S	G	S	L	N	NONE	N	2	60
52	MARTES	MARTES LATINORUM	SARDINIA	>500?	4	1	S	B	V	D,SF	N	T	N	2	0
53	MARTES	MARTES MINORICENSIS	MINORCA	500 - 2000	2	1	S	AA-1	V	D,SF	N	T	N	2	0
54	MARTES	MARTES NOTIALIS	SOUTH ABRUZZI	<5,000	4	1	S	C	S	I	N	T	N	2	0
55	MARTES	ZIBELLINA (19)	ASIA	1,000,000-1,200,000	2	?	D-	G	S	H,L	N	T,M	N	2	?
56	MARTES	ZIBELLINA BRACHYURA	HOKKAIDO	<2,000	4	NF?	D?	AAA	V/E?	H, ICE	N	LR,E	N	2	?
57	MARTES	MELAMPUS MELAMPUS	JAPAN	10,000-100,000	3	F	S?	E	S	?	N	M	N	2	?
58	MARTES	MELAMPUS TSUENSIS	TSUSHIMA ISL, JAPAN	500-5,000	3	NF	D/S?	AA-1	V	?	N	M, HM	N-PEND	2	0
59	MARTES	AMERICANA (24)	CANADA-N USA	>100,000	2	F	S	G	S	H	N	M,LM,S(INSULAR)	N-PEND	3	?
60	MARTES	PENNANTI	USA, CANADA	>100,000	2	F	S	G	S	H	N	M,LM,HR	I-2	3	>20
61	MARTES	FLAVIGULA	E. RUSSIA TO INDONESIA	25,000-100,000	3/4	F	D/S?	G	S	H, L	N	M,LR,T	I-1	2	>20
62	MARTES	FLAVIGULA ROBINSONI	JAVA	50-1,000	4	F	D?	AA-1	E/C?	SV, G?	N	S,LR,HM	N-PEND	2	0

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
63	MARTES	GWATKINSI	W GHATS	5,000-15,000	3	F	D/S	C	V	L, HD	Y	HM,LH	N	2	0
64	EIRA	BARBARA	MEXICO, N.ARGENTINA	>50,000		F	D	G	S	L	N	S	N-PEND		50
65	EIRA	BARBARA SENEX	MEX,GUATEMALA, BELIZE	10,000-35,000	1	>5	D	D	E	L	Y	S,LR	I-1	3	<20
66	GALICTIS	VITTATA													
67	GALICTIS	VITTATA CANASTER	MEX-CENTRAL AMERICA	<10,000	3	F	D	E	E/V	L	N	S,HR,LR	N-PEND	3	<30
68	GALICTIS	VITTATA VITTATA	SOUTH AMERICA	>50,000	3	?	D	G	S	L?N	N	S	N	3	28
69	GALICTIS	CUJA	NO. S. AMERICA	?	4	?	?	G	U	L?		S,HR	N-PEND	2	31
70	LYNCODON	PATAGONICUS	ARGENTINA, CHILE	?	4	?	?	E	U	L?	N	S	N-PEND	?	?
71	ICTONYX	STRIATUS (21)	SUBSAHARAN AFRICA	>100,000	3/4	NF	S	G	S	NONE	N	N	N		>20
72	POECILICTIS	LIBYCA	C SAHARA	5,000-250,000	4	F	S?	E	V?	L?	N	LR	N-PEND		0
73	POECILOGALE	ALBINUCHA	SUBSAHARAN AFRICA	20,000-100,000	2/4	NF	D	G	S	L	N	N	N		
74	GULO	GULO GULO	EUROPE	10,000	2	2	D	F	V	H,I,L	Y	T,M, LR,LH	I-1	3	<25
75	GULO	GULO SSP	N. AMERICA	>10,000	3	F	S	G	S	L,H	N	M,LN	I-2	3	?
76	**MELLIVORINAE**														

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
77	MELLIVORA	CAPENSIS (15)	INDIA, SW ASIA M.EAST,AFRIC A	50,000-250,000	3/4	F	D	G	S	L, H	N	M, T	N-PEND		>20
78	**MELINAE**														
79	MELES	MELES (19)	EU, AS	>1,000,000	2	?	S	G	S	H, PO	N	T	N		100
80	ARCTONYX	COLLARIS	E + SE ASIA	20,000-100,000	4	F	D	G	S?	H, L	N	HM	N		<20
81	MYDAUS	JAVANENSIS	SUMATRA, BORNEO, JAVA	>10,000	4	F	D	F	S?	L	N	HM	N		0
82	MYDAUS	MARCHEI	CALAMIAN IS, PALAWAN	1,000-10,000	4	F	D	AAA	V	L, H?	N	HM, LR	N-PEND		0
83	TAXIDEA	TAXUS	CANADA-MEXICO	>10,000	3	F		G	S	SEC. POISON?	N	S	N	2	
84	TAXIDEA	TAXUS BERLANDIERI	MEXICO, SW USA	?	3	F	D	G	E/V	L	N	S	N-PEND	2	
85	MELOGALE	MOSCHATA	SE + E ASIA	>50,000	4	3+	S?	F	S	H?	N	N	N		<20
86	MELOGALE	PERSONATA	SE ASIA	>50,000	4	NF?	S?	F	S	?	N	N	N		<20
87	MELOGALE	EVERETTI	NE BORNEO	?	4	?	S?	AA-1	V/S	?	N	T, HM, S	N		0
88	MELOGALE	ORIENTALIS	JAVA, BALI	2,000-15,000	3	F	D/S?	C	V/S	?	N	LR	N		<10
89	**MEPHITINAE**														
90	SPILOGALE	PYGMAEA	MEXICO	20,000-30,000?	3	F	?	D	U	?	N	S, LR	I-2	?	0
91	SPILOGALE	PUTORIUS (17)	BRIT COLUM-COSTA RICA	>100,000	3	NF	S?	G	S	NONE	N	M,T	N		<10

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
92	MEPHITIS	MEPHITIS (15)	CANADA-MEXICO	>1,000,000	3	NF	S/I	G	S	NONE	N	M,T	N		>100
93	MEPHITIS	MACROURA	USA-NICURAGUA	>100,000	3	NF	S?	G	S	?	N	M,T	N		
94	CONEPATUS	MESOLEUCUS (10)	USA-NICURAGUA	>50,000		NF	S?	G	S	NNE	N	M, TRADE	N		
95	CONEPATUS	LEUCONOTUS	USA-MEXICO	?	3	NF	S/D?	E	S?	TRADE?	N	T,M, TRADE	N		0
96	CONEPATUS	SEMISTRIATUS	MEXICO-PANAMA	>50,800+	3	NF	S?	?	S	?	N	T,M, TRADE	N		1
97	CONEPATUS	CHINGA	SOUTHERN S. AMERICA	>50,000	4	NF	S?	G	S?	TRADE?	N	M, TRADE	N		0
98	CONEPATUS	HUMBOLDTII	ARGENTINA	?	4	NF	S/D?	F	V?	TRADE?	N	S, M, TRADE	N		0
99	**LUTRINAE**														
100	LUTRA	LUTRA	EUROPE, N. AFRICA, throughout ASIA to SE ASIA	100,000-200,000	1/2	F	D-	C	V	P,PU,H,I C,F	Y(UK)	S,H,LH, T,LR,HM, M,LM	N-PEND		>100
101	LUTRA	LUTRA	ASIA	?	4	F	D	?	U	PU,P,L,H		LR,S,L,T	N-PEND		
102	LUTRA	LUTRA WHITELEYI	KOCHI PREF. SHIKOKU	EXT?	1				EXT			S			
103	LUTRA	SUMATRANA	SE ASIA	?	4	F	D	?	U			S, LR, T	N-PEND		
104	LUTRA	MACULICOLLIS	SUBSAHARAN AFRICA	10,000-100,000	2/4	F	D	G	V	L,PU,PE					
105	LUTROGALE	PERSPICILLATA	INDIA, SE ASIA, IRAQ	20,000-200,000	2/4	F	D	G	V/S	PU,PS,L, H,F	-	S,LR,T,M	N-PEND		50+

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
106	LUTRA	PERSPICILLATA MAXWELLI	IRAQ	?	4	?	D	AA-1	U	H,L,PU, WAR	-	S,LR,T,M	N-PEND		
107	LUTRA	CANADENSIS	CANADA-MEXICO	>1,000,000	1	NF	S	G	S	F	N	M, S(MEX)	N		>1000
108	LUTRA	LONGICAUDIS	MEXICO, N. ARGENTINA	100,000-500,000	3/4	F	D?	G	S	L, PU	N	S,T	N-PEND	2	>50
109	LUTRA	LONGICAUDIS ANNECTENS	MEXICO, PANAMA	<10,000?	3/4	F	D	F	V?	L,PU	N	S,T,LR,HM	N-PEND	2	>30?
110	LUTRA	LONGICAUDIS LONGICAUDIS													
111	LUTRA	PROVOCAX	ARGENTINA, CHILE	1,000-10,000	2/4	F	D	E	E/V	L, PU	N	S,M,LR	N-PEND		0?
112	LUTRA	FELINA	PERU-CHILE	<10,000	2/4	F	D?	C	E/V	F, PU, I	Y?	S,M,LR	N-PEND		
113	PTERONURA	BRASILIENSIS	AMAZON BASIN	5,000-50,000	2/4	F	D	G	E/C	L,PR,H	N	S, LR	I-2	3	<30
114	AONYX	CAPENSIS	SUBSAHARAN AFRICA	10,000-100,000	2/4	F	D	G	V	L,PR,PV		S,M,T,HM			
115	AONYX	CAPENSIS MICRODON		?											
116	AONYX	CAPENSIS PHILIPPSI		10,000-50,000											
117	AONYX	CONGICA	C. AFRICA	1,000-10,000	4	?	D?	G	V	L,PS,PU	N	S,M,T,LR	N		
118	AONYX	CINEREA	S + SE ASIA	5,000-50,000	3/4	F	D	F	V/S	PU, PS, H, L, F	-	T,S,HM,M		2	200+
119	AONYX	CINEREA NIRNAI	SOUTH INDIA	200-1,000		F	D	AA	V/E	?	Y	S,LR,HM, M	N-PEND	-	-

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
120	AONYX	CINEREA (Palawan pop.)	PALAWAN	50-200	4	F	D	AA-1	E/C	L, PU, PE, H?	-	M,S,HM,L R	N-PEND	-	-
121	ENHYDRA	LUTRIS													
122	ENHYDRA	LUTRIS LUTRIS	ALASKA-RUSSIA	>50,000	1	NF	S	G	S	-	N	-	N-PEND	2	>100
123	ENHYDRA	LUTRIS NEREIS	CALIFORNIA, MEXICO	2,500±	1	NF	S	AA-1	V	PU, F	N	S-(MEX)	I-1	2	20±
124	**VIVERRIDAE**														
125	**VIVERRINAE**														
126	VIVERRA	ZIBETHA	E+SE ASIA	>100,000	3	1	S?	G	S	H,L	N	N	N		>20
127	VIVERRA	TANGALUNGA	SE ASIA	>50,000	3/4	1	S	F	S	NONE	N	N	N		>10
128	VIVERRA	MEGASPILA	NE INDIA MYANMAR TO V'NAM TO MALAY	1000-50,000	4	?	D	E	V/U	H?,D?,L? ,PS?	N	S	I-1	1/2	<10
129	VIVERRA	CIVETTINA	W GHATS, INDIA	100-500	2/4	F	D	AA-1	C	H,LF,D?, PS	Y	S, E	I-1	2	0
130	CIVETTICTIS	CIVETTA	SUB-SAHARAN AFRICA	>100,000	4	F	S	G	S		N	N	N		>15
131	VIVERRICULA	INDICA	S+SE ASIA	>500,000	2/3	1	S	G	S	NONE	N	N	N		
132	GENETTA	THIERRYI	NORTHERN WEST AFRICA	>5,000	4	1	S	F	S	?	N	S,M	N		0
133	GENETTA	ABYSSINICA	ETHIOPIA, DJIB. & SOMAL.?	100-1000	4	F	D	AA-2	E/C	L	N	S,M	N-PEND	2	0

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
134	GENETTA	JOHNSTONI	LIBERIA, GUINEA	100-1000	4	1	D	AA	V/E	L	N	S, M	N-PEND	2	0
135	GENETTA	SERVALINA SERVALINA	ZAIRE, CONGO, CAMEROON, GABON, CAR	>50,000	4	1	D	F	S	L	N	L	N		0
136	GENETTA	SERVALINA BETTONI	UGANDA, E ZAIRE	>10,000	4	F	D	D	S/V	L	N	M,T	N		0
137	GENETTA	VICTORIAE	NE ZAIRE	<5,000	4	1	D	AAA	V	L	N	LH	N-PEND		0
138	GENETTA	GENETTA	EUROPE, AFR	500,000	2	2	S	F	S	N	N		N		>200
139	GENETTA	GENETTA ISABELAE	IBIZA I, SPAIN	<700	2	1	S	AA-1	V	H, SF	N	T	N		0
140	GENETTA	GENETTA FELINA	S. AFRICA	>50,000	4	1	S	F	S	N	N	T	N		>10
141	GENETTA	ANGOLENSIS	ZAIRE, ANGOLA	>50,000	4	1	S	G	S	N	N	T	N		0
142	GENETTA	TIGRINA	COASTAL SOUTH AFRICA	>10,000	4	1?	S	F	S	?	N	N	N		>10
143	GENETTA	TIGRINA METHI	S. AFRICA	?	4	1	?	?	U	?	N	S,M,T	N-PEND		0
144	GENETTA	RUBIGNOSA	SUB-SAHARAN AFRICA	>100,000	4	1	S	F	S	N	N	T	N		>20
145	GENETTA	RUBIGNOSA INSULARIS	BIOKO I, EQ.GUINEA	100-500	4	1	UNK	AA-2	V/E	S,M,T	N	T	N-PEND	1	0
146	GENETTA	CRISTATA	SE NIGERIA, WEST CAMEROON	500-2,000	4	1	D	AA	E	L,H	N	S,M,T	N-PEND	2	0

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
147	GENETTA	[?] BINI	S NIGERIA	UNK	4	?	UNK	UNK	U	UNK		S, T,M	N-PEND		0
148	[?]GENETTA	DEORUM: TAX.?	S&C SOMALIA	?	4	?	?	?	U	?		S, T	N-PEND		
149	[?]GENETTA	AEQUATORIALIS: TAX?	S SUDAN, SW C.A.R.	?	4	?	?	?	U	?		T	N		
150	OSBORNICTIS	PISCIVORA	NE ZAIRE	<3,000	2/4	1	D	AAA	V	L	N	S,M	I-1		2
151	POIANA	RICHARDSONI RICHARDSONI	CAMEROON, BIOKO, GABON, EQUAT. GUINEA	<5,000	4	1	D	E	V	L	N	T	N	3	0
152	POIANA	RICHARDSONI LIBERIENSIS: = R. LEIGHTONI	LIBERIA, COTE D'IVOIRE	<1500	3	1	D	B	E	L	N	S,M,T	N-PEND	3	0
153	POIANA	RICHARDSONI OCHRACEA	ZAIRE, CAR	10,000-50,000	4	1	D	F	S	L	N	T	N	3	0
154	PRIONODON	LINSANG	MYANMAR, THAILAND, MALAYSIA, INDONESIA	10,000-100,000	4	6+	D	F	S?	L	N	T	N-PEND		<20
155	PRIONODON	PARDICOLOR	CHINA, INDIA E NEPAL TO N VIETNAM	1000-50,000	3/4	F	D	D	V	LF,H	N	LR	N-PEND		<10
156	**PARADOXURINAE**														
157	NANDINIA	BINOTATA	SUB-SAHARAN FOREST EXCEPT SOUTHERN SOUTH AFRICA.	>100,000	2	3	D	G	S	L	N	T	N		>10

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
158	ARCTOGALIDIA	TRIVIRGATA	SE ASIA	10,000-100,000	4	10+	D	F	S	L	N	T	N		>20
159	ARCTOGALIDIA	TRIVIRGATA TRILINEATA	W.JAVA, INDON.	100-2000	4	F	D/S	AA	C/E	G?,H,SV, L	N	S,LR	N-PEND		0
160	PARADOXURUS	HERMAPHRODITUS	SE,E,S ASIA	>1,000,000	3/4	10+	S	G	S	NONE	N	T	N		>100
161	PARADOXURUS	ZEYLONENSIS	SRI LANKA	2,000-10,000	3/4	F	D	AA	V	L	N	S,HM	N-PEND		<5
162	PARADOXURUS	JERDONI	W GHATS, INDIA	5,000-10,000	2	2+	S	AA	V	LD	Y	T,TL,LR	N		1
163	PARADOXURUS	LIGNICOLOR	SIBERUT, MENTAWI ISL	500-10,000	4	2+	D	AA	V/E	L,H,PO?	N	HM,LR	N-PEND		0?
164	PAGUMA	LARVATA	E, SE ASIA	>1,000,000	3/4	10+	D	G	S?	H,PO	N	T, M	N		100±
165	[?]PAGUMA	LANIGERA	S TIBET		VALID?							T			
166	MACROGALIDIA	MUSCHENBROEKII	SULAWESI, INDON.	500-5,000	3/4	F	D	D	E/V	L,ICE?, H	Y	HM, TL	N-PEND		0
167	ARCTICTIS	BINTURONG	NEPAL TO INDONESIA	20,000-200,000	3/4	F	D	F	S?	L,T	N	T	N		>100
168	ARCTICTIS	BINTURONG WHITEI	PALAWAN, PHILIPPINES	1,000-5000	3	F	D	AAA	E/V	L, H	Y	HM, E	I-1	1	<20
169	**HEMIGALINAE**														
170	HEMIGALUS	DERBYANUS	S. THAILAND TO INDONESIA	10,000-100,000	4	F	D	F	S?	L,PS,PO	N	T, S	N-PEND		<10
171	DIPLOGALE	HOSEI	SARAWAK & SABAH, MALAY.	1,000-10,000	4	F	D	AAA?	E/V	L, H?	N	S, HM, LR	N-PEND		0

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
172	CHROTOGALE	OWSTONI	C+N VIETNAM, N LAOS, CHINA	1,000-10,000	3/4	F	D	D	E/V	H, L	N	HM, E, LT, LH	N-PEND		2?
173	CYNOGALE	BENNETTII	BORNEO, SUMATRA, MALAY.	1,000-10,000	3/4	F	D	D	E	L, PO	Y	HM, LR, S	N-PEND		0
174	CYNOGALE	LOWEI	N VIETNAM,S CHINA,THAI.?	EXTINCT	VLD ?				EXT			T			
175	**FOSSINAE**														
176	FOSSA	FOSSANA	E&N MADAGASCAR	1000-3000	3	F	D	C	V/E	L,H,ICE	Y	HM	N-PEND		0
177	**EUPLERINAE**														
178	EUPLERES	GOUDOT													
179	EUPLERES	G.GOUDOTII	NE MADAGASCAR	1000-3000	3	F	D	C	E	L,H	Y	HM,LR	N-PEND		0
180	EUPLERES	G.MAJOR	NW MADAGASCAR	250-2000	3	F	D	B	E/C	L,H	Y	HM,LR	I-1	2	0
181	**HERPESTIDAE**														
182	GALIDIA	ELEGANS	MADAGASCAR	5,000-25,000	3	1	S?	E	S?	L?	N	M	N		>5
183	GALIDICTIS	FASCIATA	E. MADAGAS	1,000-5,000	3/4	F	D	C	V/E	L,H?	Y	HM,LR	N-PEND		0
184	GALIDICTIS	GRANDIDIERI	SW MADAGAS	500-3,000	3	1	S?	AA	V?	NONE?	Y	HM	N-PEND		0
185	MUNGOTICTIS	DECEMLINEATA	SW MADAGAS	1,000-5,000	3	F	D	B	V/E	L	Y	HM,LR	I-1		0
186	SALANOIA	CONCOLOR	E MADAGASCAR	1,000-5,000	3/4	F	D	B/C	V/E	L	Y	HM,LR	N-PEND		0
187	HERPESTES	ICHNEUMON	PAN-AFRICAN	>100,000	4	F	S	G	S		N	T	N		>10

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
188	HERPESTES	JAVANICUS	SE ASIA	>100,000	3	F	S	G	S	NONE	N	N	N		>5
189	HERPESTES	AUROPUNCTATUS	S ASIA	>100,000	3	F	S	G	S	NONE	N	N	N		>5
190	HERPESTES	EDWARDSI	C. ARABIA TO INDIA TO SRI LANKA	>100,000	3	1	S	G	S	NONE	N	N	N		>20
191	HERPESTES	SMITHI	W. GHATS & NORTHERN INDIA	5,000-20,000	4	F	D	B	V/S	L, H	Y	S	N		>5
192	HERPESTES	FUSCUS	W. GHATS + SRI LANKA	5,000-50,000	4	F	S	B	S	L	N	S	N		0
193	HERPESTES	VITTICOLLIS	SW INDIA + SRI LANKA	10,000-20,000	3	F	S?	C	S?	NONE	N	HM	N		0?
194	HERPESTES	URVA	SE ASIA	>50,000	3/4	F	S?	G	S	NONE	N	N	N		<20
195	HERPESTES	BRACHYURUS	SE ASIA	>50,000	4	F	S	G	S	NONE	N	T	N		?
196	HERPESTES	SEMITORQUATUS													
197	HERPESTES	SEMITORQUATUS UNIFORMIS	SUMATRA, INDON.	?	4	?	D?	C/D?	U	?	N	S	N-PEND		0
198	HERPESTES	SEMITORQUATUS SEMITORQUATUS	BORNEO	1,000-50,000	4	?	D?	D	U	?	N	S	N		0
199	HERPESTES	NASO	E.G. GABON, CAR, NIGERIA, CAMEROON, ZAIRE	>100,000	4	3	D	G	S	L	N	T,LR	I-2		0
200	HERPESTES	PULVERULENTUS	SOUTHERN AFRICA	>50,000	4	1	S	E	S	NONE	N	T	N		0

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
201	HERPESTES	SANGUINEUS	SUB-SAHARAN EXCEPT S.A.	>100,000	4	1	S	G	S	NONE	N	T,L	N-PEND		0
202	HERPESTES	PALUSTRIS	W BENGAL, INDIA		VALID?							T			
203	HERPESTES	NIGRATUS	KAOKOVELD, NAMIBIA	?	2	?	?	AA	U	?	N	T,S	N		
204	[?]HERPESTES	SWALIUS(VALID ?)	S&C NAMIBIA	?	4	?	?	?	U		N	T			0
205	[?]HERPESTES	SWINNYI(VALID ?)	SOUTH AFRICA, TRANSKEI	?	4	?	?	?	U		N	T			0
206	MUNGOS	GAMBIANUS	LOCALISED W AFRICA	<10,000	4	1	D	F	V	L	N	S,M,	N-PEND		0
207	MUNGOS	MUNGO	SUB-SAHARAN TO EAST AND SOUTH	>50,000	4	1	S	G	S		N	T	N		>50
208	CROSSARCHUS	OBSCURUS	WEST AFRICA	>10,000	3	1	S	E	S	L	N				>15
209	CROSSARCHUS	PLATYCEPHALUS	WEST AFRICA	>10,000	4	1	S	E	S	L	N	T			0
210	CROSSARCHUS	ALEXANDRI	ZAIRE	>100,000	2	1	S	G	S	L	N	T			0
211	CROSSARCHUS	ANSORGEI	ZAIRE												
212	CROSSARCHUS	ANSORGEI ANSORGEI	ANGOLA	?	4	1	?	AA-2	E/C?	L,H	N	S,M,T	N-PEND		0
213	CROSSARCHUS	ANSORGEI NIGRICOLOR	ZAIRE	>50,000	2	1	D	G	S	L	N		N		0

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
214	LIBERIICTIS	KUHNI	CE LIBERIA, & IVORY C.	500-2,000	2	1	D	AA	E	L,H	N	HM	I-2		0
215	HELOGALE	PARVULA	SUB-SAHARAN EASTERN TO S.A.	>50,000	4	1	S	G	S	NONE?	N	N	N		>100
216	HELOGALE	HIRTULA: (W PARVULA)													
217	DOLOGALE	DYBOWSKII	NE ZAIRE, SUDAN, UGANDA, CAR	?	4	1	D	D	E?	L	N	S,M,T	N-PEND	3	0
218	BDEOGALE	CRASSICAUDA	ZANZIBAR, KENYA, MOZAMB., E. TANZANIA, E. ZAMBIA, S. ZAIRE	<10,000	4	F	?	G	V	L	N	S,M,T	N-PEND	3	0
219	BDEOGALE	CRASSICAUDA OMNIVORA	KENYA COAST	?	4	F	D?	AA	U	?	N	S,T	N-PEND		0
220	BDEOGALE	NIGRIPES	NIGERIA, CAMEROON, GABON, CONGO, ZAIRE	<10,000	4	1	D	G	V	L,H	N	S,M,T	N-PEND		
221	BDEOGALE	JACKSONI	C KENYA, SE UGANDA	<1,000	4	1	D	B	E	L	N	S,M,T	N-PEND		
222	RHYNCHOGALE	MELLERI	ZAMBIA, ZAIRE, TANZANIA, ZIMBABWE, MOZAMBIQUE, S. AFRICA	>10,000	4	U	S	F	S	?	N	S	N-PEND		

	TAXON		WILD POPULATION										CAPTIVE PROGRAM		
	SCIENTIFIC NAME		RANGE	EST#	DQ	SUBPOP	TRND	AREA	M/L	THRTS	PVA	RSCH	REC	DIFF	NUM
223	ICHNEUMIA	ALBICAUDA	SUB-SAHARAN	>50,000	4	1	S	G	S	NONE	N	T	N		
224	ATILAX	PALUDINOSUS	SUB-SAHARAN	>100,000	4	1	S	G	S	NONE	N	T	N		>5
225	CYNICTIS	PENICILLATA	NAMIBIA, BOTSWANA, S.A.	25,000-50,000	4	1	S	G	S	NONE	N	T	N		>10
226	PARACYNICTIS	SELOUSI	EASTERN S.A.	>10,000	4	1	U	E	U	?	N	LR	I-2		0
227	SURICATA	SURICATTA	NAMIBIA, BOTSWANA, ANGOLA, S.A.	>50,000	4	1	S	G	S		N	T	N		>300
228	**CRYPTOPROCTINAE**														
229	CRYPTOPROCTA	FEROX	MADAGASCAR	1000-5000	3	F	D?	E	V?	L?,H	Y	LR	I-1	1	>25

KEY: S*= Survey and Taxonomy work is high priority; it may make a difference for the "critical" subspecies.
!!!= Recommend Meso-American PHVA
** = NOT the insular population
D = Demographic management desirable.If local interest (say, endangered in a given region), breeding OK.
Hs= Husbandry management desirable.

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SECTION 3

SUMMARY TABLES BY TAXONOMIC GROUP

Table 12. Procyonids - comparison of Mace-Lande and current IUCN categories of threat.

MACE-LANDE	END	VUL	RARE	INDET	K	EXT	NOT	TOTAL
Critical	0	0	0	0	2	0	5	7
Endangered	0	0	0	0	2	0	4	6
Vulnerable	0	0	0	0	0	0	1	1
Secure	0	0	0	0	0	0	7	7
Unknown	0	0	0	0	0	1	1	2
TOTAL	0	0	0	0	4	1	18	23

Table 13. Threats to Procyonid populations.

MACE-LANDE	Hunting	Habitat Loss	Habitat Loss/Fragmentation	Human Interference	Other	None
Critical	3	5	0	4	4	0
Endangered	2	6	3	2	0	0
Vulnerable	1	1	0	0	0	0
Secure	4	3	1	2	1	1
Unknown	0	0	1	0	0	0
TOTAL	10	15	5	8	5	1

*Other = Trade (T), Disease (D)

Table 14. Procyonid research management recommendations.

MACE-LANDE	PHVA	SURVEY	MONITR	LIFE HISTORY RESRCH	LIMITING FACTORS RESRCH	LIMITING FACTORS MGMT	HABITAT MGMT	TAXON RESRCH	TRNSLOC
Critical	7	7	0	0	4	0	0	7	0
Endangered	4	4	6	2	1	0	0	3	0
Vulnerable	0	1	1	0	1	0	0	1	0
Secure	1	5	4	0	3	0	0	4	0
Unknown	0	1	0	0	1	0	0	0	0
TOTAL	12	18	11	2	10	0	0	15	0

Table 15. Captive program recommendations for Procyonids by Mace-Lande threat category.

MACE-LANDE	Initiate immediately 0-3 yrs	Initiate future > 3 yrs	Not currently recommended pending data or PHVA	Not currently recommended
Critical	5	0	2	0
Endangered	2	0	4	0
Vulnerable	0	0	1	0
Secure	1	6	0	0
Unknown	0	0	1	1
TOTAL	8	6	8	1

Table 16. Mustelidae - comparison of Mace-Lande and current IUCN categories of threat.

MACE-LANDE	END	VUL	RARE	INDET	K	NOT	TOTAL
Critical	1	0	0	0	0	2	3
Endangered	0	1	0	0	0	3	4
Vulnerable	0	0	0	2	3	12	17
Secure	0	0	0	0	0	35	35
Unknown/Ext	0	0	0	0	0	5	5
TOTAL	1	1	0	2	3	57	64

Table 17. Threats to Mustelidae populations.

MACE-LANDE	Hunting	Habitat Loss	Pollution	Interspp compet'n exotic spp	Uncertain	Other	None
Critical	2	1	0	1	0	3	0
Endangered	1	4	0	1	0	3	0
Vulnerable	5	8	0	1	4	9	0
Secure	13	12	1	0	5	6	9
Unknown/Ext	0	2	0	0	3	0	0
TOTAL	21	27	1	3	12	21	9

*Other = Interspecific interference or disturbance (I), Disease (D),
Catastrophic events (S), Genetic problems (G), Trade for the live animal market (T), Hybridization (Hyb).

Table 18. Mustelidae research management recommendations.

MACE-LANDE	PHVA	SURVEY	MONITR	LIFE HISTORY RESRCH	LIMITING FACTORS RESRCH	LIMITING FACTORS MGMT	HABITAT MGMT	TAXON RESRCH	TRNSLOC
Critical	1	2	2	2	2	0	3	1	1
Endangered	2	5	1	1	4	0	2	1	0
Vulnerable	4	4	5	5	11	1	5	6	0
Secure	0	5	15	0	1	3	2	16	0
Unknown/Ext	0	4	0	0	1	1	0	1	0
TOTAL	7	20	23	8	19	5	12	25	1

Table 19. Captive program recommendations for Mustelidae (excluding Lutrinae) by Mace-Lande threat category.

MACE-LANDE	Initiate immediately 0-3 yrs	Initiate future > 3 yrs	Not currently recommended pending data or PHVA	Not currently recommended
Critical	2	0	1	0
Endangered	2	0	3	0
Vulnerable	1	2	5	9
Secure	1	2	3	29
Unknown/Ext	0	1	2	2
TOTAL	6	5	14	40

NOTES ON PREPARATION OF LUTRINAE INFORMATION

Although many otter species may be recorded over large ranges, when studied their populations are always found to be fragmented. Not only are they directly affected by human disturbances, they are also very sensitive to pollution in waterways and aquatic food chains. Most otters, even in "good" habitats, are thinly distributed throughout large home ranges and the amount of habitat needed depends on many environmental factors. For instance, an estimated density of approximately 1 otter/2 km of shoreline was recorded for the coastal Lutra lutra populations in Scotland while inland populations of the same species were found to require at least 10 sq. km. per single otter. These densities are extremely variable depending on habitat characteristics even for this one species throughout its studied range in Europe.

The densities and habitat requirements of none of the tropical otters have been studied, so there are no data for making valid estimations of populations of any of these species. We do know that here, too, they are tied to uncontaminated waterways and wetlands where they are not persecuted by humans. Thus, even though some of these species may occur in large tropical forests, they are only found near the uncontaminated waterways where they have not been hunted out. The waterways in these areas are usually the "roads" that enable humans to penetrate these otherwise remote areas, and otters are often hunted. In the case of a large, diurnal and social otter species like Pteronura brasiliensis, this vulnerability has led to their rapid decline.

For these reasons, the population estimates are lower than for other small carnivores that are spread throughout the entire forests. Also, for these reasons, the Mace/Lande status is often given as more vulnerable than for other species with similar ranges. As with most of the species included in the small carnivore CAMP, all of these numbers represent "best guesses" with very little actual data, and are just provided to give something to discuss to initiate the rapid conservation attention that is required for survival of species and populations.

As detailed in the IUCN/SSC document, Otters, An Action Plan for their Conservation (Foster-Turley et al, 1990), otters are a useful indicator species for healthy aquatic habitats. For this reason, much of the effort worldwide continues to focus at the regional level to use otter conservation as a springboard for wetlands conservation in an effort to protect all aspects of these ecosystems. Due to the fragmented nature of otter populations and their easy susceptibility to many environmental disturbances, regional otter conservation programs are important regardless of the worldwide status of each species.

Table 20. Lutrinae - comparison of Mace-Lande and current IUCN categories of threat.

MACE-LANDE	END	VUL	RARE	INDET	K	NOT	TOTAL
Critical	0	0	0	0	0	0	0
Endangered	0	2	0	0	0	2	4
Vulnerable	0	2	0	0	3	4	9
Secure	0	1	0	0	0	2	3
Unknown/Ext	0	0	0	0	1	2	3
TOTAL	0	5	0	0	4	10	19

Table 21. Threats to Lutrine populations.

MACE-LANDE	H	L	Pu	F	Uncertain	Other*	None
Critical	0	0	0	0	0	0	0
Endangered	2	3	3	1	0	2	0
Vulnerable	3	6	7	4	1	10	0
Secure	0	1	1	1	0	1	0
Unknown/Ext	2	2	2	0	0	2	0
TOTALS	7	12	13	6	1	15	0

* Other = Predation by exotics (Pe), Predation (P), Human interference or disturbance (I), Pesticides (Ps), Interspecific comptetion (Ic).

Table 22. Lutrinae research management recommendations.

MACE-LANDE	PHVA	SURVEY	MONITR	LIFE HISTORY RESRCH	LIMITING FACTORS RESRCH	LIMITING FACTORS MGMT	HABITAT MGMT	TAXON RESRCH	TRNSLOC
Critical	0	0	0	0	0	0	0	0	0
Endangered	1	4	3	0	4	0	1	0	0
Vulnerable	2	8	6	1	5	1	5	6	0
Secure	0	2	1	0	0	0	0	1	0
Unknown/Ext	0	3	1	0	3	1	0	3	0
TOTAL	3	17	11	1	12	2	6	10	0

Table 23. Captive program recommendations for Lutrinae by Mace-Lande categories of threat.

MACE-LANDE	Initiate immediately 0-3 yrs	Initiate future > 3 yrs	Not currently recommended pending data or PHVA	Not currently recommended
Critical	0	0	0	0
Endangered	0	1	3	0
Vulnerable	1	0	4	4
Secure	0	0	2	1
Unknown/Ext	0	0	3	0
TOTAL	1	1	12	5

Table 24. Viverrids - comparison of Mace-Lande and current IUCN categories of threat.

MACE-LANDE	END	VUL	RARE	INDET	K	NOT	TOTAL
Critical	1	0	0	1	0	0	2
Endangered	0	2	1	1	3	3	10
Vulnerable	1	1	1	1	1	7	12
Secure	0	0	0	0	0	20	20
Unknown/Ext	0	0	0	0	0	4	4
TOTAL	2	3	2	3	4	34	48

Table 25. Threats to Viverrid populations.

MACE-LANDE	Hunting	Habitat Loss	Ps	Po	Uncertain	Other*	None
Critical	2	0	1	0	0	4	0
Endangered	5	10	0	1	0	1	0
Vulnerable	5	10	1	1	0	10	0
Secure	2	9	1	2	2	2	7
Unknown/Ext	0	0	0	0	4	0	0
TOTAL	14	29	3	4	6	17	7

*Other = Loss of habitat because of fragmentation (Lf), Disease (D), Catastrophic events (S), and Interspecific competition from exotics (Ice), Genetic problems (G), Marine perturbations (M).

Table 26. Viverrid research management recommendations.

MACE-LANDE	PHVA	SURVEY	MONITR	LIFE HISTORY RESRCH	LIMITING FACTORS RESRCH	LIMITING FACTORS MGMT	HABITAT MGMT	TAXON RESRCH	TRNSLOC
Critical	1	2	0	0	1	0	0	0	0
Endangered	5	5	3	1	4	0	7	2	2
Vulnerable	2	4	2	1	3	0	3	4	1
Secure	0	2	3	1	1	0	0	12	0
Unknown/Ext	0	3	2	0	0	0	0	4	0
TOTAL	8	16	10	3	8	0	10	22	3

Table 27. Captive program recommendations for Viverrids by Mace-Lande threat category.

MACE-LANDE	Initiate immediately 0-3 yrs	Initiate future > 3 yrs	Not currently recommended pending data or PHVA	Not currently recommended
Critical	1	0	1	0
Endangered	2	0	8	0
Vulnerable	2	0	7	3
Secure	0	0	2	18
Unknown/Ext	0	0	3	1
TOTAL	5	0	21	22

Table 28. Herpestid taxa - comparision of Mace-Lande and current IUCN categories of threat.

MACE-LANDE	END	VUL	RARE	INDET	K	NOT	TOTAL
Critical	0	0	0	0	0	0	0
Endangered	1	0	0	0	1	2	4
Vulnerable	2	1	0	1	2	3	9
Secure	0	0	0	0	0	23	23
Unknown/Ext	0	0	0	0	0	7	7
TOTAL	3	1	0	1	3	35	43

Table 29. Threats to Herpestid taxa.

MACE/LANDE	Hunting	Habitat Loss	Uncertain	None
Critical	0	0	0	0
Endangered	2	4	0	0
Vulnerable	4	8	0	1
Secure	0	7	4	12
Unknown/Ext	0	0	6	0
TOTALS	6	19	9	13

Table 30. Herpestid research management recommendations.

MACE-LANDE	PHVA	SURVEY	MONITR	LIFE HISTORY RESRCH	LIMITING FACTORS RESRCH	LIMITING FACTORS MGMT	HABITAT MGMT	TAXON RESRCH	TRNSLOC
Critical	0	0	0	0	0	0	0	0	0
Endangered	0	3	3	0	0	0	1	3	0
Vulnerable	6	4	3	0	4	0	4	2	0
Secure	0	2	1	2	1	0	1	12	0
Unknown/Ext	0	4	0	0	1	0	0	4	0
TOTAL	6	13	7	2	6	0	6	21	0

Table 31. Captive program recommendations for Herpestid taxa by Mace-Lande threat category.

MACE-LANDE	Initiate immediately 0-3 yrs	Initiate future > 3 yrs	Not currently recommended pending data or PHVA	Not currently recommended
Critical	0	0	0	0
Endangered	0	1	3	0
Vulnerable	2	0	6	1
Secure	0	1	2	17
Unknown/Ext	0	1	2	2
TOTAL	2	3	13	20

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SECTION 4

TAXON REPORTS - EUROPEAN TAXA

CAMP TAXON REPORT

SPECIES: *Lutra lutra* Eurasian otter
STATUS:
Mace-Lande: Vulnerable
CITES: II
IUCN:
Other: Bern Convention, Appendix II

Taxonomic status: 10 subspecies are recognized.
Distribution: Western Europe to northeastern Siberia and Korea, Asia minor and certain other parts of southeastern Asia, Himalayan region, extreme southern India, China, Myanmar, Thailand, Indochina, northwestern Africa, British Isles & Ireland, Sri Lanka, Sakhalin, Japan, Taiwan, Hainan, Sumatra and Java (Walker, 1991).
Wild population: 100,000-200,000 in Europe, North Africa. Numbers in Asia should be established. V. Rozhnov reports 60,000 in Russia in 1990.
Field studies: Detailed surveys in several European countries have been made (except Russia, the Ukraine, Moldova, Romania).
Threats: Habitat loss, water scarcity (for human use) in southern areas, pollution, fragmentation of populations, human disturbance, fishing and threat of losing control over hunting in eastern Europe.
Comments: Otter surveys should be carried out in all countries, where surveys have been carried out a monitoring-process should be instigated. Such monitoring is necessary in countries where otter populations may appear to be save. Surveys or monitoring need to be conducted in populations which need special attention because of their critical status (e.g. Italy, Corfu and Euboea islands in Greece). In European countries where the otter has recently disappeared, as in the Benelux countries and Switzerland, efforts must and have been initiated to restore its biotopes and to create new biotopes. Legislative frameworks for reintroduction is necessary. Several countries have legally protected areas for the otter (France, Spain).
Recommendations:
Wild management: Protection, restoration and creation of habitats to prevent fragmentation of populations, pollution control, measures to reduce accidental mortality (e.g. tunnels under roads, stopgrids for fykenets).
Research: Monitoring is needed in western Europe. Survey of the eastern Europe population is required and further investigation of the differing ecological requirements and habitat assessment of the species.Special attention to Asian and more importantly SE Asian populations studies required to assess the effect of micro-pollutants (e.g. PCB's, heavy metals and pesticides).
PHVA: Not required for the total European population but may be necessary on a regional scale. The Small Carnivore CAMP workshop and IUCN/SSC Otter Specialist Group recommend the initiation of a PHVA Workshop for Great Britain & Ireland.
Other: There is an urgent priority to notify the Russian, Hungarian and Romanian legislative authorities requesting them to re-establish the legislative control over otter hunting. Impact of tourism (!). The remaining Mediterranean island populations in Euboea and Corfu need urgent protection.

Captive population: >100. There is an International studbook and a EEP coordinated programme. The majority of the genetic pool may originate from one source.
Captive program recommendation: Identify historical pedigree of population that may indicate possible hybridization of captive stock. This is essential if captive stock is to be used as a part of a re-introduction programme where wild translocations are not possible or practical. However, at present the general consensus indicates that captive breeding will not be part of this species recovery programme but that zoos can provide important public awareness/education programmes.

SPECIES: *Genetta genetta* Small spotted genet
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Species
Distribution: Spain, Portugal, France
Wild population: >1,000,000
Field studies: surveys on distribution, ecology and behavior have been already conducted in France and Spain.
Threats: none.
Comments: introduced into Europe probably before 9th century (Ruiz-Olmo).
Recommendations:
Wild management:
Research:
PHVA: no
Other:
Captive population: > 100 animals of European origin exists
Captive program recommendation:

CAMP TAXON REPORT

SPECIES: *Genetta genetta isabelae* Ibiza common genet
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN: Rare

Taxonomic status: sub-species (validity should be confirmed)
Distribution: Ibiza I. (Spain)
Wild population: 500-700 (Ruiz-Olmo)
Field studies: feeding ecology (experts: A. Alcover, M. Delibes (Estacion Biologica de Donana, Sevilla) and A. Clevenger (University of Leon).
Threats: highly localized population, habitat fragmentation, disease, loss of habitat, hunting, fire
Comments: Workshop data: EDB: Estacion Biologica de Donana (Spain), Spanish delegate, C.of Eu delgate, MSPSG MVPSG Action Plan. Probably introduced. No fossil records.
Recommendations:
Wild management: Habitat conservation, ban of hunting
Research: taxonomy (further morphology & genetics) to identify subspecific validity
PHVA: No
Other:
Captive population: none
Captive program recommendation: not necessary

CAMP TAXON REPORT

SPECIES: *Herpestes ichneumon* Egyptian mongoose
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: species
Distribution: Europe (South-west of Spain), Africa and Asia.
Wild population: >5000? in Europe
Field studies: Ecology and distribution, behavior have been studied. European experts: Francisco Palomares and Miguel Delibes.
Threats: management of rabbits for hunting may endanger the population (Ruiz-Olmo)
Comments: probably introduced
Recommendations:
Wild management: habitat conservation, control of use of the snares for rabbits(info.-E.Fernandez-Galiano/CofE)
Research: Taxonomic research(DNA analyses), survey of distribution in Spain and Portugal
PHVA: no
Other:
Captive population: unknown
Captive program recommendation: not required

CAMP TAXON REPORT

SPECIES: *Mustela altaica* Alpine weasel
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: species
Distribution: southern Siberia to the Himalayan region and Korea (Walker, 1991)
Wild population: est. 500,000 (V.Rozhnov to verify data for CIS)
Field studies: Ecological studies in the Far East have been made.
Threats: Habitat loss? and possibly hunting
Comments: insufficient general information on a species
Recommendations:
Wild management:
Research: taxonomic research and population survey
PHVA: no
Other:
Captive population: exact figures unknown probably c.30. Breeding studies conducted in Novosibirsk (Inst. of Biology)
Captive program recommendation:

CAMP TAXON REPORT

SPECIES: *Mustela erminea* Stoat
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: species
Distribution: Scandinavia and Ireland to northeastern Siberia and the western Himalayan region, Japan, Alaska and northeastern Greenland to northern New Mexico and Maryland (Walker, 1991) - introduced population in New Zealand
Wild population: >1,000,000 (V.Rozhnov to verify data for CIS). Dr. Rozhnov reports a 1990 population of 2,200,000 in Russia.
Field studies: Extensive studies on species biology have been conducted in UK, Scandinavia, Spain, CIS, New Zealand and North America
Threats: possible threats though uncontrolled hunting in Romania. which has low populations (info from D. T. Murariu).
Comments: There are a number of island populations of unclear taxonomic validity that may require conservation attention according to the MVPSG Action Plan, ie: *M.e. baturini* (Bolshoi Shanter island, CIS), *M.e. karaginensis* (Karaginski islands, CIS) and *M.e. ricinea* (Islands of Islay & Jura, UK).
Recommendations:
Wild management:
Research: taxonomic research required
PHVA: no
Other:
Captive population: exists in zoos and research facilities in low numbers
Captive program recommendation: none

CAMP TAXON REPORT

SPECIES: *Mustela nivalis* weasel
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: species
Distribution: western Europe and Asia Minor to northeastern Siberia and Korea, parts of China and possibly Indochina, Great Britain, several Mediterranean islands, Japan, northwestern Africa, Egypt, Alaska, Canada, north central United States, Appalachian region (Walker, 1991).
Wild population: >1,000,000 (V. Rozhnov to verify data from CIS)
Field studies: Extensive field studies have been conducted in Europe (UK, France, Switzerland, Germany, Poland, Scandinavian countries), North America, CIS
Threats: population decline found in southern Europe and CIS (Dr. Rozhnov)
Comments: *M.n. galinthias* (Crete, Greece) listed in MVPSG Action Plan as possibly threatened - further data are required.
Recommendations:
Wild management:
Research:
PHVA: no
Other:
Captive population: Held in low numbers in zoos and research facilities.
Captive program recommendation: none

CAMP TAXON REPORT

SPECIES: *Mustela sibirica* Siberian weasel
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: species
Distribution: eastern European Russia to eastern Siberia and Thailand, Japan, Taiwan (Walker, 1991).
Wild population: 500,000 - 1,000,000 (Dr. Rozhnov reports a 1990 population of 500,000 in Russia.)
Field studies: Studies have been conducted by Russian Academy of Science.
Threats: potential threat of uncontrolled hunting and possible competition with M. vison.(dr. Rozhnov)
Comments: Rapid decline in a known subpopulation (Baikal) - Dr. Rozhnov
Recommendations:
Wild management:
Research: future study of Baikal subpopulation to be implemented shortly (Dr. Rozhnov)
PHVA: no
Other:
Captive population: fur-farms, zoos and in research centers in Russia.
Captive program recommendation: none

CAMP TAXON REPORT

SPECIES: *Mustela lutreola* European mink
STATUS:
Mace-Lande: Endangered
CITES:
IUCN: Vulnerable
Other: Bern Convention Appendix II

Taxonomic status:
Distribution: Historical range: France to western Siberia and the Caucasus (Walker, 1991), Spain, nowadays in eastern part of Spain, western part of France, Estonia, Belorus, central part of Russia. The Ukraine and Moldova data need to be validated. Finland ?. The range is fragmented.
Wild population: less than 30,000
Field studies: Ecological and population studies have been conducted in Russia, Estonia, Belorus, Spain and France
Threats: Habitat loss (wetlands), expansion of introduced American mink, uncontrolled illegal hunting, pollution.
Recommendations:
Wild management: management of habitats, control of pollutants, control of trapping.
Research: taxonomy(morphological & genetic), monitoring of censused populations, effects of pollution, hunting and interspecific competition from *M.vison* and *M. putorius*, behavior and ecology, pathology, toxicology, quantitative studies of biotopes.
Experts: Russia (Dr. Tumanov, Dr. Rozhnov), Belorus (Dr. Sidorovich), Estonia & captive breeding (T. Maran), France (C. Maizeret, L. Lafontaine, C. Saint-Girons), Spain (S. Palazon, J. Ruiz-Olmo)
PHVA: yes
Other:
Captive population: c.70 animals in Tallinn (Estonia), Helsinki (Finland), Ahtari(Finland), Tchernogolovka, Novosibirsk, St. Petersburg, Central Forest Reserve and probably exists in unknown number in commercial fur-farms (Russia), Bucharest zoo (Romania) - please note that 2 described subspecies are known to be held in captivity (*M.l. novikovi*, *M.l. transylvanica*) EEP and EMCC programmes exist.
Captive program recommendation: High priority to intensify existing programmes and initiate others.

CAMP TAXON REPORT

SPECIES: *Mustela eversmanni* European polecat
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: species
Distribution: steppe zone from Austria to Manchuria and Tibet (Walker, 1991).
Wild population: >1,000,000 - (see V. Rozhnov for verification of data). c.1000 - 10,000 for *M.e. amurensis* (see V. Rozhnov for verification of data). Dr. Rozhnov reports 1990 Russian populations at 90,000 for *Mustela eversmanni* and <1,000 for *M.e. amurensis*.
Field studies: Predominantly Russian ecological studies (Dr. Rozhnov) and a few in Bulgaria (Murariu).
Threats: *M.e. amurensis* is only thought to be of conservation interest through uncontrolled hunting and habitat loss.
Comments:
Recommendations:
Wild management: monitor *M.e. amurensis* population
Research: taxonomic study required, especially for *M.e. amurensis*.
PHVA: no
Other:
Captive population: c. 60 in Research Centers (Tchernogolovka, Novosibirsk), Zoos (St.Petersburg & possibly others) and fur-farms.
Captive program recommendation: initiate a managed programme for *M.e. amurensis*.

CAMP TAXON REPORT

SPECIES: *Mustela putorius* European polecat
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: species
Distribution: western Europe to Ural mountains (Walker, 1991)
Wild population: 500,000-1,000,000 (data verification V. Rozhnov for CIS). Dr. Rozhnov reports a 1990 population in Russia of 60,000.
Field studies: Several field studies have been conducted in UK, France, Switzerland, Russia, Germany?, Poland?, Belorus
Threats: Uncontrolled hunting for fur, Climate, Habitat fragmentation and loss/water pollution (Spain, etc) ?? see-Jordi Ruiz-Olmo and V. Rozhnov disagreement.
Comments: In Russia and Byelorussia the polecat population is stable. This is not the case in Southern Europe. Water demands, agriculture, loss of habitat, and a different ecology and behavior of the polecat (living in dry ecosystems), is determining a very quick decline.
Recommendations:
Wild management:
Research: taxonomic revision of species, pathology, genetical research of purity of species in U.K.
PHVA: no
Other:
Captive population: 200 are estimated to be in captive situation.
Captive program recommendation: none

CAMP TAXON REPORT

SPECIES: *Vormela peregusna* Marbled polecat
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:

Taxonomic status: species
Distribution: steppe and subdesert zones from the Balkans and Palestine to Inner Mongolia and Pakistan (Walker, 1991, citing Corbet, 1978)
Wild population: 50,000 (Dr. Rozhnov will validate data for CIS)
Field studies: The following studies have been conducted: Israel - reproduction, ecology; Russia - ecology, taxonomy; the Ukraine - ecology, survey, Kazakhstan - ecology.
Threats: habitat loss
Comments:
Recommendations:
Wild management: Survey, monitoring, habitat management
Research: Taxonomy, limiting factor research, life history studies
PHVA: Yes
Other: none
Captive population: est. 15
Captive program recommendation: The captive program may be necessary. A nucleus consisting of 50 animals should be kept in captivity.

CAMP TAXON REPORT

SPECIES: *Vormela peregusna peregusna* European marbled polecat
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN: Vulnerable

Taxonomic status: subspecies
Distribution: Europe and Asia minor (Walker, 1991)
Wild population: <1000
Field studies: Ukraine - ecology and survey, Russia - ecology, survey
Threats: Loss of habitat
Comments:
Recommendations:
Wild management: Survey, monitoring, habitat management
Research: Taxonomy, limiting factor research, life history studies
PHVA: Yes
Other: none
Captive population: 2?
Captive program recommendation: Captive program should be initiated in the future

CAMP TAXON REPORT

SPECIES: *Martes martes* Pine marten
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: species
Distribution: western Europe to western Siberia and the Caucasus, Great Britain, Corsica, Sadinia, Sicily (Walker, 1991)
Wild population: 500,000 (Dr. Rozhnov will validate data)
Field studies: Russia, Hungary, Poland, Check Republic, Spain, France, Switzerland, Germany, the Netherlands, Italy, U.K., Norway, Finland - various studies of species ecology and behavior have been made. Genetic and craniometric studies have been made in several countries. PCBs studied in Austria.
Threats: loss of habitats
Comments: There are several isolated island populations of unknown taxonomic identity and included in CAMP TAXON REPORTS for editorial information.
Not found on Sicily (J. Ruiz-Olmo) - see distribution data.
Recommendations:
Wild management:
Research:
PHVA: No
Other:
Captive population: 50 - 100
Captive program recommendation: captive breeding program is not required

CAMP TAXON REPORT

SPECIES: *Martes martes latinorum*
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:

Taxonomic status: subspecies
Distribution: Sardinia
Wild population: > 500 est.
Field studies: none
Threats: possible diseases and loss of habitats through fire
Comments:
Recommendations:
Wild management:
Research: research about validity of subspecies is needed.
PHVA: No
Other:
Captive population:
Captive program recommendation: captive breeding program is probably not required

CAMP TAXON REPORT

SPECIES: *Martes martes minoricensis*
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:

Taxonomic status: subspecies
Distribution: Minorca (Balearic islands)
Wild population: 500 - 2000
Field studies: Feeding ecology, home range, daily activity and behavior are studied. Experts: A. Alcover, A. Clevenger (University of Leon), M. Delibes (Estacion Biologica de Donana, Sevilla) & J. Ruiz-Olmo (present in the workshop).
Threats: possible diseases and loss of habitats through fire
Comments:
Recommendations:
Wild management:
Research: research about validity of subspecies is needed.
PHVA: No
Other:
Captive population: none
Captive program recommendation: captive breeding program is probably not required

CAMP TAXON REPORT

SPECIES: *Martes martes notialis*
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: subspecies
Distribution: South Abruzzi mountains (Italy)
Wild population: <5000
Field studies: none
Threats: increased tourism
Comments:
Recommendations:
Wild management:
Research: research about validity of subspecies is needed.
PHVA: No
Other:
Captive population: none
Captive program recommendation: captive breeding program is probably not required

CAMP TAXON REPORT

SPECIES: *Martes zibellina* Sable
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: species
Distribution: Scandinavia to eastern Siberia and North Korea, Sakhalin, Hokkaido (Walker, 1991)
Wild population: Dr. V. Rozhnov reports a total of 1,000,000 - 1,200,000; 710,000 in Russia in 1990.
Field studies: Intensive study by Russian scientists - all aspects of biology of species (Dr. V. Rozhnov).
Threats: Uncontrolled hunting in several regions, loss of habitats (Dr. V. Rozhnov)
Comments:
Recommendations:
Wild management:
Research: taxonomy
PHVA: No
Other:
Captive population: commercial fur farms?
Captive program recommendation: captive breeding programme is not required

CAMP TAXON REPORT

SPECIES: *Martes foina* Stone marten
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: species
Distribution: Denmark and Spain to Mongolia and the Himalayas, Crete Rhodes, Corfu (Walker, 1991)
Wild population: >1,000,000 (must be validated); Population of *Martes martes* and *Martes foina* in 1990 is reported to be 175,000 (Dr. V. Rozhnov).
Field studies: There have been numerous studies on the species biology in many countries within the range of the species.
Threats: possibly uncontrolled hunting
Comments:
Recommendations:
Wild management:
Research: taxonomy
PHVA: No
Other:
Captive population: est. 20?
Captive program recommendation: captive breeding programme not required

CAMP TAXON REPORT

SPECIES: *Gulo gulo gulo* Wolverine
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN: Vulnerable

Taxonomic status: subspecies
Distribution: Europe
Wild population: 10,000 (must be validated, Dr. Novikov, c/o Leif Blomqvist - Scandinavia). V. Rozhnov reports 30,000 *Gulo gulo* in Russia in 1990.
Field studies: Several aspects of biology have been studied in Russia (expert Dr. V. Novikov), Some studies have been made in Fennoscandia (Pulliainen in Finland)
Threats: uncontrolled hunting, human disturbance, loss of habitat in Russia and probably elsewhere
Comments:
Recommendations:
Wild management:
Research: taxonomy, monitoring, limiting factor research, life history studies.
PHVA: Yes
Other:
Captive population: <25
Captive program recommendation: A coordinated captive breeding program should be initiated

CAMP TAXON REPORT

SPECIES: *Meles meles* Eurasian badger
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: species
Distribution: Europe, Asia (to Japan and south to Iran and southern China); also several Mediterranean islands
Wild population: >1,000,000, See Griffiths (1993) Small Carnivore Conservation 9:9-10. V. Rozhnov reports 87,000 in Russia in 1990.
Field studies: Numerous well documented studies in many countries within the range.
Threats:
Comments: The Japanese badger population is now often considered a full species *Melese anakuma.*
Recommendations:
Wild management:
Research: Taxonomic studies are required
PHVA: No
Other:
Captive population: >100
Captive program recommendation: no captive propagation required.

SMALL CARNIVORE CONSERVATION ASSESSMENT AND MANAGEMENT PLAN

Final Review Draft
10 May 1994

Edited and compiled by

Roland Wirth, Angela Glatston, Onnie Byers, Susie Ellis, Pat Foster-Turley, Paul Robinson, Harry Van Rompaey, Don Moore, Ajith Kumar, Roland Melisch, and Ulysses Seal

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SECTION 5

TAXON REPORTS - ASIAN TAXA

General Recommendations for Asia

1) South-East Asia Island populations and small wetland Carnivores

Many of the small carnivores occurring on islands of the SE Asian Archipelago are still lacking proper taxonomic review.
Some of these may turn out to be valid subspecies in need of further protection.
Hence we strongly suggest to consider all island populations (of the species listed as an appendix) as at least threatened by a variety of factors, i.e. mainly habitat fragmentation and genetic isolation.
Especially, wetland species (W) are suffering from habitat loss and general water pollution. These species should be considered for further field studies to improve wetland EIA capability and for better habitat management.

Prionodon linsang
Arctogalidia trivirgata
Paradoxurus lignicolor
Macrogalidia muschenbroekii
Arctitis binturong
Hemigalus derbyanus (W?)
Diplogale hosei
Cynogale bennetti (W)
Herpestes semitorquatus
Aonyx cinerea (W)
Lutra lutra (W)
Lutrogale perspicillata (W)
Lutra sumatrana (W)
Mustela lutreolina
Mustela nudipes
Martes flavigula
Melogale personata
Melogale orientalis
Arctonyx collaris
Mydaus javanensis
Mydaus marchei

2) Western Ghats Region, India

Out of 12 species of viverrids and mustelid occurring in the Western Ghats a PHVA should be conducted on the following species. This recommendation is based on endemism, present population and conservation status.

Viverra civettina
Paradoxurus jerdoni
Martes gwatkensi
Herpestes smithi
Herpestes viticollis
Aonyx cinerea nirnai

It is also recommended that a review of the taxonomic status of the two subspecies of Paradoxurus jerdoni should be undertaken as it appears that both subspecies have been collected from the same locality.

3) Palawan and surrounding small islands, Philippines

All remaining Palawan carnivores are a matter of concern for various reasons due to severe and quick habitat loss (logging) and possibly hunting. A PHVA for *Artitis binturong whitei* should be conducted. This PHVA could raise awareness of the alarming situation on Palawan and could help to gather most needed data and help to attract attention concerning *Mydaus marchei* and *Aonyx cinerea* populations.

Mydaus marchei
Arctitis binturong whitei
Aonyx cinerea cinerea

4) South-East Asian Forest Species:

SPECIES: *Martes flavigula robinsoni*
STATUS:
Mace/Lande: Endangered/Critical
CITES:
IUCN:

SPECIES: *Melogale orientalis*
STATUS:
Mace/Lande: Vulnerable/Secure
CITES:
IUCN: Insufficiently Known

SPECIES: *Melogale everetti*
STATUS:
Mace/Lande: Vulnerable/Secure
CITES:
IUCN: Insufficiently Known

SPECIES: *Mydaus marchei*
STATUS:
Mace/Lande: Vulnerable
CITES:
IUCN:

SPECIES: *Viverrina megaspila*
STATUS:
Mace/Lande: Vulnerable
CITES:
IUCN:

SPECIES: *Prionodon linsang*
STATUS:
Mace/Lande: Secure?
CITES: II
IUCN:

SPECIES: *Prionodon pardicolor*
STATUS:
Mace/Lande: Vulnerable
CITES: I
IUCN:

SPECIES: *Arctogalidia trivirgata trilineata*
STATUS:
Mace/Lande: Critcal/Endangered
CITES: I
IUCN:

SPECIES: *Paradoxurus lignicolor*
STATUS:
Mace/Lande: Vulnerable/Endangered
CITES:
IUCN: Endangered

SPECIES: *Macrogalidia musschenbroekii*
STATUS:
Mace/Lande: Endangered/Vulnerable
CITES:
IUCN: Rare

SPECIES: *Arctitis binturong*
STATUS:
Mace/Lande: Secure?
CITES:
IUCN:

SPECIES: *Chrotogale owstoni*
STATUS:
Mace/Lande: Endangered/Vulnerable
CITES:
IUCN: Insufficiently Known

SPECIES: *Diplogale hosei*
STATUS:
Mace/Lande: Endangered/Vulnerable
CITES:
IUCN:

SPECIES: *Mustela lutreolina*
STATUS:
Mace/Lande: Vulnerable/Endangered
CITES:
IUCN: Insufficiently Known
TAXONOMIC STATUS:
DISTRIBUTION: Remaining forest areas of South-East Asia
WILD POPULATION:
FIELD STUDIES:
THREATS: All forest species are subject to severe and rapid habitat loss due to logging activities which is resulting in forest fragmentation of the remaining areas.
Road construction and logging are subsequently followed by legal or illegal human encroachment and thus leading to isolation of remaining populations of forest carnivores.
All these populations are facing genetic depression as a result of inbreeding.
RECOMMENDATIONS: The improvement of proper habitat management in protected and other remaining forest areas is therefore highly recommended.
As many species have not been studied very well in the past, basis knowledge of their ecological demands is still lacking. Thus an increase of field studies (incl. different and improved survey techniques than used in the past and species' life history studies) is highly recommended, too.
All this information is urgently needed not only to increase basic scientific knowledge about small carnivores but to improve the efficiency of already existing E.I.A. (Environmental Impact Assessment) laws.
WILD MANAGEMENT:
RESEARCH:
PHVA:
CAPTIVE POPULATION:
CAPTIVE PROGRAM RECOMMENDATIONS:

5) Asian Himalayan Region
Ailurus fulgens fulgens, Ailurus fulgens stayari

STATUS:
Mace/Lande: Endangered
CITES: II
IUCN: Insufficiently Known

TAXONOMIC STATUS: subspecies
DISTRIBUTION: Nepal to Myanmar to China
WILD POPULATION: <5,000, declining
FIELD STUDIES:
THREATS: loss of habitat, habitat fragmentation, human interference or disturbance
RECOMMENDATIONS:
WILD MANAGEMENT:
RESEARCH: Taxonomic studies, Survey, Monitoring and Life history studies
PHVA: Yes
CAPTIVE POPULATION: ±200
CAPTIVE PROGRAM RECOMMENDATIONS: Increase ongoing program.

CAMP TAXON REPORT

SPECIES: *Vivera civettina* Malabar civet
STATUS:

Mace/Lande: Critical
CITES:
IUCN: Endangered

TAXONOMIC STATUS: Species
DISTRIBUTION: On the western foothills of Western Ghats. Currently reported only in two states: Kerala and Karnataka. AA-1 (less than 1000 km2).
WILD POPULATION: Population is fragmented. Estimated to be 1-250, based upon current research in 60% of currently known habitat.
FIELD STUDIES: Two short field surveys during 1990-93. No animals seen. Data on distribution based on local information.
THREATS: Loss of lowland riparian forests, and private cashew plantations; hunting; pesticide pollution.
COMMENTS: Private forests are impossible to manage by authorities. Education campaign could be useful. Species seems to be semi-aquatic, forages for fish and frogs. Consequently it could be vulnerable to pollution.
RECOMMENDATIONS:

WILD MANAGEMENT: measures for preventing habitat loss and hunting
RESEARCH: Field research on population density and habitat requirements
PHVA: A regional PHVA to cover 6 species of Western Ghats

CAPTIVE POPULATION: None currently. Collect from private lands, where there is no hope for animals anyway. This should happen immediately (I1).
CAPTIVE PROGRAM RECOMMENDATIONS: A captive breeding program for potential reintroduction is strongly recommended, considering the small population, loss of habitat and hunting.

CAMP TAXON REPORT

SPECIES: *Paradoxurus zeylonensis* Golden palm civet
STATUS:
Mace/Lande: Vulnerable
CITES:
IUCN:
Other: Sri Lankan protection status unknown

TAXONOMIC STATUS: Species
DISTRIBUTION: Sri Lanka (endemic)
WILD POPULATION: 2,000-10,000
FIELD STUDIES: done during the 1980's
THREATS: General habitat loss, Civil war ?
COMMENTS: Habitat management and increase of survey activities
RECOMMENDATIONS:
WILD MANAGEMENT:
RESEARCH: Survey, habitat management
PHVA: No
OTHER:
CAPTIVE POPULATION: <5
CAPTIVE PROGRAM RECOMMENDATIONS: Not currently recommended but may be reconsidered pending further data

CAMP TAXON REPORT

SPECIES: *Paradoxurus jerdoni* Jerdon's palm civet
STATUS:
Mace/Lande: Vulnerable
CITES:
IUCN: Indeterminate

TAXONOMIC STATUS: The taxonomic status of the 2 subspecies needs to be confirmed, since both have been collected from the same locality.
DISTRIBUTION: Rain forests of Western Ghats, South India
WILD POPULATION: could be 5000-10,000
FIELD STUDIES: Two brief field surveys in 1990-93. No quantitative data
THREATS: Habitat degradation, small fragmented populations
COMMENTS:
RECOMMENDATIONS:
WILD MANAGEMENT: not known
RESEARCH: Population estimation, habitat requirements
PHVA: regional PHVA for six species in the W.Ghats
OTHER:
CAPTIVE POPULATION: one
CAPTIVE PROGRAM RECOMMENDATIONS: not needed

CAMP TAXON REPORT

SPECIES: *Herpestes smithi* Ruddy mongoose
STATUS:
Mace/Lande: Vulnerable/Secure
CITES:
IUCN:

TAXONOMIC STATUS: Species
DISTRIBUTION: South and Central India
WILD POPULATION: could be 5000-20,000
FIELD STUDIES: none
THREATS: population fragmentation
COMMENTS:
RECOMMENDATIONS:
WILD MANAGEMENT: not known
RESEARCH: population estimation and habitat requirements
PHVA: regional PHVA for 6 species of the W.Ghats
OTHER:
CAPTIVE POPULATION: none
CAPTIVE PROGRAM RECOMMENDATIONS: not needed

CAMP TAXON REPORT

SPECIES: *Herpestes vitticollis* Striped-necked mongoose
STATUS:
Mace/Lande: Secure?
CITES:
IUCN:

TAXONOMIC STATUS: Species
DISTRIBUTION: Western Ghats and Sri Lanka
WILD POPULATION: could be 10,000-20,000
FIELD STUDIES: none
THREATS: population fragmentation
COMMENTS:
RECOMMENDATIONS:
WILD MANAGEMENT: not known
RESEARCH:population estimation and habitat requirements
PHVA: regional PHVA for 6 species of the W.Ghats
OTHER:
CAPTIVE POPULATION: none
CAPTIVE PROGRAM RECOMMENDATIONS: not needed

CAMP TAXON REPORT

SPECIES: *Martes gwatkinsi* Nilgiri marten
STATUS:
Mace/Lande: Critical
CITES:
IUCN: Indeterminate

TAXONOMIC STATUS: Species
DISTRIBUTION: Western Ghats, South India
WILD POPULATION: could be 5,000-15,000
FIELD STUDIES: none
THREATS: population fragmentation, hunting
COMMENTS:
RECOMMENDATIONS:
WILD MANAGEMENT: not known
RESEARCH: population estimation and habitat requirements
PHVA: regional PHVA for 6 species of the W.Ghats
OTHER:
CAPTIVE POPULATION: none
CAPTIVE PROGRAM RECOMMENDATIONS: not needed

CAMP TAXON REPORT

SPECIES: *Arctogalidia trivirgata trilineata* Javan small-toothed palm civet
STATUS:
Mace/Lande: Critical/Endangered
CITES:
IUCN: Indeterminate

TAXONOMIC STATUS: Subspecies
DISTRIBUTION: Java (last recorded sighting: Boeadi, 1992 in Ujung Kulon NP)
WILD POPULATION: 100-2,000
FIELD STUDIES: WWF/ New Zealand (Mike Griffiths - office at Medan) photomapping, Ujung Kulon NP. Results?
THREATS: Incidental trapping for mouse-deer (*Tragulus sp*), volcanic catastrophes, habitat loss.
COMMENTS:
RECOMMENDATIONS:
WILD MANAGEMENT:
RESEARCH: Survey, limiting factor research
PHVA: No
OTHER:
CAPTIVE POPULATION: 0
CAPTIVE PROGRAM RECOMMENDATIONS: Not currently recommended but may be reconsidered pending further data

CAMP TAXON REPORT

SPECIES: *Prionodon pardicolor* Spotted linsang
STATUS:
Mace/Lande: Vulnerable (based upon habitat decline, population decline, fragmentation (unlikely >5 populations of 2500).
CITES: I
IUCN:

TAXONOMIC STATUS: Species
DISTRIBUTION: Nepal, Sikkim and Assam (India), N. Myanmar, Thailand, Laos, Vietnam, S. China
WILD POPULATION: 1,000-50,000
FIELD STUDIES: No studies, but few sightings in 'recent years'.
THREATS: Hunting and Habitat fragmentation
COMMENTS: We need to study the limiting factors for their distribution (i.e. basic biological information, like diet, etc.). Recommend that this species also be included in other surveys of regions where it may exist, but not be focused on individually.
RECOMMENDATIONS:
WILD MANAGEMENT:
RESEARCH: Limiting factor research
PHVA: No
OTHER:
CAPTIVE POPULATION: <10
CAPTIVE PROGRAM RECOMMENDATIONS: Not currently recommended but may be reconsidered pending further data

CAMP TAXON REPORT

SPECIES: *Prionodon linsang* Banded linsang
STATUS:
Mace/Lande: Secure?
CITES: II
IUCN:

TAXONOMIC STATUS: Species
DISTRIBUTION: Myanmar, Thailand, peninsular Malaysia, Sumatra, Java, Borneo, Bangka I., and Beliton I.
WILD POPULATION: 10,000-100,000
FIELD STUDIES:
THREATS: Loss of habitat
COMMENTS: Secure on species level, if subspecies would be recognized, some subpopulations may be vulnerable.
RECOMMENDATIONS:
WILD MANAGEMENT:
RESEARCH: Taxonomy
PHVA: No
OTHER:
CAPTIVE POPULATION: <20
CAPTIVE PROGRAM RECOMMENDATIONS: Not currently recommended but may be reconsidered pending further data

CAMP TAXON REPORT

SPECIES: *Paguma larvata* Masked palm civet
STATUS:
Mace/Lande: Secure?
CITES:
IUCN:

TAXONOMIC STATUS: Species
DISTRIBUTION: China, Indochina, Thailand, peninsular Malaysia, Sumatra, Borneo, Andaman Is., introduced in Japan.
WILD POPULATION: >1,000,000
FIELD STUDIES:
THREATS: Hunting, poison
COMMENTS: Enormous trade, especially for food. Exported to China and Hong Kong. Reported 2 million exported in some years??? May be candidate for sustainable utilization program.
RECOMMENDATIONS:
WILD MANAGEMENT:
RESEARCH: Taxonomy, monitoring
PHVA: No
OTHER:
CAPTIVE POPULATION: 100
CAPTIVE PROGRAM RECOMMENDATIONS: Not needed

CAMP TAXON REPORT

SPECIES: *Arctictis binturong* Binturong
STATUS:
Mace/Lande: Secure?
CITES:
IUCN:

TAXONOMIC STATUS: Species
DISTRIBUTION: India, Thailand, Indochina, peninsular Malaysia, Sumatra, Java, Borneo, Palawan I.
WILD POPULATION: 20,000-200,000
FIELD STUDIES:
THREATS: General fragmentation on Java and other small island populations in Indonesia.
COMMENTS: Work with A. de Dios and Philippine government to expand Palawan binturong breeding programme, and gradually phase out breeding of other captive stock.
RECOMMENDATIONS:
RESEARCH: Taxonomy
PHVA: No
OTHER:
CAPTIVE POPULATION: >100
CAPTIVE PROGRAM RECOMMENDATIONS: Not needed

CAMP TAXON SHEET

SPECIES: *Cynogale bennetii* Otter civet
STATUS:
Mace/Lande: Endangered
CITES: II
IUCN: Insufficiently Known

TAXONOMIC STATUS: Species
DISTRIBUTION: S. Thailand, peninsular Malaysia, Sumatra, Borneo
WILD POPULATION: 1,000-10,000
FIELD STUDIES:
THREATS: Loss of habitat, poison
COMMENTS: Endangered category because it is a highly sensitive specialist species associated with fragile peat swamp forest and possibly riverine habitats. At the top of the food chain, this species is also susceptible to the effects of pesticides and other pollutants in these aquatic habitats.
RECOMMENDATIONS:
WILD MANAGEMENT:
RESEARCH: Habitat management, limiting resourse management, survey
PHVA: Yes
OTHER:
CAPTIVE POPULATION: 0
CAPTIVE PROGRAM RECOMMENDATIONS: Not recommended at this time however pending further information a captive programme may be considered.

CAMP TAXON REPORT

SPECIES: *Cynogale loweii*
STATUS:
Mace/Lande: Extinct
CITES:
IUCN:

TAXONOMIC STATUS: Species or subspecies?
DISTRIBUTION: One specimen from N. Vietnam
WILD POPULATION: 0
FIELD STUDIES:
THREATS:
COMMENTS: Uncertain that species ever existed, suggestion of DNA analysis of sample at BMNH
RECOMMENDATIONS:
WILD MANAGEMENT:
RESEARCH: Taxonomy
PHVA:
OTHER:
CAPTIVE POPULATION:
CAPTIVE PROGRAM RECOMMENDATIONS:

SPECIES: *Aonyx cinerea* Oriental small-clawed otter
STATUS:
Mace/Lande: Vulnerable/Secure
CITES:
IUCN: Insufficiently Known

TAXONOMIC STATUS: Species
DISTRIBUTION: South and Southeast Asia
WILD POPULATION: 5,000-50,000
FIELD STUDIES:
THREATS: Put on vulnerable status M/L due to general water pollution, also threatened by hunting, loss of habitat and pesticides
COMMENTS:
RECOMMENDATIONS:
WILD MANAGEMENT:
RESEARCH: Taxonomy, monitoring, survey, habitat management
PHVA:
OTHER:
CAPTIVE POPULATION: +200
CAPTIVE PROGRAM RECOMMENDATIONS:

CAMP TAXON REPORT

SPECIES: *Aonyx cinerea nirnai* Small-clawed otter
STATUS:
Mace/Lande: Vulnerable/Endangered
CITES:
IUCN: Insufficiently Known

TAXONOMIC STATUS:
DISTRIBUTION: Disjunct population, Western Ghats in South India
WILD POPULATION: No confirmed sightings of this species in recent years
FIELD STUDIES: None
THREATS: Fragmented small populations; other threats not known
COMMENTS: Field identification of the tree species of otters has been a problem.
RECOMMENDATIONS:
WILD MANAGEMENT: not known
RESEARCH: Field survey and habitat surveys
PHVA: A regional PHVA covering six species of W. Ghats
OTHER:
CAPTIVE POPULATION: None
CAPTIVE PROGRAM RECOMMENDATIONS: None

SPECIES: *Lutra lutra whiteleyi*
STATUS:
Mace/Lande: Ext
CITES: II
IUCN: Vulnerable

TAXONOMIC STATUS: Some suggestion may actually be a separate species.
DISTRIBUTION: Japan, Kochi prefecture, Shikoku
WILD POPULATION: only a few individuals left.
FIELD STUDIES: Some field surveys, few signs, so far.
THREATS: Protected, but verging on extinction, genetic problems possible due to small population size.
COMMENTS:
"Friends of the Otter" organization organized to save this species
RECOMMENDATIONS:
WILD MANAGEMENT:
RESEARCH: Survey
PHVA:
OTHER:
CAPTIVE POPULATION:
CAPTIVE PROGRAM RECOMMENDATIONS: Considering captive breeding program for possible reintroductions.

SMALL CARNIVORE CONSERVATION ASSESSMENT AND MANAGEMENT PLAN

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Prepared by the participants of
a workshop held in Rotterdam, The Netherlands
11-14 February 1993

SECTION 6

TAXON REPORTS - AFRICAN TAXA

CAMP TAXON REPORT

SPECIES: *Genetta abyssinica* Abyssinian genet
STATUS:
Mace-Lande: Endangered/Critical
CITES:
IUCN: Insufficiently Known

Taxonomic status: Valid species, no sub-species.
Distribution: Known from half dozen museum specimens from Ethiopia, Somalia, possibly Djibouti; never seen in wild; formerly three in captivity Frankfurt Zoo from '49-'58.
Wild population: 100-1,000; very little known
Field studies: None
Threats: Unknown; possibly loss of habitat (unknown if forest or savannah species), war?
Comments:
Recommendations:
Wild management:
Research: Survey and monitoring to establish distribution, habitat and habits.
PHVA: Not recommended as no information about the animals.
Other:
Captive population: None known
Captive programme recommendation: Not recommended

CAMP TAXON REPORT

SPECIES: *Genetta johnstoni* Johnston's genet
STATUS:
Mace-Lande: Vulnerable/Endangered
CITES:
IUCN: Insufficiently Known

Taxonomic status: Valid species, no sub-species
Distribution: Forests of Liberia, Guinea; possibly Côte d'Ivoire
Wild population: 100-1,000; very little known
Field studies: None known
Threats: Unknown, possibly habitat loss and hunting pressure
Comments: Liberian mongoose survey (1989-90) did not reveal new evidence on this species.
Recommendations:
Wild management: Encourage and enhance protection of the remaining forests in Liberia, Guinea and Côte d'Ivoire.
Research: Survey and monitoring to confirm range, status and distribution and habits.
PHVA: Not recommended
Other:
Captive population: None known
Captive programme recommendation: Not recommended at this time as effort would be better spent protecting habitat etc.

SPECIES: *Genetta rubiginosa insularis*
STATUS:
Mace-Lande: Vulnerable/Endangered
CITES:
IUCN:

Taxonomic status: Taxonomic status to be confirmed
Distribution: Bioko (Equatorial Guinea)
Wild population: 100-500, no information
Field studies: None known
Threats: Unknown, possibly habitat destruction and hunting pressure
Comments:
Recommendations:
Wild management:
Research: Taxonomic study to confirm validity of subspecies (may be no different from mainland form). Survey and monitoring to establish status and habits.
PHVA: Not recommended
Other:
Captive population: None known
Captive programme recommendation: Not recommended as still common

CAMP TAXON REPORT

SPECIES: *Genetta cristata* Crested genet
STATUS:
Mace-Lande: Endangered
CITES:
IUCN:

Taxonomic status: Species status to be confirmed
Distribution: Very restricted distribution; the Nigerian rainforest east of the Cross River; SW Cameroon (the only record for Cameroon is from Mt Cameroon).
Wild population: 500-2000
Field studies: None
Threats: Despite the fact that this genet is found in the recently established Cross River National Park (Nigeria) and the Korup National Park (Cameroon), hunting pressure within the parks is still high and therefore the animal remains effectively unprotected.
Comments: There are few museum specimens however the animal was recently (1989-92) seen alive in Nigeria.
Recommendations:
Wild management: Enhance wildlife protection in existing National Parks
Research: Survey and monitoring to establish in particular the limits of its distribution and status; also taxonomic study to establish its validity as a species as opposed to a subspecies of *G. servalina.*
PHVA: Not recommended
Other:
Captive population: None known although four orphaned animals were recently ('89-'92) kept privately in Nigeria.
Captive programme recommendation: Not recommended at this time however pending the outcome of further survey and taxonomic study a captive programme may be considered.

CAMP TAXON REPORT

SPECIES: *Poiana richardsoni leightoni* Oyan or African linsang
STATUS:
Mace-Lande: Endangered
CITES:
IUCN: Indeterminate

Taxonomic status: Sub-species to be confirmed (considered a valid species by Rosevear 1974).
Distribution: Records from rainforests of central and northeastern Liberia, and one location in Côte d'Ivoire. Liberian mongoose survey ('89-'90) evidence suggested animal is still in existence in one area.
Wild population: Probably less than 1500
Field studies: This species was considered in the Liberian Mongoose survey ('89-'90) which collected information on several viverrid species; otherwise no known studies.
Threats: Forest habitat loss and hunting pressure
Comments:
Recommendations:
Wild management:
Research: Survey and monitoring to establish status, distribution and habits. Taxonomic study to establish species validity.
PHVA: Not recommended
Other:
Captive population: None known, no records.
Captive programme recommendation: Not recommended at this time however pending the outcome of further survey and taxonomic study a captive programme may be considered.

CAMP TAXON REPORT

SPECIES: *Liberiictis kuhni* Liberian mongoose
STATUS:
Mace-Lande: Endangered
CITES:
IUCN: Endangered

Taxonomic status: Species
Distribution: Central and eastern Liberia; possibly bordering part of western Côte d'Ivoire (Tai National Park). Range appears to be decreasing because animals were not found in historic sites in Liberia. Forest, riverine and secondary forest habitat.
Wild population: Possibly 500-2000; quite certain that a breeding population exists in the Gbi forest near the town of Tapetta, Liberia.
Field studies: Status and distribution survey 1989-92 conducted by Metro Toronto Zoo and Royal Ontario Musuem; genet study '92 by ROM.
Threats: Hunting (all specimens obtained in recent survey were the result of local hunting), Habitat loss - spread of population into historical sites (forest destruction and subsequent farming).
Comments: All field work and captive breeding has been suspended due to the war and unrest in Liberia.
Recommendations:
Wild management: Best approach will be to enhance the protection of the Gbi National Forest.
Research: Life history study as little is known of the animal's ecology although suspected to be social and diurnal.
PHVA: Not recommended as insufficient information is available on the species.
Captive population: None
Captive programme recommendation: Initiate a captive breeding program in the future, within 3 or more years; conservation officers should be made more aware of the animals status and importance so that confiscated and orphaned animals can be utilized to implement a captive breeding programme.

CAMP TAXON REPORT

SPECIES: *Crossarchus ansorgei ansorgei* Ansorge's kusimanse
STATUS:
Mace-Lande: Endangered or Critical
CITES:
IUCN:

Taxonomic status: Known only from one BMNH specimen from Ndala Tando, northwestern Angola, collected in 1908.
Distribution: NW Angola
Wild population: Possibly extinct
Field studies: None
Threats: If it exists, suspect that it would be threatened by habitat loss and possibly hunting
Comments:
Recommendations:
Wild management:
Research: Survey and monitoring to verify existence and establish status and distribution.
PHVA: Not recommended (impossible)
Other:
Captive population: None
Captive programme recommendation: Not recommended.

CAMP TAXON REPORT

SPECIES: *Dologale dybowskii* Poursargues' mongoose
STATUS:
Mace-Lande: Endangered?
CITES:
IUCN:

Taxonomic status: Species status questionable
Distribution: Limited; point where Uganda, C.A.R, Zaire, Sudan meet; probably inhabiting ecotone between closed forest zone and savannah.
Wild population: Unknown, never seen in wild
Field studies: None known
Threats: Unknown, but suspect loss of habitat
Comments:
Recommendations:
Wild management: Continuing protection of the Garamba National Park, Zaire
Research: Survey and monitoring to establish status, distribution and live habits of the species. Taxonomic study required to confirm species status (some believe it is synonymous with *Helogale*.)
PHVA: Not recommended
Other:
Captive population: Never kept
Captive programme recommendation: Pending, not currently considered

CAMP TAXON REPORT

SPECIES: *Bdeogale jacksoni* Jackson's mongoose
STATUS:
Mace-Lande: Endangered
CITES:
IUCN: Insufficiently Known

Taxonomic status: Possibly not valid species
Distribution: Relic forests in Central Kenya and SE Uganda
Wild population: Possibly less than 1000
Field studies: None known
Threats: Loss of habitat
Comments:
Recommendations:
Wild management:
Research: Survey, Monitoring, Taxonomic and morphological genetic studies
PHVA: No
Other:
Captive population: None known
Captive programme recommendation: Not recommended at this time however pending the outcome of further survey and taxonomic study a captive programme may be considered.

SPECIES: *Eupleres goudotii goudotii* Fanalouc
STATUS:
Mace-Lande: Endangered
CITES: II
IUCN: Vulnerable

Taxonomic status: Valid subspecies
Distribution: North east Madagascar
Wild population: 1,000-3,000; fragmented
Field studies:
Threats: Loss of habitat, Hunting for food or other purposes
Comments:
Recommendations:
Wild management: Habitat management
Research: Limiting factor research
PHVA: Yes
Other:
Captive population: None known
Captive programme recommendation: Not currently recommended but may be reconsidered pending further data

CAMP TAXON SHEET

SPECIES: *Eupleres goudotii major* Fanalouc
STATUS:
Mace-Lande: Endangered/Critical
CITES: II
IUCN: Vulnerable

Taxonomic status: Valid sub-species
Distribution: Northwest Madagascar
Wild population: 250-2,000
Field studies:
Threats: Loss of habitat, hunting for food or other purposes
Comments:
Recommendations:
Wild management: Habitat management
Research: Limiting factor research
PHVA:
Other:
Captive population: None
Captive programme recommendation: Initiate a captive program immediately, within 0-3 years; N-2

SPECIES: *Genetta servalina bettoni* Servaline genet
STATUS:
Mace-Lande: Secure/Vulnerable
CITES:
IUCN:

Taxonomic status: Probable subspecies
Distribution: Found in forests of East Zaire and Uganda where it is patchily distributed.
Wild population: Unknown, possibly more than 10,000
Field studies: None known
Threats: Loss of forest habitat
Comments:
Recommendations:
Wild management:
Research: Monitoring in forests of East Africa; Taxonomic study to confirm subspecies status.
PHVA: Not recommended
Other:
Captive population: None known
Captive programme recommendation: Not recommended as probable many animals remaining

CAMP TAXON REPORT

SPECIES: *Genetta victoriae* Giant genet
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:

Taxonomic status: Valid species
Distribution: Forests of NE Zaire, rather patchily distributed
Wild population: Unknown, possibly less than 5,000
Field studies: None known
Threats: Loss of forest habitat
Comments:
Recommendations:
Wild management:
Research: Study of Life history as this genet is very different; largest species of the genus and in some aspects it resembles a civet. Monitoring to determine population information.
PHVA:
Other:
Captive population: None known; never bred in captivity and only three records of it being kept.
Captive programme recommendation: Recommended data from the monitoring and life history studies.

CAMP TAXON REPORT

SPECIES: *Osbornictis piscivora* Aquatic genet
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:
Other: Complete protection by Zairean gov't (Ordinance no.79-244 of 16 October 1979!).

Taxonomic status: Valid species
Distribution: NE Zaire in riverine areas of forest
Wild population: Possibly less than 3,000;
Field studies: See Colyn & Gevaerts, 1986.
Threats: Loss of habitat due to logging, also hunted.
Comments: Is among the rarest genera of carnivores but known from Colyn's recent survey to establish its exact range and life habits (skulls and skins collected but no live specimen was seen or captured). Extremely elusive.
Recommendations:
Wild management: Enhance protection in Maiko National Park (where its existence is not confirmed but believed to occur)
Research: Further survey and monitoring
PHVA: Not recommended due to insufficient data
Other:
Captive population: Two animals kept by wildlife photographer Alan Root.
Captive programme recommendation: Initiate captive breeding programme within 0-3 years. As this is the single species of a genus captive breeding should be initiated on an opportunistic basis.

CAMP TAXON REPORT

SPECIES: *Poiana richardsoni richardsoni* Oyan or African linsang
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:

Taxonomic status: Sub-species validity to be confirmed
Distribution: Rainforests of W. Cameroon, Bioko, Gabon, Equat. Guinea
Wild population: Probably less than 5,000
Field studies: None known
Threats: Loss of habitat and probably hunting pressure
Comments:
Recommendations:
Wild management:
Research: Survey and monitoring to establish status, distribution and habits. taxonomic research to confirm subspecific validity
PHVA: Not recommended
Other:
Captive population: None known; possibly it has never been kept in a zoo.
Captive programme recommendation: Not recommended (see *P. r. leightoni*)

CAMP TAXON REPORT

SPECIES: *Mungos gambianus* Gambian mongoose
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:

Taxonomic status: Species
Distribution: Occurs almost exclusively in the Guinea woodland zone of West Africa just inland of the high forest; it may penetrate into the rather similar Doka belt (Rosevear 1974).
It also seems to occur in areas with sand ridges and sparse grass, and coastal scrub such as is found on the Accra plains, Ghana, where Cansdale found them to be fairly common in 1946.
Wild population: Possibly less than 10,000
Field studies: None known
Threats: Loss of habitat
Comments: Considered by Booth (1960) as "easily the most abundant carnivore in the Guinea savannah zone of West Africa" but recent surveys have not found no specimens therefore considered to be declining; all museum specimens are old.
Recommendations:
Wild management:
Research: Survey and monitoring to establish status, distribution and habits; monitoring.
PHVA: Not recommended
Captive population: None known in zoos; one known privately kept group did not reproduce.
Captive programme recommendation: Not currently recommended but may be reconsidered pending further data

CAMP TAXON REPORT

SPECIES: *Bdeogale crassicaudi* Four-toed mongoose
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:

Taxonomic status: Possibly 5 sub-species
Distribution: Zanzibar, Kenya, Mozambique, Zambia, E. Tanzania, S. Zaire
Wild population: Possibly less than 10,000
Field studies: One biological study known for *B. Crassicauda nigrescens*
Threats: Loss of habitat
Comments:
Recommendations:
Wild management:
Research: Survey, Monitoring, Taxonomic and morphological genetic studies
PHVA:
Other:
Captive population: None known
Captive programme recommendation: Not currently recommended but may be reconsidered pending further data

CAMP TAXON REPORT

SPECIES: *Bdeogale nigripes* Black-legged mongoose
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:

Taxonomic status: Species
Distribution: Gabon, Nigeria, Cameroon, Congo, Zaire, CAR
Wild population: Possibly less than 10,000
Field studies: None known
Threats: Loss of habitat
Comments:
Recommendations:
Wild management:
Research: Survey, Monitoring, Taxonomic and morphological genetic studies
PHVA:
Other:
Captive population: None known
Captive programme recommendation: Not currently recommended but may be reconsidered pending further data

SPECIES: *Genetta pardina* Pardine genet
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:

Taxonomic status: Unclear; is it different to *G. rubiginosa*?
Distribution: West Africa; chiefly mixed forest/savannah transition zone.
Wild population: >50,000
Field studies: None known
Threats: Habitat loss through logging and farming; Hunting
Comments: A common genet of West Africa but because of habitat loss should be considered vulnerable
Recommendations:
Wild management:
Research: Taxonomic study
PHVA: Not recommended
Other:
Captive population: None known
Captive programme recommendation: Not recommended

CAMP TAXON REPORT

SPECIES: *Fossa fossana* Malagasy civet
STATUS:
Mace-Lande: Vulnerable/Endangered
CITES: II
IUCN: Vulnerable

Taxonomic status:
Distribution: East and North Madagascar
Wild population: 1,000-3,000; fragmented
Field studies:
Threats: Hunting for food or other purposes, habitat loss, interspecific competition from exotics
Comments:
Recommendations:
Wild management: Habitat management
Research:
PHVA: Yes
Other:
Captive population: None known
Captive programme recommendation: Not currently recommended but may be reconsidered pending further data

SPECIES: *Crytoprocta ferox* Fossa
STATUS:
Mace-Lande: Vulnerable?
CITES: II
IUCN: Insufficiently Known

Taxonomic status:
Distribution: Madagascar
Wild population: 1,000-5,000; Fragmented
Field studies:
Threats: Hunting for food or other purposes; Loss of habitat?
Comments:
Recommendations:
Wild management:
Research: Limiting factor research
PHVA: Yes
Other:
Captive population: None
Captive programme recommendation: Ongoing captive program should be intensified or increased; N-1

CAMP TAXON SHEET

SPECIES: *Galidictis fasciata* Malagasy broad-striped mongoose
STATUS:
Mace-Lande: Vulnerable/Endangered
CITES:
IUCN: Indeterminate

Taxonomic status:
Distribution: East Madagascar
Wild population: 1,000-5,000; Fragmented
Field studies:
Threats: Loss of habitat; Hunting for food or other purposes?
Comments:
Recommendations:
Wild management: Habitat management
Research: Limiting factor research
PHVA: Yes
Other:
Captive population: 0
Captive programme recommendation: Not currently recommended but may be reconsidered further data

CAMP TAXON SHEET

SPECIES: *Galidictis grandidieri* Giant striped mongoose
STATUS:
Mace-Lande: Vulnerable?
CITES:
IUCN: Insuffiently Known

Taxonomic satus:
Distribution: SW? Madagascar
Wild population: 500-3,000
Field studies:
Threats: Unknown
Comments:
Recommendations:
Wild management: Habitat management
Research:
PHVA: Yes
Other:
Captive population: None
Captive programme recommendation: Not currently recommended but may be reconsidered pending further data

SPECIES: *Mungotictis decemlineata* Malagasy narrow-striped mongoose
STATUS:
Mace-Lande: Vulnerable/Endangered
CITES:
IUCN: Vulnerable

Taxonomic status:
Distribution: SW Madagascar
Wild population: 1,000-5,000; Fragmented
Field studies:
Threats: Loss of habitat
Comments:
Recommendations:
Wild management: Habitat management
Research: Limiting factor research
PHVA: Yes
Other:
Captive population: None
Captive programme recommendation: Initiate captive breeding programme within 0-3 years.

CAMP TAXON SHEET

SPECIES: *Salanoia concolor* Malagasy brown-tailed mongoose
STATUS:
Mace-Lande: Vulnerable/Endangered
CITES:
IUCN: Insufficiently Known

Taxonomic status:
Distribution: East Madagascar
Wild population: 1,000-5,000; Fragmented
Field studies:
Threats: Loss of habitat
Comments:
Recommendations:
Wild management: Habitat management
Research: Limiting factor research
PHVA: Yes
Other:
Captive population: None
Captive programme recommendation: None

CAMP TAXON SHEET

SPECIES: *Aonyx capensis* Cape clawless otter
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:

Taxonomic status:
Distribution: Sub-saharan Africa
Wild population: <50,000
Field studies: Some field studies
Threats: Loss of habitat, Pesticides, Pollution
Comments:
Recommendations:
Wild management:
Research: Survey, Monitoring, Taxonomic and morphological genetic studies
PHVA: No
Other:
Captive population: None known
Captive programme recommendation:

SPECIES: *Aonyx congica* Congo clawless otter
STATUS:
Mace-Lande: Vulnerable
CITES:
IUCN:

Taxonomic status:
Distribution: Zaire, Central Africa
Wild population: <10,000
Field studies:
Threats: Loss of habitat, Pesticides, Pollution
Comments:
Recommendations:
Wild management:
Research: Survey, Monitoring, Taxonomic and morphological genetic studies
PHVA:
Other:
Captive population: None known
Captive programme recommendation:

CAMP TAXON SHEET

SPECIES: *Lutra maculicollis* Spotted-necked otter
STATUS:
Mace-Lande: Vulnerable
CITES: II
IUCN:

Taxonomic status:
Distribution: Sub-saharan Africa
Wild population: <50,000
Field studies: Some studies done
Threats: Loss of habitat, Pollution
Comments:
Recommendations:
Wild management:
Research: Survey, Monitoring
PHVA:
Other:
Captive population:
Captive programme recommendation:

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Prepared by the participants of
a workshop held in Rotterdam, The Netherlands
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SECTION 7

TAXON REPORTS
MEXICAN, CENTRAL AMERICAN AND SOUTH AMERICAN TAXA

ENDANGERED SPECIES ASSESSMENTS
for the Procyonids and Mustelids of Mexico, Central America, and South America:

A Review

William G. Kosciolek 1
Katherine L. Terry 1
B. Diane Chepko-Sade 1
and
Don Moore 2

1) State University of New York
College of Environmental Science and Forestry
Syracuse, New York 13210 USA

2) Thompson Park Conservancy
P.O. Box 8182
1 Thompson Park
Watertown, New York 13602 USA

CAMP TAXON REPORT

SPECIES: *Bassariscus astutus* Ringtail "Ring-tailed cat", "cacomixtle", "mico de noche", "babisuri", "sal coyote", "mico rayado", "rintél", "pintorabo" (Mexico); (Leopold 1959).
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Species.
Subspecies: *B. astutus astutus:* South and Central Mexico (Hall 1981). It was collected in San Luis Potosí and Veracruz, Mexico by Hall and Dalquest (1963, as cited in Hall 1981); it was also found in Oaxaca by Goodwin (1969 as cited in Hall 1981). This subspecies was collected in Puebla by Van Gelder (1960 as cited in Hall 1981), and was found in Morelos by Ramírez (1971 as cited in Hall 1981). This subspecies has also been observed in the states of Lagunas de Zempoala and the Distrito Federal (Hall 1981).
B. astutus bolei: This subspecies is located in Southern Mexico. It was collected in the states of Guerrero and Oaxaca by Ramírez (1971 as cited in Hall 1981).
B. astutus consitus: This subspecies is located along the western half of Mexico (Hall 1981). This subspecies was collected in the states of Sinaloa, Jalisco, and Michoacán by Armstrong *et al.* (1972 as cited in Hall 1981). It was also collected in Durango by Baker and Greer (1962, as cited in Hall 1981).
B. astutus insulicola: This subspecies is found on San José Island off the eastern coast of Baja California (Hall 1981).**THIS SUBSPECIES OF CONSERVATION CONCERN** (only known from the type locality).
B. astutus macdougalli: This subspecies was collected in the extreme southern portion of Mexico in the state of Oaxaca by Goodwin (1969, as cited in Hall 1981).
B. astutus palmarius: This subspecies can be found throughout Baja California, Mexico (Hall 1981).
B. astutus saxicola: This subspecies is found on Espíritu Santo Island, off the coast of Baja California, Mexico Hall 1981).**THIS SUBSPECIES OF CONSERVATION CONCERN**
B. astutus willetti: Type locality Riverside, CA. **???**
Distribution: (figure 1-7) The ringtail can be found from Southwestern Oregon, and Eastern Kansas to Baja California, and south through Mexico to the states of Oaxaca and Chiapas (Leopold 1959, Nowak and Paradiso 1983). It can be found at elevations from sea level to 2,800 meters (Kaufmann 1987). The ringtail has extended its range into Kansas, Arkansas, and Louisiana within the last 100 years (Nowak and Paradiso 1983). They have also been reported in Alabama and Ohio (Hall 1981).
Wild population: >10,000; The ringtail is under full legal protection in the States of California, Nevada and Oregon. Despite heavy trapping pressure in other U.S. states, the ringtail population is listed as stable (Wozencraft 1989). There have been numerous population studies carried out in the United States (Taylor 1954, Grzimek 1975, Trapp 1978, Toweill and Teer 1980, Brody and Koch, 1983, Lacy 1983, Belluomini and Trapp 1984), but none were found south of the border. Within the different states where density was measured, varying results were obtained.

Taylor (1954, as cited in Kaufmann 1987) found 3.9 ringtails per square kilometer in the Edwards Plateau Texas in a juniper and oak habitat. Toweill and Teer (1980,as cited in Kaufmann 1987) found that the density was 2.2 to 4.2 individuals per square kilometer in the same area as Tayler (1954). Grzimek (1975) indicates that 10 ringtails can be found in an area of 1.5 square kilometers on Edwards Plateau; he also indicates that the California population has a density of 1 individual per 8 square kilometers. Belluomini and Trapp (1984, as cited in Kaufmann 1987) determined the population density of ringtails to be between 10.5 and 20.5 individuals per square kilometer in five different riparian habitats in California. Lacy (1983,as cited in Kaufmann 1987) found the density to be between 7 and 20 individuals per square kilometer in California. The Utah population, measured by Trapp (1978) was found to be 1.5 to 2.9 individuals per square kilometer in a mixed pinyon, juniper riparian area. Gittleman (1989) lists a general density of between 1.5 and 2.21 per square kilometer.

Field studies:

Threats: Hunting. Commercial use: Ringtails reportedly make good pets if taken young (Nowak and Paradiso 1983), however due to their nocturnal habits, they have a tendency to sleep all day and become active at night. They are also valued as a furbearer; the 1976-1977 price of a ringtail pelt was $5.50 in the United States (Deems and Pursley 1978). The pelt price of ringtails was still over five dollars in 1989 (Wozencraft 1989). During the 1989 season, 88,329 individuals were trapped. They are still extensively trapped in the U.S. states in places where they are not protected. They have a year-long hunting season in Texas and Arizona (Wozencraft 1989). In Arizona, 1,000 to 4,000 ringtails are taken yearly; in New Mexico 1,000 are taken annually. Texas lists a total take of between 45,000 and 90,000 ringtails per year (Thompson 1985, as cited in Wozencraft 1989).

Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** Grinnell *et al.* (1937), Davis (1960), and Hall and Dalquest (1963 as cited in Trapp 1972) found that ringtails preferred rough and rocky terrain with or without the presence of forests. Brody and Koch (1983), in a habitat study in California, and Kaufmann (1987) determined that the ringtail is most likely to be seen in a riparian woodland mixed within a semi-arid habitat. Brody and Koch (1983) also found that cypress, oak woodland, mixed evergreen forest, and oak savannah were more preferable than other habitat types found in arid regions. They also found that "serpentine chaparral" was most avoided by ringtails. Leopold (1959) indicates they can be found in desert, arid, and semi-arid areas. They den in rock crevices, hollow trees, Indian ruins, or in attics or garages (Nowak and Paradiso 1983). The species is mostly nocturnal, coming out to forage around dusk (Leopold 1959; Nowak and Paradiso 1983). A scat analysis conducted by Brody and Koch (1983) determined that mammals comprised the major part of the ringtail diet, followed by birds, insects, and vegetable matter. Leopold (1959) however states that fruit is the main diet of ringtail during the wet season.

B. Average group size and dispersion pattern: Ringtails are solitary except during the mating season (Nowak and Paradiso 1983).

C. Movements: Koch and Brody (1981) and Brody and Koch (1983) found that ringtails occupy an exclusive home range of between 49 and 338 hectares in California. Dixon and Chapman in an earlier study (1980) in California, determined the home range to be identical to that of Brody and Koch's study (1981, 1983), with a mean of 220.7 hectares. Trapp (1978) found similar results in Utah. Nowak and Paradiso (1983) conversely indicate that the ringtail home range is no larger than 3.2 square kilometers. Lacy (1983, as cited in Kaufmann 1987) determined the

home range to be between 5 and 13.8 hectares. Toweill and Teer (1980) found the home range to be between 35 and 51.7 hectares for males and between 15.7 and 27.7 hectares for females in Texas. Wozencraft (1989) lists a general homerange sizeof .20 to 1.29 square kilometers for males and .43 and 1.39 square kilometers for females.

D. Time of birth: There are between two and four ringtails per litter, with births occurring between May and June (Richardson 1942, as cited in Ewer 1973, Tayler 1954 Nowak and Paradiso 1983). Poglayen-Neuwall and Poglayen-Neuwall (1980) indicate that the breeding season may start as early as February. The female is receptive for only a 24 hour period within the breeding season (Poglayen-Neuwall and Poglayen-Neuwall, 1980). Gestation lasts between 51 and 53 days (Poglayen-Neuwall and Poglayen-Neuwall, 1980), but Davis (1960) states the period is between 45 and 50 days, and Kaufmann (pers. comm. to Poglayen-Neuwall) indicates a gestation of 54 days. Parturition lasts between 85 and 126 minutes (Poglayen-Neuwall and Poglayen-Neuwall, 1980).

Recommendations:

Wild management:

Research: Survey and monitoring

PHVA: No

Other:

Captive population: 17.14; There are 17 males, 14 females, and four unspecified juveniles at 15 institutions in the International Species Information System's Mammal Abstract for 31 December 1991 (ISIS 1991).

Captive programme recommendation: Initiate a captive breeding program in the future, within 3 or more years.

CAMP TAXON REPORT

SPECIES: *Bassariscus sumichrasti* Cacomistle
"olingo", "cacomistle" (Costa Rica, Panama); "guía de león", "guayanoche" (Guyana); "uayuc" (Honduras); "cacomixtle" (Mexico); (Emmons 1990)
STATUS:
Mace-Lande: Endangered/Vulnerable
CITES: III
IUCN:

Taxonomic status: Species
Subspecies: *B. sumichrasti campechensis*: Collected in the Mexican states of Quintana Roo and Campeche (Hall 1981).
B. sumichrasti latrans: Mexican state of Guerrero (Hall 1981).
B. sumichrasti notinus: This subspecies can be found in the countries of Costa Rica and Panama (Hall 1981).
B. sumichrasti oaxacensis: Collected in the Mexican states of Oaxaca and Chiapas (Hall 1981).
B. sumichrasti sumichrasti: This subspecies was collected in the Mexican states of Veracruz and Oaxaca (Hall 1981).
B. sumichrasti variabilis: This subspecies can be found in the countries of Belize, El Salvador, Guatemala, and the Mexican state of Chiapas (Burt and Stirton 1961 as cited in Hall 1981).
Distribution: (figure 1-8) The cacomistle is found from southern Mexico to western Panama to about 2000 meters elevation (Eisenberg 1989, Emmons 1990). Mendez (1970) states that the cacomistle can be found within Panama in the Central and Northwestern regions.
Wild population: 2,500-10,000. The cacomistle is CITES Appendix III (of conservation concern; regulated on a country by country basis) in Costa Rica (Emmons 1990). It is rare in Panama (Mendez 1970); it is common in the remnant forests of Vera Cruz (Emmons 1990). Fragmented populations in Mexico and declining, common in Panama (Poglayen-Neuwall pers. comm.). Handley (1966) reports that it is only known in Panama by one specimen, collected at 2,000 m.
Field studies:
Threats: Loss of habitat, fragmentation, hunting? Commercial use: While no significant evidence of commercial use was found, it is likely that the cacomistle faces many of the same threats as the ringtail. Mendez (1970) indicates that they are economically important in Mexico, but he doesn't specify to what degree.
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** This species inhabits the middle and upper canopies of tropical forests and cloud forests (Nowak and Paradiso 1983). The diet of this omnivore consists of insects, rodents, birds, fruit, and other vegetable matter (Emmons 1990).
B. Average group size and dispersion pattern: Bassariscus as a genera have solitary tendencies except during breeding season when individuals will pair up (Nowak and Paradiso 1983).
C. Time of birth: Females enter estrus in winter, spring, or summer; Mendez (1970) indicates that females generally enter estrus between May and June. Gestation lasts between 51 and 54

days, and three young are usually born (Nowak and Paradiso 1983, Poglayen-Neuwall 1973, and Poglayen-Neuwall and Poglayen-Neuwall 1980, as cited in Eisenberg 1989).

Recommendations:

Wild management:

Research: Survey and Monitoring

PHVA: No

Other:

Captive population: 1.2; There are no reported captive animals listed in the International Species Information System's Mammal Abstract for 31 December 1991 (ISIS 1991).

Captive programme recommendation: Not currently recommended but may be considered pending further data.

CAMP TAXON REPORT

SPECIES: *Procyon lotor* Northern Raccoon "mapache", "osito lavador" (Spanish); "tzil" (Mayan); (Emmons 1990); "gato manglatero", "gato de manglar", "corobo", "touarú" (Panama); "culú", "guaxiním", "osito lavatumarox", "raton laveur", "tejón", "wasberen" (Mendez 1970).
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Species. The following is a partial list of subspecies which are located south of the United States border in their distribution (Hall, 1981):
P. lotor crassidens: This subspecies can be found in the countries of Honduras, Nicaragua, Costa Rica, Panama, and El Salvador (Handley 1966 as cited in Hall 1981).
P. lotor dickeyi: This subspecies can be found in the countries of Guatemala and El Salvador.
P. lotor grinnelli: This subspecies can be found in Baja California, Mexico.
P. lotor hernandezii: This subspecies was collected in the Mexican states of Tamaulipas, Veracruz, and Querétaro by Hall and Dalquest (1963 as cited in Hall 1981). It was also collected in Chiapas, Oaxaca, and San Blas by Goodwin (1969 as cited in Hall 1981). Dalquest (1953) states that this subspecies is found from the isthmus of Tehuantepec to San Luis Potosí.
P. lotor pumilus: This subspecies can be found throughout the country of Panama (Handley 1966, as cited in Hall 1981).
P. lotor shufeldti: This subspecies can be found in the Mexican states of Oaxaca, Veracruz, and Yucatán, and the countries of Honduras and Guatemala (Goodwin 1969, as cited in Hall 1981.)
P. lotor inesperatus
P. lotor marinus
Distribution: (Figure 1-2) The raccoon is found from Southern Canada to Panama (Mendez 1970; Nowak and Paradiso 1983; Eisenberg 1989; Emmons 1990). In Panama, the northern raccoon ranges to just south of the Panama Canal, overlapping the distribution of *P. cancrivorus* on the Atlantic Coast (Mendez 1970). It is found along wet areas in Mexico, although it may be locally absent or rare in the mountainous regions of the country. It can be found in any habitat in Mexico providing there is water nearby (Leopold 1959). This species has been expanding its range northward further into Canada in the last few years (Nowak and Paradiso 1983).
Wild population: >1,000,000; This species is widespread and common throughout its entire range (Emmons 1990). It is likely that more individuals are found in areas high in wetlands, as compared to dry desert-like areas (Leopold 1959). As many as 167 raccoons could be found in an area of 41 hectares, or as few as one individual in 5 to 43 hectares (Lotze and Anderson 1979). Wozencraft (1989) gives a general density of .5 to 1.0 raccoon per square kilometer.
Field studies: We are not aware of any current conservation measures for this species. Due to its adaptability to human habitation and its widespread and abundant status, it appears that this species is not in need of immediate protection. Raccoons carry rabies and many other parasites and diseases, making them the subjects of nuisance wildlife calls, and the target of wildlife management interventions to prevent undesirable contact with humans.
Threats: None. Native subsistence use: Dalquest (1953) indicates that raccoons are used as a

food source by Native Americans in Mexico. Commercial use: They are trapped for fur, but the popularity of raccoon pelts has declined in recent years. Deems and Pursley (1978) indicate the price of raccoon pelts in 1978 was $26.00 in the United States. In 44 states of the U.S., 3,832,802 skins were taken making this species the most valuable fur bearer in the United States during the season of 1978 (Deems and Pursley 1978). The pelt value at present ranges between $8.00 and $10.00 U.S. (Ron Geigrich pers. comm. 1992). Mendez (1970) however indicates that the pelage of the raccoons living in the tropics is of a poor quality. They are hunted for sport in the United States, whereas they are used primarily as a food source in Mexico (Leopold 1959). Dalquest (1953) indicates they are hunted with dogs in the eastern part of San Luis Potosí, Mexico. Raccoons are frequently kept as pets, but the extent of this practice is not indicated (Nowak and Paradiso 1983). Many are likely to be killed as a result of animal damage to crops and property (Leopold 1959).

Comments: Ecology and Reproduction:

A. Habitat and Food Preference: Raccoons are very opportunistic, and can exploit a wide variety of habitats. They can be found on beaches, in mangrove swamps, and near rivers (Sanderson 1983), as well as in forested habitats. Raccoons have been found up to 5,300 feet in Panama (Handley 1966). Raccoons are nocturnal, and arboreal, rarely being seen during the day far from their den site. Food preferences include fruits, small vertebrates, and invertebrates, especially aquatic species (Leopold 1959, Sanderson 1983). Stomach content analysis showed evidence of prickly pear cactus, fruit, and grain, as well as fish, invertebrates, small mammals, and birds (Dalquest 1953).

B. Average group size and dispersion pattern: There is no direct evidence indicating that raccoons are territorial, but they do not tolerate more than one individual at a feeding site (Stuewer 1943, Gander 1966, as cited in Ewer 1973, Lotze 1979). Leopold (1959) and Emmons (1990), note that raccoons are solitary except when with young or at a concentrated food source.

C. Movements: The reported home range size of the raccoon is between 0.2 and 4,946 hectares, but a smaller range is given by Lotze (1979) who determined the size to be 65 ha. for males and 39 ha. for females on St. Catherine's Island Georgia. Wozencraft (1989) gives a general range of 8.1 hectares for females and 25.6 hectares for males. Home ranges of raccoons seem to be very variable.

D. Time of Birth: In Illinois, males are reproductively active from October through May, females become receptive in the middle of February, and young are born around the middle of April (Sanderson and Nalbandov, as cited in Sanderson 1983). Stuewer (1943, as cited in Ewer 1973) reports that mating occurs between February and the beginning of March, with birth occurring from April to May in Michigan. Leopold (1959) indicates that raccoons breed later in the season in Mexico and Central America. Mendez (1970) states that the raccoon is a very prolific species due to the possibility of having more than one birth per year, as well as the number of young born per litter. Raccoons have a litter of between three and seven individuals, with an average of four (Stuewer 1943 as cited in Ewer 1973, Mendez 1970, Eisenberg 1989). The gestation period for raccoons is 63 days (Leopold 1959, Mendez 1970; Eisenberg 1989).

Recommendations:

Wild management:

Research: None

PHVA: No

Other:

Captive population: A total of 42 males, 51 females, and 7 unspecified juveniles at 38 institutions (no designated subspecies) are listed in the International Species Information System's Mammal Abstract for 31 December 1991 (ISIS 1991).
Captive programme recommendation: Initiate a captive breeding program in the future, within 3 or more years.

CAMP TAXON REPORT

SPECIES: *Procyon lotor incautus*
STATUS:
Mace-Lande: Endangered?
CITES:
IUCN:

Taxonomic status: Subspecies
Distribution: Florida Keys
Wild population: ??
Field studies:
Threats: Loss of habitat
Comments:
Recommendations:
Wild management:
Research: Monitoring
PHVA: No
Other:
Captive population: 0
Captive programme recommendation: Not currently recommended but may be considered pending further data.

SPECIES: *Procyon lotor auspitatus*
STATUS:
Mace-Lande: Endangered?
CITES:
IUCN:

Taxonomic status: Subspecies
Distribution: Florida Keys
Wild population: ??
Field studies:
Threats: Loss of habitat
Comments:
Recommendations:
Wild management:
Research: Monitoring
PHVA: No
Other:
Captive population: 0
Captive programme recommendation: Not currently recommended but may be considered pending further data.

CAMP TAXON REPORT

SPECIES: *Procyon maynardi*
STATUS:
Mace-Lande: Critical?
CITES:
IUCN:

Taxonomic status:
Distribution: Bahamas
Wild population: <500
Field studies:
Threats: Human interference, specifically tourism
Comments:
Recommendations:
Wild management:
Research: Taxonomy and survey
PHVA: Yes
Other:
Captive population: 0
Captive programme recommendation: Initiate a captive breeding programme immediately.

SPECIES: *Procyon pygmaeus*
STATUS:
Mace-Lande: Critical?
CITES:
IUCN: Insufficiently Known

Taxonomic status:
Distribution: Cozumel
Wild population: <500
Field studies:
Threats: Human interference, loss of habitat, trade for the live animal market
Comments:
Recommendations:
Wild management:
Research: Taxonomy and survey
PHVA: Yes
Other:
Captive population: 0
Captive programme recommendation: Initiate a captive breeding programme immediately.

CAMP TAXON REPORT

SPECIES: *Procyon minor*
STATUS:
Mace-Lande: Critical?
CITES:
IUCN:

Taxonomic status:
Distribution: Guadalupe
Wild population: <500
Field studies:
Threats: Hunting, human interference and loss of habitat
Comments:
Recommendations:
Wild management:
Research: taxonomy and survey
PHVA: Yes
Other:
Captive population: 0
Captive programme recommendation: Initiate a captive breeding programme immediately.

SPECIES: *Procyon gloveralleni* (extinct)
STATUS:
Mace-Lande: Extinct
CITES:
IUCN: Extinct?

Taxonomic status:
Distribution: Barbados
Wild population: extinct
Field studies:
Threats:
Comments:
Recommendations:
Wild management:
Research:
PHVA:
Other:
Captive population:
Captive programme recommendation:

CAMP TAXON REPORT

SPECIES: *Procyon cancrivorus* Crab-Eating Raccoon, "mapache", "osito lavador" (Spanish); "guaxinim", "mao-pelada" (Brazil); "wasbeer", "krabdagoe" (Suriname); "gato mayuato" (Panama); "ratón laveur" (French Guyana); "aguará-popé", "Goáxiní" (Guyana); "Mayuato" (Quichua) (Emmons 1990); "gato manglatero", "gato de manglar", "corobo", "touarú", (Panama); "chien mangue", "jaguaracambe", "zorro cangrejero" (Mendez 1970).
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Species. [The subspecies *Procyon cancrivorus panamensis* can be found in the countries of Panama, Costa Rica, and Venezuela (Handley 1966 as cited in Hall 1981; Mendez 1970; Hall 1981).]
Distribution: (Figure 1-1) The crab-eating raccoon can be found from southeastern Costa Rica to the northern Argentine provinces as far as Santa Fe (Mendez 1970; Nowak and Paradiso 1983; Eisenberg 1989; Emmons 1990; Honacki et al. 1982, as cited in Redford and Eisenberg 1992). This species, although having a range throughout the South American continent, is rarely found in eastern Brazil (Eisenberg 1989). The crab-eating raccoon overlaps the northern raccoon along the Atlantic coast of Panama (Mendez 1970).
Wild population: >10,000; It is thought to be uncommon in Eastern Panama and the Caribbean coast of Western Panama (Handley 1966). Bisbal (1987) indicates that *Procyon cancrivorus* is common in Venezuela although it hasn't been collected in many of the states and territories. We estimate the entire species population to be over 10,000 individuals due to the species wide range and adaptability. We find no evidence that this species is of conservation concern throughout its range.
Field studies:
Threats: Human interference and loss of habitat. Native Subsistence Use: Emmons (1990) states that this species probably is rarely hunted by Native Americans. Commercial Uses: No evidence of any significant commercial use or value was found for this species. Mendez (1970) states that the pelage of *P. cancrivorus* is of an inferior quality to the northern raccoon, therefore it is unlikely that the fur is in demand. Bisbal (1987) indicates that some may be killed in an attempt to reduce crop damage.
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** This species is restricted to wetland habitats such as swamps, rivers, and lakes (Handley 1976; Eisenberg 1989; Emmons 1990, Redford and Eisenberg 1992). *P. cancrivorus* can be found in evergreen forest, swamp, and deciduous forest up to 320 meters (Handley 1976). Bisbal (1987) determined that tropical dry forests are the most favored habitat, followed by tropical humid forest. It is reported to be a good swimmer and climber (Mares, Ojeda and Barquez 1989). Food preferences include mollusks, fish, and crabs with some use of amphibians and insects and a limited use of fruit (Emmons 1990). Bisbal (1986) determined from stomach content analysis that insects and other arthropods are eaten most frequently, followed by mollusks, fish, and reptiles. He found no use of fruit or other vegetation.
B. Average group size and dispersion pattern: Unlike *P. lotor*, the crab-eating raccoon is thought to be solitary, except when breeding or with young (Mares, Ojeda and Barquez 1989; Emmons 1990).

C. Time of birth: Females produce young between May and July, with a litter size of between two and four (Mendez 1970; Redford and Eisenberg 1992). The gestation period is approximately two months (Mendez 1970). The developmental pattern of young crab-eating raccoons is similar to *P. lotor* (Lohmer 1976; and Crespo 1982, as cited in Redford and Eisenberg 1992).

Recommendations: The results of Bisbal's study (1987) indicate that the crab-eating raccoon may adapt well following the alteration of habitat by dam and road construction. Depending on the severity of the impact and the recovery time of the habitat, the crab-eating raccoon may be able to increase its population density. Regular monitoring to ascertain population levels and trends is suggested.

Wild management:

Research: Survey, monitoring

PHVA: No

Other:

Captive population: Five males and six females at four institutions are listed in the International Species Information System's Mammal Abstract for 31 December 1991 (ISIS 1991). At least 60 animals were held in 25 institutions in Brazil at the end of 1991; 11 were born, but 5 died within 30 days, and a total of 12 died during the year (there was a net loss to the captive population)(Anon. 1991).

Captive programme recommendation: Initiate a captive breeding program in the future, within 3 or more years.

CAMP TAXON REPORT

SPECIES: *Nasua nasua* South American Coati, "coatí, (Spanish, Guyana); "achuni" (Peru); "tejón" (Ecuador); "cuzumbo" (Columbia); "quati", "quatimundé" (Brazil); "neusbeer", "kwaskwasi" (Suriname); (Emmons, 1990); "gato solo", "astuben", "susuma" (Panama); "coatimundi", "cuchuche", "choluga", "guache", "osito de los palos", "pisote", "pistole", "pizote", "solitario", "soncho", "tejón", "zorro guache" (Mendez 1970).
STATUS:
Mace-Lande: Secure
CITES: III
IUCN:

Taxonomic status: Hall, Eisenberg, Redford, Nowak and Paradiso, and Gittlemann consider *Nasua nasua* and *N. narica* to be conspecific, while Kaufmann, Emmons, Grzimek, Decker, and Wozencraft consider *N. nasua* and *N. narica* to be separate species. Decker and Wozencraft (1991) have found that there are several morphological components that differ between the species. They will be treated below as separate species.
Distribution: (Figure 1-3) This species is found mainly in wooded areas in South America, from Southern Venezuela south on the east side of the Andes to Paraguay and Northern Argentina's Santa Fe Province (Emmons 1990; Redford and Eisenberg 1992). They have also been introduced on Robinson Crusoe Island, Chile (Honacki, Kinman and Koeppl 1982; and Pine, Miller, and Schamberger 1979, as cited in Redford and Eisenberg 1992).
Wild population: 25,000-70,000; This species is listed under CITES Appendix III (of conservation concern; regulated on a country by country basis) in Uruguay, and is generally uncommon, though its range is large (Emmons 1990). Handley (1966) indicates that *N. nasua* are locally common throughout all areas and elevations of Panama. Bisbal (1987) found that coati are one of the most common carnivores in the Guyana highlands. Nowak and Paradiso (1983) counting *N. nasua* and *N. narica* as one species, reported population densities on Barro Colorado Island, Panama to be between 26 and 42 individuals per 100 hectares. Since this is in the area of range overlap for the two species, it is unclear which species (or both) were censused. **Field studies:** From the estimates of coati abundance, it appears that coati populations may be stable in northern South America and Central America, and less abundant as one travels further south into its range. Coati population densities may increase due to clearcutting, mineral exploitation, and dam construction (Bisbal 1987). It is clear that coatis need to be surveyed throughout their range to determine whether or not they are increasing or declining.
Threats: Hunting; Native Subsistence Use: Some impact on the species derives from hunting pressure. This species is hunted for its meat by native people, sometimes with the assistance of dogs (Nowak and Paradiso 1983, Mares, Ojeda and Barquez 1989 Mittermeier 1991). Mittermeier (1991) indicates that coati are not taken as frequently as many other species of mammals. Vickers (1991) indicates that coati were ranked sixteenth out of 48 species hunted by Indians in the Shuskufindi Territory between 1973 and 1982. Ayres (1991) indicates that coati are hunted very infrequently in Dardanelos, Brazil. Only one coati was taken in 1978 (out of 582 mammals total), and none were taken in 1980, out of a total of 179 taken.
Commercial Uses: Coati have been reported to be tamed as pets (Nowak and Paradiso 1983, Mares, Ojeda and Barquez 1989). Coatis are also sold on the live animal market, and are under slight

hunting pressure (Emmons 1990). Wozencraft (1989) has found that coati are becoming more shy and nocturnal in Mexico due to intensive hunting. Aranda (1991) indicates that coati skins were found for sale in San Cristobal de las Casas and Comitan, Mexico, but that coati skins were nowhere near as prevalent as those of other mammals. Bisbal (1987) reports that one skin was confiscated out of 1,624 total skins between 1970 and 1979 in Venezuela. Some may be killed in an attempt to reduce crop damage (Bisbal 1987).

Comments: Ecology and reproduction: **A. Habitat and Food Preferences:** This species is found mainly in wooded areas, but can be found in a variety of habitat types ranging from dry deciduous forest to multistratal tropical evergreen forests (Eisenberg 1989). Specimens were collected by Handley (1976) at elevations of between 100 and 350 meters. Handley (1976) notes that coati prefer evergreen forest to deciduous, and are more likely to be found in moist sites rather than dry, but are not restricted to one particular area (Handley 1976). Bisbal (1987) found that tropical dry forest and tropical humid forest is preferred over other habitats. Food preferences are varied and wide, but when fruit is abundant coatis may become nearly completely frugivorous (Nowak and Paradiso 1983). They hunt for food mainly on the ground actively seeking forest floor invertebrates and small vertebrates (Eisenberg 1989).

B. Average group size and dispersion pattern: There are usually between four and 20 individuals per group; each group contains females and males less than two years of age (Nowak and Paradiso 1983). Emmons (1990) reports that there may be as many as 30 individuals in a group.

C. Movements: South American coati bands move between 1,500 and 2,000 meters per day, with a home range of about 35-45 hectares (Kaufmann 1962, discussing *N. narica*; Eisenberg 1989, combining both species as *N. nasua*).

D. Time of birth: *N. nasua* has approximately the same breeding season as *N. narica.* Breeding occurs around March with an average gestation period of 72 days resulting in a time of birth between late April to June (Gander 1928, as cited in Ewer 1973; Nowak and Paradiso 1983). Eisenberg (1989) indicates a gestation period of 77 days. Coati litters range from one to six individuals (Redford and Eisenberg 1992). In Argentina, coati's breed between October and February, and produce three to six young (Crespo, 1982,as cited in Redford and Eisenberg, 1989).

Recommendations:

Wild management:

Research: Monitoring, Taxonomy, Limiting factors research

PHVA: No

Other:

Captive population: 150+; There are 51 males, 86 females, and seven unspecified juveniles at 40 establishments listed without subspecies in the International Species Information System's Mammal Abstract for 31 December 1991 (ISIS, 1991). There are also one male, two female and four juvenile *N. nasua nasua*, and one male *N. nasua solitaria* listed (ISIS, 1991).

Captive programme recommendation: Initiate a captive breeding program in the future, within 3 or more years.

CAMP TAXON REPORT

SPECIES: *Nasua nelsoni* Cozumel Island Coati, "pizote", "pizote solo" (Costa Rica, Honduras); "tejón" (Ecuador, Mexico); "cuzumbo" (Columbia); "gato solo" (Panama); "chic", "sis" (Mayan); (Emmons 1990).
STATUS:
Mace-Lande: Critical
CITES:
IUCN: InsufficientLy Known

Taxonomic status: Species
Distribution: (Figure 1-3) This coati inhabits Cozumel Island, Mexico (Hall 1981).
Wild population: *Nasua* is listed on CITES Appendix III (of conservation concern; regulated on a country by country basis), (Emmons, 1990). Less than 250?
Field studies:
Threats: Human interference, loss of habitat, taxonomy.
Native subsistence use: Unknown for this species.
Commercial use: **Nasua spp.** were found for sale in San Cristobol de las Casas and Comitan Mexico (Aranda 1991). Use of **Nasua nelsoni** is unknown.
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** The coati inhabits pine-oak and riparian woodlands in Northern Mexico and the United States (Kaufmann 1987), they also inhabit lowland tropical rainforests, deserts, and savannas (Kaufmann 1983). This genus is omnivorous and feeds on seasonally abundant fruits and animals (Kaufmann 1983). Coati are diurnal, and feed primarily on the ground (Russell 1982). Nearly twice as much time is spent foraging for animals during the wet season than during the dry season (Russell 1982). Scat analysis indicates that beetles provide the majority of the animal food source, followed by spiders, millipedes, ants, land crabs, and many other infrequently occurring animals (Russell 1982). Delibes *et al.* (1987) found similar results in their scat analysis, but they found other species of arthropods being eaten more frequently. Russell (1982) found that vertebrates provide a very small component of the coati diet. Delibes *et al.* (1989) found vertebrate remains (mostly rodent) in ten percent of the scat analyzed. Fruit species predominantly fed upon are determined by accessibility and time of ripening (Russel 1982). On Barro Colorado Island, the available fruit crop peaks during the time when the young are born; this results in the diet changing to nearly exclusively fruit during that time (Smythe 1970).
B. Average group size and dispersion pattern: *Nasua spp.* are the only gregarious genera within the family Procyonidae. Adult males are solitary; females and males younger than two live in bands of four to 30 members which are based on family units (Kaufmann 1983).
C. Movements: Coati move greater distances in their foraging during the wet season than they do during the dry season (Russell 1982). Kaufmann (1962) found that coati moved an average distance of 1,983 meters per day in the wet season, and 1,466 meters per day in the dry season. In semiarid habitat, coatis were found to have a home range of up to 300 hectares (Kaufmann, Lanning and Poole 1976, Lanning 1976). In general, the coati is more sedentary in the tropical regions of its range, and semi-nomadic in the arid regions (Kaufmann pers. comm. 1992).
D. Time of birth: Coatis are seasonally monestrous, breeding from April to May (Russell 1982, Kaufmann 1987). They have a ten to eleven week gestation period. Mating behavior corresponds

roughly with the dry season, with mating behavior exhibited during late January to mid-March (Kaufmann 1962). Coati synchronize their breeding period (within and between social groups), which has the effect of concentrating births in the coati bands for a given year (Russell 1982). Kaufmann (1962) states that coati give birth to between four and six individuals per season. However, the number born per litter may differ between years because Russell (1982) indicates that coati on Barro Colorado Island Panama have on average 3.5 young per litter.

Recommendations:

Wild management:

Research: Taxonomy, survey, limiting factors research

PHVA: Yes

Other:

Captive population: 0

Captive programme recommendation: Initiate a captive breeding programme immediately.

CAMP TAXON REPORT

SPECIES: *Nasua narica* White-Nosed Coati, "quash" (Belize); "pizote", "pizote solo" (Costa Rica, Honduras); "tejón" (Ecuador, Mexico); "cuzumbo" (Columbia); "gato solo" (Panama); "chic", "sis" (Mayan); (Emmons 1990).
STATUS:
Mace-Lande: Secure?
CITES: III
IUCN:

Taxonomic status: The following is a list of subspecies which are located south of the United States border: *N. narica molaris:* This subspecies was collected in the Mexican state of Veracruz by Hall and Dalquest (1963 as cited in Hall 1981). It was also collected in the states of Oaxaca and Sonora (Hall 1981).
N. narica narica: This subspecies was collected in the Mexican state of Veracruz by Hall and Dalquest (1963, as cited in Hall 1981). It also ranges through the countries of Belize and Honduras, down the east coast to South America, and the west coast from El Salvador, to South America (Burt and Striton 1961, as cited in Hall 1981).
N. narica (nasua) yucatanica: This subspecies can be found in the Mexican states of Quintana Roo and Yucatán, and the countries of Belize and Guatemala (Hall 1981).
Distribution: (Figure 1-3) This coati inhabits a smaller geographic range, encompassing New Mexico, Arizona, and Texas south along the western side of the Andes (Kaufmann, Lanning and Poole 1976). Emmons (1991) indicates the range of *N. narica* only extends as far south as Ecuador along the west coast of South America, and considers any *Nasua spp.* south of this area to be *N. nasua.* Kaufmann (1987) states that *N. narica* ranges from Panama northward into the southern United States, bounded by the Baboquirari Mountains in Arizona to the east, the Animas Mountains in New Mexico to the west, and the Gila River to the north. The coati can be found at elevations of between 1,400 and 2,000 meters, although their range may extend higher into evergreen forests, or lower into desert scrub (Kaufmann 1987), or 500-3000 meters (Kaufmann pers. comm. 1993).
Wild population: 10,000-50,000; This species is listed on CITES Appendix III (of conservation concern, regulated on a country by country basis) in Honduras (Emmons 1990). Its status varies from region to region, it can be locally common or rare (Emmons 1990). Dalquest (1953) has found that coatis are fairly common in San Luis Potosí, especially on the eastern slopes of the Sierra Madre mountains. Coatis are most common in the United States in the state of Arizona (Wozencraft 1989). In New Mexico, the coati is on the endangered species list, and as of 1985, was under review to be protected in Texas (Wozencraft 1989). Kaufmann (pers. comm. 1992) states that the coati population in the United States is restricted in distribution and at low density.
Lanning (1976) determined the population density of Coati in Arizona to be 1.2 to 2 individuals per hectare. Kaufmann, Lanning and Poole (1976) indicate that there can be as many as 10 per square kilometer.
Field studies: Much of the habitat needed by coati in the United States is under some degree of protection, but Kaufmann (pers. comm. 1993) indicates that more riparian habitat is needed for adequate protection of this species, especially in Arizona where most of the population resides. Due to hunting presures in Mexico, it is possible that the U.S. and Mexican population have become isolated from each other, indicaating the need for increased protection of the smaller U.S. population

(Kaufmann pers. comm. 1993)
Threats: Loss of habitat; human interference, hunting, disease. Native subsistence use: Coati are used by natives as a food source. Between 1973 and 1982, .195 *Nasua* sp. per 100 hunting hours were killed by residents of the Shushufindi Territory (Vickers 1991). It is likely that many of the reported uses of *N. nasua* are also relevant for *N. narica.* Commercial use: Found for sale in San Cristobol de las Casas and Comitan Mexico (Aranda 1991). They are not allowed to be trapped in the United States (Wozencraft 1989), but it is likely there is a significant amount of accidental trapping. The population in the Burro Mountains of New Mexico has been severely reduced due to indiscriminate poison bait settings for coyote control (Wozencraft 1989). They are also subject to animal damage control measures, but Dalquest (1953) states that they do little harm to crops. Many of the commercial uses listed for *N. nasua* are also relevant for *N. narica.*
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** The coati inhabits pine-oak and riparian woodlands in Northern Mexico and the United States (Kaufmann 1987), they also inhabit lowland tropical rainforests, deserts, and savannas (Kaufmann 1983). This species is omnivorous and feeds on seasonally abundant fruits and animals (Kaufmann 1983). Coati are diurnal, and feed primarily on the ground (Russell 1982). Nearly twice as much time is spent foraging for animals during the wet season than during the dry season (Russell 1982). Scat analysis indicates that beetles provide the majority of the animal food source, followed by spiders, millipedes, ants, land crabs, and many other infrequently occurring animals (Russell 1982). Delibes *et al.* (1987) found similar results in their scat analysis, but they found other species of arthropods being eaten more frequently. Russell (1982) found that vertebrates provide a very small component of the coati diet. Delibes *et al.* (1989) found vertebrate remains (mostly rodent) in ten percent of the scat analyzed. Fruit species predominantly fed upon are determined by accessibility and time of ripening (Russell 1982). On Barro Colorado Island, the available fruit crop peaks during the time the young are born, resulting in the diet changing to nearly exclusively fruit during that time (Smythe 1970).
B. Average group size and dispersion pattern: *Nasua spp.* are the only gregarious genera in the family Procyonidae. Adult males are solitary, females and males younger than two live in bands of four to 30 members which are based on family units (Kaufmann 1983).
C. Movements: Coati move greater distances in their foraging during the wet season than they do during the dry season (Russell 1982). Kaufmann (1962) found the home range of *N. narica* on Barro Colorado Island, Panama to average 40 hectares, with an average core area of 16.6 hectares. Kaufmann (1962) also found that coati moved an average distance of 1,983 meters per day in the wet season, and 1,466 meters per day in the dry season. In semiarid habitat, coatis were found to have a home range of up to 300 hectares (Kaufmann, Lanning and Poole 1976, Lanning 1976). In general, the coati is more sedentary in the tropical regions of its range, and semi-nomadic in the arid regions (Kaufmann pers. comm. 1992).
D. Time of birth: Coatis are seasonally monestrous, breeding from April to May (Russell 1982, Kaufmann 1987). They have a ten to eleven week gestation period. Mating behavior corresponds roughly with the dry season, with mating behavior exhibited from late January to mid-March (Kaufmann 1962). Coati synchronize their breeding period (within and between the social groups), which has the effect of concentrating births in the coati bands for a given year (Russell 1982). Kaufmann (1962) states that coati give birth to between four and six individuals per season. The number born per litter may differ between years; Russell (1982) indicates that coati on Barro Colorado Island Panama have on average 3.5 young per litter.
Recommendations:

Wild management:
Research: Survey, monitoring, limiting factor research, taxonomy?
PHVA: Yes
Other:
Captive population: 95; There are 35 males, 39 females and three unspecified juveniles at 27 institutions listed without subspecies in the International Species Information System's Mammal Abstract for 31 December 1991 (ISIS, 1991). There are also six male and seven female *N. narica narica*, three male and ten female *N. narica molaris*, and two male and four female *N. narica yucatanica* listed (ISIS, 1991). Kaufmann (pers. comm. 1993) indicates that there are coatis held at the Arizona-Sonora Desert Museum, Arizona.
Captive programme recommendation: Initiate a captive breeding program in the future, within 3 or more years.

CAMP TAXON REPORT

SPECIES: *Nasuella olivacea* Mountain Coati, "coati olivia", "lesser "coatimundi", "mountain coatimundi"
STATUS:
Mace-Lande: Unknown
CITES:
IUCN:

Taxonomic status:
Distribution: (Figure 1-4) The mountain coati is found in the Andes of western Venezuela, Columbia, and Ecuador (Cabrera 1957, as cited in Nowak and Paradiso 1983 Kaufmann 1987). Occupies montane regions of tropical forests at elevations greater than 2,000 meters (Aagaard 1982, as cited in Eisenberg 1989).
Wild population: The status of the mountain coati is unknown in the wild. Due to the specific distribution and habitat needs required by this species, its status should be detailed in the near future.
Field studies:
Threats: Loss of habitat, fishing.
Native subsistence use: No evidence of any significant native subsistence use or value was found (in the literature) for this species.
Commercial use: No evidence of any significant commercial use or value was found (in the literature) for this species.
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** What little evidence is available on the ecology of this species indicates a life history similar to that of the lowland coatis (Nowak and Paradiso 1983, Eisenberg 1989). Most specimens collected were found on the ground in tropical, very humid, forests and subalpine paramo (Bisbal 1987). Handley (1976) collected most of his specimens on the ground between altitudes of 2,000 and 3,020 meters.
B. Average group size and dispersion pattern: Unknown
C. Movements: Unknown
D. Time of birth: Unknown
E. Conservation measures for the species: Before conservation measures can be designed, it is important to derive a better understanding of the basic life history characteristics of this mammal. Very little is known about the ecological needs of this species; it may be similar to the lowland coatis (Nowak and Paradiso 1983, Eisenberg 1989). Habitat modification from clearcutting, mining, and road construction may all have a negative effect on the mountain coati (Bisbal 1987). Due to the localized distribution and restricted range of the mountain coati, it may be more vulnerable to habitat manipulation than other Procyonids. These pressures may be alleviated somewhat by the existence of protected zones within the Andes zone of Venezuela (Bisbal 1987). **Recommendations:**
Wild management:
Research: Survey, limiting factors research
PHVA: No
Other:
Captive population: There are no captive animals listed in the International Species Information System's Mammal Abstract for 31 December 1991 (ISIS 1991).
Captive programme recommendation: Not now recommended but may be considered in future.

CAMP TAXON REPORT

SPECIES: *Potos flavus* Kinkajou "jupará", "macaco-de noite" (Brazil); "night walker" (Belize); "perro demonte", "oso mielero", "marta", "martucha" (Columbia, Mexico); "kinkaju", "tancho", "oso mielero", "mico de noche", "micoleón", "godoy" (Mexico); "martilla" (Costa Rica); "martica", "tutamono", "chuche", "cuchicuchi" (Ecuador); "chosna" (Peru); "meti-keskesi" (Suriname); "cusumbí" (Panama); (Emmons 1990); "huasa", "leoncito", "macaco da meia noite", "manviri", "martucha", "mico león", "perro de monte", "quati da meia noite", "tuta" "yapará" (Mendez 1970); "honey bear".
STATUS:
Mace-Lande: Secure
CITES: III
IUCN:

Taxonomic status: Species.
Subspecies: *P. flavus chiriquensis (= arborensis):* This subspecies can be found in the Mexican states of Yucatán and Chiapas, and the countries of Belize, Nicaragua, Panama, Costa Rica, El Salvador, and Guatemala (Burt and Stirton 1961, and Kortlucke 1973, as cited in Hall 1981).
P. flavus megalotus: Panama and Venezuela (Kortlucke 1973, as cited in Hall 1981).
P. flavus prehensilis: Mexican states of Veracruz, Tamaulipas, Oaxaca, Guerrero, and San Luis Potosí (Kortlucke 1973 as cited in Hall 1981).
P. flavus chapadensis, P. flavus meridensis, P. flavus modestus, P. flavus nocturnus
Distribution: (Figure 1-6) Kinkajous can be found from Mexico to Brazil (Eisenberg 1989, Hall 1981, Cabrera 1957). In Mexico, they can principally be found in the forests of southeastern Mexico, and along the Gulf coast (Dalquest 1953, Leopold 1959). It is present in habitat below 500 meters elevation, but can occasionally be found up to 1,750 meters (Emmons 1990).
Wild population: 10,000-50,000; The kinkajou is CITES Appendix III (of conservation concern; regulated on a country by country basis) in Honduras, however it is widespread and common over much of its range (Emmons 1990). Handley (1966) indicates it is common at all elevations of Panama. Walker and Cant (1977) found that in good habitat, population densities can be as high as 59 individuals per square kilometer. They also determined a density of 0.74 individuals per hectare on Tikal National Park, Guatemala (Walker and Cant 1977). Tikal is different becuase it is an old Mayan site; the Mayans favored highly nutritious food plants, and this is now reflected in animal abundance (Cuaro pers. obs.).
Field studies:
Threats: Loss of habitat. Native subsistence use: Kinkajous are considered an excellent meat by Amerindians, and are also kept as pets (Husson 1978). Robinson and Redford (1991) found that the kinkajou is one of the most important Procyonids to Native Americans. Campesinos and the indigenous people of the Maracaibo Basin, the Amazonas Lowlands, the Amacuro Delta, and the Guayana Highlands of Venezuela hunt kinkajous for food (Ruddle and Wilbert 1983, as cited in Bisbal 1987). Mittermeier (1991), however, indicates that kinkajous are used very little by Indians in Suriname. Commercial use: The kinkajou is hunted for meat and for the pet trade (Husson 1978), although Leopold (1959) reports that hunting for meat is a very small part of the total harvest. Kinkajous were one of the more common skins found in San Cristobal, Mexico by Aranda (1991). Dalquest (1953) found skins in Tamazunchale, Mexico. The value in 1991 was three dollars (U.S.)

for a skin (Aranda 1991). Bisbal (1987) reports finding three skins confiscated in Venezuela between 1970 and 1974, and none between 1975 and 1979, out of a total confiscation of 1,307 skins in the first period, and 317 in the second four years. Leopold (1959) indicates that there is a well-established pet trade in Mexico despite legal protection. Bisbal (1987) indicates that some may be killed in an attempt to reduce crop damage. Perhaps destruction of virgin forests in Mexico play a large part in reducing kinkajou populations (Leopold 1959).

Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** The kinkajou inhabits mature, disturbed, and second growth forests (Emmons 1990). Almost completely arboreal and nocturnal, this species feeds on fruit, honey, insects, and small vertebrates (Husson 1978, Nowak and Paradiso 1983, Eisenberg 1989). Bisbal (1987) found kinkajous to inhabit all ecological zones of Venezuela except for the arid region. They occur more frequently in tropical humid forest, premontane very humid, and tropical very humid forest.

B. Average group size and dispersion pattern: The kinkajou is solitary, and travels alone or in pairs (Nowak and Paradiso 1983). Eisenberg (1989) however, reports that several kinkajous may be seen in the same tree, and Leopold (1959) reports that they commonly forage in bands.

C. Time of birth: Husson (1978) and Eisenberg (1989) state that births take place in April or May following a 112-118 day gestation period. Poglayen-Neuwall (1962) and Grzimek (1975, **in** Nowak and Paradiso, 1983), however, state that there is no definite breeding season for the kinkajou. A single kinkajou is usually born, although there may be as many as two (Poglayen-Neuwall 1962, Eisenberg 1989).

D. Conservation measures for the species: Due to its dependence on successional fruit species, the kinkajou population may be at risk from selective logging or forest fragmentation (Bisbal 1987). Kinkajous may be able to adapt to some alteration of habitat as long as there is always an abundance of fruit bearing trees (Bisbal 1987). While the kinkajou appears to be more able to adapt to the pressures provided by human population than is the olingo, priority should still be placed on preserving its habitat. The kinkajou occurs in all protected areas of its range, which reduces the threat of endangerment (Bisbal 1987) Habitat preservation should still be of special concern in Honduras since this species is CITES Appendix III.

Recommendations:

Wild management:

Research: Survey, taxonomy, monitoring

PHVA: No

Other:

Captive population: 100+; There are 42 males, 56 females and 3 unspecified juveniles at 37 institutions listed in the International Species Information System's Mammal Abstract for 31 December 1991 (ISIS 1991). There are also one male *P. flavus arborensis*, one male and four female *P. flavus chiriquensis*, and two male and four female *P. flavus megalotus* listed (ISIS, 1991).

Captive programme recommendation: Initiate a captive breeding programme within 3 or more years.

CAMP TAXON REPORT

SPECIES: *Bassaricyon gabbii* Olingo "Jupara" (Brazil), "ocate", "chosna pericote" (Peru), "olingo" (Panama) (Emmons 1990)
STATUS:
Mace-Lande: Endangered/Vulnerable
CITES: III
IUCN:

Taxonomic status: Species.
Subspecies: *B. gabbii gabbii:* Costa Rica (Hall 1981). *B. gabbii medius:* Panama and parts of South America (Handley 1966 as cited in Hall 1981). *B. gabbii richardsoni:* Nicaragua and Costa Rica (Hall 1981).
Distribution: (Figure 1-5) The olingo is found from Nicaragua south to the lower Amazon basin. It is only found in the western Amazon region from Venezuela to Bolivia (Eisenberg 1989, Emmons 1990). This species can be found from sea level to 2,000 meters (Nowak and Paradiso 1983). Distribution is likely to be very scattered and localized throughout its range (Mondolfi 1977, Bisbal 1987).
Wild population: 1,000-10,000. The olingo is listed under CITES Appendix III (of conservation concern; regulated on a country by country basis) in Costa Rica (Emmons 1990). It is thought to be uncommon throughout Panama (Handley 1966), and is likely to be locally threatened by rain forest clearing in some areas, although it is widespread and common over much of its range (Emmons 1990).
Field studies:
Threats: Loss of habitat, hunting. Native subsistence use: Campesinos and the indigenous people of the Maracaibo Basin, the Amazonas Lowlands, the Amacuro Delta, and the Guayana Highlands of Venezuela hunt olingoes for food (Ruddle and Wilbert 1983 & 1985, as cited in Bisbal 1987). Commercial use: No evidence of any significant commercial use or value.
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** The olingo is restricted to multistratal tropical evergreen forests below 2,000 meters (Eisenberg 1989). Most specimens collected were found in tropical humid forest and premontane, very humid forest (Bisbal 1987). Handley (1976) found all his specimens in trees at elevations between 135 and 460 meters. Primarily arboreal and nocturnal, the olingo feeds mainly on fruit, but also feeds on invertebrates and small vertebrates found in the arboreal community (Nowak and Paradiso 1983, Eisenberg 1989).
B. Average group size and dispersion pattern: The olingo is thought to live alone, or in pairs throughout the year (Nowak and Paradiso 1983). Captive studies indicate that individuals of the same gender do not tolerate each other (Eisenberg 1989).
C. Time of birth: There have been no studies that indicate a definitive breeding season for this species (Nowak and Paradiso 1983). Females give birth to a single young after a gestation period of 74 days (Eisenberg 1989).
D. Conservation measures for this species: Due to its dependence on successional fruit species, the olingo population may be at risk from selective logging or forest fragmentation (Bisbal 1987). For adequate protection of this species, it is necesary to preserve the habitat on which it depends. While the olingo occurs in all protected areas of its range, which reduces the threat of extinction (Bisbal 1987), more area should be preserved to assure survival of this species.

Recommendations:
Wild management:
Research: taxonomy, survey, monitoring, limiting factors research
PHVA: Yes!!
Other:
Captive population: 1.2; One male and two females of unspecified subspecies at one institution listed in the International Species Information System's Mammal Abstract for 31 December 1991 (ISIS 1991).
Captive programme recommendation: Not currently recommended but may be considered pending further data.

CAMP TAXON REPORT

SPECIES: *Bassaricyon gabbii pauli* Chiriqui Olingo
STATUS: Critical
Mace-Lande:
CITES:
IUCN:

Taxonomic status: Subspecies
Distribution: Western Panama (Hall 1981, Burton 1987).
Wild population: <250
Field studies:
Threats: Loss of habitat and hunting
Comments:
Recommendations:
Wild management:
Research: Taxonomy, survey, limiting factors research
PHVA: Yes!!!
Other:
Captive population:
Captive programme recommendation: Not currently recommended but may be considered pending further data.

SPECIES: *Bassaricyon gabbii lasius* Harris's Olingo
STATUS:
Mace-Lande: Critical
CITES:
IUCN:

Taxonomic status: Subspecies
Distribution: Small, isolated populations in Costa Rica (Hall 1981, Burton 1987).
Wild population: <250
Field studies:
Threats: loss of habitat, hunting
Comments:
Recommendations:
Wild management:
Research: Taxonomy, survey, limiting factors research
PHVA: Yes!!!
Other:
Captive population:
Captive programme recommendation: Not currently recommended but may be considered pending further data.

CAMP TAXON REPORT

SPECIES: *Bassaricyon gabbii beddardi*
STATUS:
Mace-Lande: Vulnerable?
CITES:
IUCN:

Taxonomic status:
Distribution: Guyana, with possible radiations to neighboring countries (Nowak and Paradiso 1983). Venezuela, Brazil
Wild population: 5,000-25,000
Field studies:
Threats: Loss of habitat and hunting
Comments:
Recommendations:
Wild management:
Research: taxonomy, survey, limiting factors research, monitoring
PHVA: No
Other:
Captive population:
Captive programme recommendation: Not currently recommended but may be considered pending further data.

SPECIES: *Bassaricyon gabbii alleni*
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Subspecies
Distribution: Ecuador, Peru and parts of Venezuela (Nowak and Paradiso 1983).
Wild population: 10,000-50,000
Field studies:
Threats: Loss of habitat, hunting
Comments:
Recommendations:
Wild management:
Research: Taxonomy, survey and limiting factors research
PHVA: No
Other:
Captive population: 0
Captive programme recommendation: Initiate a captive breeding programme within 0-3 years.

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CAMP TAXON REPORT

SPECIES: *Mustela felipei* Columbian weasel
STATUS:
Mace-Lande: Critical/Endangered
CITES:
IUCN:

Taxonomic status:
Distribution: Endemic to the Neotropics, never observed by scientists alive, this recently discovered species may be the rarest carnivore in South America. Only four specimens have been obtained, (two in the 1950's and two undated) three from Columbia (in the provinces of Huila and Cauca) and one from Andean Ecuador (Schreiber *et al.* 1989).
Wild population: 100-5000; Very rare, with very little information available. One specimen was collected near the administrative center of the Cuerva de los Guacharos National Park (Schreiber *et al.* 1989) and the protected areas of Parque Nacional de Huila and de Purace are close to where the few specimens known were collected (Leibermann pers. comm. to Schrieber *et al.* 1989).
Field studies:
Threats: Hunting and pollution
Comments: Some zoologists suggest placing *M. africana* and *M. felipei* into the subgenus *Grammogale* due to morphological similarities (Kruska 1990). Ecology and Reproduction:
A. Habitat and Food Preference: The specimens that have been found were from an altitude where cloud forests predominate. One specimen was obtained in the upper Suaza river valley (Cueva de los Guacharos National Park). This may indicate a dependence upon riverine habitats (Schreiber *et al.* 1989). Since the known range of this species is very small, this narrow-niche theory could be important (Schreiber *et al.* 1989).
B. Average group size and dispersion pattern: No information found.
C. Movements: No information found.
D. Time of Birth: No information found.
Recommendations:
Wild management:
Research: Habitat management, survey, limiting factor research and life history. Studies should be undertaken immediately to learn about the habitat needs and behavior of this rarely seen species. The areas where specimens were previously collected should be protected and attempts should be made to discover if this species is still alive in the wild or if it is extinct.
PHVA:
Other:
Captive population: No records exist in ISIS (1991) or for the Brazilian Zoo Association (Anon 1991) of any *Mustela felipei* in captivity.
Captive programme recommendation: Pending

CAMP TAXON REPORT

SPECIES: *Mustela africana* Amazon weasel "Comadreja", (Spanish); "furao" (Brazil); (Emmons 1990).

STATUS:
Mace-Lande: Vulnerable/Endangered?
CITES:
IUCN:

Taxonomic status: Species
Subspecies:
Mustela africana stolzmanni: Found within the drainages of the three western tributaries of the Amazon, the Napo, the Maranon, and the Ucayali rivers. These rivers unite in the vicinity of Iquitos, Loreto, Peru, forming the Amazon, which then flows easterly (Izor and de la Torre 1978). A specimen was taken in the 1960's by a trapper, then acquired by the Field Museum in Chicago in 1975, and first reported by Izor and de La Torre in 1978. It was from the state of Amazonas, Brazil between Guajara and Floresta. This specimen is tentatively identified as *Mustela africana stolzmanni* by Izor and de la Torre, and fills in the large gap of 2,800 kilometers between the known distributions of *M. a. africana* and *M. a. stolzmanni* (Hall 1951).
Mustela africana africana: Two specimens which were previously misidentified were found along the Rio Tapajos in Brazil--this is about 600 kilometers further west than the previously known range of this species which was along the Amazon delta by the Tabajos and Tocantins tributaries (Izor and Peterson 1985).
Distribution: (Figure 2-2) This species is found in South America east of the Andes, in the lowland Amazon basins of Peru, Ecuador, and Brazil. (Emmons 1990, Kruska 1990). It is known from the drainage areas of three western tributaries of the Amazon (the Napo, the Maranon, and the Ucayali) in eastern Ecuador and eastern Peru. It can also be found 2,800 miles east, in the Amazon delta, but this large separation distance, along with some morphological differences, may distinguish two different subspecies (*Mustela africana stolzmanni*, and *Mustela africana africana.*) (Schreiber, *et al.* 1989). **Past Distribution:** Endemic to the Neotropics (Schreiber *et al.* 1989).
Wild population: 500-50,000; Over the past 160 years, only about 30 specimens have been reported (Izor and de la Torre 1978).
Field studies:
Threats: Hunting, pollution
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** There is limited information available on this rare species, but Emmon's field guide to Neotropical Mammals, states that some specimens have been found in the lowland rainforest. Kruska (1990) reports observations of the species along jungle streams, and states that *M. africana* is a good climber and swimmer. Some specimens have been found in hollow stumps, and may feed on rodents and other small mammals (Emmons 1990). This species is restricted to humid riparian forests possibly by a need for cover, by aquatic habits, or by competition with *Mustela frenata* (Cabrera and Yepes 1960).
B. Average group size and dispersion pattern: No information found.
C. Movements: No information found.

D. Time of birth: No information found.

Recommendations:

Wild management: Like *M. frenata*, the amazon weasel is affected by human activities such as clear cutting, agricultural practices, and dam construction, but this species is much rarer than the long-tailed weasel, and its present habitat should be preserved until more information can be obtained. More information is needed about this weasel's life history, including population status, habitat preferences, food needs and reproduction habits before any developmental activities are undertaken in the areas where *M. africana* has been found.

Research: Survey, Limiting factor research, Limiting factor management

PHVA: None

Other:

Captive population: ISIS (1991) lists none in captivity. Though there are probably no specimens in captivity, Museum Goeldi, Belem (Brazil), has preserved specimens which originated from the zoological garden in the city of Belem (Izor 1987 as cited in Schrieber *et al.*, 1989). No current holdings are listed by the Brazilian Zoo Association (Anon. 1991).

Captive programme recommendation: Pending

CAMP TAXON REPORT

SPECIES: *Mustela frenata* Long-tailed weasel
"Comadreja" (Spanish); "oncilla" (Mexico);
"lince" (Paraguay); "tolompeo" (Peru); (Emmons 1990).

STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Species.
Subspecies: *M. frenata costaricensis:* Found in the vicinity of Costa Rica (Hall 1981).
M. frenata frenata: Southern Texas and in the Mexican states of Tamaulipas (Alvarez 1963), Distrito Federal, Mexico, San Luis Potosí, and Coahuila (in the mountains near Saltillo); (Davis 1944; Dalquist 1953; Hall 1981). Davis (1944) also claims that *M. ffrenata* and *M. f. perotae* intergrade at the higher altitudes east of the Valley of Mexico with characteristics of *M. f. perotae* dominating.
M. f.goldmanni: Also found in Guerrero, Mexico (Davis and Lukens 1958).
M. frenata goldmani: Distributed from Chiapas, Mexico to El Salvador, and Guatemala (Finca San Isidro, and San Sebastian) (Hall 1981).
M. frenata latirostra: Found from California to northern Baja California (Ralston and Clark 1971 as cited in Hall 1981).
M. frenata leucoparia: Found in Guerrero, Mexico and intergrades in Sierra Madre del Sur with *M. f. goldmanni* in southern Guerrero and Oaxaca (Davis and Lukens 1958). Also found in the Mexican states of Nayarit, and Jalisco, (Genoways and Jones 1973 as cited in Hall 1981); Michoacan, Morelos (Ramirez-P. 1971 as cited in Hall 1981); and Oaxaca (Goodwin 1969 as cited in Hall 1981).
M. frenata macrophonius: Found in the Mexican states of Veracruz and Oaxaca (Goodwin 1969).
M. frenata neomexicana: Found in the United States in Colorado, Kansas and Texas (Hall 1981). This subspecies was identified in Durango, Mexico (Baker and Greer 1962, and Anderson 1972 as cited in Hall 1981). This record extended its range northeast 126 km from the previous record of Durango City (Hall and Kelson 1957; Peterson 1976). Western Coahuila is also included in the range of this subspecies (Baker 1956).
M. frenata nicaraguae: Honduras and Nicaragua (Hall 1981).
M. frenata panamensis: Found in Siola and Rio Gariche at 5300 ft eastward to Mt. Pierre in Panama (Handley 1966; Hall 1981).
M. frenata perda: Found in the Mexican states of Guatemala, Chiapas, and Yucatán (Hall 1981).
M. frenata perotae: Found near Monte Rio Frio, Mexico and Puebla, Mexico (Davis 1944). Also found in the Mexican states of Veracruz (Hall and Dalquest 1963), Oaxaca (Goodwin 1969), and Mexico (Hall 1981).
M. frenata tropicalis: Found from Tamaulipas, Mexico (Hall 1981) to Veracruz (Davis 1944, Hall and Dalquest 1963 as cited in Hall 1981) to San Luis Potosí, Mexico (Dalquist 1953).
Distribution: (Figure 2-1) This species is distributed from Southern British Columbia in Canada to the northern portion of South America, including the coastal Cordillera in Venezuela,

Colombia, Ecuador, Peru, and northern Bolivia (Kruska 1990). It has been noted in scattered localities such as the premontane forests of the Guayana highlands in Southern Venezuela, parts of Columbia (Hall 1951, as cited in Eisenberg 1989), and in the Andean highlands from Venezuela to Bolivia (Izor and de la Torre 1978). Bisbal (1987), states that this species is relatively unstudied in Venezuela, but also says that it is found in the Andes states, Santa Lucia mountains, Cordillera de la Costa, and is scattered south of the Orinoco river. The weasels are common in the coniferous forests east of Mexico City (Davis 1944), in eastern Coahuila, and the northern end of the Sierra Madre Oriental, east of Monclova, Mexico (Baker 1956). One specimen was located at 11,000 feet (Davis 1944). In April, 1968, a specimen was recorded in Northern Baja California, Mexico south of the Guadalupe River in the Chaparral Zone of the region (Ralston and Clark 1971). *M. frenata* is locally distributed throughout Panama. It is rare for the most part, but is more common in the highlands of Chiriqui (Handley 1966, Mendez 1970).

Wild population: >1,000,000; Widespread and common over range (Emmons 1990). Population densities vary from one individual per 2.6 hectare to one individual to 260 hectares (Nowak and Paradiso 1983).

Field studies:

Threats: Commercial Use: This species was found for sale in San Cristobal de las Casas and Comitan in Mexico (Aranda 1991). In Panama, *M. frenata* is not valued for its pelt, and even less for its meat. It is considered a threat to poultry though it is useful for rodent control in cultivated areas (Mendez 1970). In North America, *M. frenata* is trapped for its fur. The reported number of skins taken in the 1976/77 season in the United States and Canada was 61,175 at a value of $1.00 per pelt (Deems and Pursely 1978).

Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** Mustela frenata prefers wooded habitats with a wide range of elevation (Hall 1951 as cited in Eisenberg 1989), but Nowak and Paradiso (1983) state that it is found in open, grassy areas near water. It dens in hollow logs or stumps, among rocks, or in an abandoned den and eats rodents and small mammals (Mendez 1970, Nowak and Paradiso 1983, Emmons 1990), ground nesting birds (Mendez 1970, Emmons 1990) and was observed in India killing big brown bats in a barn (Mumford 1969). It can climb, but does not usually forage in trees (Hall 1951), though de Vos (1959) reported observing *M. frenata* climbing a tree for prey (a ground squirrel) with the agility of a martin or fisher. Bisbal (1987) and Mondolfi (1977) said that this species is most frequently found in tropical, very humid, premontane forests. It is not a rainforest species, but is highly adaptable. It prefers drier, cleared, open country, agricultural land, or montane forests at higher elevations. Tate (1931) claims that neotropical weasels are confined to the Andes with their lowest elevation at 3600 feet, but there are many conflicting reports. Emmons (1990) claims that it is usually found below 1000 meters in Central American rainforests, and one specimen of *M. f. leucoparia* was found in the Sierra Madre del Sur on the Pacific slope in 1956 at 2800 feet (Davis and Lukens 1958).

B. Average group size and dispersion pattern: Adults are usually solitary except during the breeding season (Hall 1951). Home ranges may overlap, but individuals rarely meet (Nowak and Paradiso 1989).

C. Movements: Home ranges are influenced by prey availability (Fagerstone 1987). Males usually have home ranges of between 10 hectares and 24 hectares (DeVan 1982), while females' are smaller and included within males' (Fagerstone 1989). In North America, in areas of high

prey density, home ranges are usually 65%-85% smaller than normal (DeVan 1982).
D: Time of birth: Mustela frenata has a gestation of 230-250 days with a delay of implantation by 200-220 days and an average litter size of 3.1 (Foresman and Mead 1973). That is, this weasel breeds in the summer and implantation of the blastocyst is delayed until approximately 27 days before the young are born, the following April or May. Females enter estrous during their first summer when they are three to four months old (Wright 1947, Mendez 1970, Nowak and Paradiso 1989, Kruska 1990) while males do not become sexually active until they are about one year old (Neal and Deanesly 1935, Wright 1947, Harrison 1958, Hamilton and Eadie 1964, Wright 1968 as cited in Mead 1968b, Mendez 1970, Kruska 1990). Wright (1948) observed litter sizes of six to nine young in the wild, and less in captive litters, and Kruska (1990) reported an average litter size of six young. Wright (1948b as cited in Fagerstone 1989) also says that females go into estrous soon after giving birth, and if they do not breed, remain in estrous for a long time (65-104 days).
Recommendations: Presently, *M. frenata* is not in danger of population decline; it is not known what may become of this species, especially the populations in the neotropical areas. Some causes of future decline may include destruction of habitat, fire, climate change, disease, population fragmentation, hunting and trapping, and genetic introgression. Genetic introgression can be defined as species migration or introduction to an area inhabited by a similar species, causing the different genomes to blend together (Schreiber *et al.* 1989). Bisbal (1987) discussed many human factors relating to habitat interference for various species in Venezuela. Human actions which affect wildlife in this area include burning, agricultural practices, dam building, forest clearing, and urban development. All of these activities also affect many other neotropical mustelids including *Mustela africana, Mustela felipei, Lyncodon patagonicus, Eira barbara,* and *Galictis spp. M. frenata* is most commonly located in the Andes Zone and the North Coast Zone in Venezuela, both of which are greatly affected by burning, forest cutting, agriculture and cattle raising, and expansion of urbanization. Most of the weasels are in protected areas, so they are not as negatively affected by these actions as might otherwise be the case. This species may adjust well to changes north of the Orinoco River which may increase its food source, but dam construction will have a negative effect on the North Coastal range due to the flooding of immense areas. This area has undergone heavy development with 40 out of 100 dams built between 1940 and 1985. Approximately 231,331 hectares of wildlife habitat have already been flooded (Bisbal 1987). An important conservation measure which should be considered is the ecological assessment of impacts resulting from the construction of dams. Studies concerning the effect of human activity (agricultural practices, road building, clearcutting, etc.) on populations of *M. frenata* should be undertaken as soon as possible.
Wild management:
Research: None
PHVA: No
Other:
Captive population: According to ISIS (1991), *Mustela frenata* is found in the Abilene Zoological Garden in Abilene, TX, which holds 0 males, 1 female, and 4 juveniles. One female of the nominate subspecies, *M. f. freneta*, is held in captivity at the Gladys Porter Zoo, Brownsville, TX (ISIS, 1991). No specimens are listed by the Brazilian Zoo Association (Anon. 1991).
Captive programme recommendation: None

CAMP TAXON REPORT

SPECIES: *Eira barbara* Tayra "bushdog", (Belize); "irara", (Brazil); "tayra", (Columbia); "tolomuco", (Costa Rica); "tejón" or "manco" or "perro de monte", (Peru and Ecudor); "lepasil", (Honduras); "gato negro" or "gato cutarra", (Panama); "gato eirá", (Paraguay); "cabeza de viejo", (Mexico); "guache" or "guanico", (Venezuela); "eirá", (Guam); "sacol", (Mayan); (Emmons 1990).
STATUS: Secure
Mace-Lande:
CITES:
IUCN:

Taxonomic status: Species
Subspecies:
E. barbara biologiae: Found from Costa Rica, and Panama (Handley 1966 as cited in Hall 1981), into the northwestern coast of South America (Hall 1981).
E. barbara inserta: Found in Honduras, Nicaragua, Costa Rica, and El Salvador (Hall 1981).
Distribution: (Figure 2-5) This species is distributed from southern Sinaloa in west-central Mexico and southern Tamaulipas in east-central Mexico to northern Argentina and the island of Trinidad (Leopold 1959, Cabrera 1957, Goodwin and Greenhall 1961, Hall 1981 as cited in Nowak and Paradiso 1983, Janzen 1983). *E. barbara* is distributed throughout Mexico, Central America, Trinidad Islands, and all South American countries except Chile and Uruguay (Mendez 1970). Lucero (1983), Husson (1978), and Honaki, Kinman, and Koeppl (1982) have reported the tayra's distribution as being as far south as northern Argentina and Paraguay. Tayras are commonly seen on Barro Colorado Island in the Panama Canal Zone (Kaufmann and Kaufmann 1964). They are also widely distributed in Venezuelan mainland forests (Bisbal 1987). Handley (1976) has reported collecting specimens from ground level to 2,380 meters. Specimens have been collected all over Suriname by Krumbiegel (1942), Sanderson (1949), and Husson (1978); (Husson 1978). Janzen (1983) states that *E. barbara* is found throughout Costa Rica below 2000 meters, however Handley (1966) states that this species is uncommon in Panama.
Wild population: CITES Appendix II (in danger of becoming threatened if trade is not regulated) in Honduras. According to Emmons (1990) the tayra is one of the most widespread and common of the carnivores, and can live in disturbed habitats near man where it becomes crepuscular.
Field studies:
Threats: Loss of habitat. Habitat loss rate is 4-8% per year, depending on the area, in Mexico and Guatemala (Cuaro pers. comm.). Native uses: The tayra is used by some South Americans to protect their houses from rodents (Schreiber *et al.*, 1989). Commercial uses: The tayra is not important in Panama for hunting purposes (Mendez 1970).
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** The tayra has a variety of food sources with mammals being the most important. It has been called a poultry farm pest by some for it preys on birds and eggs (Mendez 1970, Husson 1978, Nowak and Paradiso 1983). The spiny rat (*Proechimys spp.*) was identified as a preferred prey by Bisbal (1986), and Kaufmann and Kaufmann (1964). Fruit provided the secondary food source (Mendez

1970, Janzen 1983, Bisbal 1986, Kruska 1990). *E. barbara* also feeds on insects (Bisbal 1986, Kruska 1990), and many authors have reported a preference for honey (Cabrera and Yepes 1960, Borrero 1967, Brosset 1968, Mendez 1970, Husson 1978, Nowak and Paradiso 1983, Bisbal 1986, Kruska 1990). Nowak and Paradiso (1983) include small deer (*Mazama*) in its diet. This species is both terrestrial and arboreal, living primarily in forested areas (Leopold 1959, Kaufmann and Kaufmann 1964, Janzen 1983, Kruska 1990, Redford and Eisenberg 1992) as high as 200 meters (Mares, Ojeda, and Barquey 1989). Tayras are more frequent in tropical humid forests and the premontane humid forests (Mendez 1970, Bisbal 1987). Leopold (1972) and Sunquist *et al.* (1989) say that the tayra is widely distributed in forested areas, but not abundant. Defler (1979) noted a preference for forested areas also, and recorded sightings on tayras in open savannas primarily at night while the animals were crossing from one forested region to another. They prefer to nest in hollow trees or logs, or in an abandoned burrow (Leopold 1959). A den was discovered in the base of a tree 30 meters up a steep hill in broken deciduous forest above a creek in Santa Rosa, Costa Rica (Janzen 1983). In grassy areas they move very close to the ground, and in trees they use their tail as a balancing rod (Kaufmann and Kaufmann 1964). In captivity, these animals are reported to be diurnal (Kaufmann and Kaufmann 1964, Kavanau 1971, Redford and Eisenberg 1992), but are reported by Cabrera and Yepes (1940) and Gaumer (1917 as cited in Kaufmann and Kaufmann 1964) to be nocturnal. Unlike the grison, tayras seem to have no affinity for water (Kaufmann and Kaufmann 1964).

B. Average group size and dispersion pattern: Tayras are usually seen alone or in small family groups (Mendez 1970, Sunquist *et al.* 1989, Redford and Eisenberg 1992), but Leopold (1959) reported an old record of hunting troops with 20 individuals. Kruska (1990) has described the tayra as being both solitary or travelling in hunting groups of two to four. These usually consisted of a mother with her young. Defler (1979) says that over half of the tayra sightings have been male/female pairs with occasional solitary sightings, but Sunquist *et al.* (1989) and Leopold (1959) both suggest that it is a primarily solitary animal.

C. Movements: One radio-collared female was reported to have a home range of nine square kilometers in the Llanos of Venezuela (Sunquist *et al.* 1989). Konecny (1989) observed captive tayras for three to 13 months and reported an average movement of 6.89 kilometers per day. One male had a home range of 2.11 square kilometers while the other had a home range of 24.44 square kilometers. A female specimen had a range of 16.03 square kilometers. The animals remained in one area for one to three days before moving on.

D. Time of Birth: Gestation period is approximately 65-70 days with an average litter size of two (Vaughn 1974, and Poglayen-Neuwall 1975). Leopold (1959) reports births in February, but other reports indicate any season (Nowak and Paradiso 1983). In captivity, female tayras have had three heat periods per year with two young born after a gestation period of 63-70 days. Tayras reproduce only after the age of two (Kruska 1990). In the Mexican state of Yucatán, February births were observed, and in Sinaloa, November births were recorded. There were three or four young per litter (Mendez 1970).

Recommendations:

Wild management: The tayra, like the grison, resides in the Llanos of Venezuela, and the Guayana highlands which suffer large losses of habitat. The tayra is not as well adapted to open areas as the grison, (Bisbal 1987) but Emmons (1990) states that it is widespread and common and can live in disturbed habitats near man. Studies should be undertaken to learn the adaptivity of this species to human intervention in its natural habitat. These should be done before

proceeding with dam construction or clearcutting in the distributional range of *E. barbara.*
Research: Survey
PHVA: No
Other:
Captive population: Two institutions hold a total of ten males, nine females, and no juveniles worldwide; one male and two female *E. b. poliocephala* are held at the Pittsboro Carnivore Preservation Trust, and one male and one female *E. b. sinuensis* are held at the San Diego Zoo (ISIS, 1991); 37 are held in 16 Brazilian zoos, with 2 births in the last year (Anon. 1991). *E. b. senex* is held by the Chiapas (Mexico) zoo, which produced young in 1991 and 92 (Cuaro pers. comm.); some are held in Guatemala, one in Belize (but less than 20 in all 3 zoos).
Captive programme recommendation: Pending

CAMP TAXON REPORT

SPECIES: *Eira barbara senex:* Grey-headed tayra, "Viejo de Monte", cabeza viejo
STATUS: Endangered
Mace-Lande:
CITES:
IUCN:

Taxonomic status: Subspecies
Distribution: Found from Guatemala northward along the coast to Sinaloa. Also found in the Mexican states of Veracruz, Tamaulipas, Campeche, and San Luis Potosí (Dalquest 1953, and Hall 1981). May be extinct in Sinaloa (or it was disjunct distribution). Five other subspecies found south into Brazil and northern Argentina.
Wild population: 10,000-35,000
Field studies:
Threats: Loss of habitat
Comments:
Recommendations:
Wild management:
Research: Survey, limiting factor research
PHVA: Yes
Other:
Captive population: <20
Captive programme recommendation: Initiate a captive program immediately.

CAMP TAXON REPORT

SPECIES: *Galictis vittata canaster* Grison
STATUS:
Mace-Lande: Endangered/Vulnerable
CITES:
IUCN:

Taxonomic status: Subspecies
Distribution: Found from San Luis Potosí, Mexico eastward to the Gulf Coast and along the coast to Yucatán, Mexico, then along the Carribbean coast to Panama (Handley 1966 as cited in Hall 1981) and into South America northward along the Pacific coast to Chiapas, Mexico (Hall 1981). (Figure 2-3). The grison ranges from southern Veracruz, Mexico to central Peru and southeast Brazil (Krumbiegel 1942, Leopold 1959, Grzimek 1975, Emmons 1990 and Kruska 1990). In Central America, this species has been observed in eastern Guatemala by Ibarra (1959), and in the Costa Rican lowlands in the provinces of Guanacaste, Putatenas, Heredia, and Limon by Goodwin (1946) and Wilson (1983). Considered rare in Panama (Mendez 1970), Handley (1966) documented sitings in the provinces of Colon, Panama, Bocas del Toro, and Darien. In Mexico, the species has been found in San Luis Potosí, Veracruz, Oaxaca, Chiapas, Yucatán, and Quintana Roo by Ramirez-P. *et al.* (1983) and Leopold (1959), but has never been recorded on the west coast above the Isthmus (Leopold 1959). *G. vittata* was included in the Honduran specimen documentation by Goodwin (1942), with no specimen documentation (McCarthy et al. 1991).
Wild population: <10,000; This species is listed as a CITES Appendix III (of conservation concern; regulated on a country by country basis) in Costa Rica (Emmons 1990). Though widespread, it is uncommon (Emmons 1990). *G. vittata* is uncommon throughout Brazil, and is represented in Brazilian museums by less than 12 skins (Barros, Lorine and Persson 1990). Leopold (1959) states that this species is one of the rarest Mexican carnivores.
Field studies:
Threats: Loss of habitat. The grison is useful to local citizens for rodent control (Mendez 1970). They were commonly domesticated in early 19th century Chile, and were used to drive chinchillas out of their burrows (Osgood 1943 as cited in Nowak and Paradiso 1983). The grison does not have a pelt of high value (Mendez 1970).
Comments:
Recommendations:
Wild management: The grison resides in the Llanos of Venezuela, which is the area most affected by deforestation, and the Guayana highlands which, along with the Llanos, has the most habitat loss in Venezuela due to flooding from dam construction. Other human activities could have a positive effect on the species depending on how long it takes for an area to recover to an inhabitable state. The grison is better adapted to open areas than most other mustelids of this region. Human activity resulting in cleared areas increases grison habitat as well as its food source (Bisbal 1987). Like other neotropical mustelids, the grison is in need of limiting factors research concerning the impacts of human activities such as dam construction on populations of the species.
Research: Survey, habitat management , limiting factor research.

PHVA: No
Other:
Captive population: A total of three males, seven females, and no juveniles are being held in captivity in three institutions worldwide (ISIS 1991). One male, three females and no juveniles of the subspecies *G. v. canaster*, are being held at the Carnivore Preservation Trust in Pittsboro, North Carolina, USA (ISIS 1991). The Amsterdam Museum holds specimens which were obtained from the Amsterdam zoo in 1932 and 1934 (Husson 1978). 28 animals (no births in the last year) are held in Brazil (Anon 1991), G. v. canaster has bred regularly at Zoologico Regional Miguel Alvarez del Toro in Chiapas Mexico (second generation births as of 1992) (Cuaro pers. obs.). Apparently the species bred in the Houston Zoo in the 1960's, but the young did not survive (M. Jones pers. comm. to A. Cuaro).
Captive programme recommendation: Pending

CAMP TAXON REPORT

SPECIES: *Galictis vittata vittata* Grison "Bushdog" (Belize); "furao" or "furax" (Brazil); "hurón" (Columbia and Ecuador); "grisón" (Costa Rica and Mexico); "lobo gallinero" or "tigrillo rosillo" (Panama); "wetiaira" (Suriname); "zabin" (Mayan); (Emmons 1990).
STATUS: Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Subspecies. **Note:** There have been discrepencies in the naming of this species. *G. vittata* and *G. cuja* are recognized as separate species by most authors. Confusion is generated with the inclusion of *G.v. canaster* as a subspecies, since some authors classify *G. canaster* as a separate species (Dalquest 1953). Dalquest (1953) claims that this is a monotypic genus, and its Central American distribution is from Panama north through Central America and eastern Mexico to San Luis Potosí. The following is Hall's (1981) classification of *G.v. canaster* as a subspecies. There has also been a problem concerning *G. allamandi.* Redford and Eisenberg (1992) consider this a separate species, and Handley (1966) describes its distribution in Panama. Mendez (1970) claims that *G. allamandi* is a separate species from *G. vittata* based on geographical evidence, but Honaki *et al.* (1982) state that this species may be a junior synonym of *G. vittata.* Since the subspecies of *G. vittata* described by Hall (1981) fit the distributions of Mendez's species, and the ecology and life history data of *G. allamandi* are the same as those of *G. vittata*, it is not included as a separate species in this report.
Distribution: Found from southeast Mexico through central America, south to central Peru and south east Brazil. It may also be found in Venezuela, northern Brazil, and the Guyanas (Husson 1978). (Figure 2-3) The grison ranges from southern Veracruz, Mexico to central Peru and southeast Brazil (Krumbiegel 1942, Leopold 1959, Grzimek 1975, Emmons 1990 and Kruska 1990). In Central America, this species has been observed in eastern Guatemala by Ibarra (1959), and in the Costa Rican lowlands in the provinces of Guanacaste, Putatenas, Heredia, and Limon by Goodwin (1946) and Wilson (1983). Considered rare in Panama (Mendez 1970), Handley (1966) documented sitings in the provinces of Colon, Panama, Bocas del Toro, and Darien. In Mexico, the species has been found in San Luis Potosí, Veracruz, Oaxaca, Chiapas, Yucatán, and Quintana Roo by Ramirez-P. *et al.* (1983) and Leopold (1959), but has never been recorded on the west coast above the Isthmus (Leopold 1959). *G. vittata* was included in the Honduran specimen documentation by Goodwin (1942), with no specimen documentation (McCarthy et al. 1991).
Wild population: >50,000; This species is listed as a CITES Appendix III (of conservation concern; regulated on a country by country basis) in Costa Rica (Emmons 1990). Though widespread, it is uncommon (Emmons 1990). *G. vittata* is uncommon throughout Brazil, and is represented in Brazilian museums by less than 12 skins (Barros, Lorine and Persson 1990). Leopold (1959) states that this species is one of the rarest Mexican carnivores.
Field studies:
Threats: Possibly loss of habitat. The grison is useful to local citizens for rodent control (Mendez 1970). They were commonly domesticated in early 19th century Chile, and were used to drive chinchillas out of their burrows (Osgood 1943 as cited in Nowak and Paradiso 1983).

The grison does not have a pelt of high value (Mendez 1970).
Comments: Ecology and Reproduction: **A. Habitat and Food Preferences:** Galictis vittata can be found in both dry deciduous forests and multistratal tropical rain forests (Krumbiegel 1942, Kruska 1990). The grison can also be found in open country from sea level to 1,200 meters (Mendez 1970, Nowak and Paradiso 1983, Kruska 1990, Redford and Eisenberg 1992) or in partially flooded rice fields (Sunquist *et al.* 1989). It lives under rocks or tree roots, in hollow logs, or abandoned burrows and eats small mammals, birds and eggs, cold-blooded vertebrates, invertebrates, and fruit (Leopold 1959, Mendez 1970, Grzimek 1975, Bisbal 1986, Sunquist *et al.* 1989, Emmons 1990, Kruska 1990). The grison is willing to swim fairly large distances, but is usually terrestrial based on captive observations done by Kaufmann and Kaufmann (1964) [Mendez (1970) and Kruska (1990) report an excellent swimming ability in this animal].
B. Average group size and dispersion pattern: The grison has been seen in pairs or small groups and also solitarily (Mendez 1970, Emmons 1990).
C. Movements: One adult female was tracked by radio collar, and found to have a home range of 4.2 square kilometers in the Llanos of Venezuela (Sunquist *et al.* 1989). No records of male home ranges found.
D. Time of Birth: The grison has a 39 day gestation period with an average litter of two (Miles Roberts pers. comm. to Eisenberg 1989). There have been limited observations of the reproductive activity of *G. vittata*, but from these reports it can be determined that in Yucatán, Mexico, the grison gives birth in March, while in the state of Veracruz, parturition occurs in August and September with litters of two to four young (Mendez 1970).
Recommendations:
Wild management: The grison resides in the Llanos of Venezuela, which is the area most affected by deforestation, and the Guayana highlands which, along with the Llanos, has the most habitat loss in Venezuela due to flooding from dam construction. Other human activities could have a positive effect on the species depending on how long it takes for an area to recover to an inhabitable state. The grison is better adapted to open areas than most other mustelids of this region. Human activity resulting in cleared areas increases grison habitat as well as its food source (Bisbal 1987). Like other neotropical mustelids, the grison is in need of limiting factors research concerning the impacts of human activities such as dam construction on populations of the species.
Research: Survey
PHVA: No
Other:
Captive population: A total of three males, seven females, and no juveniles are being held in captivity in three institutions worldwide (ISIS 1991). One male, three females and no juveniles of the subspecies *G. v. canaster*, are being held at the Carnivore Preservation Trust in Pittsboro, North Carolina, USA (ISIS 1991). The Amsterdam Museum holds specimens which were obtained from the Amsterdam zoo in 1932 and 1934 (Husson 1978). 28 animals (no births in the last year) are held in Brazil (Anon 1991), G. v. canaster has bred regularly at Zoologico Regional Miguel Alvarez del Toro in Chiapas Mexico (second generation births as of 1992) (Cuaro pers. obs.). Apparently the species bred in the Houston Zoo in the 1960's, but the young did not survive (M. Jones pers. comm. to A. Cuaro).
Captive programme recommendation: Pending

CAMP TAXON REPORT

SPECIES: *Galictis cuja* Lesser grison "quirique", (Chile); (Greer 1965).

STATUS:
Mace-Lande: Unknown
CITES:
IUCN:

Taxonomic status: Species
Distribution: (Figure 2-4) The distribution of the lesser grison is from east and central Brazil, Bolivia, and Peru extending southward (Cabrera 1958); however, Honaki *et al.* (1982) and Ebensperger *et al.* (1991) both state that it ranges from southern Peru throughout Uruguay, Paraguay, central Chile, and through Argentina southward to the Chubut province. Krumbiegel (1942) adds the Guyanas to the area distribution, and Greer (1965) states that *G. cuja* is found in the mountainous areas throughout Malleco, Chile, in Cordillera de los Andes, and the Cordillera de Nahuelbuta, but there have been no reports of specimens seen in the Central Valley of Chile. This species lives at more temperate latitudes and at higher elevations than other grisons (Emmons 1990).
Wild population: *G. cuja* is uncommon throughout Brazil with only two specimens obtained by the Musea de Historia Natural in Brazil in the last 5 years (Barros, Lorine, and Persson 1990).
Field studies:
Threats: Possibly loss of habitat. Native Uses: The lesser grison has been used in Central America to hunt guinea pigs (Kruska 1990). It has also been used in Chile to drive chinchillas out of rock piles (Osgood 1943, Pearson 1957, Barlow 1965, Lucero 1983, and A. Taber (pers. comm. to Redford and Eisenberg) as cited in Redford and Eisenberg 1992). Commercial Uses: The lesser grison plays an important role in the control of rodent pests which damage cultivated areas and human habitats (Mares, Ojeda and Barquey 1989). Residents of Malleco Province, Chile claim that this species does no appreciable damage to poultry (Greer 1965).
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** The lesser grison, though not aquatic, can be found near open water, and prefers a habitat with little vegetation. The animal burrows in hollow trees, crevaces, boulder piles, and abandoned burrows. It is an agile climber and can be found at altitudes up to 3,500 meters in the xeric chaco of Paraguay (Mares, Ojeda, and Barquey 1989, and Osgood 1943, Pearson 1957, Barlow 1965, Lucero 1983, and A. Taber (pers. comm. to Redford and Eisenberg), as cited in Redford and Eisenberg 1992). In Salta Province, Argentina, *G. cuja* inhabits mountains, savannas and arid zones above 4000 meters (Mares, Ojeda and Barquey 1989). In central Chile, this species inhabits evergreen shrublands and is presumed to be a generalist predator. In Chile, it inhabits bushy areas below the timberline in the mountains (Greer 1965). Its primary food source is small mammals including rodents, and birds. Its secondary food source consists of reptiles including snakes and lizards (Bisbal 1986, Ebensperger, Mella, and Simonetti 1991). No quantitative study has been done of its food habits or trophic relationships with other syntopic predators (Ebensperger, Mella, and Simonetti 1991).
B. Average group size and dispersion pattern: According to Mares, Ojeda, and Barquey (1989), the lesser grison is highly social, and can be found in family groups or alone. In

Patagonia, this species can be seen in groups of four consisting of a mother and her young (Osgood 1943, Pearson 1957, Barlow 1965, Lucero 1983, and A. Taber (pers. comm. to Redford and Eisenberg) as cited in Redford and Eisenberg 1992).

C. Movements: No information found.

D. Time of Birth: No information found.

Recommendations:

Wild management:

Research: Survey and habitat management

PHVA:

Other:

Captive population: There are three males, one female, and no juveniles held in captivity at the National Zoological Park, Washington, D.C. (ISIS 1991). Several are held in zoos in Uruguay (Moore pers obs), and 31 are held in 4 institutions in Brazil, with 14 births in the last year (Anon 1991).

Captive programme recommendation: Pending

CAMP TAXON REPORT

SPECIES: *Lyncodon patagonicus* Patagonian weasel
STATUS:
Mace-Lande: Unknown
CITES:
IUCN:

Taxonomic status: Species
Distribution: Distributed from the Salta province in Argentina southward along the western portion of the country to the Santa Cruz province and into Chile along the southern Argentine border (Allen 1905, Osgood 1943, Peña 1966, and Olrog 1979, as cited in Redford and Eisenberg 1992). Cabrera (1928) describes the range of *L. patagonicus*: parts of Chubut next to The Andes. He classified a specimen from the Museo de La Plata which was found in the city of La Rioja in Argentina to be the subspecies *L. patagonicus thomasi*. No mention has been made of this subspecies in any subsequent literature. Eisenberg (1981) states that this weasel is "terrestrially adapted and occupies a weasel-like niche in the Patagonian region."
Wild population: This animal is not common, and is poorly represented in all museum collections (Allen 1905, Osgood 1943, Peña 1966, and Olrog 1979, as cited in Redford and Eisenberg 1992). Reasons for the limited reports of observations of *L. patagonicus* include its small size, nocturnal nature, and its inhabitance of sparsely inhabited countries (Cabrera 1928).
Field studies:
Threats: Possibly loss of habitat. Native uses: This species was sometimes kept by ranchers to help reduce populations of rats (Nowak and Paradiso 1983).
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** Relatively little is known about this animal. This weasel has been seen both night and day, and in captivity, has been known to eat rodents and other rodent matter (Schreiber *et al.* 1989) Eisenberg (1981) states that the Patagonian weasel is solitary, and is an insectivore/omnivore. Schrieber *et al.* (1989) report that this species prefers dry shrublands as high as 2000 meters, and Kruska (1990) states that it inhabits the pampas regions of Argentina and southern Chile. *L. patagonicus* has been reported as nocturnal or crepuscular (Koslowsky 1904, Mares 1973, as cited in Redford and Eisenberg 1992).
B. Average group size and dispersion pattern: No information found.
C. Movements: No information found.
D. Time of Birth: No information found.
Recommendations:
Wild management:
Research: Not enough is known about the habitat of this species to recommend conservation actions. Studies should be undertaken to determine the distribution, population status and life history of this rarely-seen species, action can be taken to conserve it.
PHVA:
Other:
Captive population: No record exists in ISIS (1991) or the Brazilian Zoo Association (Anon. 1991) for any specimens of *Lyncodon patagonias* in captivity.
Captive programme recommendation: Pending

CAMP TAXON REPORT

SPECIES: *Spilogale pygmaea* Pygmy spotted skunk, "zorillo manchado", "zorillo pinto", "zorillo rayado", "zorillo", (Mexico); (Leopold 1959).
STATUS:
Mace-Lande: Unknown
CITES:
IUCN:

Taxonomic status: Species
Subspecies:
S. pygmaea pygmaea: Found from Rosario and Sinoloa, Mexico (Genoways and Jones 1971 as cited in Hall 1981) to Jalisco (Lopez-F *et al.* 1973 as cited in Hall 1981) and Colima, Mexico (Greer and Greer 1970).
S. pygmaea austrialis Distributed from Guerrero to Oaxaca, Mexico (Genoways and Jones 1971 as cited in Hall 1981).
Distribution: (Figure 2-9) This species is known to be distributed throughout western Mexico (Teska 1974). The first specimen of this species taken from Colima, Mexico was recorded in 1969 on the north rim of a canyon draining into Rio Salada near Colima (Greer and Greer 1970). This record is 480 km from the nearest localities which had been previously recorded in Sinaloa or Guerrero (Greer and Greer 1970). *S. putorius* and *S. pygmaea* have never before been recorded in the same area in Sinaloa with the closest record being 80 miles apart, but one *S. putorius* was taken in Presa Sanaloma at an altitude of 600 feet. This is well within the altitudinal range of *S. pygmaea* so it is conceivable that the two species may occur sympatrically in south Sinaloa and the adjacent area (Genoways and Jones 1971).
Wild population: 20,000-30,000?? Rare in western Mexico, there are few specimens on record (Teska 1974).
Field studies:
Threats: ?
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** S. pygmaea is one of the world's smallest carnivores (Teska 1974). This species is found in the arid tropical thorn forests of western Mexico (Teska 1974). Genoways and Jones (1971) had a report of *S. p. australis* from Guerrero which was the first report from a habitat other than the arid coastal plain of western Mexico. This specimen was taken from an abandoned cornfield which had grown to brush and was surrounded by dense cloud forest (Genoways and Jones 1971). The specimen from Colima, Mexico was taken in a rocky area on the rim of a canyon. The area consisted of a dense thicket of thorny shrubs and trees seperated by open areas with tall grasses (Greer and Greer 1970). This nocturnal species is found throughout Mexico except in extreme desert or the pine-forested mountains (Leopold 1959). It has been observed at an elevation of 2,500 meters in California (Orr 1943). *S. pygmaea* occurs in semi-arid brushlands, and also wet tropical forests which is a unique characterist of skunks (Leopold 1959). Gaumer (1917) stated that *Spilogale* is found throughout the Yucatán in forests, brushlands, farmlands, and villages mainly in clearings and not forests.
B. Average group size and dispersion pattern: Spilogale spp. are solitary (Leopold 1959). As many as eight individuals may share the same den (Nowak and Paradiso 1983).

C. Movements: According to Banfield (1974 as cited in Nowak and Paradiso 1983), male specimens of *Spilogale sp.* may have home ranges of 64 hectares in the winter and five to ten square kilometers in the spring, while the females' are smaller.
D. Time of Birth: The breeding cycle is controlled by photoperiods. In captivity, *S. pygmaea* has been observed to have a gestation period of approximately 50 days and a litter of six young born in June (Teska 1974). Teska, Rybak and Baker (1981) gave a speculative gestation period of between 43 and 51 days. They stated that this species has "minimized its period of gestation because, as the smallest of skunks, it may need to produce more than one litter per year for species survival." Leopold (1959) observed litters of four born in the spring in Mexico.
Recommendations:
Wild management: Though members of this genus have been known to carry rabies and occasionally infiltrate poultry farms, they are generally beneficial to humans by destroying rodent pests (Nowak and Paradiso 1983).
Research: Survey, limiting factors research
PHVA: No
Other:
Captive population: 0
Captive programme recommendation: Initiate a captive breeding program in the future, within 3 or more years.

CAMP TAXON REPORT

SPECIES: *Spilogale putorius* *Eastern spotted skunk*
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Species;
Subspecies:
S. putorius angustifrons: Found in Jalisco area (Genoways and Jones 1971 as cited in Hall 1981), and also found in Distrito Federal, and Michoacan (Van Gelder 1959 as cited in Hall 1981).
S. putorius celeris: Found in Nicaragua (Van Gelder 1959 as cited in Hall 1981), and Costa Rica (Hall 1981).
S. putorius elata: found in Chiapas, Mexico and Honduras (Van Gelder 1959 as cited in Hall 1981). Also found in El Salvador and Guatemala (Hall 1981).
S. putorius interrupta: Found throughout central United States, and along the east coast of northern Mexico in the state of Tamaulipas (Alvarez 1963 as cited in Hall 1981).
S. putorius leucoparia: Found in Arizona, New Mexico, and Texas (Van Gelder 1959 as cited in Hall 1981), and in the Mexican states of Nuevo Leon (Hall and Kelson 1959 as cited in Hall 1981), San Luis Potosí, Hildago, Guanajuato (Hall and Kelson 1959 as cited in Hall 1981), Sonora (Van Gelder 1959 as cited in Hall 1981) and Sinaloa (Genoways and Jones 1971). Dalquest (1953) made a referrence to *Spilogale leucoparia*, saying that it has a distribution from southern Texas and New Mexico southward through the Mexico Plateau to Hildago.
S. putorius lucasana: Found in Santo Domingo, Baja California (Van Gelder 1959 as cited in Hall 1981).
S. putorius martirensis: Found near Alamos, Baja California (Van Gelder 1959 as cited in Hall 1981).
S. putoris tropicalis: Six specimens were obtained from Puebla, Mexico between December, 1953 and January, 1954 (Van Gelder 1960). Also found in the Mexican states of Oaxaca (Goodwin 1969 as cited in Hall 1981) Guerrero, and in El Salvador (Hall 1981).
S. putorius yucatanensis: Found in Yucatán along the coast from Merida to Belize (Hall 1981). Mead (1968 as cited in Wozencraft 1989) suggested separating this species into an eastern subspecies and a western subspecies, western specimens being characterized by delayed implantation, but in this report I follow Hall (1981) who considers both to be the same species.
Distribution: (Figure 2-9) *S. putorius* is distributed from Costa Rica to northeastern Mexico (Rosatte 1989). This species varies in size from the north to the south of western Mexico. Specimens from Jalisco and Sinaloa are from an area of intergradation between two subspecies (*S.p. angustifrons* and *S.p. leucoparia*); (Genoways and Jones 1971). *S. putorius* and *S. pygmaea* have never before been recorded in the same area in Sinaloa with the closest record being 80 miles apart, but one *S. putorius* was taken in Presa Sanaloma at an altitude of 600 feet. This is well within the altitudinal range of *S. pygmaea* so it is conceivable that the two species may occur sympatrically in southern Sinaloa and the adjacent area (Genoways and Jones 1971).
Wild population: >100,000. Population densities can reach five individuals per square kilometer

on good cultivated land (Banfield 1975 as cited in Nowak and Paradiso 1983). This species is one of the most common mustelids in western Mexico (Genoways and Jones 1971). Also noted as one of the more common carnivores seen in the vicinity of Izucar de Matamoros (Van Gelder 1960). Mead (1968a) states that this species is endangered in the prairie states of the United States.

Field studies:

Threats: None. Commercial uses: Though members of this genus have been known to carry rabies and occasionally infiltrate poultry farms, they are generally beneficial to humans by destroying rodent pests (Nowak and Paradiso 1983). *Spilogale spp.* has the finest fur of all the skunks, and in the 1976/77 trapping season, the reported harvest in the United States was 41,952 skins selling at $4.00 each (Deems and Pursley 1978). In Mexico, the pelt of *Spilogale spp.* is worth less than that of *Mephitis spp.* (Leopold 1959).

Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** *S. putorius* is found in thorny vegetated areas, oak forests, or pine forests (Genoways and Jones 1971) in rocky bushlands, farms, or small forests, but not in thick woods or wet territories (Kruska 1990). Specimens have been found where tropical deciduous forest prevailed, and also in an area of open grasslands with widely scattered trees (Genoways and Jones 1968). It is common in rocky outcroppings or rock fences (Genoways and Jones 1971). Originally thought to prefer lowlands, *Spilogale putorius* is also at home in the mountainous country of western and southern North America (Baker and Baker 1975). Specimens have been found on elevated mesas at 2415 meters as well as in pine oak forests of 200 hectares surrounded by steep-sided barrancas (Baker and Baker 1975). This species commonly dens in broken rubble just below the rim of forested mesas. Insects comprise the bulk of its food, but it also eats lizards and seeds (Baker and Baker 1975). *S. putorius* is adept at climbing in order to escape predators or search for food (Kruska 1990).

B. Average group size and dispersion pattern: As many as eight individuals may share the same den (Nowak and Paradiso 1983).

C. Movements: According to Banfield (1974 as cited in Nowak and Paradiso 1983), male specimens of *Spilogale sp.* may have home ranges of 64 hectares in the winter and five to ten square kilometers in the spring, while females' ranges are smaller.

D. Time of Birth: The pattern of reproduction is not the same throughout the range of the genus (Mead 1968a). Mead (1968a) states that in the eastern forms of the genus (such as *S. putorius*), breeding takes place in April, with litters born in June after a gestation period of 55-65 days. According to Mead (1969a), no delayed implantation is known in this species, but Constantine (1961), and Foresman and Mead (1973 as cited in Rosatte 1989) agree that there is a slight delay of implantation of approximately two weeks, and a gestation period of 45-60 days. Mating occurs earlier in southern latitudes based on observations in Texas (July), and the Grand Canyon (July) (Mead 1968a). Kruska (1990) reports mating in this species occuring in March or April and a gestation period of 50-65 days with litters of two to nine young born in May or June. Members of this species become sexually mature at one year of age (Kruska 1990). In 1960, Constantine held a captive *S.p. leucoparia* for 120 days in isolation, and observed the birth of at least two young, concluding a gestation period of at least 120 days which is double the gestation period of *Mephitis*. Johnson (pers. comm. to Mead 1968) captured a female specimen with implanted embryos on April 22, 1961. This specimen gave birth to a litter of three young on May 5, 1961. She was kept with her young until October, then isolated. After giving birth to

another litter the following April, it was determined by Johnson that *S. p. leucoparia* has an autumn estrous period with a gestation period of at least 191 days and also that males reach sexual maturity within five months. Gaumer (1917 as cited in Van Gelder 1959) observed births of *S. p. yucatenensis* in February with litter sizes of four to six young.

Recommendations:

Wild management:

Research: Monitoring and toxonomy.

PHVA: No

Other:

Captive population: There are two males, one female and no juvenile specimens of this species without subspecific designation held in captivity in two institutions (ISIS, 1991). Two males and two females are held under the name *Spilogale putorius ambarvalis*. These are located in the Minnesota Zoological Garden, Apple Valley, Minnesota (ISIS 1991).

Captive programme recommendation: None

CAMP TAXON REPORT

SPECIES: *Mephitis mephitis* Striped skunk, "zorillo listado", "zorillo", or "mobeta rayada" (Mexico); (Leopold 1959).

STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Species
Subspecies:
M. mephitis estor: Found from Utah and Colorado (Armstrong 1972 as cited in Hall 1981) through New Mexico (Anderson 1972 as cited in Hall 1981) and into the Mexican states of Durango, Chihuahua, Sonora, and Baja, California (Hall 1981).
M. mephitis holzneri: Type locality from Baja, California (Hall 1981).
M. mephitis varians: Found from Colorado (Armstrong, 1972 as cited in Hall 1981), Kansas, Oklahoma, and Texas (Davis 1966 as cited in Hall 1981) into the Mexican states of Tamaulipas (Baker and Webb 1967 as cited in Hall 1981), Coahuila (Baker 1956), and Chihuahua (Anderson 1972 as cited in Hall 1981). It is most common on the Gulf Coastal Plain (Baker 1956), and was observed by Marsh (1937) in the Sierra del Carmen and the Sierra Hermosa de Santa Rosa.
Distribution: (Figure 2-10) This species is more common across the United States, but its range does extend into northern Mexico (Hall 1981). It is found in the temperate northern localities of Mexico such as Northern Baja California, the Sierra Madre Occidental from Sonora and Chihuahua south to Durango, the Sierra del Carmen in northern Coahuila and the lower Rio Grande in Tamaulipas (Leopold 1959). The ranges of *M. macroura* and *M. mephitis* overlap in northern Coahuila (Baker 1956).
Wild population: >1,000,000; No information has been found for Mexico, but this species is widespread in the United States. Densities have been reported as 0.4 to 27 individuals per square mile (Nowak and Paradiso 1983).
Field studies:
Threats: None. Commercial uses: Though known to attack domestic fowl, and to be a principle carrier of rabies in North America (Wade-Smith and Richmond 1975), this species is also beneficial to humans by controlling rodent and insect populations (Nowak and Paradiso 1983). In the United States, skunks are one of the most important fur-bearers, and their pelts are taken in the millions annually, but in Mexico, they have sparser fur, and consequently are of lesser value (Leopold 1959). The harvest of *Mephitis spp.* in Canada and the United States during the 1976/77 season was 175,884 skins at a value of $2.25 each (Deems and Pursely 1978).
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** *M. mephitis* is nocturnal and omnivorous, eating primarily insects, invertebrates, fruit, and eggs (Leopold 1959). It is common on cultivated lands which have sparse cover such as bushes, fences, or buildings (Leopold 1959). *M.m. varians* has been taken at watersheds, and is abundant in streamside vegetation at lower elevations and in dense shrubs on foothills adjacant to rocky ledges (Baker 1956).
B. Average group size and dispersion pattern: This species is mostly solitary (Leopold 1959).
C. Movements: Home ranges change to accomodate life history requirements such as parturition,

winter denning, etc. (Anderson 1981 as cited in Rosatte 1989).
D. Time of Birth: This species is monoestrous, mating in mid-February to mid-April with southern species breeding earlier (Wade-Smith *et al.* 1980). Males are polygamous (Ernst 1965). Females have an estrous period of nine to ten days, and a gestation period of 59-77 days, which suggests a delay of implantation of the eggs (Wright 1931, Wade-Smith and Richmond 1978a&b, Wade-Smith *et al.* 1980 as cited in Rosatte 1987). Litter sizes are between five and nine (Hall and Kelson 1959, Patton 1974, Wade-Smith *et al.* 1980, Rue 1981 as cited in Rosatte 1987). Leopold (1959) reports mating in late winter with an average of five young born eight weeks later.
Recommendations:
Wild management:
Research: Monitoring and taxonomy
PHVA: No
Other:
Captive population: >100; There are 26 males, 17 females, and no juveniles of *M. mephitis* in 26 institutions worldwide. These have no subspecific allocation (ISIS 1991). One female *M. mephitis varians* is being held at the Fort Worth Zoological Park in Texas (ISIS 1991).
Captive programme recommendation: None

CAMP TAXON REPORT

SPECIES: *Mephitis macroura* Hooded skunk, "zorillo listado", "zorillo", or "mobeta rayada" (Mexico); (Leopold 1959).
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Species
Subspecies:
M. macroura eximius: Found in Veracruz, Mexico (Hall 1981). It is certain that this subspecies which is from the arid coastal plain of eastern Mexico has no connection with the upland population of *M.m. macroura* (Hall and Dalquest 1950).
M. macroura macroura: Distributed from Guatemala to San Luis Potosí and Tamaulipas, Mexico (Dalquist 1953 and Alvarez 1963 as cited in Hall 1981). Davis (1944) adds that this subspecies is fairly common on the Mexican tableland. One specimen was reported in the vicinity of Puebla, Mexico, and others were reported later (Van Gelder 1960). Davis and Leukins (1958) claim that this subspecies is uncommon but widespread at elevations below 6000 feet. A specimen they have reported near Chilpan, and one from the Balsas Basin have extended the known range onto the Pacific slope of the Sierra Madre del Sur in Guerero (Davis and Leukins 1958).
M. macroura milleri: This skunk has a distribution from the southwest part of New Mexico and Arizona into Mexico, including the Mexican states of Coahuila, Durango (Baker and Greer 1962 as cited in Hall 1981), and Sinaloa (at an elevation of 5000 feet) (Armstrong *et al.* 1972). Hubbard (1972) claims that it has extended its range northward and up Lilly Mt, New Mexico. The previous westernmost range of *M.m. milleri* was Camoa, Hermosillo and Siora Cuababi, Mexico (Hall and Kelson 1959). An adult female was obtained in 1964, 10 miles northwest of Guaymas, Sonora in the San Carlos Bay area of Mexico. This record extends the known geographic range 70 miles southwest of Hermosillo, and a record of a specimen in Ward County, Texas extends its range 75 miles northeast (Packard 1964).
M. macroura richardsoni: Found in San Rafael del Norte, Nicaragua (Hall 1981).
Distribution: (Figure 2-9) This species is distributed from Arizona and southwest Texas through Mexico, Nicaragua, and Guatemala (Dalquist 1953, Godin 1982 as cited in Rosatte 1989). It is not known if *M. macroura* has a continuous distribution from the southern end of the Mexican tableland south to Duenas in Guatemala, since it is unlikely that the lowland population at San Mateo deo Mar on the Pacific slope of Oaxaca is in contact with the *M.m. macroura* population of the Mexican Plateau (Hall and Dalquest 1950). The ranges of *M. macroura* and *M. mephitis* overlap in northern Coahuila (Baker 1956).
Wild population: >100,000; Not a common species, but widespread throughout Mexico (Davis and Leukins 1958). Densities have been reported as .4 to 27 individuals per square mile, but locations were not specified (Nowak and Paradiso 1983).
Field studies:
Threats: Native uses: The flesh of *M. macroura macroura* is considered a delicacy by some Mexicans (Davis 1944). Commercial uses: Though known to attack domestic fowl, and to be a principle carrier of rabies in North America (Wade-Smith and Richmond 1975), this species is

also beneficial to humans by controlling rodent and insect populations (Nowak and Paradiso 1983). In the United States, skunks are one of the most important fur-bearers, and their pelts are taken in the millions annually, but in Mexico, they have sparser fur, and consequently are of lesser value (Leopold 1959). The harvest of *Mephitis spp.* in the united States and Canada during the 1976/77 season was 175,884 skins at a value of $2.25 each (Deems and Pursely 1978).
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** The subspecies *M. m. macroura* is widely distributed in the deserts of San Luis Potosí, and the arid habitats of the Mexican Plateau (Hall and Dalquest 1950), but is not abundant (Dalquist 1953). *M. m. nigra* inhabits heavily forested areas, and commonly follows deer paths, abandoned roads, or footpaths as it forages. It eats berries and other fruit and carrion beetles which are attracted to scats along these paths (Chapman 1946). Hubbard (1972 as cited in Rosatte 1989) gives an altitudinal range of sea level to 2,440 meters for *M. macroura.* This species is more abundant in riparian vegetational areas and along permanent water courses and is not associated with humans as many other species of skunks commonly are. Leopold (1959) claims that this species is known throughout Mexico except in the northwestern deserts and the dense rainforests. They have been observed inhabiting rocky canyon areas, forested or shrubby uplands, desert plains, and grassland areas (Baker 1956, Findley, *et al.* 1975, Godin 1982 as cited in Rosatte 1989, Kruska 1990). Hall and Dalquest (1950) give an altitudinal range of 2000-4500 feet for *M.m. macroura* and say that the Jico barrier of the Tropical Life Zone excludes the hooded skunk from the arid territory below the humid belt.
B. Average group size and dispersion pattern: Probably solitary, this species is expanding its range in Texas and Mexico (Packard 1965).
C. Movements: No information found.
D. Time of Birth: M. macroura breeds in late February and early March, has a gestation period of 60 days, and three to six young are born in May or June (Patton 1974, Nowak and Paradiso 1983, Kruska 1990). Delayed implantation may be involved (Nowak and Paradiso 1983). Members of this species become sexually active in their first year of life, and there is a high mortality rate due to predators and disease which affect the species (Kruska 1990). Little is known about the reproductive behavior of this species (Patton 1974).
Recommendations:
Wild management:
Research: Monitoring and taxonomy
PHVA: No
Other:
Captive population: There are one male, one female, and no juveniles of *M. macroura* being held in captivity in Guadalajara Zoo (ISIS 1991).
Captive programme recommendation: None

CAMP TAXON REPORT

SPECIES: *Conepatus mesoleucus* *Hog-nosed Skunk, "zorillo", "zorrocolito", "zorillo espalda blanca", (Mexico); (Leopold 1959).*
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Raun and Wilks (1961) and Hall (1981 as cited in Wozencraft 1989) believe *C. mesoleucus* and *C. leuconotus* to be conspecific. Expert interpretations are apparently needed, but none were available at the time of their report. No new information has been found.
Subspecies:
C. mesoleucus mearnsi: Found from New Mexico (Findley et al. 1975 as cited in Hall 1981) to Texas (Davis 1966 as cited in Hall 1981) and into the Mexican states of Tamaulipas (Alvarez 1963 as cited in Hall 1981), San Luis Potosí, and Jalisco (Hall 1981). There is suitable habitat for this species throughout Coahuila; it does occur in most parts, but prefers mesic areas (Greer 1965).
C. mesoleucus mesoleucus: Found in the area of Puebla, Mexico (Davis and Leukins 1958, and Hall 1981). This subspecies is less common on the Mexican tableland than *Mephitis* (Davis 1944).
C. mesoleucus nelsoni: Found in the area of Colima, Mexico, but not common. There are records from the Pacific slopes of Sierra Madre del Sur, but this subspecies is absent from the Balsas Basin (Davis and Leukins 1958).
C. mesoleucus nicaraguae: Found in Honduras, Nucaragua, and El Salvador (Burt and Stirton 1961 as cited in Hall 1981).
C. mesoleucus sonoriensis: Found in Sonora with type locality from Sinaloa, Mexico (Armstrong *et al.* 1972 as cited in Hall 1981). Also found in Jalisco (Hall 1981).
C. mesoleucus venaticus: Found from Arizona (Huey 1961, as cited in Hall 1981), New Mexico (Findley *et al.*, 1975 as cited in Hall 1981) and into the Mexican state of Sonora (Hall 1981).
Distribution: Two specimens have been reported in the area of Puebla, Mexico, and several have also been seen southeast of the city (Van Gelder 1960). In 1960, a specimen was reported 0.5 miles south of the Temple Bar junction. The previous northern record was 16 miles southeast of Kingman, Arizona by Musgrove and Hoffmeister (1957). The new specimen extends the range 73 miles north, and it appears that the Colorado River is the northern barrier (Huey 1961).
Wild population: >50,000; *Conepatus spp.* is abundant in the pine-oak forests of Mexico, but uncommon in the tropical forests, and rare in southeastern Mexico (Leopold 1959).
Field studies:
Threats: None; Commercial uses: Specimens of *C. mesoleucus* were found for sale in San Cristobal de las Casas and Comitan, Mexico (Aranda 1991). In Mexico, *Conepatus spp.* is of little commercial value (Leopold 1959).
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** Conepatus mesoleucus nelsoni has been observed on narrow coastal plains at elevations below 3000 feet (Davis and Leukins 1958). In Texas, *C. mesoleucus* prefers canyons, streambeds and hollow terrain (Patton 1974). *C. m. mearnsi* occurs in mesic areas where shrubby vegetation grows

either along arroyos and streams at low elevations, or in oak forests on uplands at elevations of 800-7000 feet in Chile (Greer 1965). Members of this genus are found in open and wooded areas at all elevations up to 4100 meters (Nowak and Paradiso 1983). Individuals are generally nocturnal and den in rocky areas, logs, or abandoned burrows (Nowak and Paradiso 1983). Their diet is primarily insects, invertebrates, and secondarily fruit and small vertebrates (Nowak and Paradiso 1983).

B. Average group size and dispersion pattern: Members of this species are not as social as other genuses of skunks, commonly denning and travelling alone (Davis 1966b as cited as Nowak and Paradiso 1983).

C. Movements: No information found.

D. Time of Birth: Cahalane (1947 as cited in Leopold 1959) observed *Conepatus spp.* litters of one to four young born in the early spring in Mexico. Walker (1964 as cited in Rosatte 1987) reports an average of two to five young per litter in the South American species of *Conepatus spp.* The breeding season in Texas for *C. mesoleucus* begins in February or March with parturition occuring in April of May. Gestation lasts about two months (Nowak and Paradiso 1983).

Recommendations:

Wild management:

Research: Monitoring, trade

PHVA:

Other:

Captive population: None

Captive programme recommendation: None

CAMP TAXON REPORT

SPECIES: *Conepatus leuconotus* Hog-nosed skunk, "zorillo", "zorrocolito", "zorillo espalda blanca", (Mexico); (Leopold 1959).
STATUS:
Mace-Lande: Secure?
CITES:
IUCN:

Taxonomic status: Species;
Subspecies:
C. leuconotus leuconotus: Found in the Mexican states of Veracruz and Puebla (Cockrum 1961 as cited in Hall 1981).
C. leuconotus texansis: Ranges from southern Texas to San Luis Potosí (Dalquist 1953, and Hall 1981).
Distribution: This species is distributed from Veracruz, Mexico to Texas (Dalquist 1953). *C. leuconotus* is found throughout Mexico except in Baja California and the north deserts (Leopold 1959). Kruska (1990) extends this range to Nicaragua.
Wild population: *Conepatus spp.* is abundant in the pine-oak forests of Mexico, but uncommon in the tropical forests, and rare in southeastern Mexico (Leopold 1959).
Field studies:
Threats: Native uses: Many natives use the skins of *Conepatus spp.* for capes or blankets, and some believe the meat has healing properties (Nowak and Paradiso 1983). Commercial uses: ?
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** This subspecies (*C. l. texansis*) is found mainly in the tropical parts of San Luis Potosí and ranges in the mountains near Hacienda Capulin (Dalquist 1953). Members of this genus are found in open and wooded areas at all elevations up to 4100 meters (Nowak and Paradiso 1983). Individuals are generally nocturnal and den in rocky areas, logs, or abandoned burrows (Nowak and Paradiso 1983). Their diet is primarily insects, invertebrates, and secondarily fruit and small vertebrates (Nowak and Paradiso 1983).
B. Average group size and dispersion pattern: No specific information found, but it is likely that this species is similar to other species of *Conepatus spp.*
C. Movements: No information found.
D. Time of Birth: Cahalane (1947 as cited in Leopold 1959) observed *Conepatus spp.* litters of one to four young born in the early spring in Mexico. Walker (1964 as cited in Rosatte 1987) reports an average of two to five young per litter in the South American species of *Conepatus spp.*
Recommendations:
Wild management:
Research:
PHVA:
Other:
Captive population: 0
Captive programme recommendation: None

CAMP TAXON REPORT

SPECIES: *Conepatus semistriatus* Striped hog-nosed skunk, "polecat", (Belize); "jaritataca" or "zorilho", (Brazil); "mofeta" or "mapuro" or "mapurito", (Columbia and Ecuador); "zorillo" or "zorillo pijón", (Mexico and Columbia); "gambá" or "zorrino" or "anas", (Peru); "gato cañero", (Panama); "yaguaré", (Guam); (Emmons, 1990). "zorrocolito", "zorillo espalda blanca", (Mexico); (Leopold 1959).
STATUS:
Mace-Lande: Secure
CITES:
IUCN:

Taxonomic status: Species. Hershkovitz (1959) states that "all skunks of genus *Conepatus* appear to be conspecific." Based on distributional records and evidence by Hall (1981), and Redford and Eisenberg (1992), the following taxa are treated separately below: *C. semistriatus, C. humboldtii, C. rex, C. chinga, C. leucoparia,* and *C. mesoleucus.*
Subspecies:
C. semistriatus conepatal: Found in Veracruz, Mexico (type locality) and probably eastward to coast and along the coast to Campeche (Hall 1981).
C. semistriatus trichurus: Found in Costa Rica and Panama (Handley 1966 as cited in Hall 1981).
C. semistriatus yucatanicus: Found from Yucatán to Guatemala (Hall 1981).
Distribution: (Figure 2-6 and 2-10)
C. semistriatus is distributed from Yucatán, Veracruz and Tabasco, Mexico (Kruska 1990) through northern Columbia and into northern Venezuela (Eisenberg 1989, Emmons 1990). Emmons (1990) states that this species is also found in coastal Peru and Ecuador, but not in eastern Panama. Handley (1966) also states that this species is rare in Panama, and that it probably occurs throughout the country, but only in western Panama. Mendez (1970) agrees that this species is limited to the western portion of the Central American Isthmus, but also states that its distribution includes the Provincia de Bocas del Toro adjacent to Costa Rica in the greater parts of the provinces of Chiriqui, Veraguas, Cocle and possibly some areas of the provinces of Herrera and Los Santos. He also includes northern Brazil in the general distribution. Bisbal (1983) discovered two female specimens of *C. semistriatus* on Margarita Island, Venezuela.
Wild population: *C. semistriatus* is widespread, adaptable, and rarely hunted (Emmons1990). The subspecies most common in Central America is *C. s. trichurus* (Mendez 1970). On Margarita Island, *C. semistriatus* is common and widespread over the entire area (Bisbal 1983). *Conepatus spp.* are abundant in the pine-oak forests of Mexico, but uncommon in the tropical forests, and rare in southeastern Mexico (Leopold 1959).
Field studies:
Threats: ?; Native uses: *Conepatus semistriatus* is valuable as a predator of insect pests, and therefore warrants protection. Some natives favor its meat and some tame it (Mendez 1970). Commercial uses: The pelt of *C. semistriatus* is inferior to that of *Mephitis spp*, but it is being marketed in increasing amounts from Texas (Davis 1966 as cited in Deems and Pursley 1978). Records from CITES during the 1970's indicate that 155,000 skins of *C. semistriatus* were

exported from the United States annually at a value of $8.00 per pelt, but trade may have declined since then (Broad, Luxmoore and Jenkins 1988). This species was also an important furbearer in Argentina in the period 1976-1979, with a total of 784,974 skins exported at a value of $5.54 per pelt. The number of skunk skins was 3.6% of the total fur trade during this time (Robinson and Redford 1991). Mendez (1970) states that this species does have a valuable pelt, but not enough to interest hunters in Panama. In Mexico, *Conepatus spp.* is of little commercial value (Leopold 1959).

Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** Members of this species are not true forest animals as they tend to avoid dense forests (Grimwood 1969), but they are occasionally found in Central American rainforest, and inhabit pre-montane dry forest on Margarita Island (Bisbal 1983). They are not found in the Amazonian rainforest, but around its fringes (Emmons 1990). Strictly terrestrial, their usual habitat is clearings gardens, pastures, roadsides, and other cultivated areas (Mendez 1970, Emmons 1990). Found at high elevations in the Andes, and in catinga and cerrado in Eastern central Brazil (Emmons 1990); this skunk has been observed at 4100 meters in elevation (Grimwood 1969, Emmons 1990). Primarily nocturnal, *Conepatus semistriatus* feeds on insects and other invertebates, small vertebrates, and fruit (Leopold 1959, Mendez 1970, Bisbal 1983, Eisenberg 1989, Sunquist *et al.* 1989, Emmons 1990). This species was also observed preying upon snakes by Grimwood (1969).

B. Average group size and dispersion pattern: Most observations of *C. semistriatus* have been of solitary specimens (Emmons 1990, Mendez 1970, Sunquist *et al.* 1989).

C. Movements: One adult female was captured and tracked by Sunquist et al. (1989) in the Llanos of Venezuela, and was found to have a minimal home range of 53 hectares in the dry season and 18 hectares during the wet season.

D. Time of birth: Leopold (1959) and Dalquest (1963) have reported births in Mexico in the spring with a gestation period of some South American specimens of 42 days and litter sizes of two to four young. Other sources describe a gestation period of about 60 days with four to five young in a litter (Eisenberg 1989), and Mendez (1970) observed a gestation period of 42 days in Panama with five young. Walker (1964) reports an average of two to five young per litter in the South American species of *Conepatus*. Cahalane (1947 as cited in Leopold 1959) observed *Conepatus spp.* litters of one to four young born in the early spring in Mexico.

Recommendations:

Wild management: The skunk is widespread and common over all areas north of the Orinoco River, and is adapted to open savanna, shrub woodlands, and deciduous forest. Human activity (except dam construction) may have a positive effect on this species since it prefers cultivated areas, and can adapt well to vegetational changes. Land use changes may even cause an increase in the population of *Conepatus spp.* (Bisbal 1987). Studies should be done to determine the effects of human activities on this species.

Research: taxonomy, monitoring, trade

PHVA: No

Other:

Captive population: None reported in ISIS (1991). The Museo de Historia Natural at the Universidad Nacional Mayor de San Marcos, Peru holds two preserved specimens of *C. semistriatus* (Victor Pacheco, pers. comm. 1993). One in Brazilian zoos (Anon. 1991).

Captive programme recommendation: None

CAMP TAXON REPORT

SPECIES: *Conepatus chinga* Hog-nosed skunk
STATUS:
Mace-Lande: Secure?
CITES:
IUCN:

Taxonomic status: Species. This species is considered by some authors to be conspecific with *Conepatus rex* (Redford and Eisenberg 1992).
Distribution: (Figure 2-8) Found from Bolivia south through Uruguay and western Paraguay into Argentina at least as far south as the Neuguen province and central Chile (Mann 1945, and Osgood 1943, Honacki, Kinman and Koeppl 1982, Kruska 1990). In Chile, this species is distributed through the Cordillera de Nahuelbuta and the Cordillera de los Andes (Greer 1965). Wild population: >50,000; No information found, but due to the large number of specimens held by the Museo de Historia Natural in Peru (V. Pacheco pers. comm.), this species is probably fairly common in that area.
Field studies:
Threats: Trade?; Native uses: Natives use the skins of *Conepatus spp.* for capes or blankets, and some believe the meat has healing properties (Nowak and Paradiso 1983). Commercial uses: Unknown.
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** In the Tucuman province of Argentina, this species has been observed at 3000+ meters (Redford and Eisenberg 1992). In Uruguay, *C. chinga* is becoming more abundant as grassland replaces wooded areas (Redford and Eisenberg 1992); (WHERE? -- Moore (pers. obs.) has not observed this increase in grasslands). This species prefers arid habitats in the puna, chaco, and transitional forest, is crepuscular and nocturnal, and is an insectivore/omnivore (Mares, Ojeda and Barquey 1989). Members of this genus are found in open and wooded areas at all elevations up to 4100 meters (Nowak and Paradiso 1983). Individuals are generally nocturnal and den in rocky areas, logs, or abandoned burrows (Nowak and Paradiso 1983). Their diet is primarily insects, invertebrates, and secondarily fruit and small vertebrates (Nowak and Paradiso 1983).
B. Average group size and dispersion pattern: Observed only as solitary (Mares, Ojeda and Barquey 1989).
C. Movements: No information found.
D. Time of Birth: In Uruguay, *C. chinga* is monoestrous with a protracted breeding season (Barlow 1965). Walker (1964 as cited in Rosatte 1987) reports an average of two to five young per litter in the South American species of *Conepatus spp.*
Recommendations:
Wild management:
Research: Monitoring and trade
PHVA: No
Other:
Captive population: 0
Captive programme recommendation: None

CAMP TAXON REPORT

SPECIES: *Conepatus humboldtii* Patagonian hog-nosed skunk
STATUS:
Mace-Lande: Vulnerable?
CITES:
IUCN:

Taxonomic status: Species; **Note:** This species is considered by some authors to be conspecific with *C. castaneus* (Redford and Eisenberg 1992). Little information was found specific to *C. castaneus*; consider the two species to be relatively the same.
Distribution: (Figure 2-7) This species is distributed from Chile and Argentina south to the Strait of Magellan (Cabrera and Yepes 1940, Osgood 1943, Cabrera 1957, Miller and Rottmann 1976, Olrog and Lucero 1980, as cited in Fuller *et al.*, 1987, Kruska 1990) and north to the Chubut and the Rio Negro province (Redford and Eisenberg 1992), and the Cordillera de los Andes in Chile (Greer 1965). A specimen from Rio Longuimay suggests that this species has a continuous distribution across the Andes from Chile into Argentina (Greer 1965).
Wild population: ?; CITES Appendix II; (Fuller *et al.* 1987).
Field studies:
Threats: Trade?; Native uses: Many natives use the skins of *Conepatus spp.* for capes or blankets, and some believe the meat has healing properties (Nowak and Paradiso 1983).
Comments: Ecology and Reproduction: **A. Habitat and Food Preference:** When active, which is mostly at night, *C. humboldtii* forages in grassy habitats, garbage sites, and vegetable gardens. During its periods of rest, this species dens in shrub or forest cover, under buildings or woodpiles, in earthen tunnels and rock piles. It changes its place of cover daily (Fuller *et al.* 1987). This skunk is more commonly found in flat or rolling areas of topography as opposed to steep terrain (Fuller *et al.* 1987). Members of this genus are found in open and wooded areas at all elevations up to 4100 meters (Nowak and Paradiso 1983). Individuals are generally nocturnal and den in rocky areas, logs, or abandoned burrows (Nowak and Paradiso 1983). Their diet is primarily insects, invertebrates, secondarily fruit and small vertebrates (Nowak and Paradiso '83).
B. Average group size and dispersion pattern: Ninety percent of observed specimens of Conepatus humboldtii consisted of lone individuals, two percent were groups of four (a mother and her young), and two percent were in pairs (Fuller *et al.* 1987).
C. Movements: Members of this species tend to have overlapping home ranges. One female was reported with a home range of 16.4 hectares, and six juveniles had home ranges falling between 7.4 hectares and 11.6 hectares (Fuller *et al.* 1987).
D. Time of Birth: Walker (1964 as cited in Rosatte 1987) reports an average of two to five young per litter in the South American species of *Conepatus*.
Recommendations:
Wild management: Due to the potentially threatened status of this species, further information needs to be obtained. Studies should be undertaken to determine the status of *C. humboldtii*, and the effects of human activities on this species.
Research: survey, monitoring, trade
PHVA: No
Captive population: 0
Captive programme recommendation: None

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NOTE: Bisbal (1987) discussed many human factors relating to habitat interference for various species in Venezuela. Human actions which affect wildlife in this area include burning, agricultural practices, dam building, forest clearing, and urban development. All of these activities also affect many other neotropical mustelids including *Mustela africana, Mustela felipei, Lyncodon patagonicus, Eira barbara,* and *Galictis spp.* PHVA's are recommended on a regional basis for Argentina (the "Southern Cone") and Meso-America.

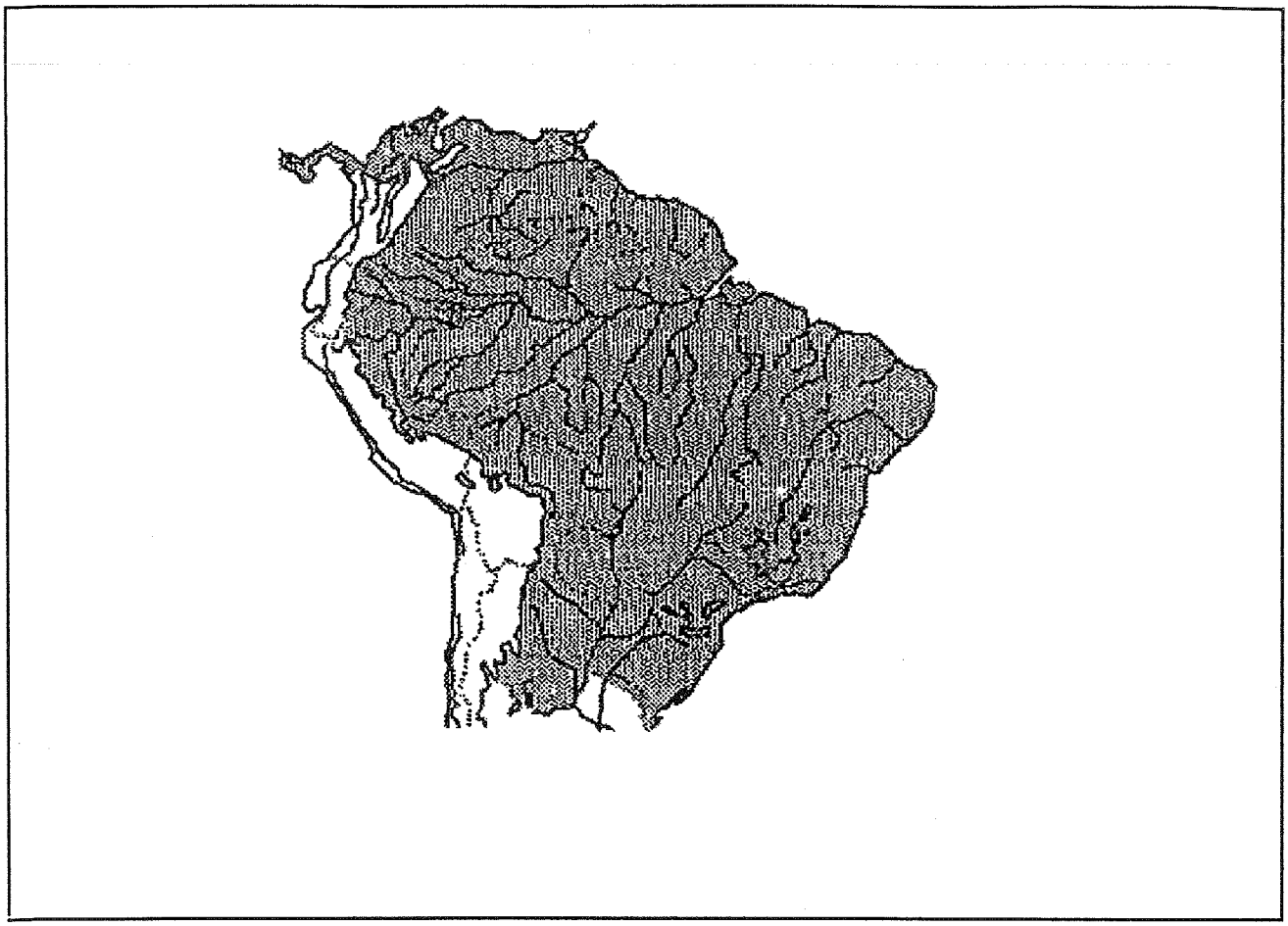

Figure 1-1. Distribution of the crab-eating raccoon, (*Procyon cancrivorus*) in Central and South America (redrawn from Emmons, 1990).

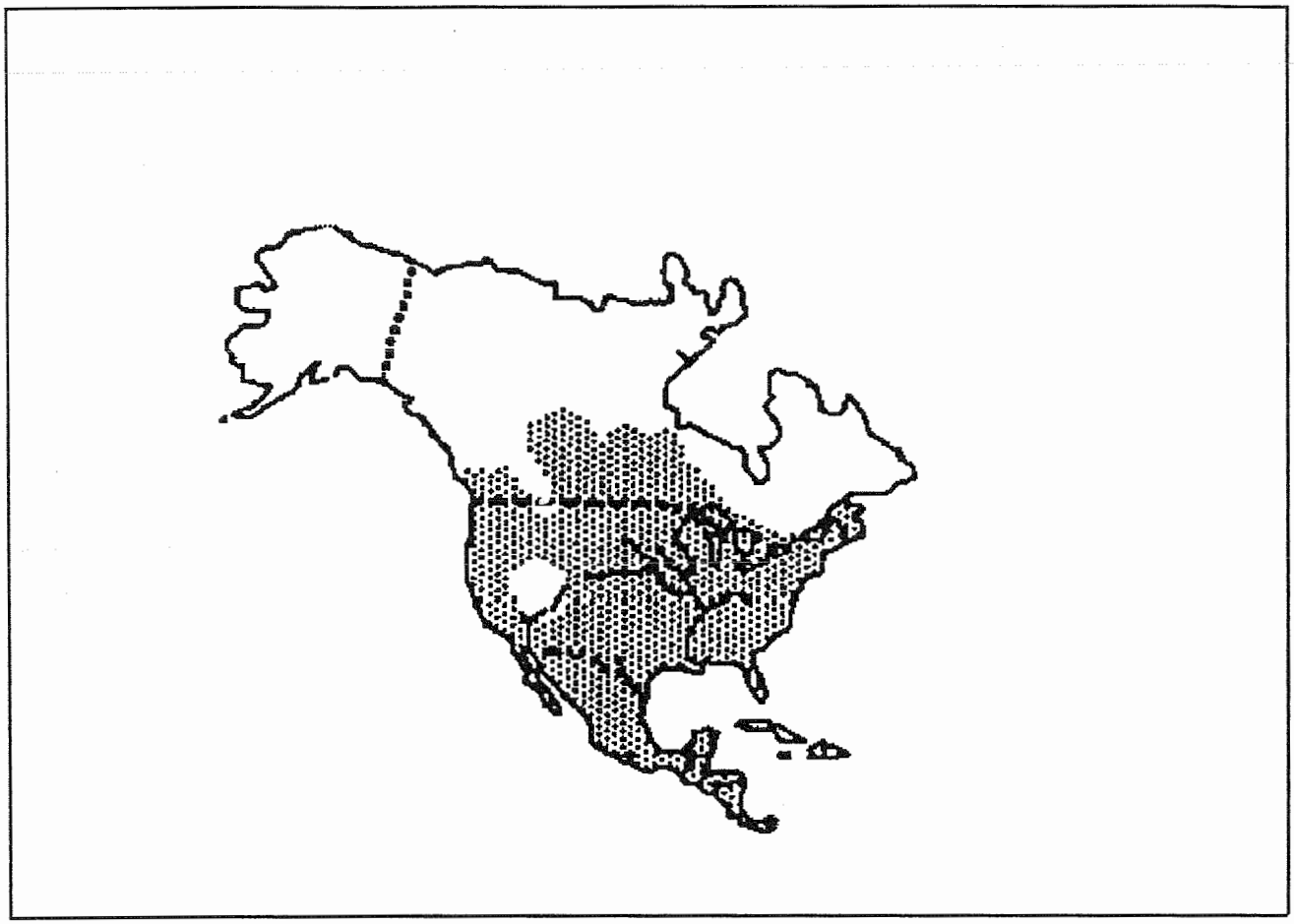

Figure 1-2. Distribution of the northern raccoon, (*Procyon lotor*) in North and Central America (redrawn from Emmons, 1990).

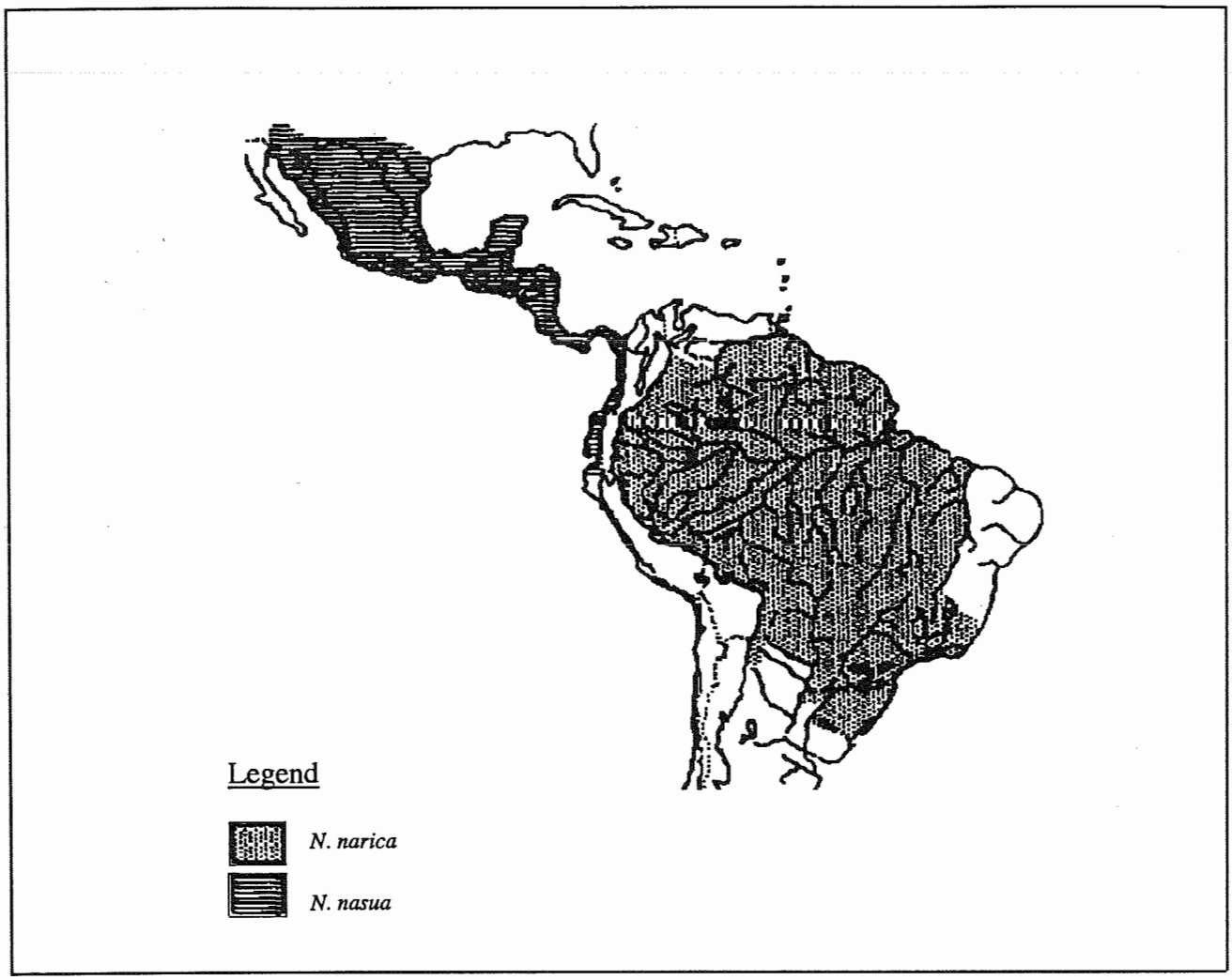

Figure 1-3. Distribution of the South American coati, (*Nasua nasua*) and the white-nosed coati, (*Nasua narica*) in North and South America (redrawn from Emmons, 1990)

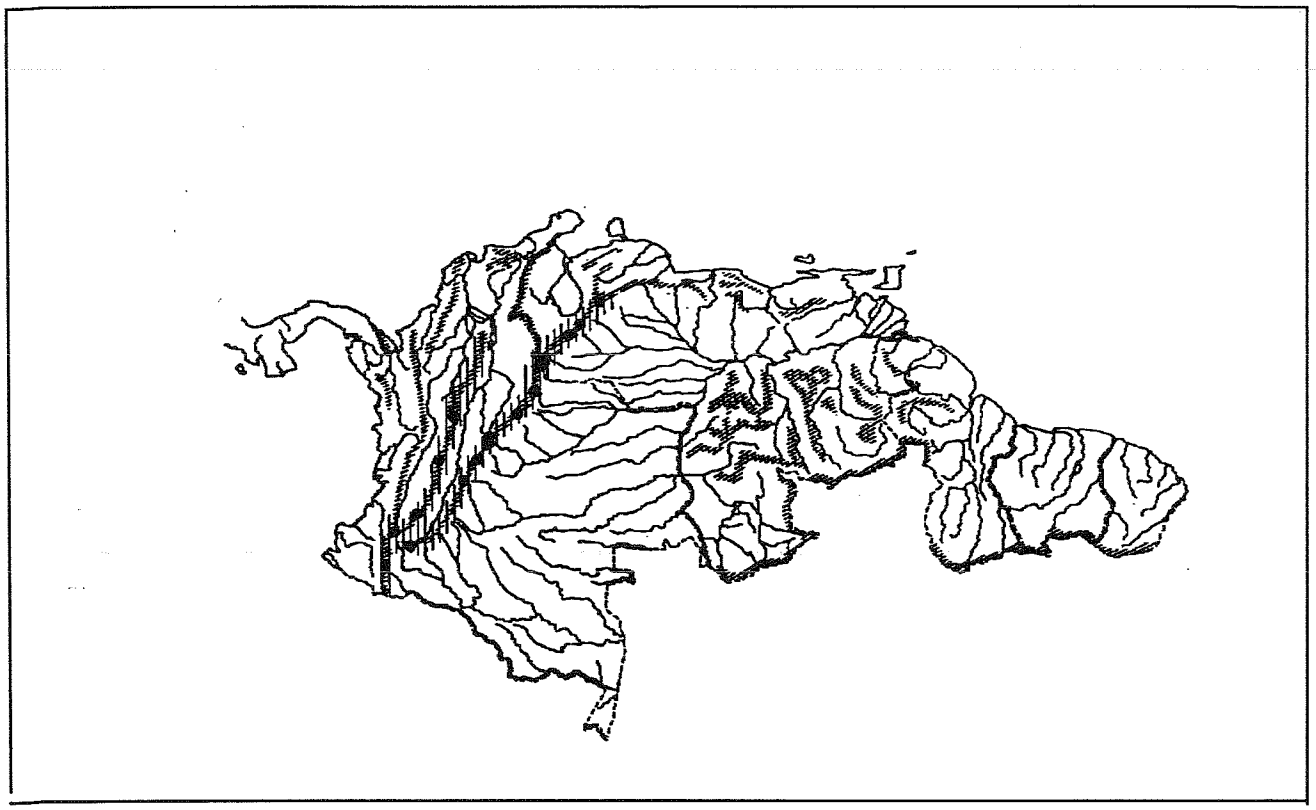

Figure 1-4. Distribution of the mountain coati, (*Nasuella olivacea*) in the Northern half of South America (redrawn from Eisenberg, 1989).

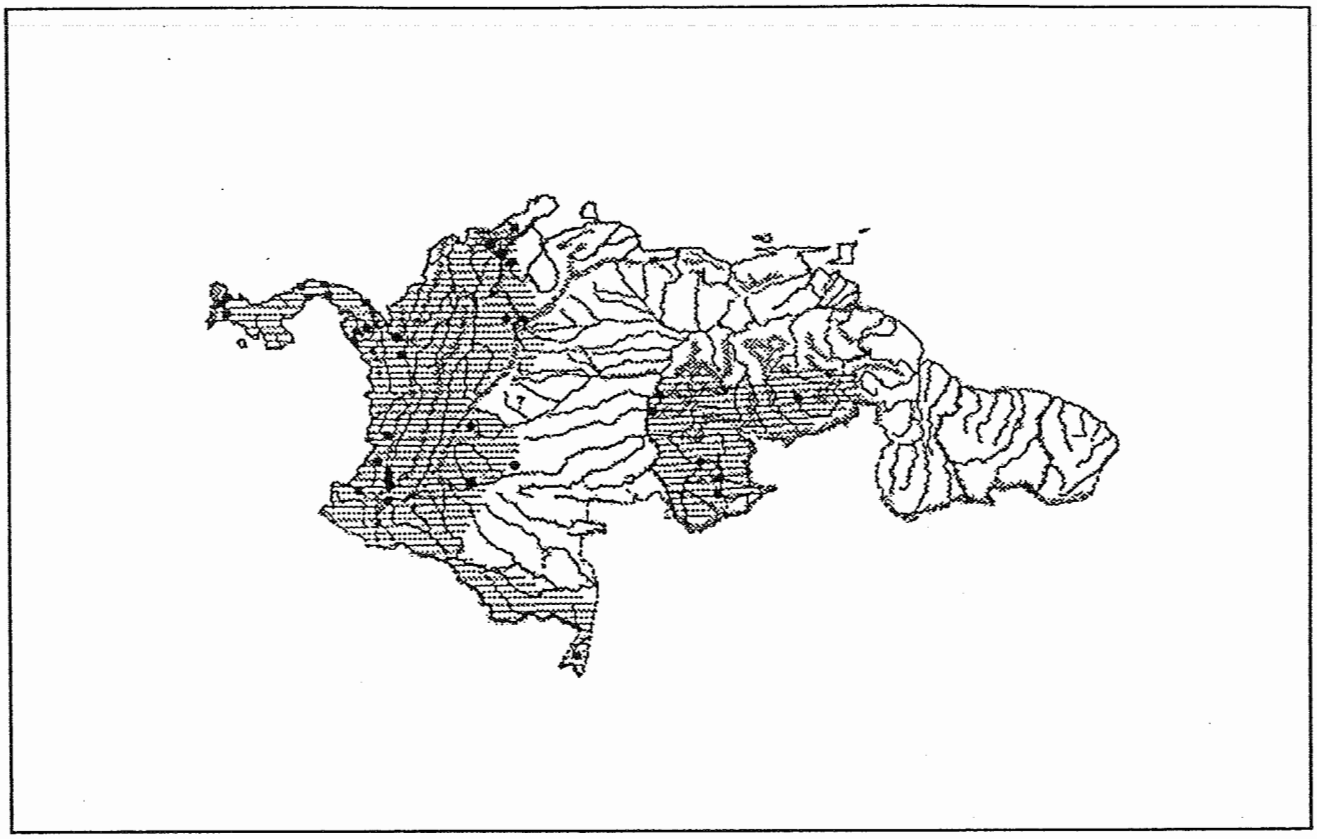

Figure 1-5. Distribution of the olingo (*Bassaricyon gabbii*) in the northern half of South America, and Central America (redrawn from Eisenberg, 1989).

Figure 1-6. Distribution of the kinkajou, (*Potus flavus*) in North and South America (redrawn from Emmons, 1990).

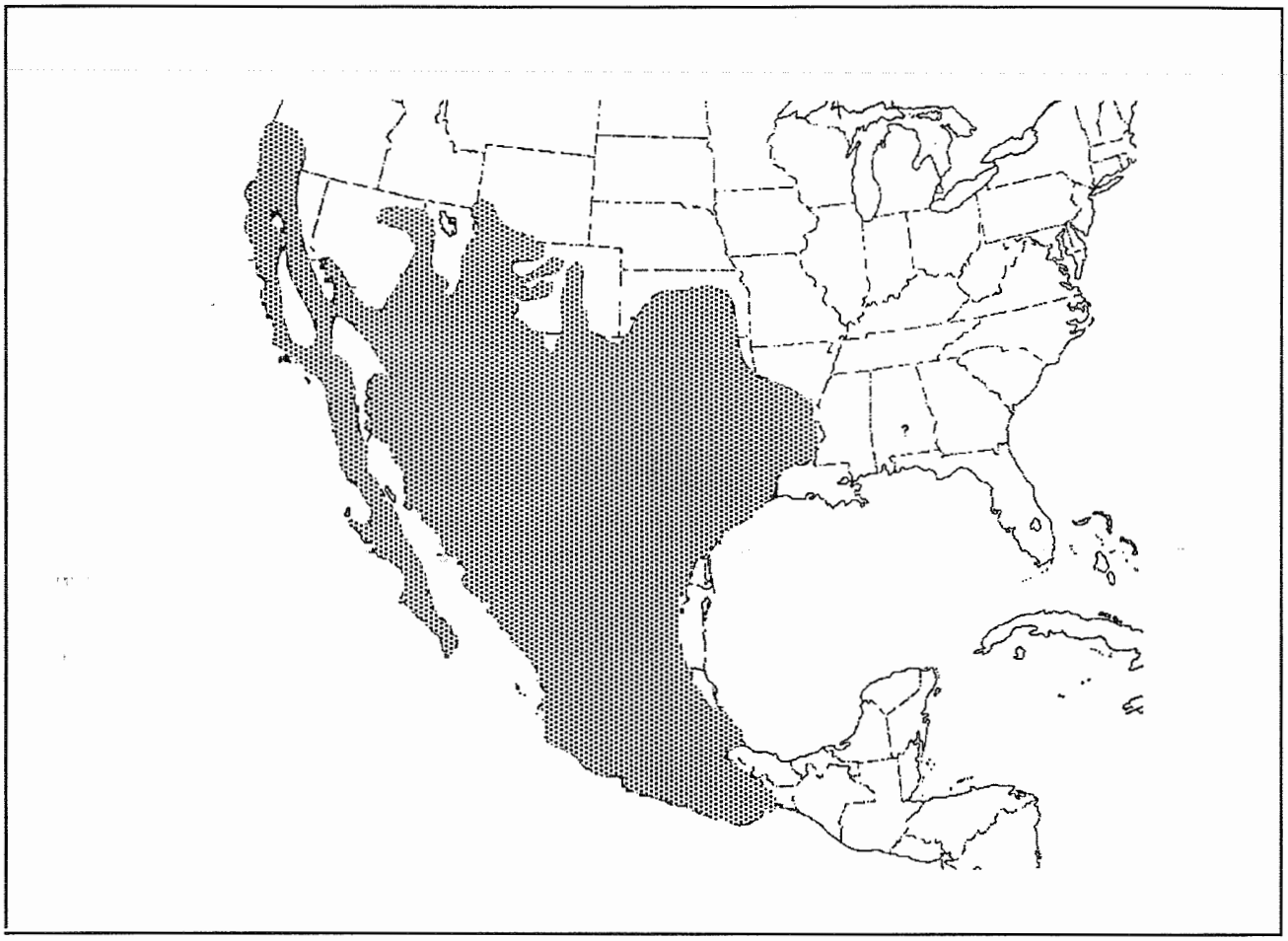

Figure 1-7. Distribution of the ringtail, (*Bassariscus astutus*) in North America (redrawn from Hall, 1981).

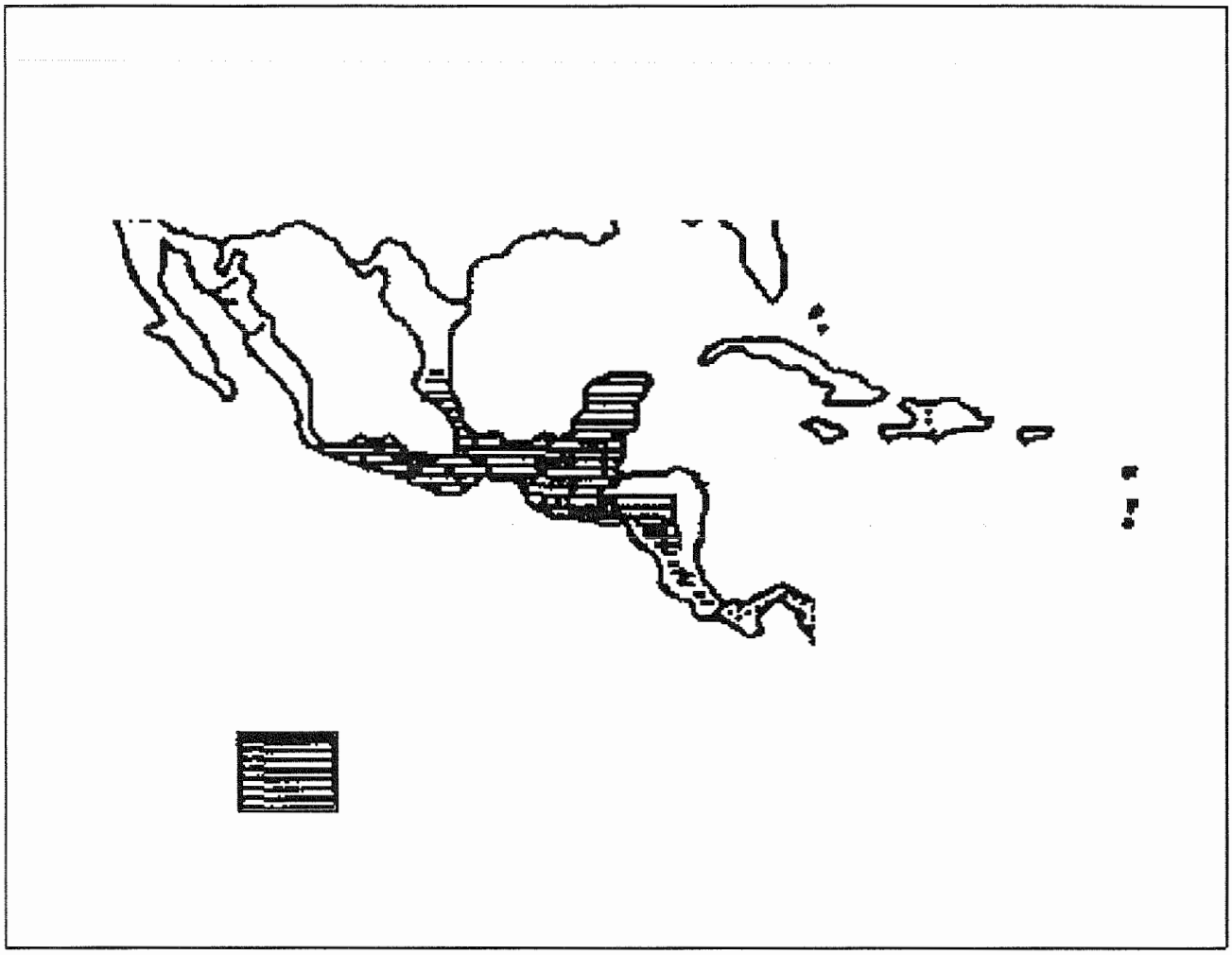

Figure 1-8. Distribution of the cacomistle, (*Bassariscu¢ sumichrasti*) in Mexico and Central America (redrawn from Emmons, 1990).

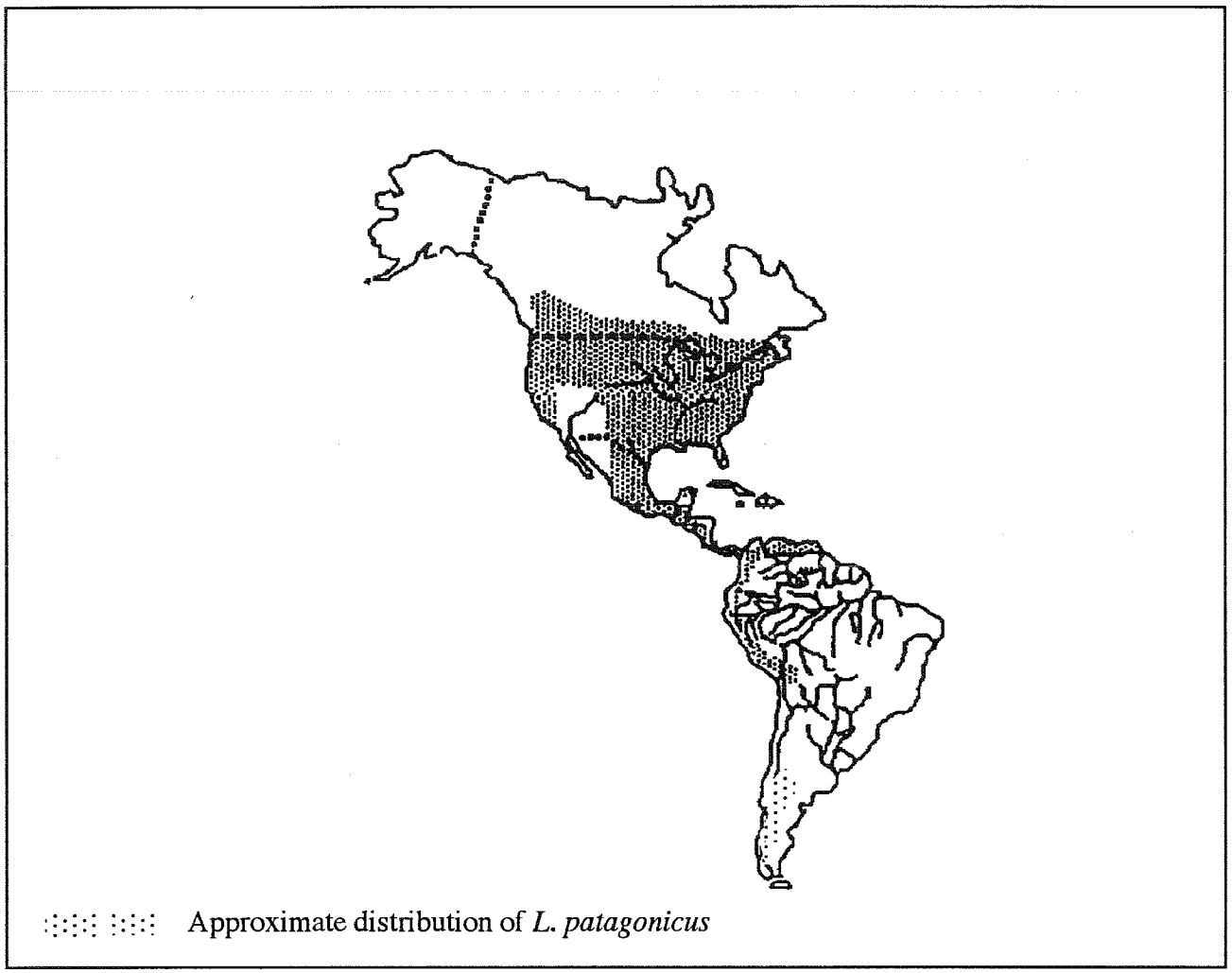

Figure 2-1. Distribution of the long tailed weasel, (*Mustela frenata*) and the Patagonian weasel (*Lyncodon patagonicus*) in North and South America (redrawn from Emmons, 1990).

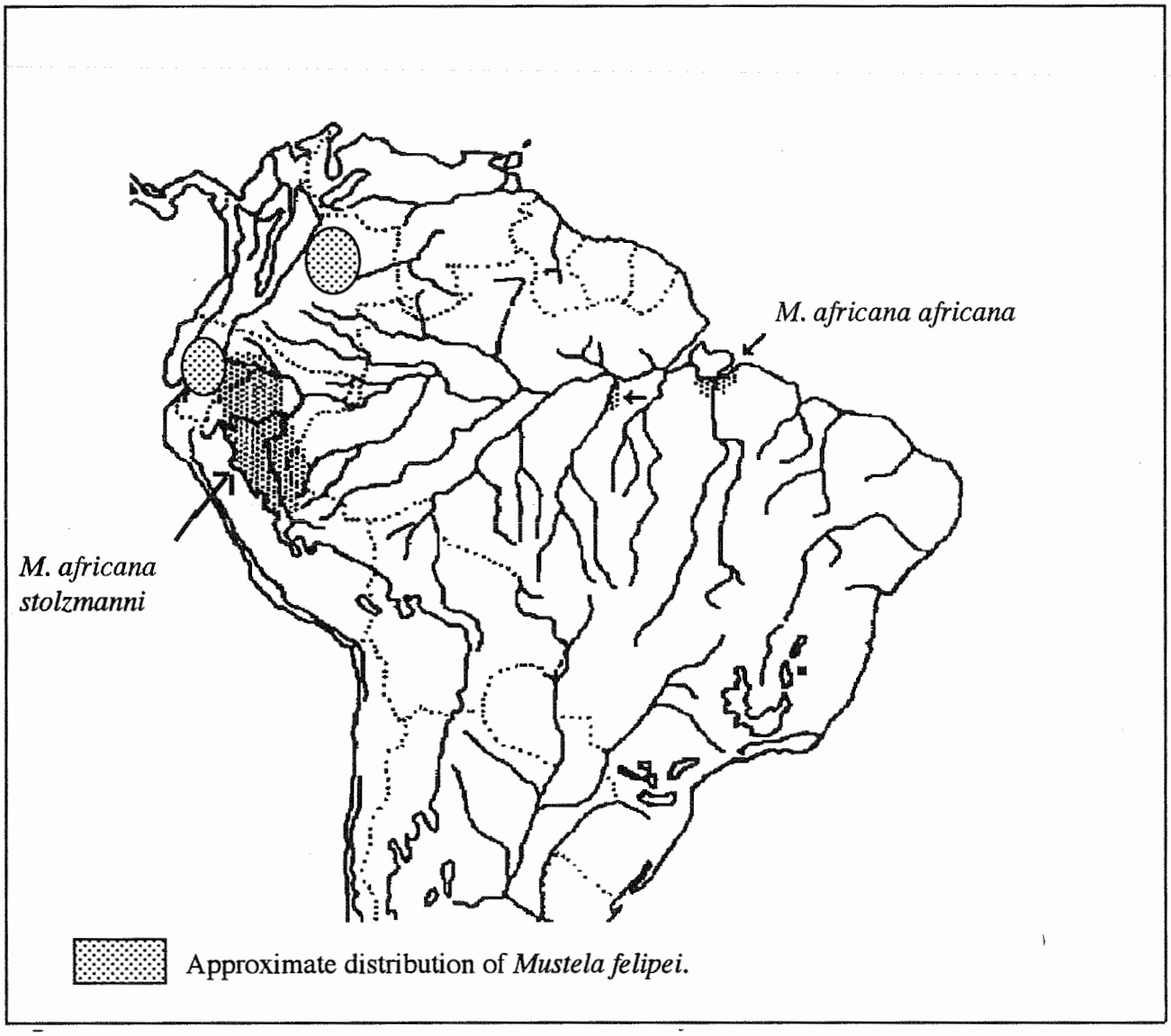

Figure 2-2. Distribution of the Amazon weasel (*Mustela africana*) and the Colombian weasel (*M. felipei*) in South America (redrawn from Emmons, 1990).

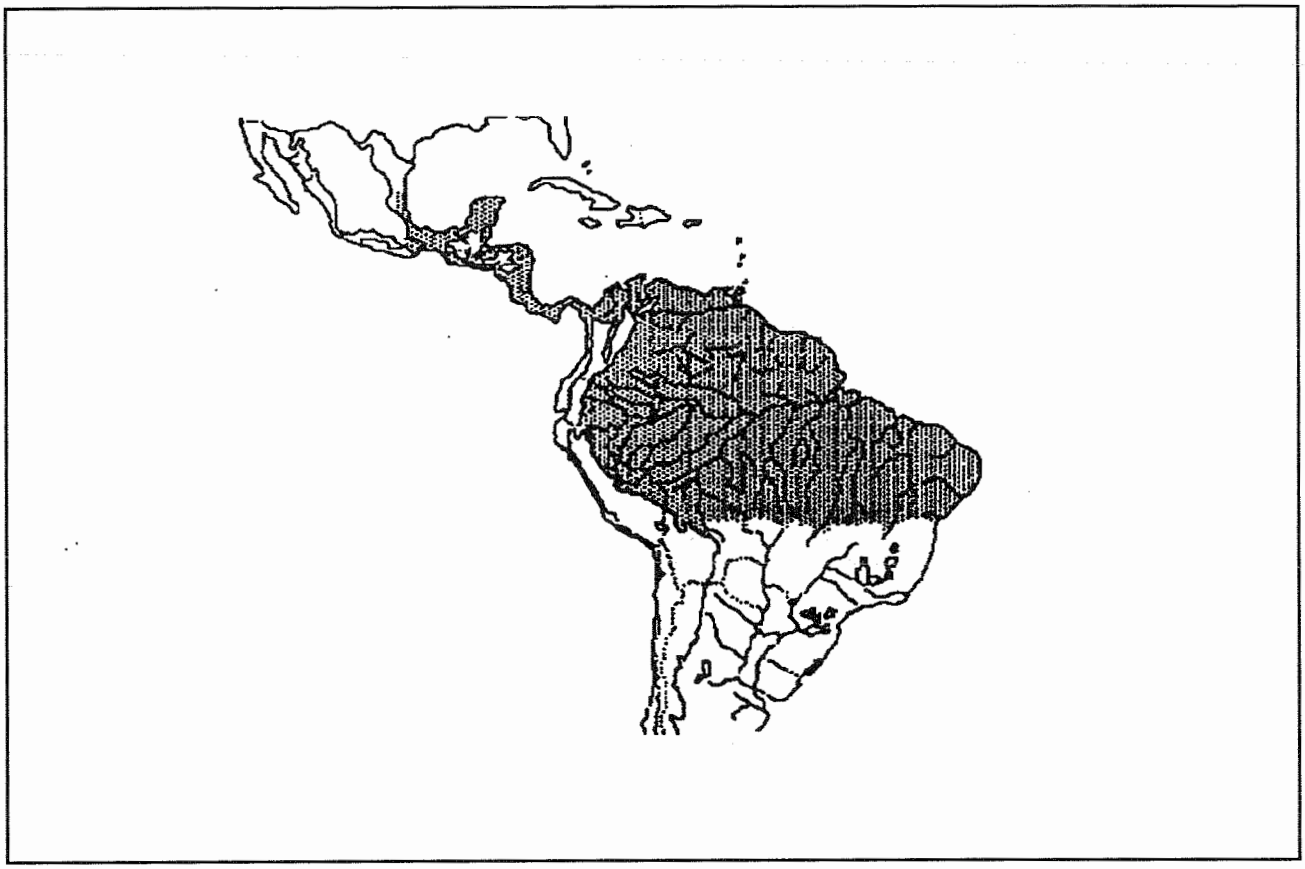

Figure 2-3. Distribution of the Amazon weasel, (*Galictis vittata*) In North and South America (redrawn from Emmons, 1990).

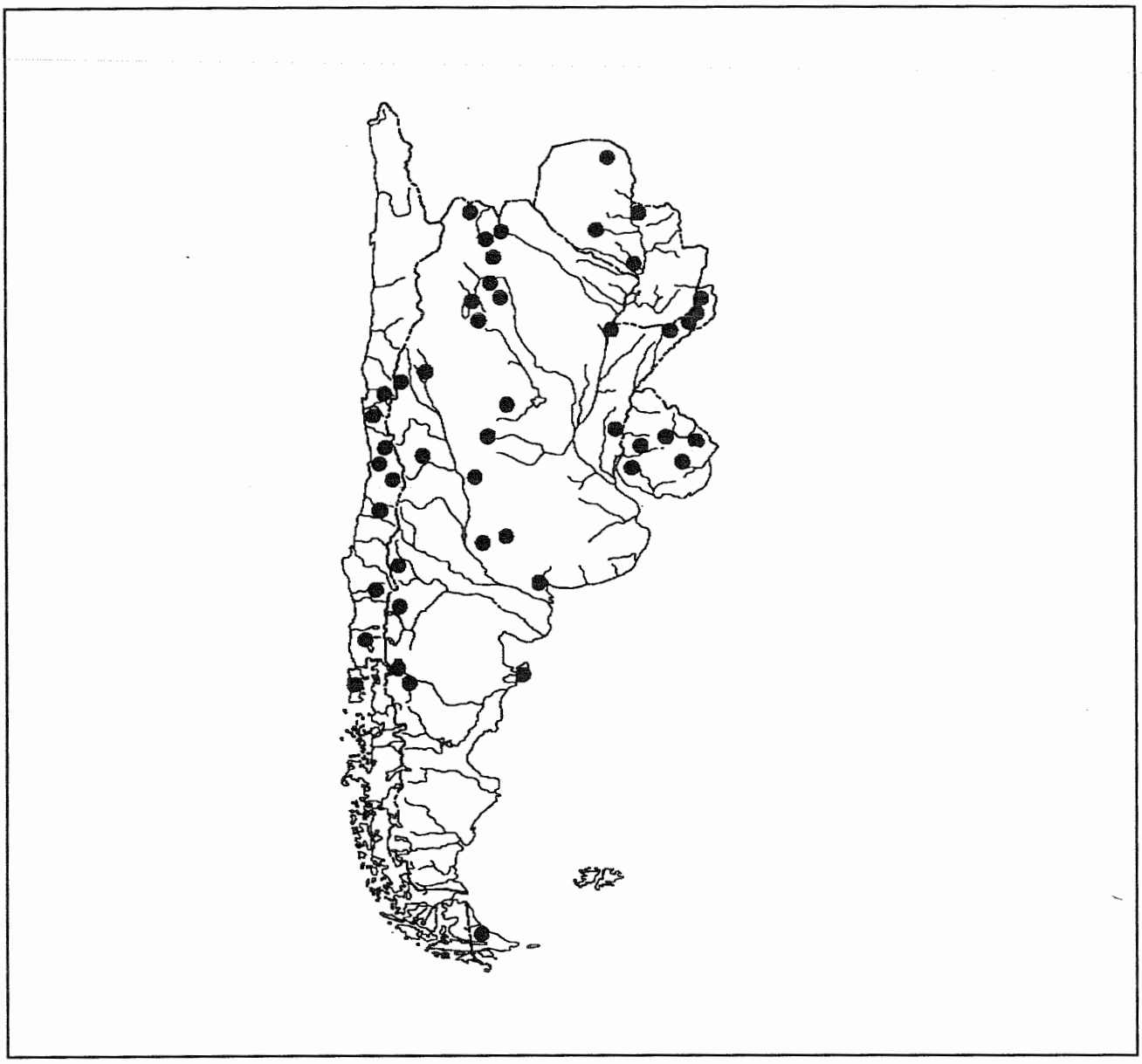

Figure 2-4. Partial distribution of the lesser grison, (*Galictis cuja*) in the southern half of South America (redrawn from Redford and Eisenberg, 1992).

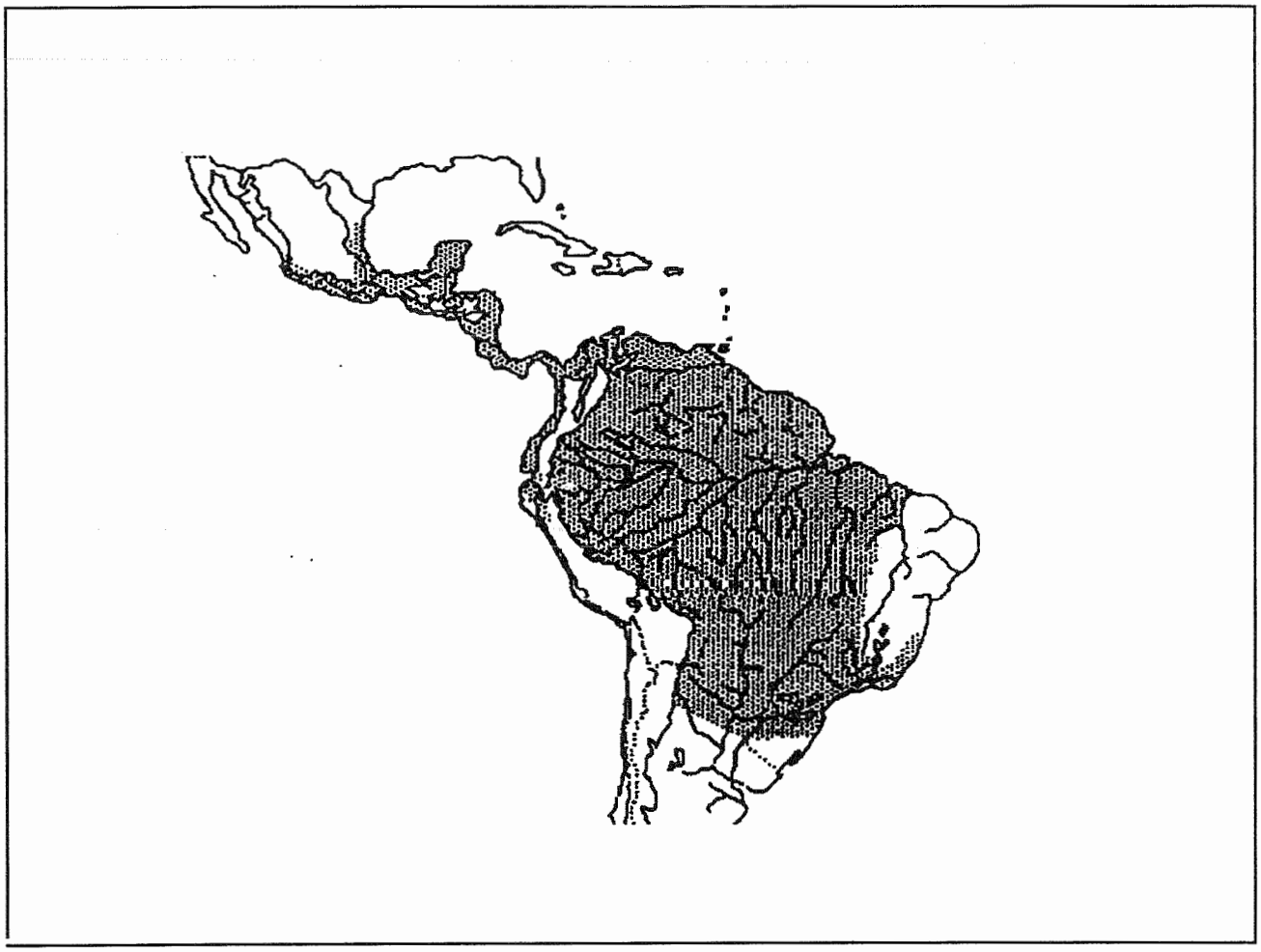

Figure 2-5. Distribution of the tayra, (*Eira barbara*) in North and South America (redrawn from Emmons, 1990).

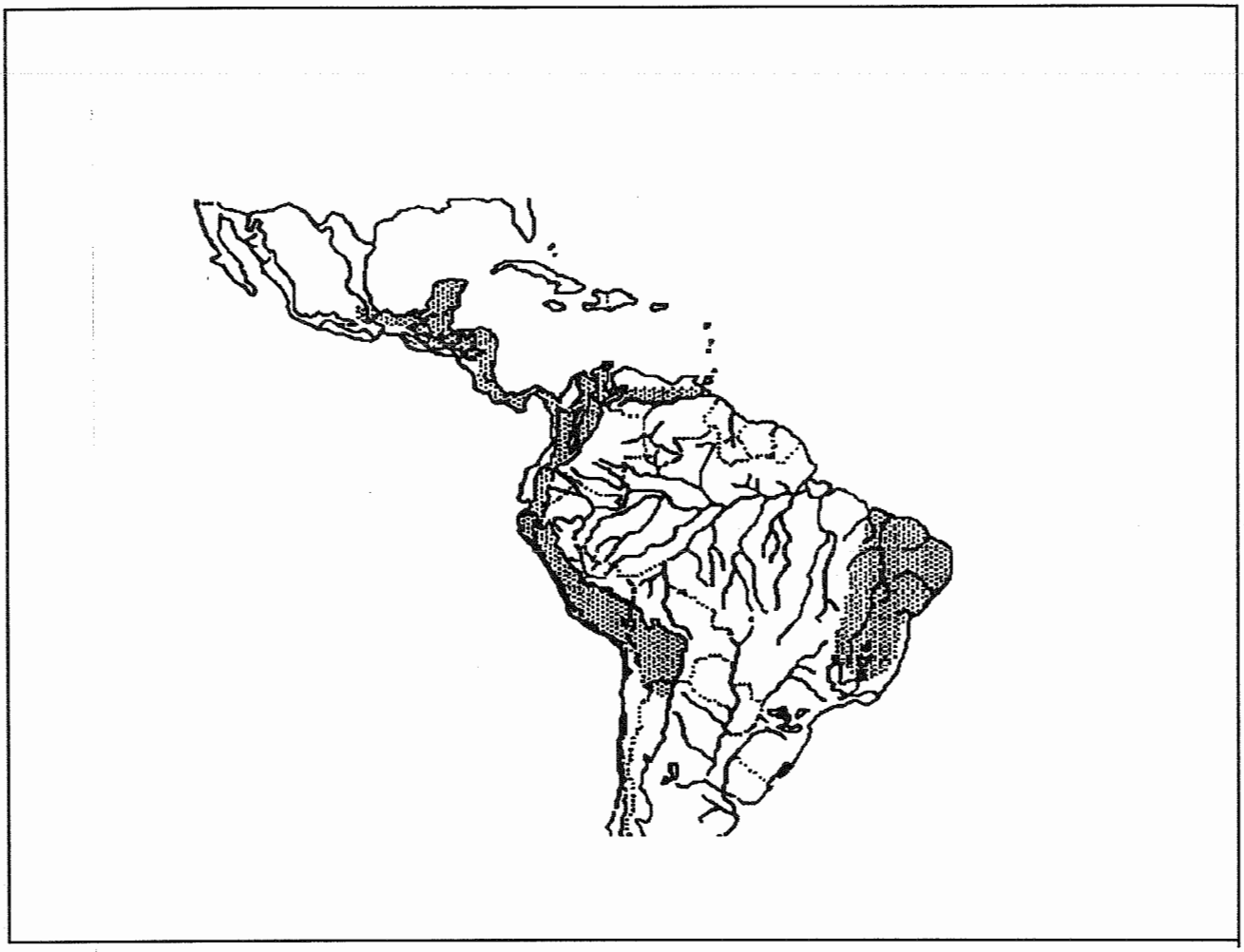

Figure 2-6. Distribution of the striped hog-nosed skunk, (*Conepatus semistriatus*) in Central and South America (redrawn from Emmons, 1990).

Figure 2-7. Distribution of the hog-nosed skunk, (*Conepatus humboldti*) in the southern half of South America (redrawn from Redford and Eisenberg, 1992).

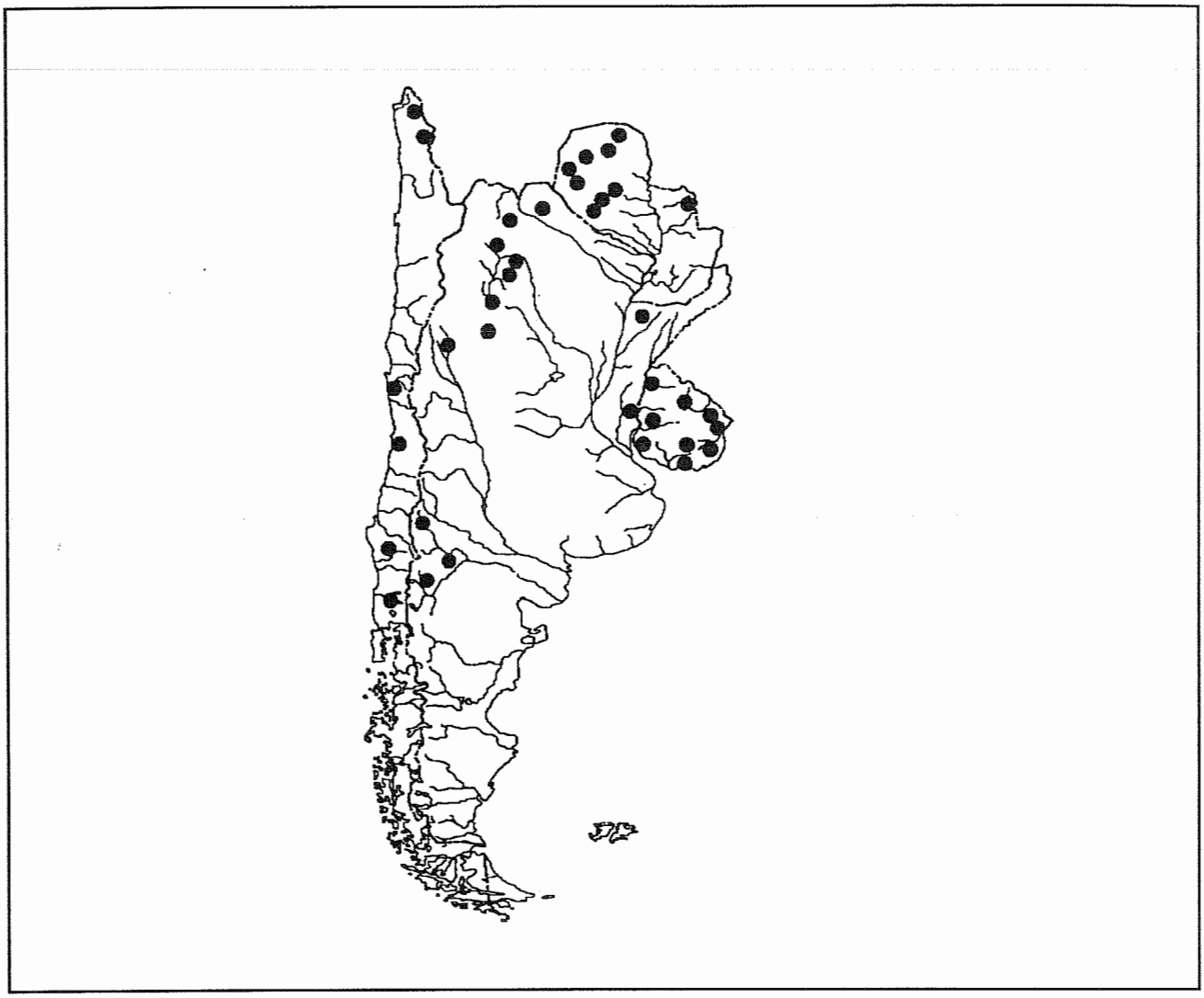

Figure 2-8. Distribution of the hog-nosed skunk, (*Conepatus chinga*) in the southern half of South America (redrawn from Redford and Eisenberg, 1992).

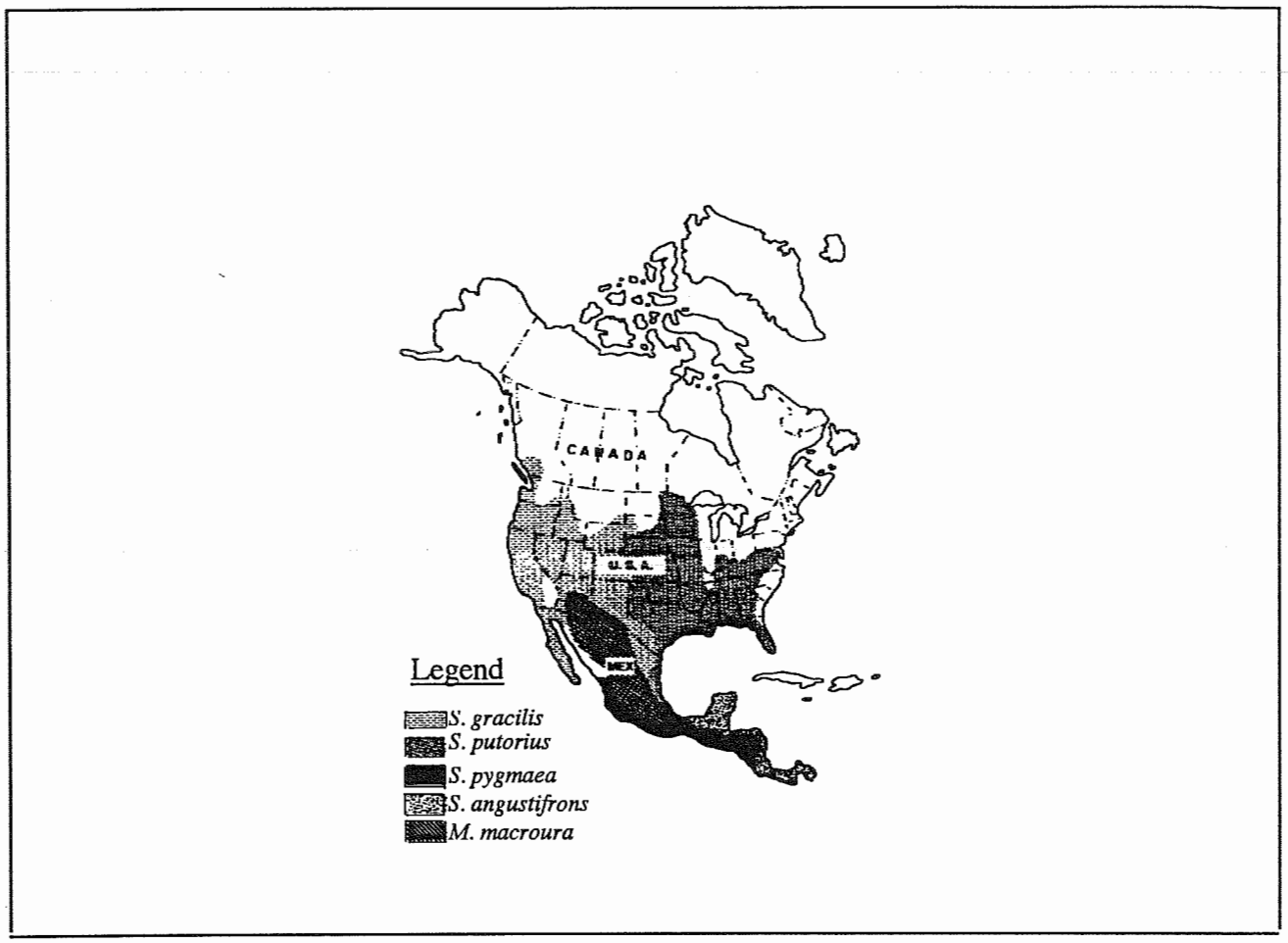

Figure 2-9. Distribution of the genus *Spilogale* and *Mephitis macroura* in North and Central America (redrawn from Rosatte, 1987).

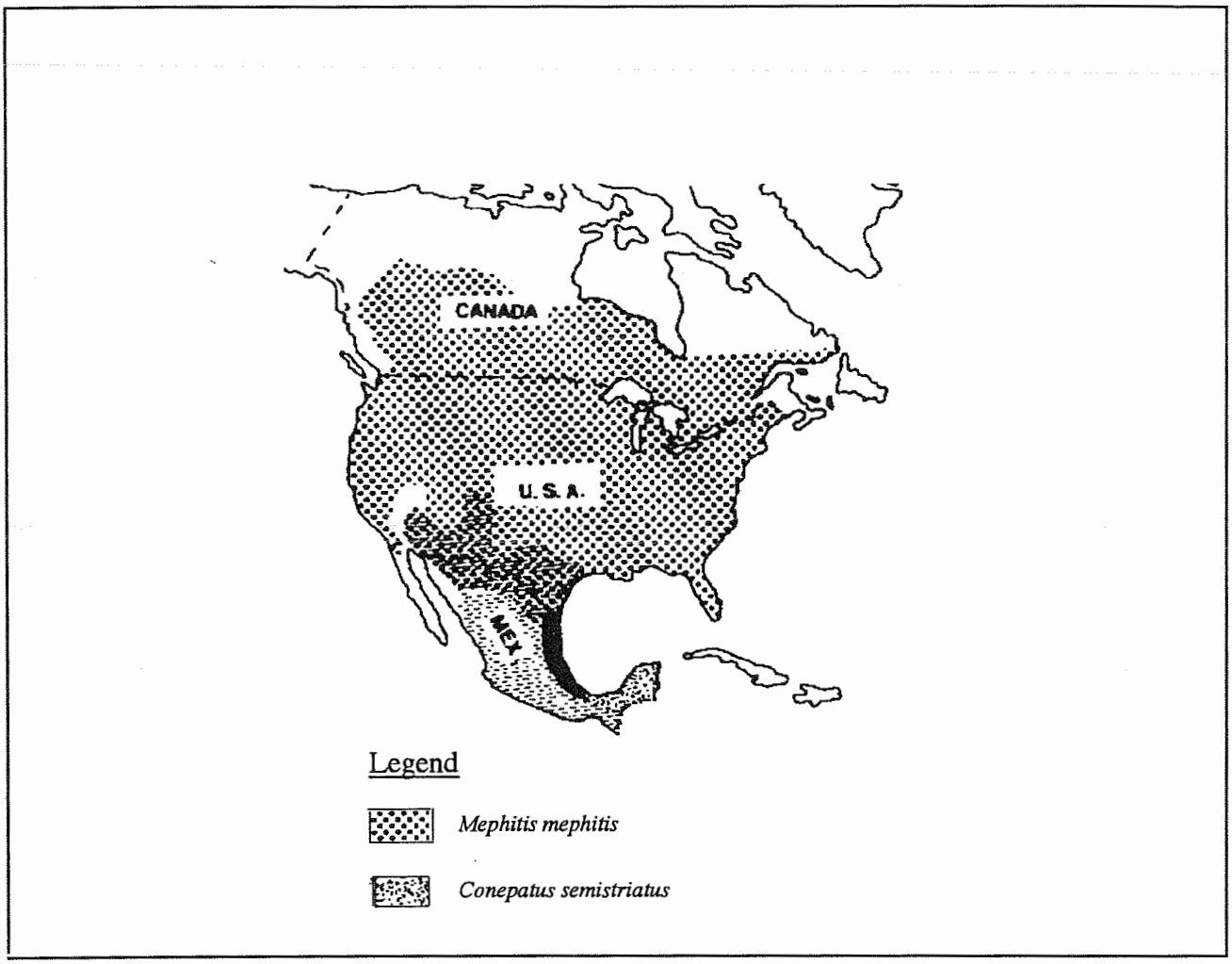

Figure 2-10. Distribution of the striped skunk, (*Mephitis mephitis*) in North America (redrawn from Rosatte, 1987).

SMALL CARNIVORE CONSERVATION ASSESSMENT AND MANAGEMENT PLAN

Final Review Draft
10 May 1994

Edited and compiled by

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Prepared by the participants of
a workshop held in Rotterdam, The Netherlands
11-14 February 1993

SECTION 8

LIST OF PARTICIPANTS

SMALL CARNIVORE CAMP WORKSHOP
LIST OF PARTICIPANTS
12-14 February, 1993
Rotterdam, Netherlands

Roland Wirth
Franz-Senn-Str. 14
D-81377 Munchen, GERMANY

Angela R. Glatston
Royal Rotterdam Zoological Gardens
Van Aerssenlaan 49
3039 KE Rotterdam, NETHERLANDS

Dr. Ulie Seal, CBSG
12101 Johnny Cake Ridge Road
Apple Valley, MN 55124 USA

Dr. Harry van Rompaey
Jan Verbertlei 15
2650 Edegem BELGIUM

Don Moore, Thompson Park Conservancy
P.O. Box 8182
1 Thompson Park
Watertown, NY 13602 USA

Drs. Koen Brouwer,
Stichting Nationaal Onderzoek Dierentuinen
Postbus 20164
1000 HD Amsterdam NEDERLAND

Paul Robinson, Southport Zoo
Princes park, Southport
Merseyside PR8 1RX, ENGLAND

John Carnio, Curator of Mammals
Metro Toronto Zoo, P.O. Box 280
West Hill, Ontario M1E 4R5, CANADA

Tiit Maran, Tallinn Zoo
Paldiski mnt. 145
EE0035 Tallin ESTONIA

Dr. Viatcheslav Rozhnov
A.N. Svertzov Institute of Evolutionary
Morphology and Animal Ecology,
Russian Academy of Sciences
33, Leninsky Prospect, 117071 Moscow
RUSSIA

Dr. P.J.H. van Bree,
Instituut voor Taxonomische Zoologie
P.O. Box 4766
1009 AT AMSTERDAM NEDERLAND

Dr. Ajith Kumar,
Wildlife Institute of India
New Forest
Dehra Dun 248006, INDIA

Jordi Ruiz-Olmo,
Direccio General del Medi Natural
C/Corsega, 329,5
08037 Barcelona SPAIN

Dr. Pat Foster-Turley
Marine World Africa USA
Marine World Parkway, Vallejo
CA 94589 USA

Claus Reuther,
Aktion Fischotterschutz e.V.
Otterzentrum
D-29386 Hankensbuttel
GERMANY

Barbel Rogoschik,
Aktion Fischotterschutz e.V.
Otterzentrum
D-29386 Hankensbuttel
GERMANY

Dr. Aflredo D. Cuarón
Sub-dept Veterinary Anatomy University of Cambridge
Tennis court Road, Cambridge CB2 1QS, ENGLAND or
Centro de Ecologia-UNAM
Apartado postal 70-275
Mexico DF 04510, Mexico

Eladio Fernandez-Galiano
Conseil de l'Europe
F 67000 Strasbourg, FRANCE
M.C. Saint Girons
13 rue Gracieuse
75005 PARIS, FRANCE

Dumitru T. Murariu
"Grigore antipa" MNH
SOS Kiseleff Nr.1, Sectorul 1
Bucharest 2 79744 ROMANIA

A.W.J.J. de Jongh, Otterpark Aqualutra
Stichting Otterstation Nederland
De Groene Ster 2
8926 XE Leeuwarden, NEDERLAND

Roland Melisch, Institut fur Zoologie
Universitat Hohenheim
D-70593 Stuttgart, GERMANY
currently at Asian Wetland Bureau-Indonesia, PO Box 254, BOO
Bogor, 16002, Indonesia

Prof. Dr. Rudiger Schropfer
Universitat Osnabruck, FB Biologie/Chemie
Dept. of Ethology, Wildlife Eco-Ethology RG
Barbarastrasse 11, D-(W) 4500 Osnabruck, GERMANY

C. Maizeret
GREGE
Les Bayles
33720 BUDOS, FRANCE

Shelagh Heard
PO Box 156
Honeymoon Bay, BC Canada VOR 1YO

Dr. T.E. Tew, Joint Nature Conservation Committee
Monkstone Hnse, City Road
Peterborough PE1 1JY, ENGLAND

Vadim Sidorovich
Belarus, Minsk-220072
St. Skoriny-27 Institute of Zoology of Belarus Academy of Sciences
BYELORUSSA

SMALL CARNIVORE CONSERVATION ASSESSMENT AND MANAGEMENT PLAN

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SECTION 9

ISIS DATA

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR CIR CDR CDRn CER CRC	Crude Genetics %>=F2 WCbr WCliv WClivbr LivBr

Explanatory Notes

Collection- Number of collections holding living specimens on ISIS as of report date.
? = specimen currently OFF ISIS inventory

Census - Live count on ISIS as of end of year (Male.Female.Unknown).

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Crude Genetics>

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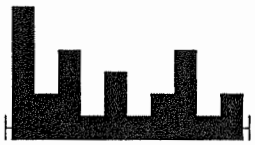
An example: (bar chart)



Age Distribution: 0 10 age classes...

Age Distribution: 0 10 age classes... (single line chart)

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr
Procyonidae/**RACCOONS**/family													
Ailurus/**PANDA, RED**/genus													
Ailurus fulgens (no subsp)/**RED PANDA**/													
ISIS Global:	24	34.33.0	24%	1%	21%	42%	0%	1.007	37%	17	3	0	25
Age Distribution: 0 ... 100 age classes...													
Ailurus fulgens fulgens/**RED PANDA**/													
ISIS Global:	50	72.87.2	32%	0%	15%	18%	0%	1.106	45%	10	0	0	56
Age Distribution: 0 ... 100 age classes...													
Ailurus fulgens styani/**RED PANDA**/													
ISIS Global:	20	30.30.1	17%	4%	11%	26%	0%	1.071	30%	13	19	8	17
Age Distribution: 0 ... 100 age classes...													
Bassaricyon/**OLINGO**/genus													
Bassaricyon gabbii/**BUSHY-TAILED OLINGO**/													
ISIS Global:	1	1.2.0	0%	17%	0%	0%	0%	1.100	0%	0	1	0	0
Age Distribution: 0 ... 100 age classes...													
Bassariscus/**CACOMISTLE**/genus													
Bassariscus astutus (no subsp)/**NORTH AMERICAN CACOMISTLE**/													
ISIS Global:	15	14.12.2	15%	6%	18%	49%	0%	0.983	21%	6	14	4	5
Age Distribution: 0 ... 100 age classes...													
Bassariscus astutus arizonensis/**NORTH AMERICAN CACOMISTLE**/													
ISIS Global:	6	5.2.0	0%	8%	10%	0%	0%	0.978	0%	0	6	0	0
Age Distribution: 0 ... 100 age classes...													
Bassariscus astutus consitus/**CACOMISTLE**/													
ISIS Global:	1	2.0.0	0%	0%	0%	0%	0%	1.000	0%	0	2	0	0
Age Distribution: 0 ... 100 age classes...													
Bassariscus astutus flavus/**NORTH AMERICAN CACOMISTLE**/													
ISIS Global:	1	1.2.0	10%	0%	12%	0%	0%	0.983	0%	0	2	0	0
Age Distribution: 0 ... 100 age classes...													

Age Distribution Percentiles: ▮ > 80th, ▓ > 60th, ▒ > 40th, ⁞ > 20th

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr
Bassariscus sumichrasti/**CENTRAL AMERICAN CACOMISTLE**/													
ISIS Global:	1	2.2.0	47%	0%	0%	0%	0%	1.067	0%	0	0	0	0
Age Distribution: 0 ... 100 age classes...													
Nasua/**COATI**/genus													
Nasua narica (no subsp)/**COATI**/													
ISIS Global:	37	42.54.6	20%	6%	14%	12%	0%	1.049	28%	17	26	3	22
Age Distribution: 0 ... 100 age classes...													
Nasua narica narica/**COATI**/													
ISIS Global:	5	6.6.0	49%	42%	28%	15%	0%	1.193	8%	6	6	4	4
Age Distribution: 0 ... 100 age classes...													
Nasua narica molaris/**COATI**/													
ISIS Global:	7	7.5.0	34%	11%	15%	15%	0%	1.141	8%	2	5	2	2
Age Distribution: 0 ... 100 age classes...													
Nasua narica yucatanica/**COATI**/													
ISIS Global:	3	2.4.0	0%	0%	11%	0%	0%	0.891	0%	3	1	0	0
Age Distribution: 0 ... 100 age classes...													
Nasua nasua (no subsp)/**COATI**/													
ISIS Global:	45	56.126.7	37%	3%	25%	33%	0%	1.017	28%	35	18	5	44
Age Distribution: 0 ... 100 age classes...													
Nasua nasua nasua/**COATI**/													
ISIS Global:	1	1.2.0	27%	0%	3%	0%	0%	1.072	33%	1	0	0	1
Age Distribution: 0 ... 100 age classes...													
Nasua nasua solitaria/**COATI**/													
ISIS Global:	1	1.0.0	0%	17%	0%	0%	0%	0.967	0%	0	1	0	0
Age Distribution: 0 ... 100 age classes...													
Nasuella/**COATI,MOUNTAIN**/genus													
Potos/**KINKAJOU**/genus													
Potos flavus (no subsp)/**KINKAJOU**/													
ISIS Global:	53	59.64.7	8%	6%	3%	21%	0%	1.042	15%	47	75	18	21
Age Distribution: 0 ... 100 age classes...													

Age Distribution Percentiles: ▉ > 80th, ▓ > 60th, ▒ > 40th, ▒ > 20th

Taxon		Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr
Potos flavus arborensis/**KINKAJOU**/	ISIS Global:	1	1.0.0	0%	0%	0%	0%	0%	1.000	0%	0	1	0	0
Age Distribution: 0	100 age classes...													
Potos flavus chiriquensis/**KINKAJOU**/	ISIS Global:	1	1.4.0	15%	0%	15%	60%	0%	0.943	0%	5	5	2	2
Age Distribution: 0	100 age classes...													
Potos flavus megalotus/**KINKAJOU**/	ISIS Global:	4	4.6.1	13%	60%	15%	0%	0%	1.464	0%	4	8	4	4
Age Distribution: 0	100 age classes...													
Procyon/**RACCOON**/genus														
Procyon cancrivorus/**CRAB-EATING RACCOON**/	ISIS Global:	6	6.10.2	22%	8%	9%	13%	0%	1.157	28%	2	7	0	2
Age Distribution: 0	100 age classes...													
Procyon lotor (no subsp)/**RACCOON**/	ISIS Global:	46	64.62.22	10%	13%	11%	8%	0%	1.000	5%	14	83	2	8
Age Distribution: 0	100 age classes...													
Procyon lotor lotor/**RACCOON**/	ISIS Global:	6	6.14.0	1%	37%	11%	0%	0%	1.010	5%	8	17	2	2
Age Distribution: 0	100 age classes...													
Procyon lotor elucus/**RACCOON**/	ISIS Global:	1	1.0.0	0%	0%	0%	0%	0%	1.000	0%	0	1	0	0
Age Distribution: 0	100 age classes...													
Procyon lotor fuscipes/**RACCOON**/	ISIS Global:	3	1.2.2	0%	12%	0%	0%	0%	0.717	0%	2	5	0	0
Age Distribution: 0	100 age classes...													
Procyon lotor hirtus/**RACCOON**/	ISIS Global:	5	3.6.0	0%	21%	6%	0%	0%	1.004	0%	7	7	0	0
Age Distribution: 0	100 age classes...													

Age Distribution Percentiles: ▉ > 80th, ▓ > 60th, ▒ > 40th, ░ > 20th

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr

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Collection- Number of collections holding living specimens on ISIS as of report date.
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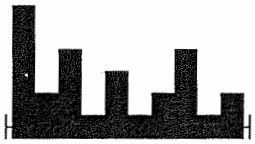

Age Distribution: 0|10 age classes...

Age Distribution: 0|10 age classes... (single line chart)

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr
Lutra/**OTTER,AMERICAN & EURASIAN**/genus													
Lutra canadensis (no subsp)/**NORTH AMERICAN OTTER**/													
ISIS Global:	69	79.76.3	7%	10%	11%	2%	0%	1.026	1%	26	91	11	12
Age Distribution: 0 ... 100 age classes...													
Lutra canadensis canadensis/**OTTER**/													
ISIS Global:	22	20.18.0	8%	6%	8%	5%	0%	1.024	5%	2	22	0	1
Age Distribution: 0 ... 100 age classes...													
Lutra canadensis lataxina/**OTTER**/													
ISIS Global:	17	13.14.0	2%	23%	16%	0%	0%	1.052	0%	0	25	0	0
Age Distribution: 0 ... 100 age classes...													
Lutra canadensis pacifica/**OTTER**/													
ISIS Global:	5	6.3.1	0%	19%	10%	0%	0%	1.090	0%	1	8	0	0
Age Distribution: 0 ... 100 age classes...													
Lutra canadensis degener/**OTTER**/													
ISIS Global:	1	0.1.1	0%	20%	0%	0%	0%	0.400	0%	0	2	0	0
Age Distribution: 0 ... 100 age classes...													
Lutra/**OTTER,AMERICAN & EURASIAN**/genus													
Lutra lutra (no subsp)/**EURASIAN OTTER**/													
ISIS Global:	2	2.2.0	23%	3%	29%	8%	0%	0.878	25%	2	1	0	1
Age Distribution: 0 ... 100 age classes...													
Lutra lutra lutra/**EURASIAN OTTER**/ IUCN Red List: Vulnerable in Wild													
ISIS Global:	14	24.20.1	22%	7%	6%	0%	0%	1.102	13%	1	12	0	6
Age Distribution: 0 ... 100 age classes...													
Lutra lutra chinensis/**EURASIAN OTTER**/													
ISIS Global:	1	0.1.0	0%	0%	0%	0%	0%	0.200	0%	0	1	0	0
Age Distribution: 0 ... 100 age classes...													
Lutra maculicollis/**SPOTTED-NECKED OTTER**/													
ISIS Global:	3	1.4.0	20%	0%	30%	25%	0%	0.921	60%	2	0	0	3
Age Distribution: 0 ... 100 age classes...													
Lutra perspicillata (no subsp)/**SMOOTH INDIAN OTTER**/													
ISIS Global:	1	2.1.0	0%	10%	0%	0%	0%	1.100	0%	0	3	0	0
Age Distribution: 0 ... 100 age classes...													

Age Distribution Percentiles: ▮ > 80th, ▮ > 60th, ▮ > 40th, ▮ > 20th

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WCivbr	LivBr
Lutra perspicillata perspicillata/**SMOOTH OTTER**/													
ISIS Global:	1	1.1.0	0%	0%	0%	0%	0%	1.000	0%	0	2	0	0

Age Distribution: 0 ... 100 age classes...

Age Distribution Percentiles: ▉ > 80th, ▒ > 60th, ▓ > 40th, ⁞ > 20th

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr

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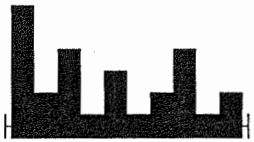


Age Distribution: 0|10 age classes...

Age Distribution: 0|10 age classes... (single line chart)

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr
Viverridae/**CIVETS, GENETS, MONGOOSES**/family													
Genetta/**GENET**/genus													
Genetta abyssinica/**GENET**/													
ISIS Global:	1	1.0.0	0%	0%	0%	0%	0%	0.200	0%	0	1	0	0
Age Distribution: 0 ... 100 age classes...													
Genetta genetta (no subsp)/**SMALL SPOTTED GENET**/													
ISIS Global:	3	2.5.1	29%	9%	17%	26%	0%	0.946	25%	3	5	1	2
Age Distribution: 0 ... 100 age classes...													
Genetta genetta genetta/**SMALL SPOTTED GENET**/													
ISIS Global:	3	6.4.0	10%	27%	8%	0%	0%	1.221	0%	2	7	1	1
Age Distribution: 0 ... 100 age classes...													
Genetta genetta felina/**SMALL SPOTTED GENET**/													
ISIS Global:	2	1.4.0	53%	5%	17%	0%	0%	1.163	20%	0	0	0	1
Age Distribution: 0 ... 100 age classes...													
Genetta pardina/**FOREST GENET**/													
ISIS Global:	1	0.0.0	0%	10%	30%	0%	0%	0.733	0%	0	0	0	0
Age Distribution: 0 ... 100 age classes...													
Genetta tigrina/**BLOTCHED GENET**/													
ISIS Global:	5	5.7.0	11%	26%	20%	0%	0%	0.945	0%	6	8	0	3
Age Distribution: 0 ... 100 age classes...													
Osbornictis/**CIVET,CONGO WATER**/genus													
Poiana/**LINSANG,AFRICAN**/genus													
Prionodon/**LINSANG,BANDED AND SPOTTED**/genus													
Prionodon linsang/**BANDED LINSANG**/													
ISIS Global:	3	6.4.2	64%	6%	39%	60%	0%	1.315	33%	2	6	1	2
Age Distribution: 0 ... 100 age classes...													
Viverra/**CIVET,AFRICAN AND ORIENTAL**/genus													
Viverra civetta/**AFRICAN CIVET**/													
ISIS Global:	6	7.10.2	19%	7%	13%	41%	0%	1.089	21%	6	5	2	6

Age Distribution Percentiles: ▇ > 80th, ▓ > 60th, ▒ > 40th, ░ > 20th

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr
Age Distribution: 0 ... 100 age classes...													
Viverra tangalunga tangalunga/**MALAY CIVET**/													
ISIS Global:	1	6.5.5	10%	28%	16%	7%	0%	0.767	0%	2	15	1	1
Age Distribution: 0 ... 100 age classes...													
Viverricula/**CIVET,SMALL INDIAN**/genus													
Viverricula indica/**SMALL INDIAN CIVET**/													
ISIS Global:	1	2.0.0	0%	0%	0%	0%	0%	0.200	0%	4	2	0	0
Age Distribution: 0 ... 100 age classes...													
Arctictis/**BINTURONG**/genus													
Arctictis binturong (no subsp)/**BINTURONG**/													
ISIS Global:	47	67.52.5	22%	3%	9%	20%	0%	1.067	29%	26	25	6	28
Age Distribution: 0 ... 100 age classes...													
Arctictis binturong binturong/**BINTURONG**/													
ISIS Global:	5	7.8.3	25%	6%	12%	35%	0%	1.187	28%	4	7	0	2
Age Distribution: 0 ... 100 age classes...													
Arctictis binturong penicillatus/**BINTURONG**/													
ISIS Global:	1	1.1.3	50%	0%	17%	30%	0%	1.067	0%	2	1	1	1
Age Distribution: 0 ... 100 age classes...													
Arctogalidia/**CIVET,SMALL-TOOTHED PALM**/genus													
Arctogalidia trivirgata (no subsp)/**SMALL-TOOTHED PALM CIVET**/													
ISIS Global:	1	0.0.3	0%	0%	35%	0%	0%	0.250	0%	2	3	0	0
Age Distribution: 0 ... 100 age classes...													
Arctogalidia trivirgata major/**SMALL-TOOTHED PALM CIVET**/													
ISIS Global:	1	1.0.0	0%	0%	0%	0%	0%	0.867	100%	0	0	0	0
Age Distribution: 0 ... 100 age classes...													
Arctogalidia trivirgata stigmatica/**SMALL-TOOTH PALM CIVET**/													
ISIS Global:	1	8.3.0	0%	0%	0%	0%	0%	0.400	0%	0	11	0	0
Age Distribution: 0 ... 100 age classes...													
Macrogalidia/**CIVET,CELEBES PALM**/genus													
Nandinia/**CIVET,AFRICAN PALM**/genus													

Age Distribution Percentiles: ▮ > 80th, ▒ > 60th, ▒ > 40th, ▒ > 20th

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr
Nandinia binotata/**TWO-SPOTTED PALM CIVET**/													
ISIS Global:	3	4.4.0	0%	15%	5%	0%	0%	0.958	0%	2	8	0	0
Age Distribution: 0 ... 100 age classes...													
Paguma/**CIVET,MASKED PALM**/genus													
Paguma larvata/**MASKED PALM CIVET**/													
ISIS Global:	3	2.1.5	0%	40%	0%	0%	0%	1.395	0%	0	6	0	2
Age Distribution: 0 ... 100 age classes...													
Paguma larvata ogilbyi/**MASKED PALM CIVET**/													
ISIS Global:	1	3.4.0	0%	0%	0%	0%	0%	0.400	0%	0	7	0	0
Age Distribution: 0 ... 100 age classes...													
Paguma larvata robusta/**MASKED PALM CIVET**/													
ISIS Global:	1	1.1.0	0%	0%	0%	0%	0%	1.000	0%	0	2	0	0
Age Distribution: 0 ... 100 age classes...													
Paguma larvata taivana/**MASKED PALM CIVET**/													
ISIS Global:	1	16.11.0	8%	9%	0%	0%	0%	1.165	0%	3	17	3	3
Age Distribution: 0 ... 100 age classes...													
Paradoxurus/**CIVET,COMMON PALM**/genus													
Paradoxurus hermaphroditus/**COMMON PALM CIVET**/													
ISIS Global:	12	15.10.9	22%	26%	14%	14%	0%	1.261	3%	10	19	3	4
Age Distribution: 0 ... 100 age classes...													
Chrotogale/**CIVET,OWSTON'S PALM**/genus													
Chrotogale owstoni/**OWSTONS PALM CIVET**/													
ISIS Global:	1	1.2.0	0%	0%	0%	0%	0%	0.000	0%	0	3	0	0
Age Distribution: 0 ... 100 age classes...													
Cynogale/**CIVET,OTTER**/genus													
Eupleres/**FALANOUC**/genus													
Fossa/**CIVET,MALAGASY**/genus													
Hemigalus/**CIVET,BANDED PALM**/genus													

Age Distribution Percentiles: > 80th, > 60th, > 40th, > 20th

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr
Hemigalus derbyanus (no subsp)/**BANDED PALM CIVET**/													
ISIS Global:	2	3.0.4	0%	2%	55%	0%	0%	0.275	0%	4	7	0	0
Age Distribution: 0 ... 100 age classes...													
Hemigalus derbyanus derbyanus/**BANDED PALM CIVET**/													
ISIS Global:	1	0.0.2	0%	0%	0%	0%	0%	0.200	0%	0	2	0	0
Age Distribution: 0 ... 100 age classes...													
Galidia/**MONGOOSE,RING-TAILED**/genus													
Galidia elegans (no subsp)/**RING-TAILED MONGOOSE**/													
ISIS Global:	1	0.1.0	0%	0%	17%	0%	0%	0.833	0%	2	0	0	0
Age Distribution: 0 ... 100 age classes...													
Galidictis/**MONGOOSE,BROAD-STRIPED**/genus													
Mungotictis/**MONGOOSE,MADAGASCAR NARROW-STRIPED**/genus													
Salanoia/**MONGOOSE,BROWN-TAILED**/genus													
Atilax/**MONGOOSE,MARSH**/genus													
Atilax paludinosus/**MARSH MONGOOSE**/													
ISIS Global:	3	3.5.1	21%	30%	9%	0%	0%	1.424	33%	4	6	2	2
Age Distribution: 0 ... 100 age classes...													
Bdeogale/**MONGOOSE,BLACK-LEGGED**/genus													
Crossarchus/**CUSIMANSE**/genus													
Crossarchus obscurus/**CUSIMANSE**/													
ISIS Global:	3	13.14.0	53%	124%	48%	5%	0%	2.257	0%	4	5	3	4
Age Distribution: 0 ... 100 age classes...													
Cynictis/**MONGOOSE,YELLOW**/genus													
Cynictis penicillata/**YELLOW MONGOOSE**/													
ISIS Global:	4	9.10.0	16%	16%	15%	12%	0%	1.115	21%	4	4	1	7
Age Distribution: 0 ... 100 age classes...													

Age Distribution Percentiles: ▇ > 80th, ▓ > 60th, ▒ > 40th, ░ > 20th

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr
Helogale/**MONGOOSE,DWARF**/genus													
Helogale hirtula/**MONGOOSE**/													
ISIS Global:	1	1.2.0	35%	0%	40%	27%	0%	0.950	67%	1	0	0	1
Age Distribution: 0									100 age classes...				
Helogale parvula/**DWARF MONGOOSE**/													
ISIS Global:	20	69.56.10	43%	0%	27%	48%	0%	1.106	42%	2	8	0	21
Age Distribution: 0									100 age classes...				
Helogale parvula undulata/**DWARF MONGOOSE**/													
ISIS Global:	1	1.4.0	37%	0%	27%	20%	0%	1.093	0%	2	0	0	0
Age Distribution: 0									100 age classes...				
Herpestes/**MONGOOSE**/genus													
Herpestes auropunctatus/**SMALL INDIAN MONGOOSE**/													
ISIS Global:	1	0.1.0	0%	50%	24%	0%	0%	1.189	0%	2	1	0	0
Age Distribution: 0									100 age classes...				
Herpestes ichneumon/**EGYPTIAN MONGOOSE**/													
ISIS Global:	1	0.0.0	10%	0%	0%	0%	0%	0.700	0%	5	0	0	0
Age Distribution: 0									100 age classes...				
Herpestes ichneumon widdringtoni/**EGYPTIAN MONGOOSE**/													
ISIS Global:	1	2.3.0	0%	82%	12%	0%	0%	1.495	0%	0	5	0	0
Age Distribution: 0									100 age classes...				
Herpestes javanicus/**JAVAN MONGOOSE**/													
ISIS Global:	1	1.1.0	0%	20%	0%	0%	0%	1.000	0%	0	2	0	0
Age Distribution: 0									100 age classes...				
Herpestes urva/**CRAB-EATING MONGOOSE**/													
ISIS Global:	1	3.2.0	0%	0%	0%	0%	0%	1.000	0%	0	5	0	0
Age Distribution: 0									100 age classes...				
Ichneumia/**MONGOOSE,WHITE-TAILED**/genus													
Ichneumia albicauda/**WHITE-TAILED MONGOOSE**/													
ISIS Global:	2	2.0.0	0%	40%	7%	0%	0%	1.333	0%	0	2	0	0
Age Distribution: 0									100 age classes...				

Age Distribution Percentiles: ▇ > 80th, ▓ > 60th, ▒ > 40th, ░ > 20th

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WCivbr	LivBr
Liberiictis/**CUSIMANSE,KUHN'S**/genus													
Mungos/**MONGOOSE,BANDED**/genus													
Mungos mungo/**BANDED MONGOOSE**/													
ISIS Global:	15	43.36.13	55%	6%	33%	46%	0%	1.243	4%	0	16	0	8
Age Distribution: 0 ... 100 age classes...													
Mungos mungo taenianotus/**BANDED MONGOOSE**/													
ISIS Global:	3	9.10.0	47%	0%	14%	24%	0%	0.814	16%	4	5	4	7
Age Distribution: 0 ... 100 age classes...													
Paracynictis/**MONGOOSE,SELOUS'**/genus													
Rhynchogale/**MONGOOSE,MELLER'S**/genus													
Suricata/**MEERKAT,SLENDER-TAILED**/genus													
Suricata suricatta (no subsp)/**SLENDER-TAILED MEERKAT**/													
ISIS Global:	81	207.166.33	31%	1%	21%	32%	0%	1.037	23%	38	32	16	76
Age Distribution: 0 ... 100 age classes...													
Suricata suricatta (no subsp)/ <<< Hybrid >>> /**SLENDER-TAILED MEERKAT**/													
ISIS Global:	1	0.2.0	0%	0%	0%	4%	0%	0.800	0%	0	0	0	0
Age Distribution: 0 ... 100 age classes...													
Suricata suricatta hahni/**SLENDER-TAILED MEERKAT**/													
ISIS Global:	14	33.29.8	41%	0%	19%	16%	0%	1.057	33%	6	2	1	8
Age Distribution: 0 ... 100 age classes...													
Cryptoprocta/**FOSSA**/genus													
Cryptoprocta ferox/**FOSSA**/IUCN Red List: Vulnerable in Wild													
ISIS Global:	2	7.11.0	19%	0%	4%	15%	0%	1.128	22%	0	0	0	6
Age Distribution: 0 ... 100 age classes...													

Age Distribution Percentiles: ▮ > 80th, ▓ > 60th, ▒ > 40th, ░ > 20th

Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr

Explanatory Notes

Collection- Number of collections holding living specimens on ISIS as of report date.
? = specimen currently OFF ISIS inventory

Census - Live count on ISIS as of end of year (Male.Female.Unknown).

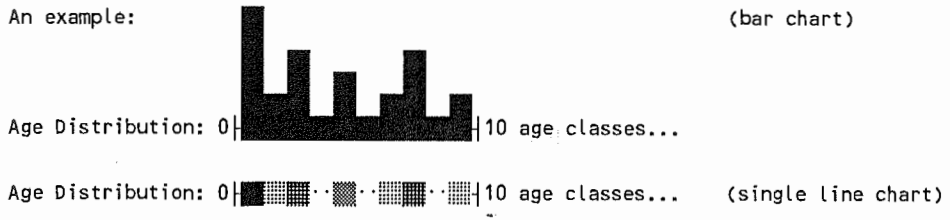
Crude Demographics> mean of last 5 years annual rates

CBR - Crude birth rate (births per 100).
CIR - Crude import rate (imports per 100).
CDR - Crude death rate (deaths per 100).
CDRn - Crude death rate of neonates (neonatal deaths per 100 births).
CER - Crude export rate (exports per 100).
CRC - Crude rate of change (actual observed annual growth rate).

Crude Genetics>

%>=F2 - Percent living in second or higher generation of captivity.
WCbr - Wild caught breeders.
WCliv - Wild caught individuals currently alive.
WClivbr - Wild caught individuals currently alive that are breeders.
LivBr - Total living breeders of all origins.

The AgeBar is intended to represent a density bar chart of the populations age distribution. A dark square indicates that the bar for that age class should rise to within 80 percent of the chart top. A single dot indicates that the bar is less than or equal to only 20 percent toward the chart top. Other densities lie between.



Taxon	Number of Collections	31/12/1993 Census	Crude Demographics CBR	CIR	CDR	CDRn	CER	CRC	Crude Genetics %>=F2	WCbr	WCliv	WClivbr	LivBr
Herpestes/**MONGOOSE**/genus													
Herpestes auropunctatus/**SMALL INDIAN MONGOOSE**/													
ISIS Global:	1	0.1.0	0%	50%	24%	0%	0%	1.189	0%	2	1	0	0
Age Distribution: 0 ... 100 age classes...													
Herpestes ichneumon/**EGYPTIAN MONGOOSE**/													
ISIS Global:	1	0.0.0	10%	0%	0%	0%	0%	0.700	0%	5	0	0	0
Age Distribution: 0 ... 100 age classes...													
Herpestes ichneumon widdringtoni/**EGYPTIAN MONGOOSE**/													
ISIS Global:	1	2.3.0	0%	82%	12%	0%	0%	1.495	0%	0	5	0	0
Age Distribution: 0 ... 100 age classes...													
Herpestes javanicus/**JAVAN MONGOOSE**/													
ISIS Global:	1	1.1.0	0%	20%	0%	0%	0%	1.000	0%	0	2	0	0
Age Distribution: 0 ... 100 age classes...													
Herpestes urva/**CRAB-EATING MONGOOSE**/													
ISIS Global:	1	3.2.0	0%	0%	0%	0%	0%	1.000	0%	0	5	0	0
Age Distribution: 0 ... 100 age classes...													

Age Distribution Percentiles: ▉ > 80th, ▓ > 60th, ▒ > 40th, ▒ > 20th

SMALL CARNIVORE CONSERVATION ASSESSMENT AND MANAGEMENT PLAN

Final Review Draft
10 May 1994

Edited and compiled by

Roland Wirth, Angela Glatston, Onnie Byers, Susie Ellis, Pat Foster-Turley, Paul Robinson, Harry Van Rompaey, Don Moore, Ajith Kumar, Roland Melisch, and Ulysses Seal

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SECTION 10

REFERENCE
MACE AND LANDE, 1991

Essay

Assessing Extinction Threats: Toward a Reevaluation of IUCN Threatened Species Categories

GEORGINA M. MACE

Institute of Zoology
Zoological Society of London
Regent's Park, London NW1 4RY, U.K.

RUSSELL LANDE

Department of Ecology and Evolution
University of Chicago
Chicago, Illinois 60637, U.S.A.

Abstract: *IUCN categories of threat (Endangered, Vulnerable, Rare, Indeterminate, and others) are widely used in 'Red lists' of endangered species and have become an important tool in conservation action at international, national, regional, and thematic levels. The existing definitions are largely subjective, and as a result, categorizations made by different authorities differ and may not accurately reflect actual extinction risks. We present proposals to redefine categories in terms of the probability of extinction within a specific time period, based on the theory of extinction times for single populations and on meaningful time scales for conservation action. Three categories are proposed (CRITICAL, ENDANGERED, VULNERABLE) with decreasing levels of threat over increasing time scales for species estimated to have at least a 10% probability of extinction within 100 years. The process of assigning species to categories may need to vary among different taxonomic groups, but we present some simple qualitative criteria based on population biology theory, which we suggest are appropriate at least for most large vertebrates. The process of assessing threat is clearly distinguished from that of setting priorities for conservation action, and only the former is discussed here.*

Resumen: *La categorización de la Unión Internacional para la Conservación de la Naturaleza (UICN) de las especies amenazadas (en peligro, vulnerables, raras, indeterminadas y otras) son ampliamente utilizadas en las Listas Rojas de especies en peligro y se han convertido en una herramienta importante para las acciones de conservación al nivel internacional, nacional, regional y temático. Las definiciones de las categorías existentes son muy subjetivas y, como resultado, las categorizaciones hechas por diferentes autores difieren y quizás no reflejen con certeza el riesgo real de extinción. Presentamos propuestas para re-definir las categorías en términos de la probabilidad de extinción dentro de un período de tiempo específico. Las propuestas están basadas en la teoría del tiempo de extinción para poblaciones individuales y en escalas de tiempo que tengan significado para las acciones de conservación. Se proponen tres categorías (CRITICA, EN PELIGRO, VULNERABLE) con niveles decrecientes de amenaza sobre escalas de tiempo en aumento para especies que se estima tengan cuando ménos un 10% de probabilidad de extinción en 100 años. El proceso de asignar especies a categorías puede que necesite variar dentro de los diferentes grupos taxonómicos pero nosotros presentamos algunos criterios cualitativos simples basados en la teoría de la biología de las poblaciones, las cuales sugerimos son apropiadas para cuando ménos la mayoría de los grandes vertebrados. El proceso de evaluar la amenaza se distingue claramente del de definir las prioridades para las acciones de conservación, sólamente el primero se discute aquí.*

Paper submitted February 12, 1990; revised manuscript accepted October 8, 1990.

Introduction

Background

The Steering Committee of the Species Survival Commission (SSC) of the IUCN has initiated a review of the overall functioning of the Red Data Books. The review will cover three elements: (1) the form, format, content, and publication of Red Data Books; (2) the categories of threat used in Red Data Books and the IUCN Red List (Extinct, Endangered, Vulnerable, Rare, and Indeterminate); and (3) the system for assigning species to categories. This paper is concerned with the second element and includes proposals to improve the objectivity and scientific basis for the threatened species categories currently used in Red Data Books (see IUCN 1988 for current definitions).

There are at least three reasons why a review of the categorization system is now appropriate: (1) the existing system is somewhat circular in nature and excessively subjective. When practiced by a few people who are experienced with its use in a variety of contexts it can be a robust and workable system, but increasingly, different groups with particular regional or taxonomic interests are using the Red Data Book format to develop local or specific publications. Although this is generally of great benefit, the interpretation and use of the present threatened species categories are now diverging widely. This leads to disputes and uncertainties over particular species that are not easily resolved and that ultimately may negatively affect species conservation. (2) Increasingly, the categories of threat are being used in setting priorities for action, for example, through specialist group action plans (e.g., Oates 1986; Eudey 1988; East 1988, 1989; Schreiber et al. 1989). If the categories are to be used for planning then it is essential that the system used to establish the level of threat be consistent and clearly understood, which at present it does not seem to be. (3) A variety of recent developments in the study of population viability have resulted in techniques that can be helpful in assessing extinction risks.

Assessing Threats Versus Setting Priorities

In the first place it is important to distinguish systems for assessing threats of extinction from systems designed to help set priorities for action. The categories of threat should simply provide an assessment of the likelihood that if current circumstances prevail the species will go extinct within a given period of time. This should be a scientific assessment, which ideally should be completely objective. In contrast, a system for setting priorities for action will include the likelihood of extinction, but will also embrace numerous other factors, such as the likelihood that restorative action will be successful; economic, political, and logistical considerations; and perhaps the taxonomic distinctiveness of the species under review. Various categorization systems used in the past, and proposed more recently, have confounded these two processes (see Fitter & Fitter 1987; Munton 1987). To devise a general system for setting priorities is not useful because different concerns predominate within different taxonomic, ecological, geographical, and political units. The process of setting priorities is therefore best left to specific plans developed by specialist bodies such as the national and international agencies, the specialist groups, and other regional bodies that can devise priority assessments in the appropriate regional or taxonomic context. An objective assessment of extinction risk may also then contribute to the decisions taken by governments on which among a variety of recommendations to implement. The present paper is therefore confined to a discussion of assessing threats.

Aims of the System of Categorization

For Whom?

Holt (1987) identifies three different groups whose needs from Red Data Books (and therefore categories of threat) may not be mutually compatible: the lay public, national and international legislators, and conservation professionals. In each case the purpose is to highlight taxa with a high extinction risk, but there are differences in the quality and quantity of information needed to support the assessment. Scott et al. (1987) make the point that in many cases simple inclusion in a Red Data Book has had as much effect on raising awareness as any of the supporting data (see also Fitter 1974). Legislators need a simple, but objective and soundly based system because this is most easily incorporated into legislation (Bean 1987). Legislators frequently require some statement about status for every case they consider, however weak the available information might be. Inevitably, therefore, there is a conflict between expediency and the desire for scientific credibility and objectivity. Conservationists generally require more precision, particularly if they are involved in planning conservation programs that aim to make maximal use of limited resources.

Characteristics of an Ideal System

With this multiplicity of purposes in mind it is appropriate to consider various characteristics of an ideal system:

(1) The system should be essentially simple, providing easily assimilated data on the risk of extinction. In terms of assessing risk, there seems to be little virtue in developing numerous categories, or in categorizing risk on the basis of a range of different parameters (e.g., abundance, nature of threat, likelihood of persistence of threat, etc.). The categories should be few in number,

should have a clear relationship to one another (Holt 1987; Munton 1987), and should be based around a probabilistic assessment of extinction risk.

(2) The system for categorization has to be flexible in terms of data required. The nature and amount of data available to assess extinction risks varies widely from almost none (in the vast majority of species) to highly detailed population data (in a very few cases). The categorization system should make maximum use of whatever data are available. One beneficial consequence of this process would be to identify key population data for field workers to collect that would be useful in assessing extinction risk.

(3) The categorization system also needs to be flexible in terms of the population unit to which it applies. Throughout this discussion, it is assumed that the system being developed will apply to any species, subspecies, or geographically separate population. The categorization system therefore needs to be equally applicable to limited lower taxonomic levels and to more limited geographical scope. Action planning will need to be focused on particular taxonomic groups or geographical areas, and can then incorporate an additional system for setting priorities that reflect taxonomic distinctiveness and extinction risks outside the local area (e.g., see East 1988, 1989; Schreiber et al. 1989).

(4) The terminology used in categorization should be appropriate, and the various terms used should have a clear relationship to each other. For example, among the current terms both 'endangered' and 'vulnerable' are readily comprehended, but 'rare' is confusing. It can be interpreted as a statement about distribution status, level of threat, or local population size, and the relationships between these factors are complex (Rabinowitz et al. 1986). Rare (i.e., low-density) species are not always at risk and many species at risk are not numerically rare (King 1987; Munton 1987; Heywood 1988). The relationship of 'rare' to 'endangered' and 'vulnerable' is also unclear.

(5) If the system is to be objectively based upon sound scientific principles, it should include some assessment of uncertainty. This might be in terms of confidence levels, sensitivity analyses, or, most simply, on an ordinal scale reflecting the adequacy of the data and models in any particular case.

(6) The categories should incorporate a time scale. On a geological time scale all species are doomed to extinction, so terms such as "in danger of extinction" are rather meaningless. The concern we are addressing here is the high background level of the current rates of extinction, and one aim is therefore preservation over the upcoming centuries (Soulé & Simberloff 1986). Therefore, the probability of extinction should be expressed in terms of a finite time scale, for example, 100 years. Munton (1987) suggests using a measure of number of years until extinction. However, since most models of population extinction times result in approximately exponential distributions, as in Goodman's (1987) model of density-dependent population growth in a fluctuating environment, mean extinction time may not accurately reflect the high probability that the species will go extinct within a time period considerably shorter than the mean (see Fig. 1). More useful are measures such as "95% likelihood of persistence for 100 years."

Population Viability Analysis and Extinction Factors

Various approaches to defining viable populations have been taken recently (Shaffer 1981, 1990; Gilpin & Soulé, 1986; Soulé 1987). These have emphasized that there is no simple solution to the question of what constitutes a viable population. Rather, through an analysis of extinction factors and their interactions it is possible to assess probabilities and time scales for population persistence for a particular taxon at a particular time and place. The development of population viability analyses has led to the definition of intrinsic and extrinsic factors that determine extinction risks (see Soulé 1983; Soulé 1987; Gilpin & Soulé 1986; see also King 1987). Briefly these can be summarized as population dynamics (number of individuals, life history and age or stage distribution, geographic structure, growth rate, variation in demographic parameters), population characteristics (morphology, physiology, genetic variation, behavior and dispersal patterns), and environmental effects (habitat quality and quantity, patterns and rates of environmental disturbance and change, interactions with other species including man).

Preliminary models are available to assess a population's expected persistence under various extinction pressures, for example, demographic variation (Goodman 1987*a*, *b*; Belovsky 1987; CBSG 1989), catastrophes (Shaffer 1987), inbreeding and loss of genetic diversity (Lande & Barrowclough 1987; Lacy 1987), metapopulation structure (Gilpin 1987; Quinn & Hastings 1987; Murphy et al. 1990). In addition, various approaches have been made to modeling extinction in populations threatened by habitat loss (e.g., Gutiérrez & Carey 1985; Maguire et al. 1987; Lande 1988), disease (e.g., Anderson & May 1979; Dobson & May 1986; Seal et al. 1989), parasites (e.g., May & Anderson 1979; May & Robinson 1985; Dobson & May 1986), competitors, poaching (e.g., Caughley 1988), and harvesting or hunting (e.g., Holt 1987).

So far, the development of these models has been rather limited, and in particular they often fail to successfully incorporate several different extinction factors and their interactions (Lande 1988). Nevertheless the approach has been applied in particular cases even with

existing models (e.g., grizzly bear: Shaffer 1983; spotted owl: Gutiérrez & Carey 1985; Florida panther: CBSG 1989), and there is much potential for further development.

Although different extinction factors may be critical for different species, other, noncritical factors cannot be ignored. For example, it seems likely that for many species, habitat loss constitutes the most immediate threat. However, simply preserving habitats may not be sufficient to permit long term persistence if surviving populations are small and subdivided and therefore have a high probability of extinction from demographic or genetic causes. Extinction factors may also have cumulative or synergistic effects; for example, the hunting of a species may not have been a problem before the population was fragmented by habitat loss. In every case, therefore, all the various extinction factors and their interactions need to be considered. To this end more attention needs to be directed toward development of models that reflect the random influences that are significant to most populations, that incorporate the effects of many different factors, and that relate to the many plant, invertebrate, and lower vertebrate species whose population biology has only rarely been considered so far by these methods.

Viability analysis should suggest the appropriate kind of data for assigning extinction risks to species, though much additional effort will be needed to develop appropriate models and collect appropriate field data.

Proposal

Three Categories and Their Justification

We propose the recognition of three categories of threat (plus EXTINCT), defined as follows:

CRITICAL:	50% probability of extinction within 5 years or 2 generations, whichever is longer.
ENDANGERED:	20% probability of extinction within 20 years or 10 generations, whichever is longer.
VULNERABLE:	10% probability of extinction within 100 years.

These definitions are based on a consideration of the theory of extinction times for single populations as well as on meaningful time scales for conservation action. If biological diversity is to be maintained for the foreseeable future at anywhere near recent levels occurring in natural ecosystems, fairly stringent criteria must be adopted for the lowest level of extinction risk, which we call VULNERABLE. A 10% probability of extinction within 100 years has been suggested as the highest level of risk that is biologically acceptable (Shaffer 1981) and seems appropriate for this category. Furthermore, events more than about 100 years in the future are hard to foresee, and this may be the longest duration that legislative systems are capable of dealing with effectively.

It seems desirable to establish a CRITICAL category to emphasize that some species or populations have a very high risk of extinction in the immediate future. We propose that this category include species or populations with a 50% chance of extinction within 5 years or two generations, and which are clearly at very high risk.

An intermediate category, ENDANGERED, seems desirable to focus attention on species or populations that are in substantial danger of extinction within our lifetimes. A 20% chance of extinction within 20 years or 10 generations seems to be appropriate in this context.

For increasing levels of risk represented by the categories VULNERABLE, ENDANGERED, and CRITICAL, it is necessary to increase the probability of extinction or to decrease the time scale, or both. We have chosen to do both for the following reasons. First, as already mentioned, decreasing the time scale emphasizes the immediacy of the situation. Ideally, the time scale should be expressed in natural biological units of generation time of the species or population (Leslie 1966), but there is also a natural time scale for human activities such as conservation efforts, so we have given time scales in years and in generations for the CRITICAL and ENDANGERED categories.

Second, the uncertainty of estimates of extinction probabilities decreases with increasing risk levels. In population models incorporating fluctuating environments and catastrophes, the probability distribution of extinction times is approximately exponential (Nobile et al. 1985; Goodman 1987). In a fluctuating environment where a population can become extinct only through a series of unfavorable events, there is an initial, relatively brief period in which the chance of extinction is near zero, as in the inverse Gaussian distribution of extinction times for density-independent fluctuations (Ginzburg et al. 1982; Lande & Orzack 1988). If catastrophes that can extinguish the population occur with probability p per unit time, and are much more important than normal environmental fluctuations, the probability distribution of extinction times is approximately exponential, pe^{-pt}, and the cumulative probability of extinction up to time t is approximately $1 - e^{-pt}$. Thus, typical probability distributions of extinction times look like the curves in Figures 1A and 1B, and the cumulative probabilities of extinction up to any given time look like the curves in Figures 1C and 1D. Dashed curves represent different distributions of extinction times and cumulative extinction probabilities obtained by changing the model parameters in a formal population viability analysis (e.g., different amounts of environmental variation in demographic parameters). The uncertainty in an

estimate of cumulative extinction probability up to a certain time can be measured by its coefficient of variation, that is, the standard deviation among different estimates of the cumulative extinction probability with respect to reasonable variation in model parameters, divided by the best estimate. It is apparent from Figures 1C and 1D that at least for small variations in the parameters (if the parameters are reasonably well known), the uncertainty of estimates of cumulative extinction probability at particular times decreases as the level of risk increases. Thus at times, t_1, t_2, and t_3 when the best estimates of the cumulative extinction probabilities are 10%, 20%, and 50% respectively, the corresponding ranges of extinction probabilities in Figure 1C are 6.5%–14.8%, 13.2%–28.6%, and 35.1%–65.0%, and in Figure 1D are 6.8%–13.1%, 13.9%–25.7%, and 37.2%–60.2%. Taking half the range as a rough approximation of the standard deviation in this simple illustration gives uncertainty measures of 0.41, 0.38, and 0.30 in Figure 1C, and 0.31, 0.29, and 0.23 in Figure 1D, corresponding to the three levels of risk. Given that for practical reasons we have chosen to shorten the time scales for the more threatened categories, these results suggest that to maintain low levels of uncertainty, we should also increase the probabilities of extinction in the definition of the ENDANGERED and CRITICAL categories.

These definitions are based on general principles of population biology with broad applicability, and we believe them to be appropriate across a wide range of life forms. Although we expect the process of assigning species to categories (see below) to be an evolving (though closely controlled and monitored) process, and one that might vary across broad taxonomic groups, we recommend that the definitions be constant both across taxonomic groups and over time.

Assigning Species or Populations to Categories

We recognize that in most cases, there are insufficient data and imperfect models on which to base a formal probabilistic analysis. Even when considerable information does exist there may be substantial uncertainties in the extinction risks obtained from population models containing many parameters that are difficult to estimate accurately. Parameters such as environmental stochasticity (temporal fluctuations in demographic parameters such as age- or developmental stage–specific mortality and fertility rates), rare catastrophic events, as well as inbreeding depression and genetic variability in particular characters required for adaptation are all difficult to estimate accurately. Therefore it may not be possible to do an accurate probabilistic viability analysis even for some very well studied species. We suggest that the categorization of many species should be based on more qualitative criteria derived from the same body of theory as the definitions above, which will broaden the scope and applicability of the categorization system. In these more qualitative criteria we use measures of effective population size (N_e) and give approximate equivalents in actual population size (N). It is important to recognize that the relationship between N_e and N depends upon a variety of interacting factors. Estimating N_e for a particular population will require quite extensive information on breeding structure and life history characteristics of the population and may then produce only an approximate figure (Lande & Barrowclough 1987). In addition, different methods of estimating N_e will give variable results (Harris & Allendorf 1989). N_e/N ratios vary widely across species, but are typically in the range 0.2 to 0.5. In the criteria below we give a value for N_e as well as an approximate value of N assuming that the N_e/N ratio is 0.2.

We suggest the following criteria for the three categories:

CRITICAL: 50% probability of extinction within 5 years or 2 generations, whichever is longer, or

(1) Any **two** of the following criteria:
- (a) Total population $N_e < 50$ (corresponding to actual $N < 250$).
- (b) Population fragmented: ≤2 subpopulations with $N_e > 25$ ($N > 125$) with immigration rates <1 per generation.
- (c) Census data of >20% annual decline in numbers over the past 2 years, or >50% decline in the last generation, or equivalent projected declines based on demographic projections after allowing for known cycles.
- (d) Population subject to catastrophic crashes (>50% reduction) per 5 to 10 years, or 2 to 4 generations, with subpopulations highly correlated in their fluctuations.

or (2) Observed, inferred, or projected habitat alteration (i.e., degradation, loss, or fragmentation) resulting in characteristics of (1).

or (3) Observed, inferred, or projected commercial exploitation or ecological interactions with introduced species (predators, competitors, pathogens, or parasites) resulting in characteristics of (1).

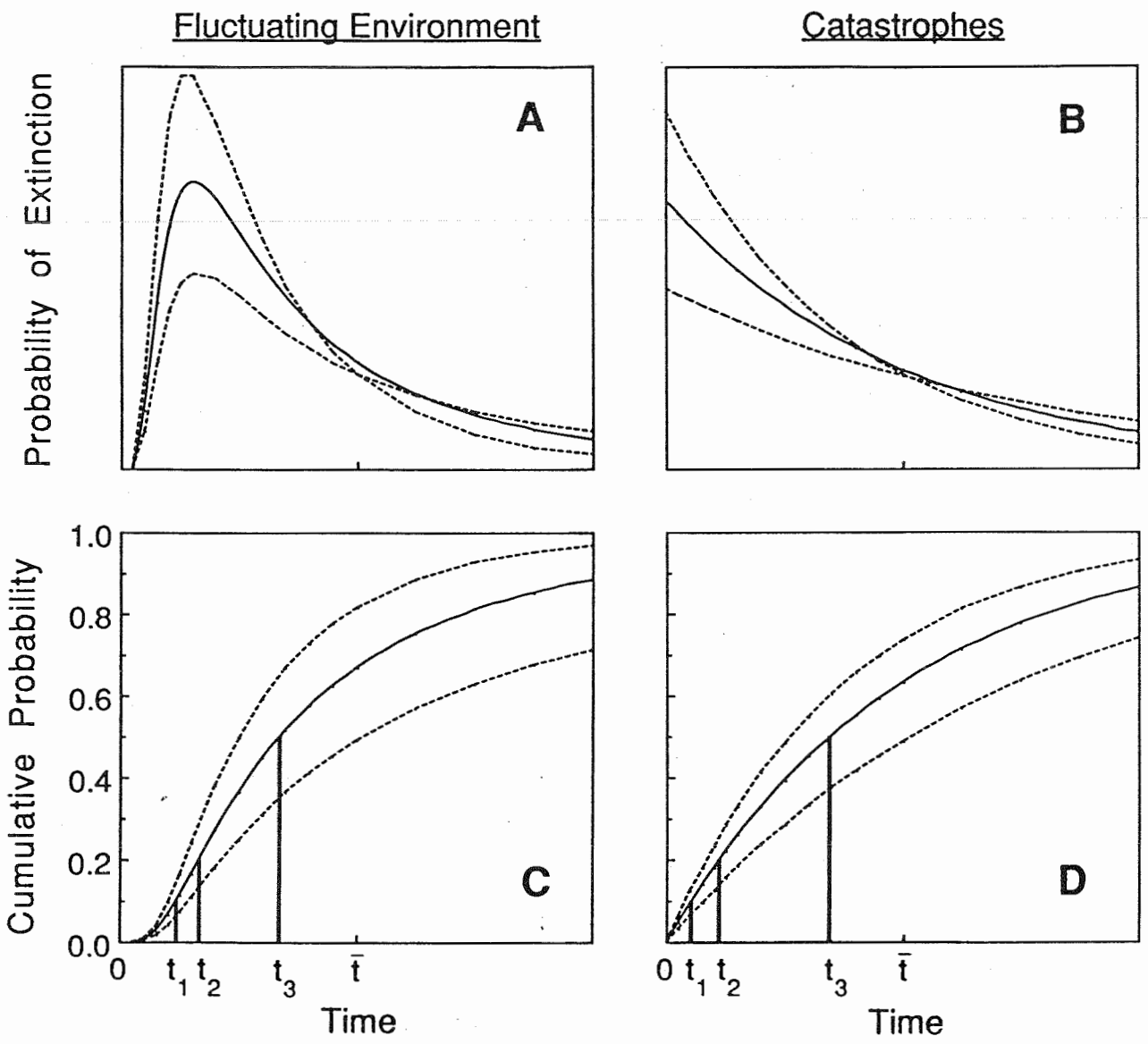

Figure 1. Probability distributions of time to extinction in a fluctuating environment, inverse Gaussian distributions (A), or with catastrophes, exponential distributions (B). Corresponding cumulative extinction probabilities of extinction up to any given time are shown below (C and D). Solid curves represent the best estimates from available data and dashed curves represent different estimates based upon the likely range of variation in the parameters. t_1, t_2, and t_3 are times at which the best estimates of cumulative extinction probabilities are 10%, 20%, and 50%. $\bar{t}$ is the expected time to extinction in the solid curves.

ENDANGERED:

20% probability of extinction within 20 years or 10 generations, whichever is longer, or

(1) Any **two** of the following or any **one** criterion under CRITICAL

(a) Total population $N_e < 500$ (corresponding to actual $N < 2,500$).

(b) Population fragmented:
(i) ≤5 subpopulations with $N_e >$ 100 ($N > 500$) with immigration rates <1 per generation, or
(ii) ≤2 subpopulations with $N_e > 250$ ($N > 1,250$) with immigration rates <1 per generation.

(c) Census data of >5% annual decline in numbers over past 5 years, or >10% decline per generation over past 2 generations, or equivalent projected declines based on demographic data after

allowing for known cycles.

(d) Population subject to catastrophic crashes: an average of >20% reduction per 5 to 10 years or 2 to 4 generations, or >50% reduction per 10 to 20 years or 5 to 10 generations, with subpopulations strongly correlated in their fluctuations.

or (2) Observed, inferred, or projected habitat alteration (i.e., degradation, loss, or fragmentation) resulting in characteristics of (1).

or (3) Observed, inferred, or projected commercial exploitation or ecological interactions with introduced species (predators, competitors, pathogens, or parasites) resulting in characteristics of (1).

VULNERABLE:

10% probability of extinction within 100 years, or

(1) Any **two** of the following criteria or any **one** criterion under ENDANGERED.

(a) Total population N_e < 2,000 (corresponding to actual N < 10,000).

(b) Population fragmented:
(i) ≤5 subpopulations with N_e > 500 (N > 2,500) with immigration rates <1 per generation, or
(ii) ≤2 subpopulations with N_e > 1,000 (N > 5,000) with immigration rates <1 per generation.

(c) Census data of >1% annual decline in numbers over past 10 years, or equivalent projected declines based on demographic data after allowing for known cycles.

(d) Population subject to catastrophic crashes: an average of >10% reduction per 5 to 10 years, >20% reduction per 10 to 20 years, or >50% reduction per 50 years, with subpopulations strongly correlated in their fluctuations.

or (2) Observed, inferred, or projected habitat alteration (i.e., degradation, loss, or fragmentation) resulting in characteristics of (1).

or (3) Observed, inferred, or projected commercial exploitation or ecological interactions with introduced species (predators, competitors, pathogens, or parasites) resulting in characteristics of (1).

Prior to any general acceptance, we recommend that these criteria be assessed by comparison of the categorizations they lead to in particular cases with the results of formal viability analyses, and categorizations based on existing methods. This process should help to resolve uncertainties about both the practice of, and results from, our proposals. We expect a system such as this to be relatively robust and of widespread applicability, at the very least for most higher vertebrates. For some invertebrate and plant taxa, different kinds of criteria will need to be developed within the framework of the definitions above. For example, many of these species have very high rates of population growth, short generation times, marked or episodic fluctuations in population size, and high habitat specificity. Under these circumstances, it will be more important to incorporate metapopulation characteristics such as subpopulation persistence times, colonization rates, and the distribution and persistence of suitable habitats into the analysis, which are less significant for most large vertebrate populations (Murphy et al. 1990; Menges 1990).

Change of Status

The status of a population or species with respect to risk of extinction should be up-listed (from unlisted to VULNERABLE, from VULNERABLE to ENDANGERED, or from ENDANGERED to CRITICAL) as soon as current information suggests that the criteria are met. The status of a population or species with respect to risk of extinction should be down-listed (from CRITICAL to ENDANGERED, from ENDANGERED to VULNERABLE, or from VULNERABLE to unlisted) only when the criteria of the lower risk category have been satisfied for a time period equal to that spent in the original category, or if it is shown that past data were inaccurate.

For example, if an isolated population is discovered consisting of 500 individuals and no other information is available on its demography, ecology, or the history of the population or its habitat, this population would initially be classified as ENDANGERED. If management efforts, natural events, or both caused the population to increase so that 10 years later it satisfied the criteria of the VULNERABLE category, the population would not be removed from the ENDANGERED category for a further period of 10 years. This time lag in down-listing prevents frequent up-listing and down-listing of a population or species.

Uncertain or Conflicting Results

Because of uncertainties in parameter estimates, especially those dealing with genetics and environmental

variability and catastrophes, substantial differences may arise in the results from analyses of equal validity performed by different parties. In such cases, we recommend that the criteria for categorizing a species or population should revert to the more qualitative ones outlined above.

Reporting Categories of Threat

To objectively compare categorizations made by different investigators and at different times, we recommend that any published categorization also cite the method used, the source of the data, a date when the data were accurate, and the name of the investigator who made the categorization. If the method was by a formal viability model, then the name and version of the model used should also be included.

Conclusion

Any system of categorizing degrees of threat of extinction inevitably contains arbitrary elements. No single system can adequately cover every possibility for all species. The system we describe here has the advantage of being based on general principles from population biology and can be used to categorize species for which either very little or a great deal of information is available. Although this system may be improved in the future, we feel that its use will help to promote a more uniform recognition of species and populations at risk of premature extinction, and should thereby aid in setting priorities for conservation efforts.

Summary

1. Threatened species categories should highlight species vulnerable to extinction and focus appropriate reaction. They should therefore aim to provide objective, scientifically based assessments of extinction risks.
2. The audience for Red Data Books is diverse. Positive steps to raise public awareness and implement national and international legislation benefit from simple but soundly based categorization systems. More precise information is needed for planning by conservation bodies.
3. An ideal system needs to be simple but flexible in terms of data required. The category definitions should be based on a probabilistic assessment of extinction risk over a specified time interval, including an estimate of error.
4. Definitions of categories are appropriately based on extinction probabilities such as those arising from population viability analysis methods.
5. We recommend three categories, CRITICAL, ENDANGERED, and VULNERABLE, with decreasing probabilities of extinction risk over increasing time periods.
6. For most cases, we recommend development of more qualitative criteria for allocation to categories based on basic principles of population biology. We present some criteria that we believe to be appropriate for many taxa, but are appropriate at least for higher vertebrates.

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