AZA

Small Carnivore Taxon Advisory Group

Regional Collection Plan
3rd Edition
2009

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Compiled by:
Small Carnivore TAG Steering Committee

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Introduction:

The Small Carnivore Taxon Advisory Group (SCTAG) of the Association of Zoos and Aquariums (AZA) includes 7 families under the order Carnivora: Mustelidae, Viverridae, Procyonidae, Ailuridae, Eupleridae, Mephitidae and Herpestidae. All species of these 7 families are covered under the TAG with the exception of *Enhydra lutris* (sea otter) which is covered under the Marine Mammal TAG.

Of the 162 species represented, 5 are either threatened or endangered according to the United States Fish and Wildlife Service (USFWS). The SCTAG published its original Regional Collection Plan (RCP) under the direction of Greta McMillian and the Steering Committee in 1999. The first revision was published under the direction of Dusty Lombardi and the Steering Committee in 2005.

The primary responsibility of the SCTAG is the development of a RCP as written in the AZA Regional Collection Plan handbook (1). TAGs develop RCPs to assist AZA institutions when developing their Institutional Collection Plans (ICP). Institutions that use RCPS to guide their ICP benefit from the TAGs' comprehensive taxonomic review. This RCP is a dynamic document and will continue to change as conditions for zoo and wild populations change.

1: AZA Regional Collection Handbook

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We would like to thank all of the SCTAG Steering Committee Members, Advisors, Institutional Representatives, and the PMC (Sarah Long, Cara Groome, Kristine Schad, Anne Oiler) for their work on this Regional Collection Plan.
With special thanks to Cindy Colling, Debbie Thompson, Mark Weldon, Katie Kimble, Jan Reed-Smith, Mary Noell, Carol Sodaro, & Dusty Lombardi for their final edit on this document and Jen Compston for compiling the RCP.

Mission:

Assist and promote the conservation of all species under the umbrella of the SCTAG through *in situ* and *ex situ* conservation.

Goals:

- Complete the Animal Care Manuals
- Solicit Point People for newly formed DERPs
- Hold a mid-year meeting
- Coordinate and fundraise for *in situ* conservation activities as they relate to managed species
- Identify and coordinate the education plan with the education advisor
- Systematically review managed species for animal health trends
- Serve as a resource for zoos/aquariums seeking information on husbandry and management of small carnivores

SCTAG Structure:

The SCTAG consists of a 9 member Steering Committee including 3 officers (Chair, Vice-Chair, & Secretary), and non-voting Program Managers, Advisors, and the TAG WCMC liaison. An election did not occur since there were not enough interested parties to run for the management group. Vice Chair is currently vacant. (AZA's Guidelines for TAGs: 3) Also according to the AZA's guidelines for TAGs (3) each participating facility may assign an Institutional Representative (IR) to the TAG if it so chooses. The Primary responsibility of the IR is to communicate with the committee and disseminate information from the SCTAG to their respective institution. Communication with the IRs is through an electronic listserv and at the Annual meetings. Steering Committee members and Advisors communicate via e-mail and listservs.
sctagsteer@lists.aza.org is a listserv that includes TAG Chair, Vice Chair, Secretary, Steering Committee Members, Advisors, and WCMC liaison. This listserv is used to provide a confidential method of conducting TAG business.
sctag@lists.aza.org is a listserv that includes Officers, Committee Members and IRs and any individual interested in the TAG. This listserv is used for general communications from the TAG.

The SCTAG also maintains a website www.itech.pjc.edu/sctag under the direction of Advisor Joyce Kaplan.

The Steering Committee is elected from a pool of IRs. Steering Committee Members serve a term of 3 years with no term limit. Their responsibilities include taking part in decision making and TAG operations, assisting in the RCPs, oversight of program management, and other administrative duties as needed. Members are required to have access to electronic communication and are encouraged to attend one meeting of the TAG each year. Officers are elected from the Steering Committee and by the Steering Committee and serve unlimited terms for as long as they sit on the Committee. Advisors to the TAG include SSP Coordinators, PMP Managers, and Studbook Keepers (if they are not elected to the Steering Committee) and specialists in Nutrition, Veterinary care, Education, Reproduction, and Field Conservation. Advisors are non-voting participants in TAG operations and management.
3: AZA Taxon Advisory chair handbook

TAG Definition:

The seven families Mustelidae, Viverridae, Procyonidae, Ailuridae, Mephitidae, Herpestidae and Eupleridae fall under the programs of the SCTAG. However the majority of these species have never been held in captivity nor are they likely to be obtained from the wild. A review of all species was performed and is contained in this document. A complete list of these species contained in the RCP can be found in Table 1. Domestic ferrets are well represented in AZA facilities. This domestic breed does not compete for space but is included in this review.

Mustelidae (wolverine, ferrets, badgers, and otters): there are 2 subfamilies, 22 genera and 59 species. Eleven species are represented for management under the TAG. These species are found in all land areas of the world except West Indies, Madagascar, Sulawesi and the Islands to the East, most of the Philippines, New Guinea, Australia, New Zealand, Antarctica, and most oceanic Islands.

Viverridae (civets, genets, and linsangs): there are 4 subfamilies, 15 genera and 35 species. Four species are represented for management under the TAG. These species are found in Southwestern Europe, Southern Asia, East Indies, Africa and Madagascar.

Procyonidae (raccoons, kinkajou, cacomistle, ringtail, coati): there are no subfamilies, 6 genera and 14 species. Four species are represented for management under the TAG. These 14 species are found in North and South America.

Herpestidae (mongoose and meerkat): there are no subfamilies, 14 genera and 33 species. Three species are represented for management under the TAG. Twenty- four species are found in Africa with 9 extending into Eurasia.

Eupleridae (Malagasy carnivores, fossa): there are two subfamilies, 7 genera and 8 species. One species is managed under the TAG.

Ailuridae (red panda): there is one genus, one species and two subspecies. Both subspecies are recommended for management under the TAG. They are found in Asia.

Mephitidae (skunks): there are no subfamilies, 4 genera and 12 species. There is 1 species represented for management under the TAG. They are found in North and South America.

TABLE 1: TAG Species List

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)
Red Panda	*Ailurus fulgens*	*Ailurus fulgens*	*Ailurus fulgens*
Asian small-clawed Otter	*Aonyx cinerea*	*Aonyx cinereus*	*Aonyx cinerea*
Black-footed Ferret	*Mustela nigripes*	*Mustela nigripes*	*Mustela nigripes*
Binturong	*Arctictis binturong*	*Arctictis binturong*	*Arctictis binturong*
Ringtail	*Bassariscus astutus*	*Bassariscus astutus*	*Bassariscus astutus*
Fossa	*Cryptoprocta ferox*	*Cryptoprocta ferox*	*Cryptoprocta ferox*
Wolverine	*Gulo gulo*	*Gulo gulo*	*Gulo gulo*
Dwarf Mongoose	*Helogale parvula*	*Helogale parvula*	*Helogale parvula*
North American River Otter	*Lontra canadensis*	*Lontra canadensis*	*Lontra canadensis*
Spotted-necked otter	*Lutra maculicollis*	*Hydrictis maculicollis*	*Lutra maculicollis*
Fisher	*Martes pennanti*	*Martes pennanti*	*Martes pennanti*
White-nosed coati (Northern)	*Nasua narica*	*Nasua narica*	*Nasua narica*
Kinkajou	*Potos flavus*	*Potos flavus*	*Potos flavus*
Giant Otter	*Pteronura brasiliensis*	*Pteronura brasiliensis*	*Pteronura brasiliensis*
Meerkat	*Suricata suricatta*	*Suricata suricatta*	*Suricata suricatta*
Tayra	*Eira barbara*	*Eira barbara*	*Eira barbara*
Small spotted genet	*Genetta genetta*	*Genetta genetta*	*Genetta genetta*
Striped skunk	*Mephitis mephitis*	*Mephitis mephitis*	*Mephitis mephitis*
Banded mongoose	*Mungos mungo*	*Mungos mungo*	*Mungos mungo*
Polecat/domestic ferret	*Mustela putorius*	*Mustela putorius furo*	*Mustela putorius*
Raccoon	*Procyon lotor*	*Procyon lotor*	*Procyon lotor*
American badger	*Taxidea taxus*	*Taxidea taxus*	*Taxidea taxus*
Marbled polecat	*Vormela peregusna*	*vormela peregusna*	*Vormela peregusna*
Owston's Palm Civet	*Chrotogale owstoni*	*Chrotogale owstoni*	*Chrotogale owstoni*
African clawless otter	*Aonyx capensis*	*Aonyx capensis*	*Aonyx capensis*
Three-striped palm civet	*Arctogalidia trivirgata*	*Arctogalidia trivirgata*	*Arctogalidia trivirgata*
Central American cacomistle	*Bassariscus sumichrasti*	*Bassariscus sumichrasti*	*Bassariscus sumichrasti*
African civet	*Civettictis civetta*	*Civettictis civetta*	*Civettictis civetta*
Large spotted genet	*Genetta tigrina*	*Genetta tigrina*	*Genetta tigrina*
Banded palm civet	*Hemigalus derbyanus*	*Hemigalus derbyanus*	*Hemigalus derbyanus*
American marten	*Martes americana*	*Martes americana*	*Martes americana*
Ermine	*Mustela erminea*	*Mustela erminea*	*Mustela erminea*
Steppe polecat	*Mustela eversmanii*	*Mustela eversmanii*	*Mustela eversmanii*
Long-tailed weasel	*Mustela frenata*	*Mustela frenata*	*Mustela frenata*

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)
Brown-nosed coati (Southern)	*Nasua nasua*	*Nasua nasua*	*Nasua nasua*
American mink	*Neovison vison*	*Neovison vison*	*Neovison vison*
Eastern spotted skunk	*Spilogale putorius*	*Spilogale putorius*	*Spilogale putorius*
Hog badger	*Arctonyx collaris*	*Arctonyx collaris*	*Arctonyx collaris*
Marsh mongoose	*Atilax paludinosus*	*Atilax paludinosus*	*Atilax paludinosus*
Allen's olingo	*Bassaricyon alleni*	*Bassaricyon alleni*	*Bassaricyon alleni*
Beddard's olingo	*Bassaricyon beddardi*	*Bassaricyon beddardi*	*Bassaricyon beddardi*
Olingo	*Bassaricyon gabbi*	*Bassaricyon gabbi*	*Bassaricyon gabbi*
Harris olingo	*Bassaricyon lasius*	*Bassaricyon lasius*	*Bassaricyon lasius*
Chiriqui olingo	*Bassaricyon pauli*	*Bassaricyon pauli*	*Bassaricyon pauli*
Bushy-tailed mongoose	*Bdeogale crassicauda*	*Bdeogale crassicauda*	*Bdeogale crassicauda*
Jackson's mongoose	*Bdeogale jacksoni*	*Bdeogale jacksoni*	*Bdeogale jacksoni*
Black-legged mongoose	*Bdeogale nigripes*	*Bdeogale nigripes*	*Bdeogale nigripes*
Molina's hog-nosed skunk	*Conepatus chinga*	*Conepatus chinga*	*Conepatus chinga*
Humboldt's hog-nosed snake	*Conepatus humboldtii*	*Conepatus humboldtii*	*Conepatus humboldtii*
American hog-nosed skunk	*Conepatus leuconotus*	*Conepatus leuconotus mesoleucus*	*Conepatus leuconotus*
Striped hog-nosed skunk	*Conepatus semistriatus*	*Conepatus semistriatus*	*Conepatus semistriatus*
Alexander's cusimanse	*Crossarchus alexandri*	*Crossarchus alexandri*	*Crossarchus alexandri*
Ansorge's cusimanse	*Crossarchus ansorgei*	*Crossarchus ansorgei*	*Crossarchus ansorgei*
Cusimanse	*Crossarchus obscurus*	*Crossarchus obscurus*	*Crossarchus obscurus*
Cameroon cusimanse	*Crossarchus platycephalus*	*Crossarchus platycephalus*	*Crossarchus platycephalus*
Yellow mongoose	*Cynictis penicillata*	*Cynictis penicillata*	*Cynictis penicillata*
Otter civet	*Cynogale bennettii*	*Cynogale bennettii*	*Cynogale bennettii*
Hose's palm civet	*not listed*	*Dipogale hosei*	*Dipogale hosei*
Pousargues' mongoose	*Dologale dybowskii*	*Dologale dybowskii*	*Dologale dybowskii*
Falanouc	*Eupleres goudotii*	*Eupleres goudotii*	*Eupleres goudotii*
Malagasy civet	*Fossa fossana*	*Fossa fossana*	*Fossa fossana*
Kaokoveld Slender mongoose	*Galarella flavescens*	*Galarella flavescens*	*Galarella flavescens*
Somalian Slender Mongoose	*Herpestes ochraceus*	*not listed*	*Galerella ochracea*
Cape grey mongoose	*Herpestes pulverulentus*	*not listed*	*Galarella pulverulentus*
Slender mongoose	*Herpestes sanguineus*	*Galarella sanguineus*	*Galarella sanguineus*
Grison	*Galictis vittata*	*Galictis vittata*	*Galictis vittata*
Lesser grison	*not listed*	*Galictus cuja*	*Galictus cuja*
Ring-tailed mongoose	*Galidia elegans*	*Galidia elegans*	*Galidia elegans*
Broad-striped mongoose	*Galidictis fasciata*	*Galidictis fasciata*	*Galidictis fasciata*

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)
Giant striped mongoose	*Galidictis grandidieri*	*Galidictis grandidieri*	*Galidictis grandidieri*
Abyssinian genet	*Genetta abyssinica*	*Genetta abyssinica*	*Genetta abyssinica*
Angolan genet	*Genetta angolensis*	*Genetta angolensis*	*Genetta angolensis*
Bourlon's genet	*Genetta bourloni*	*Genetta bourloni*	*Genetta bourloni*
Crested servaline genet	*not listed*	*Genetta cristata*	*Genetta cristata*
Johnston's genet	*Genetta johnstoni*	*Genetta johnstoni*	*Genetta johnstoni*
Central African Large-spotted Genet	*Genetta maculata*	*Genetta maculata*	*Genetta maculata*
West African Large-spotted genet	*Genetta pardina*	*Genetta pardina*	*Genetta pardina*
Aquatic genet	*not listed*	*Genetta piscivora*	*Genetta piscivora*
King genet	*not listed*	*Genetta poensis*	*Genetta poensis*
Servaline genet	*Genetta servalina*	*Genetta servalina*	*Genetta servalina*
Housa genet	*Genetta thierryi*	*Genetta thierryi*	*Genetta thierryi*
Giant Forest genet	*not listed*	*Genetta victoriae*	*Genetta victoriae*
Ethiopian dwarf mongoose	*Helogale hirtula*	*Helogale hirtula*	*Helogale hirtula*
Short-tailed mongoose	*Herpestes brachyurus*	*Herpestes brachyurus*	*Herpestes brachyurus*
Indian grey mongoose	*Herpestes edwardsii*	*Herpestes edwardsii*	*Herpestes edwardsii*
Indian brown mongoose	*Herpestes fuscus*	*Herpestes fuscus*	*Herpestes fuscus*
Large grey mongoose	*Herpestes ichneumon*	*Herpestes ichneumon*	*Herpestes ichneumon*
Small Asian Mongoose	*Herpestes javanicus*	*Herpestes javanicus*	*Herpestes javanicus*
Long-nosed mongoose	*Herpestes naso*	*Herpestes naso*	*Herpestes naso*
Collared mongoose	*Herpestes semitorquatus*	*Herpestes semitorquatus*	*Herpestes semitorquatus*
Ruddy mongoose	*Herpestes smithii*	*Herpestes smithii*	*Herpestes smithii*
Crab-eating mongoose	*Herpestes urva*	*Herpestes urva*	*Herpestes urva*
Stripe-necked mongoose	*Herpestes vitticollis*	*Herpestes vitticollis*	*Herpestes vitticollis*
White-tailed mongoose	*Ichneumia albicauda*	*Ichneumia albicauda*	*Ichneumia albicauda*
Saharan striped weasel	*not listed*	*Ictonyx libyca libyca*	*Ictonyx libyca*
Zorilla	*Ictonyx striatus*	*Ictonyx striatus*	*Ictonyx striatus*
Liberian mongoose	*Liberiictis kuhni*	*Liberiictis kuhni*	*Liberiictis kuhni*
Marine otter	*Lontra felina*	*Lontra felina*	*Lontra felina*
Neotropical otter	*Lontra longicaudis*	*Lontra longicaudis*	*Lontra longicaudis*
European otter	*Lutra lutra*	*Lutra lutra*	*Lutra lutra*
Japanese otter	*not listed*	*not listed*	*Lutra nippon*
Southern River otter	*Lutra provocax*	*not listed*	*Lutra provocax*
Hairy-nosed otter	*Lutra sumatrana*	*Lutra sumatrana*	*Lutra sumatrana*
Smooth-coated otter	*Lutrogale perspicillata*	*Lutrogale perspicillata*	*Lutrogale perspicillata*

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)
Patagonian weasel	*Lyncodon patagonicus*	*Lyncodon patagonicus*	*Lyncodon patagonicus*
Sulawesi palm civet	*Macrogalidia musschenbroekii*	*Macrogalidia musschenbroekii*	*Macrogalidia musschenbroekii*
Yellow throated marten	*Martes flavigula*	*Martes flavigula*	*Martes flavigula*
Stone Marten	*Martes foina*	*Martes foina*	*Martes foina*
Nilgiri Marten	*not listed*	*Martes gwatkinsi*	*Martes gwatkinsi*
Pine marten	*Martes martes*	*Martes martes*	*Martes martes*
Japanese marten	*Martes melampus*	*Martes melampus*	*Martes melampus*
Japanese sable	*Martes zibellina*	*Martes zibellina*	*Martes zibellina*
Japanese badger	*Meles anakuma*	*Meles meles anakuma*	*Meles anakuma*
Asian badger	*Meles leucurus*	*Meles meles leucurus*	*Meles leucurus*
Eurasian badger	*Meles meles*	*Meles meles*	*Meles meles*
Honey Badger	*Mellivora capensis*	*Mellivora capenses*	*Mellivora capensis*
Everett's ferret badger	*not listed*	*Melogale everetti*	*Melogale everetti*
Chinese ferret badger	*Melogale moschata*	*Melogale moschata*	*Melogale moschata*
Javan ferrett badger	*Melogale orientalis*	*Melogale orientalis*	*Melogale orientalis*
Burmese ferret badger	*not listed*	*Melogale personata*	*Melogale personata*
Hooded skunk	*Mephitis macroura*	*Mephitis macroura*	*Mephitis macroura*
Gambian mongoose	*Mungos gambianus*	*Mungos gambianus*	*Mungos gambianus*
Narrow-striped mongoose	*Mungotictis decemlineata*	*Mungotictis decemlineata*	*Mungotictis decemlineata*
Amazon weasel	*Mustela africana*	*Mustela africana*	*Mustela africana*
Mountain weasel	*Mustela altaica*	*Mustela altaica*	*Mustela altaica*
Columbian weasel	*Mustela felipei*	*Mustela felipei*	*Mustela felipei*
Japanese weasel	*Mustela itatsi*	*Mustela itatsi*	*Mustela itatsi*
Yellow-bellied weasel	*Mustela kathiah*	*Mustela kathiah*	*Mustela kathiah*
European mink	*Mustela lutreola*	*Mustela lutreola*	*Mustela lutreola*
Indonesian Mountain weasel	*Mustela lutreolina*	*Mustela lutreolina*	*Mustela lutreolina*
Least weasel	*Mustela nivalis*	*Mustela nivalis*	*Mustela nivalis*
Malaysian weasel	*not listed*	*Mustela nudipes*	*Mustela nudipes*
Siberian weasel	*Mustela sibirica*	*Mustela sibirica*	*Mustela sibirica*
Black striped weasel	*not listed*	*Mustela strigidorsa*	*Mustela strigidorsa*
Egyptian weasel	*Mustela subpalmata*	*Mustela subpalmata*	*Mustela subpalmata*
Sunda Stink badger	*Mydaus javanensis*	*Mydaus javanensis*	*Mydaus javanensis*
Palawan stink badger	*Mydaus marchei*	*Mydaus marchei*	*Mydaus marchei*
African palm civet	*Nandinia binotata*	*Nandinia binotata*	*Nandinia binotata*
Mountain coati	*Nasuella olivacea*	*Nasuella olivacea*	*Nasuella olivacea*

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)
Sea mink	*Neovision macrodon*	*Neovision macrodon*	*Neovision macrodon*
Masked palm civet	*Paguma larvata*	*Paguma larvata*	*Paguma larvata*
Selous meerkat	*not listed*	*Paracynictis selousi*	*Paracynictis selousi*
Common palm civet	*Paradoxurus hermaphroditus*	*Paradoxurus hermaphroditus*	*Paradoxurus hermaphroditus*
Jerdon's palm civet	*Paradoxurus jerdonii*	*Paradoxurus jerdonii*	*Paradoxurus jerdonii*
Golden palm civet	*Paradoxurus zeylonensis*	*Paradoxurus zeylonensis*	*Paradoxurus zeylonensis*
White-naped weasel	*not listed*	*Poecilogale albinucha*	*Poecilogale albinucha*
Leighton's linsang	*Poiana leightoni*	*Poiana leightoni*	*Poiana leightoni*
African linsang	*Poiana richardsonii*	*Poiana richardsonii*	*Poiana richardsonii*
Banded linsang	*Prionodon linsang*	*Prionodon linsang*	*Prionodon linsang*
Spotted linsang	*Prionodon pardicolor*	*Prionodon pardicolor*	*Prionodon pardicolor*
Crab-eating raccoon	*not listed*	*Procyon cancrivorous*	*Procyon cancrivorous*
Cozumel raccoon	*Procyon pygmaeus*	*Procyon pygmaeus*	*Procyon pygmaeus*
Meller's mongoose	*Rhynchogale melleri*	*Rhynchogale melleri*	*Rhynchogale melleri*
Brown-tailed mongoose	*Salanoia concolor*	*Salanoia concolor*	*Salanoia concolor*
Southern spotted skunk	*Spilogale angustifrons*	*Spilogale angustifrons*	*Spilogale angustifrons*
Western spotted skunk	*Spilogale gracilis*	*Spilogale gracilis*	*Spilogale gracilis*
Pygmy spotted skunk	*Spilogale pygmaea*	*Spilogale pygmaea*	*Spilogale pygmaea*
Malabar civet	*Viverra civettina*	*Viverra civettina*	*Viverra civettina*
Large spotted civet	*not listed*	*Viverra megaspila*	*Viverra megaspila*
Malay civet	*Viverra tangalunga*	*Viverra tangalunga*	*Viverra tangalunga*
Large Indian civet	*Viverra zibetha*	*Viverra zibetha*	*Viverra zibetha*
Small Indian civet	*Viverricula indica*	*Viverricula indica*	*Viverricula indica*

not listed in ISIS
not listed on IUCN

2: Mammal Species of the World, 3rd edition, Wilson & Reeder, 2005

REGIONAL COLLECTION PLAN Development

TABLE 2: Recommendations Summary

Common Name	Mgmt Status	Wilson & Reeder (2)	3 year Pop.	Program Role	Program Leader	Institution	Phone	e-mail
Red Panda	SSP	*Ailurus fulgens fulgens & Ailurus fulgens refulgens*	249	Education/Display	Sarah Glass	Knoxville Zoo	865-216-2243	sglass@knoxville-zoo.org
Asian small-clawed Otter	SSP	*Aonyx cinerea*	250	Conservation Support	Dusty Lombardi	Columbus Zoo	614-645-3458	Dusty.lombardi@columbus
Black-footed Ferret	SSP	*Mustela nigripes*	350	Conservation Support	Della Garelle	Cheyenne Mountain	719-633-9925	dgarelle@cmzoo.org
Spotted-necked otter	SSP	*Lutra maculicollis*	27	Education/Display	Randi Meyerson	Toledo Zoo	419-385-5721	randi@toledozoo.org
Giant Otter	SSP	*Pteronura brasiliensis*	34	Flag Ship	Kim Lengel	Philadelphia Zoo	215-243-5244	lengel.kim@phillyzoo.org
Binturong	PMP	*Arctictis binturong*	73	Education/Display	Tim Hrynewycz	Wild Animal Kingdom	407-939-6382	tim.a.hyrnewycz@disney.c
Ringtail	PMP	*Bassariscus astutus*	50	Education/Display	Debbie Thompson	Little Rock Zoo	501-661-7206	dthompson@littlerock.org
Fossa	PMP	*Cryptoprocta ferox*	62	Flagship	Mandi Olsen	Omaha Zoo	402-738-2026	fossa@omahazoo.org
Wolverine	PMP	*Gulo gulo*	40	Education/Display	Chris Kline	Minnesota Zoo	952-431-9328	chris.kline@state.mn.us
Dwarf Mongoose	PMP	*Helogale parvula*	93	Education/Display	Christine Mcknight	Minnesota Zoo	952-431-9464	christine.mcknight@state.m
North American river otter	PMP	*Lontra canadensis*	312	Education/Display	David Hamilton	Seneca Park Zoo	585-336-2502	dhamilton@monroecounty.
Fisher	PMP	*Martes pennanti*	29	Education/Display	Margaret Dwyer	Rosamond Gifford Zoo	315-435-8511	mlouer2@twcny.rr.com
White-nosed coati (Northern)	PMP	*Nasua narica*	143	Education/Display	Cindy Colling	Detroit Zoo	248-541-5717	ccolling@detroitzoo.org
Kinkajou	PMP	*Potos flavus*	78	Education/Display	Liz Toth	Boonshoft Museum	937-275-7431	ltoth@boonshoftmuseum.o
Meerkat	PMP	*Suricata suricatta*	654	Education/Display	Katie Kimble	Toledo Zoo	419-385-5721	katie.kimble@toledozoo.org
Tayra	DERP	*Eira barbara*	14	Education/Display	Sue Booth Binczik	Dallas Zoo	214-671-0777	Sue.boothbinczik@dallasci
Striped skunk	DERP	*Mephitis mephitis*	64	Education/Display				
Banded mongoose	DERP	*Mungos mungo*	31	Education/Display				
Polecat/domestic ferret	DERP	*Mustela putorius*	39	Education/Display				
Raccoon	DERP	*Procyon lotor*	82	Education/Display				
American badger	DERP	*Taxidea taxus*	31	Education/Display				
Owston's Palm Civet	Species of Interest	*Chrotogale owstoni*	8	In Situ Focus	Pete Riger	Houston Zoo	713-533-6745	priger@houstonzoo.org

All SSP & PMP 3-5 year populations were taken from a combination of the Space Survey and the PMC. All DERPs and Species of Interest 3-5 year populations were taken strictly from the Space Survey

TABLE 3: Conservation Status of Managed Species

Common Name	Mgmt Status	IUCN Taxa	ISIS Taxa	Wilson & Reeder (2)	Red List	CITES	USFWS
Red Panda	SSP	*Ailurus fulgens fulgens & Ailurus fulgens refulgens*	*Ailurus fulgens fulgens & Ailurus fulgens refulgens*	*Ailurus fulgens fulgens & Ailurus fulgens refulgens*	Vulnerable	Appendix I	
Asian small-clawed Otter	SSP	*Aonyx cinerea*	*Aonyx cinereus*	*Aonyx cinerea*	Vulnerable	Appendix II	
Black-footed Ferret	SSP	*Mustela nigripes*	*Mustela nigripes*	*Mustela nigripes*	Endangered		Endangered
Spotted-necked otter	SSP	*Lutra maculicollis*	*Hydrictis maculicollis*	*Lutra maculicollis*	Least Concern	Appendix II	
Giant Otter	SSP	*Pteronura brasiliensis*	*Pteronura brasiliensis*	*Pteronura brasiliensis*	Endangered	Appendix I	Endangered
Binturong	PMP	*Arctictis binturong*	*Arctictis binturong*	*Arctictis binturong*	Vulnerable	Appendix III, India	
Ringtail	PMP	*Bassariscus astutus*	*Bassariscus astutus*	*Bassariscus astutus*	Least Concern		
Fossa	PMP	*Cryptoprocta ferox*	*Cryptoprocta ferox*	*Cryptoprocta ferox*	Vulnerable	Appendix II	
Wolverine	PMP	*Gulo gulo*	*Gulo gulo*	*Gulo gulo*	Near Threatened		
Dwarf Mongoose	PMP	*Helogale parvula*	*Helogale parvula*	*Helogale parvula*	Least Concern		
North American river otter	PMP	*Lontra canadensis*	*Lontra canadensis*	*Lontra canadensis*	Least Concern	Appendix II	
Fisher	PMP	*Martes pennanti*	*Martes pennanti*	*Martes pennanti*	Least Concern		
White-nosed coati (Northern)	PMP	*Nasua narica*	*Nasua narica*	*Nasua narica*	Least Concern	Appendix III, Honduras	
Kinkajou	PMP	*Potos flavus*	*Potos flavus*	*Potos flavus*	Least Concern		
Meerkat	PMP	*Suricata suricatta*	*Suricata suricatta*	*Suricata suricatta*	Least Concern		
Tayra	DERP	*Eira barbara*	*Eira barbara*	*Eira barbara*	Least Concern	Appendix III, Honduras	
Striped skunk	DERP	*Mephitis mephitis*	*Mephitis mephitis*	*Mephitis mephitis*	Least Concern		
Banded mongoose	DERP	*Mungos mungo*	*Mungos mungo*	*Mungos mungo*	Least Concern		
Polecat/domestic ferret	DERP	*Mustela putorius*	*Mustela putorius furo*	*Mustela putorius*	Least Concern		
Raccoon	DERP	*Procyon lotor*	*Procyon lotor*	*Procyon lotor*	Least Concern		
American badger	DERP	*Taxidea taxus*	*Taxidea taxus*	*Taxidea taxus*	Least Concern		
Owston's Palm Civet	Species of Interest	*Chrotogale owstoni*	*Chrotogale owstoni*	*Chrotogale owstoni*	Vulnerable		

Species Selection Process:

The SCTAG Steering Committee makes its species selection and determines the management needs for the species included in the RCP by using the Space Survey (Table 4), Decision Tree (Table 5) , current Studbook and ISIS data (Table 9), and the Target Population Size Analysis meeting with the PMC.

Space Analysis

A space assessment survey was conducted and completed by Danny Morris of Omaha's Henry Doorly Zoo in March of 2009. A space survey was distributed electronically to 220 AZA accredited institutions and related facilities. The responses from this survey were analyzed to determine the amount of space that is currently available and that will be available in the future to manage small carnivores. 181 AZA institutions responded to the survey, which represents 82.3% of those surveyed.

Results indicated that in 2009 there were 1083 spaces being occupied by Small Carnivores in AZA institutions. Within the next 2-10 years the survey results indicated that maximum capacity would increase within AZA institutions to 1347 spaces (increase of 291 spaces). Results from the 2009 Space Survey can be found in the Space Survey Summary (Table 4).

TABLE 4: Space Survey Summary

	Number Animal Now	Display Spaces Now	Holding Spaces Now	Space Now	Number Animal Future	Display Spaces Future	Holding Spaces Future	Space Future	Animals Difference Now & Future	Space Difference Now & Future
SSP										
Red Panda	139	80	52	132	245	106	72	178	106	46
Asian Small-Clawed Otter	143	45	29	74	193	61	36	92	50	18
Black-footed Ferret	143	15	126	141	157	25	151	176	14	35
Total:	425	140	207	347	595	192	259	446	170	99
PMP										
N.A. River Otter	232	117	72	189	312	140	87	228	80	39
Giant Otter	11	3	0	3	34	10	22	32	23	29
Ringtail	40	26	18	44	47	27	14	41	7	-3
White-nosed Coati (Northern)	81	34	16	50	94	40	19	59	13	9
Kinkajou	59	17	41	58	59	20	38	58	0	0
Binturong	44	23	22	45	73	36	30	66	29	21
Dwarf Mongoose	61	9	11	20	83	11	10	21	22	1
Meerkat	399	72	23	95	654	92	38	130	255	35

	Number Animal Now	Display Spaces Now	Holding Spaces Now	Space Now	Number Animal Future	Display Spaces Future	Holding Spaces Future	Space Future	Animals Difference Now & Future	Space Difference Now & Future
Wolverine	18	12	9	21	36	20	15	35	18	14
Fossa	36	17	17	34	52	30	18	48	16	14
Fisher	10	6	6	12	29	15	8	23	19	11
Spotted-necked Otter	19	5	6	11	23	6	7	13	4	2
Total:	1010	341	241	582	1496	447	306	754	486	172
	Number Animal Now	Display Spaces Now	Holding Spaces Now	Space Now	Number Animal Future	Display Spaces Future	Holding Spaces Future	Space Future	Animals Difference Now & Future	Space Difference Now & Future
DERP										
Raccoon	70	30	21	51	82	38	25	63	12	12
Striped Skunk	47	17	22	39	64	29	29	58	17	19
Polecat	39	7	24	31	39	7	27	34	0	3
Badger	20	16	9	24	31	23	10	32	11	8
Tayra	11	7	4	11	14	8	7	15	3	4
Banded Mongoose	25	2	0	2	31	3	1	4	6	2
Total:	212	79	80	158	261	108	99	206	49	48
Species of Interest										
Owston's Palm Civet	0	0	0	0	8	5	4	9	8	9

All criteria from the original selection process in 1999 were used in the tree with the exception of Taxonomic Uniqueness as in the 2005 RCP. The Steering Committee felt that this was not relevant to this TAG.
All 162 species of small carnivores were put through the Decision Tree.

Species Selection Criteria:

The Steering Committee utilized the Decision Tree from the 2005 RCP which incorporated the information from the previous RCP (2000). The filters used are:

- Population exists in North America
- Current population is viable (potential exist for population capable of growing or sustainable source)
- If population is not viable is there sufficient potential recruitment and interest
- Species is a cornerstone or flagship species and an initiative is under way
- Species exhibits significant conservation value for North American zoos' collection plans or range country programs
- Species has considerable education, or regional exhibit value for North American zoos' collection plans or range country programs
- Species has scientific/ research value that could benefit range country captive breeding or *in situ* conservation programs.
- Species status – numerical values assigned.

Not Recommended (NR)	0
Phase Out (PO)	1 to 3
DERP	4 to 7
PMP	8 to 12
SSP	13 to 16

The following steps are an explanation of how the decision tree was applied to each taxon.

Step 1. Does the species exist in North America? If **Yes**, go to second box. If **No**, does a potential exist for a viable population? If **Yes**, go the next box. If **No**, the species is NOT RECOMMENDED.

Step 2. Each species was evaluated by using 2 to 6 criteria depending upon the answers to each step.

Step 3. Management levels were assigned based on numerical sum of criteria values:
Rank of 13 or higher= SSP, Rank of 8 to 12 = PMP or Species of Interest, Rank of 4 to 7 =DERP, Rank of 1 to 3 = Phase out

TABLE 5 Decision Tree

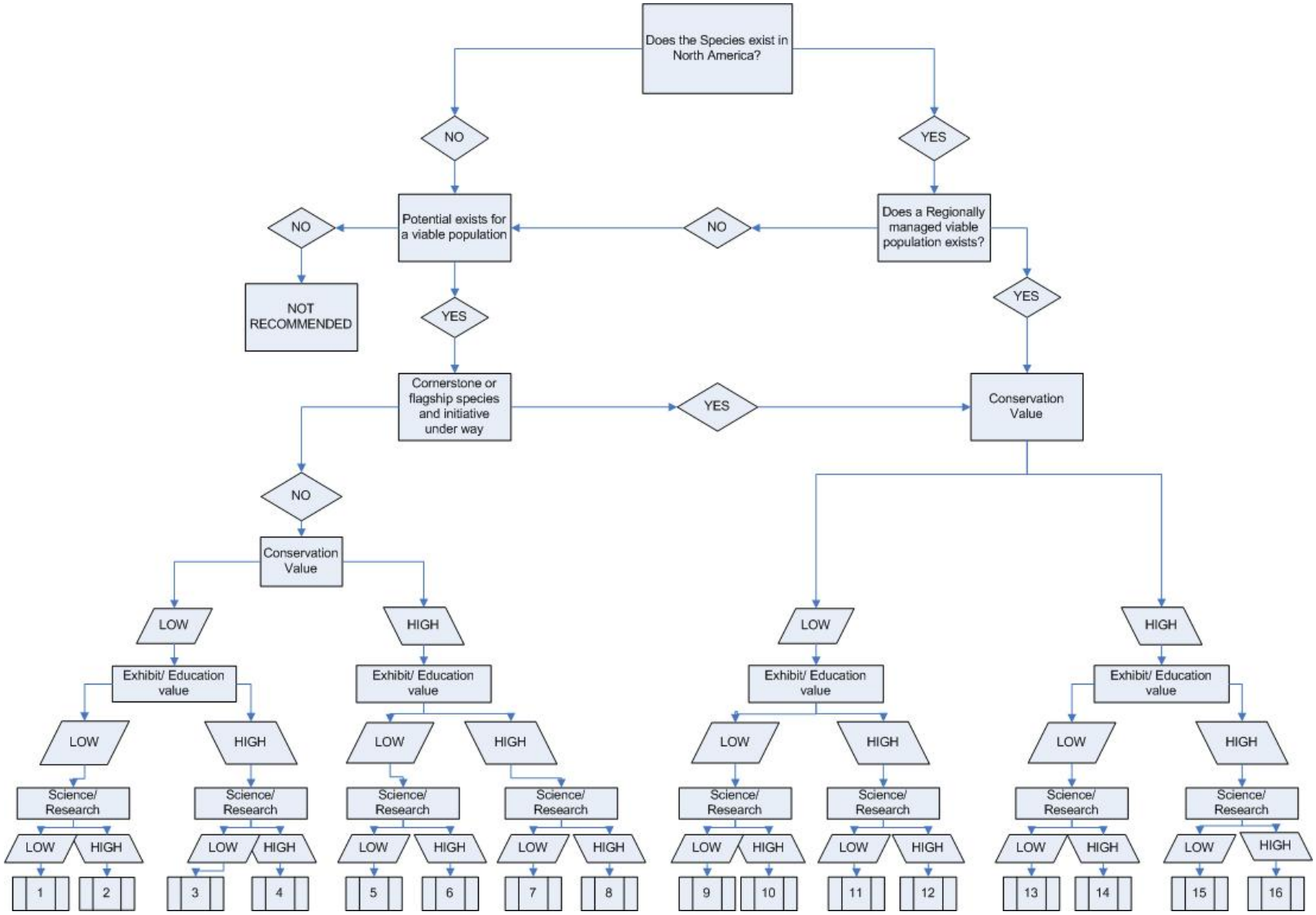

TABLE 6: Taxa Ranking

I - Population exists in North America

II - Current population is viable

III - If population is not currently viable there is sufficient potential recruitment and interest.

IV - Species is a cornerstone or flagship species and an initiative is under way.

V - Species exhibits significant conservation value for *in situ* programs and range country initiatives.

VI - Species has considerable education, or regional exhibit value for North American zoos collection plans or range country programs.

VII - Species has scientific/research value that could benefit range country captive breeding or i*n situ* programs.

Common Name	I	II	III	IV	V	VI	VII	Value	Management level
Red Panda	Y	Y	NA	NA	H	H	H	16	SSP
Asian small-clawed otter	Y	Y	NA	NA	H	H	H	16	SSP
Black-footed ferret	Y	Y	NA	NA	H	H	H	16	SSP
Spotted-necked otter	Y	Y	NA	NA	H	H	H	16	SSP☆
Giant Otter	Y	N	Y	Y	H	H	H	16	SSP☆
Binturong	Y	Y	NA	NA	L	H	H	12	PMP
Ringtail	Y	Y	NA	NA	L	H	L	11	PMP
Fossa	Y	N	Y	Y	H	H	H	16*	PMP
Wolverine	Y	N	Y	N	H	H	H	8	PMP
Dwarf mongoose	Y	Y	NA	NA	L	H	L	11	PMP
North american otter	Y	N	Y	Y	L	H	H	12	PMP
Fisher	Y	Y	NA	NA	L	L	H	10	PMP
White-nosed coati (Northern)	Y	Y	NA	NA	L	H	L	11	PMP
Kinkajou	Y	Y	NA	NA	L	H	L	11	PMP
Meerkat	Y	Y	NA	NA	L	H	L	11	PMP
Tayra	Y	N	Y	N	L	H	H	4	DERP
Striped skunk	Y	N	Y	N	H	H	L	7	DERP

Explanation of changes to the Taxa Ranking Table

* - Fossa: Although this species received a ranking of 16 on the decision tree, the current founder population size would need to increase before elevating it to an SSP status. There is an international studbook keeper and the studbook is always current. The population could be managed internationally. Received a ranking of PMP on the Management Criteria table (TABLE 8)

** - Owston's palm civet: This species was designated as a "Phase In" in the previous RCP, since that time there have been changes in the management of the animals in Vietnam (Cuc Phong). There is no longer a breeding program and it is unlikely that animals will be exported in the near future. Since there is an *in situ* conservation program in place in Vietnam this species will be a Species of Interest for the TAG.

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VII - Species has scientific/research value that could benefit range country captive breeding or i*n situ* programs.

Common Name	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**Value**	**Management level**
Banded mongoose	Y	N	Y	N	L	H	H	4	DERP☆
Polecat/domestic ferret	Y	N	Y	N	L	H	H	4	DERP
Raccoon	Y	N	Y	N	L	H	H	4	DERP
American badger	Y	N	Y	N	L	H	H	4	DERP
Owston's palm civet	N	Y	Y	Y	L	H	H	12**	Species of Interest☆
African clawless otter	Y	N	N	N	L	L	L	1	PO ☆
Three-striped palm civet	Y	N	Y	N	L	H	L	3	PO
Central American cacomistle	Y	N	N	N	L	L	L	1	PO
African civet	Y	N	Y	N	L	L	L	1	PO
Large spotted genet	Y	N	Y	N	L	L	L	1	PO
Banded palm civet	Y	N	N	N	L	H	L	3	PO
American marten	Y	N	N	N	L	L	H	2	PO
Ermine	Y	N	Y	N	L	L	L	1	PO
Steppe polecat	Y	N	Y	N	L	L	L	1	PO
Long-tailed weasel	Y	N	Y	N	L	L	L	1	PO
Brown-nosed coati (Southern)	Y	N	N	N	L	L	L	1	PO
American mink	Y	N	Y	N	L	L	L	1	PO
Eastern spotted skunk	Y	N	Y	N	L	H	L	3	PO

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VII - Species has scientific/research value that could benefit range country captive breeding or i*n situ* programs.

Common Name	I	II	III	IV	V	VI	VII	Value	Management level
Small spotted genet	Y	N	N						NR☆
Marbled polecat	Y	N	N						NR
Hog badger	N	N	N						NR
Marsh mongoose	N	N	N						NR
Allen's olingo	N	N	N						NR
Beddard's olingo	N	N	N						NR
Olingo	N	N	N						NR
Harris olingo	N	N	N						NR
Chiriqui olingo	N	N	N						NR
Bushy-tailed mongoose	N	N	N						NR
Jackson's mongoose	N	N	N						NR
Black-legged mongoose	N	N	N						NR
Molina’s hog-nosed skunk	N	N	N						NR
Humboldt’s hog-nosed skunk	N	N	N						NR
American hog-nosed skunk	N	N	N						NR
Striped hog-nosed skunk	N	N	N						NR
Alexander’s cusimanse	N	N	N						NR
Ansorge’s cusimanse	N	N	N						NR

Explanation of changes to the Taxa Ranking Table

* - Fossa: Although this species received a ranking of 16 on the decision tree, the current founder population size would need to increase before elevating it to an SSP status. There is an international studbook keeper and the studbook is always current. The population could be managed internationally. Received a ranking of PMP on the Management Criteria table (TABLE 8)

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Common Name	I	II	III	IV	V	VI	VII	Value	Management level
Cusimanse	N	N	N						NR☆
Cameroon cusimanse	N	N	N						NR
Yellow mongoose	N	Y	N						NR
Otter civet	N	N	N						NR
Hose's palm civet	N	N	N						NR
Pousargues' mongoose	N	N	N						NR
Falanouc	N	N	N						NR
Malagasy civet	N	N	N						NR
Kaokoveld slender mongoose	N	N	N						NR
Somalian slender mongoose	N	N	N						NR
Cape grey mongoose	N	N	N						NR
Slender mongoose	N	N	N						NR
Grison	N	N	N						NR
Lesser grison	N	N	N						NR
Ring-tailed mongoose	Y	N	N						NR
Broad-striped mongoose	N	N	N						NR
Giant striped mongoose	N	N	N						NR
Abyssinian genet	N	N	N						NR☆

Explanation of changes to the Taxa Ranking Table

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** - Owston's palm civet: This species was designated as a "Phase In" in the previous RCP, since that time there have been changes in the management of the animals in Vietnam (Cuc Phong). There is no longer a breeding program and it is unlikely that animals will be exported in the near future. Since there is an *in situ* conservation program in place in Vietnam this species will be a Species of Interest for the TAG.

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VII - Species has scientific/research value that could benefit range country captive breeding or i*n situ* programs.

Common Name	I	II	III	IV	V	VI	VII	Value	Management level
Angolan genet	N	N	N						NR
Bourlon's genet	N	N	N						NR
Crested servaline genet	N	N	N						NR
Johnston's genet	N	N	N						NR
Central African Large-spotted Genet	N	N	N						NR
West African Large-spotted genet	N	N	N						NR
Aquatic genet	N	N	N						NR
King genet	N	N	N						NR
Servaline genet	N	N	N						NR
Housa genet	N	N	N						NR
Giant forest genet	N	N	N						NR
Ethiopian dwarf mongoose	N	N	N						NR
Short-tailed mongoose	N	N	N						NR
Indian grey mongoose	N	N	N						NR
Indian brown mongoose	N	N	N						NR
Large grey mongoose	N	N	N						NR
Small Asian mongoose	N	N	N						NR
Long-nosed mongoose	N	N	N						NR

Explanation of changes to the Taxa Ranking Table

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VII - Species has scientific/research value that could benefit range country captive breeding or i*n situ* programs.

Common Name	I	II	III	IV	V	VI	VII	Value	Management level
Collared mongoose	N	N	N						NR
Ruddy mongoose	N	N	N						NR
Crab-eating mongoose	N	N	N						NR
Stripe-necked mongoose	N	N	N						NR
White-tailed mongoose	N	N	N						NR
Saharan striped weasel	N	N	N						NR
Zorilla	N	N	N						NR
Liberian mongoose	N	N	N						NR
Marine otter	N	N	N						NR
Neotropical otter	N	N	N						NR
European otter	N	Y	N						NR☆
Japanese otter	N	N	N						NR
Southern river otter	N	N	N						NR
Hairy-nosed otter	N	N	N						NR
Smooth-coated otter	N	N	N						NR
Patagonian weasel	N	N	N						NR
Sulawesi palm civet	N	N	N						NR
Yellow-throated marten	N	N	N						NR

Explanation of changes to the Taxa Ranking Table

* - Fossa: Although this species received a ranking of 16 on the decision tree, the current founder population size would need to increase before elevating it to an SSP status. There is an international studbook keeper and the studbook is always current. The population could be managed internationally. Received a ranking of PMP on the Management Criteria table (TABLE 8)

** - Owston's palm civet: This species was designated as a "Phase In" in the previous RCP, since that time there have been changes in the management of the animals in Vietnam (Cuc Phong). There is no longer a breeding program and it is unlikely that animals will be exported in the near future. Since there is an *in situ* conservation program in place in Vietnam this species will be a Species of Interest for the TAG.

☆ - Changes from 2005 RCP, explanation in Table 11.

I - Population exists in North America
II - Current population is viable
III - If population is not currently viable there is sufficient potential recruitment and interest.
IV - Species is a cornerstone or flagship species and an initiative is under way.
V - Species exhibits significant conservation value for *in situ* programs and range country initiatives.
VI - Species has considerable education, or regional exhibit value for North American zoos collection plans or range country programs.
VII - Species has scientific/research value that could benefit range country captive breeding or i*n situ* programs.

Common Name	I	II	III	IV	V	VI	VII	Value	Management level
Stone marten	N	Y	N						NR
Niligiri marten	N	N	N						NR
Pine marten	N	Y	N						NR
Japanese marten	N	N	N						NR
Japanese sable	N	N	N						NR
Japanese badger	N	N	N						NR
Asian badger	N	N	N						NR
Eurasian badger	N	Y	N						NR
Honey badger	Y	N	N						NR
Everett's ferret badger	N	N	N						NR
Small tooth ferret badger	N	N	N						NR
Javan ferret badger	N	N	N						NR
Burmese ferret badger	N	N	N						NR
Hooded skunk	N	N	N						NR
Gambian mongoose	N	N	N						NR
Narrow-striped mongoose	Y	N	N						NR
Amazon weasel	N	N	N						NR
Mountain weasel	N	N	N						NR

Explanation of changes to the Taxa Ranking Table

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VII - Species has scientific/research value that could benefit range country captive breeding or i*n situ* programs.

Common Name	I	II	III	IV	V	VI	VII	Value	Management level
Columbian weasel	N	N	N						NR
Japanese weasel	N	N	N						NR
Yellow-bellied weasel	N	N	N						NR
European mink	N	Y	N						NR
Indonesian mountain weasel	N	N	N						NR
Least weasel	N	N	N						NR
Malaysian weasel	N	N	N						NR
Siberian weasel	N	Y	N						NR
Black striped weasel	N	N	N						NR
Egyptian weasel	N	N	N						NR
Sunda stink badger	N	N	N						NR
Palawan stink badger	N	N	N						NR
African palm civet	N	N	N						NR
Mountain coati	N	N	N						NR
Sea mink	N	N	N						NR
Masked palm civet	N	N	N						NR☆
Selous meerkat	N	N	N						NR
Common palm civet	N	N	N						NR

Explanation of changes to the Taxa Ranking Table

* - Fossa: Although this species received a ranking of 16 on the decision tree, the current founder population size would need to increase before elevating it to an SSP status. There is an international studbook keeper and the studbook is always current. The population could be managed internationally. Received a ranking of PMP on the Management Criteria table (TABLE 8)

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VI - Species has considerable education, or regional exhibit value for North American zoos collection plans or range country programs.
VII - Species has scientific/research value that could benefit range country captive breeding or i*n situ* programs.

Common Name	I	II	III	IV	V	VI	VII	Value	Management level
Jerdon's palm civet	N	N	N						NR
Golden palm civet	N	N	N						NR
White-naped weasel	N	N	N						NR
Leighton's linsang	N	N	N						NR
African linsang	N	N	N						NR
Banded linsang	N	N	N						NR☆
Spotted linsang	N	N	N						NR
Crab-eating raccoon	N	N	N						NR
Cozumel raccoon	N	N	N						NR
Meller's mongoose	N	N	N						NR
Brown-tailed mongoose	N	N	N						NR
Southern spotted sunk	N	N	N						NR
Western spotted skunk	N	N	N						NR
Pygmy spotted skunk	N	N	N						NR
Malabar civet	Y	N	N						NR
Large spotted civet	N	N	N						NR
Malay civet	N	Y	N						NR
Large Indian civet	N	N	N						NR
Small Indian civet	N	N	N						NR

Explanation of changes to the Taxa Ranking Table

* - Fossa: Although this species received a ranking of 16 on the decision tree, the current founder population size would need to increase before elevating it to an SSP status. There is an international studbook keeper and the studbook is always current. The population could be managed internationally. Received a ranking of PMP on the Management Criteria table (TABLE 8)

** - Owston's palm civet: This species was designated as a "Phase In" in the previous RCP, since that time there have been changes in the management of the animals in Vietnam (Cuc Phong). There is no longer a breeding program and it is unlikely that animals will be exported in the near future. Since there is an *in situ* conservation program in place in Vietnam this species will be a Species of Interest for the TAG.

☆ - Changes from 2005 RCP, explanation in Table 11.

Management Assessment Criteria

The taxa that were selected for management in the 2005 RCP were then assessed using the following WCMC Management Assessment Criteria (MAC) to assist in determining the type of management program to recommend.

1. What is the availability of the taxon in AZA collections?
2. What is the availability of the taxon outside AZA collections?
3. What is the extinction risk for the taxon within AZA collections if it is not managed?
4. What is the extinction risk for the taxon within AZA collections if it is managed?
5. What is the demand for the taxon within AZA collections?
6. What is the institutional commitment to the taxon within AZA membership?
7. How easy is it to breed the taxon?
8. What is the extinction risk for the taxon in the wild?
9. What are the acquisition costs for this taxon?
10. What are the program costs for this taxon?
11. Is there an international conservation/management program for this taxon?
12. What type of link would a management program have to conservation of this taxon in the wild?
13. Is there a North American governmental conservation program associated with this taxon?

In 2009 the Steering Committee evaluated each program using the above questions and the table on the following page.

Responses were recorded as:

E = No management/DERP
P = PMP
S = SSP
NA = Not Applicable
SI = Species of Interest

The program's previous status is listed at the top of the column. The total number of each response (E, P, or S) was tallied and the largest total is listed at the bottom of the column. For example, Wolverine received 6 PMP responses and 5 SSP responses so the MAC recommends PMP, which agrees with the existing program status.

Management Assessment Criteria for Recommended Taxa

TABLE 7

CRITERIA	SSP	PMP	No Management (DERP/PHASE IN)
Availability within AZA	LOW	MODERATE	EXTREMES**
Availability outside AZA	LOW	MODERATE	EXTREMES**
Extinction Risk without Management (in Zoos & Aquariums)	ENDANGERED/ THREATENED	VULNERABLE	EXTREMES**
Extinction Risk with Management (in Zoos & Aquariums)	DECREASES	DECREASES/ STABLE	STABLE
Demand within AZA	HIGH	MODERATE	LOW
Institutional Commitment	HIGH	MODERATE	LOW
Ease of Breeding	LOW/ MODERATE	HIGH	EXTREMES**
Extinction Risk (Wild)	ENDANGERED/ THREATENED	VULNERABLE	LEAST CONCERN
Acquisition Cost (Outside AZA)	HIGH	MODERATE	LOW
Program Operating Costs	HIGH	MODERATE	LOW
International Program	YES	NO	NO
Link to Conservation of Wild Population	DIRECT	INDIRECT OR NONE	NONE
North American Governmental Conservation Program	YES	NO	NO

Characteristics of Population Management Levels

	SSP	PMP	No Management (DERP/Phase In)
Participation	FULL/ MANDATORY	VOLUNTARY	N/A
Memorandum of Participation	NO	NO	N/A
Compliance	MANDATORY	VOLUNTARY	N/A
AZA Conflict Resolution Process	YES	NO	N/A
Non-member Participation	YES	PER PARTICIPANT A/D POLICY	PER PARTICIPANT A/D POLICY
Animal-by-Animal Recommendations	YES	PER PARTICIPANT A/D POLICY	NO
Steering Committee	OPTIONAL	NO	N/A
AZA PMP Assistance	YES	YES	NO
SPMAG Assistance	YES	YES	EVALUATED ON A CASE-BY-CASE BASIS
AZA Regional Studbook	YES	YES	NO

**"Extremes" refers to species that are either so highly abundant or so rare as to render management impractical or unnecessary.

TABLE 8: Management Assessment Criteria for Small Carnivores

Species	Red Panda	Asian Small-Clawed Otter	Black-footed ferret	Spotted-necked otter	Giant otter	Binturong	Ringtail	Fossa	Wolverine	Dwarf Mongoose	North American otter	Fisher	White-nosed coati (Northern)	Kinkajou	Meerkat
Program	SSP	SSP	SSP	PMP	PMP	PMP	PMP	PMP	PMP	PMP	PMP	PMP	PMP	PMP	PMP
1	S	S	S	S	S	P	P	P	S	S	S	P	P	P	P
2	S	S	E	S	S	P	P	P	P	P	P	P	E	P	P
3	S	P	S	S	S	P	P	S	S	P	P	P	P	E	P
4	S	P	S	S	S	P	P	S	S	P	P	P	P	P	P
5	S	S	S	P	P	P	E	P	P	E	S	E	P	P	P
6	S	S	S	P	S	P	E	P	P	E	S	E	P	E	P
7	S	S	P	S	S	S	S	P	S	P	S	P	P	P	P
8	P	P	S	P	S	P	E	P	E	E	P	E	E	E	E
9	S	P	S	S	S	P	E	S	P	P	P	E	P	E	P
10	P	P	P	P	S	P	E	P	P	P	S	E	E	E	E
11	S	S	P	P	S	P	P	S	S	S	P	P	P	S	S
12	P	S	S	S	S	P	P	P	P	P	P	P	P	P	P
13	NA	NA	S	NA	NA	NA	NA	NA	NA	NA	S	NA	NA	NA	NA
	SSP	SSP	SSP	SSP	SSP	PMP	PMP	PMP	PMP	PMP	PMP	PMP	PMP	PMP	PMP

Species	Tayra	Striped skunk	Banded mongoose	Polecat/ domestic ferret	Raccoon	American Badger	African Clawless otter	Owston's palm civet
Program	DERP	DERP	DERP	DERP	DERP	DERP	PMP	Phase In
1	P	P	P	E	E	E	E	E
2	P	P	P	E	E	E	E	P
3	E	E	E	E	E	E	E	E
4	E	E	E	E	E	E	E	E
5	E	E	E	E	E	E	E	P
6	E	E	E	E	E	E	E	S
7	S	E	E	E	E	E	E	P
8	E	E	E	E	E	E	E	P
9	E	E	E	E	E	E	P	S
10	E	E	E	E	E	E	P	E
11	P	P	P	P	P	P	P	S
12	E	E	E	E	E	E	P	S
13	NA	NA	NA	NA	NA	NA	NA	NA
	DERP	DERP	DERP	DERP	DERP	DERP	Phase Out	SI

Comments: The TAG recommends 3 changes to the status of managed programs from the 2005 RCP. See TABLE 11 for details.

TABLE 9: Historical ISIS Data for SSP & PMP Species

	ISIS Database 31 December 1999		ISIS Database 01 August 2003		ISIS Database 15 February 2009	
Small Carnivore Species	**# of Animals in N.A.**	**N. A. Institutions**	**# of Animals in N.A.**	**N.A. Institutions**	**# of Animals in N.A.**	**N.A. Institutions**
Black-footed ferret	87.95	21	93.108.9	21	60.79.31	17
Red panda	77.94		69.67.5	59	107.86.5	76
A. fulgens	13.14	11	15.14	20	3.5.0	5
A. f. fulgens	38.51	32	31.39.4	33	52.57.2	52
A. f. refulgens (styani)	26.29	20	23.14.1	17	24.24.3	19
Binturong	71.53	36	35.32	33	28.31	38
White-nosed coati *(N. narica)* Northern	48.63	45	45.65	44	52.54.1	44
Kinkajou	46.58	48	36.45.1	47	41.52.1	62
Dwarf mongoose	33.34	12	26.33.3	11	37.34.1	11
Meerkat	190.162.45	72	186.153.61	54	219.164.33	73
Wolverine	5.6	6	14.14.1	11	13.11	16
Ringtail	16.22 (*B. astutus)*	20	13.6 (*B. astutus*)	18	20.17.0	27
Fisher	16.12	11	12.7	11	12.7	9
Fossa	4.4	4	12.12	10	19.4.5	16
OTTER SSP						
Asian small-clawed otter	48.39	24	58.52	28	100.96.1	37
N. A. river otter	134.130	125	127.132	125	126.139.1	140
African clawless otter	3.7	4	3.4	3	3.2.1	3
Giant otter	2	1	2.2	2	8.8.0	4
Spot necked otter	0.2	2	10.6	4	13.14.1	7

Programs Roles & Purposes

The Roles & Purposes for all species included in the RCP are included in the Program Recommendations Tables (Table 11) and are described below as written in the AZA Regional Collection Plan Handbook 2007.

Conservation Support – A sustainable captive population managed as an insurance population against the loss of the species in the wild, and which has components which directly link to some aspect of *in situ* conservation for the species. This conservation may include the release of captive animals back to the wild.

Education and Display – A sustainable captive population recommended due to the role they can play in educating the visiting public through unique conservation stories, behavior, biology, or a combination of the above.

Flagship species – High profile taxa that are likely to generate attention and financial support for field conservation programs for these taxa in their native ranges.

Research Focus – Species that would serve as models for the development of husbandry, reproductive and/or nutrition protocols, ecological and/or behavioral analyses, or censusing efforts which are designed to benefit both captive and wild populations of these and other taxa. Species receiving the "Research Focus" designation must have a TAG approved Research Proposal and a Program Leader who would be responsible for coordinating and reporting program progress.

***In Situ* Focus** – A species currently not in a North American captive program and/or unlikely to be part of a North American captive program. Species is of high Conservation Concern and is a priority for either supporting existing conservation work with the species or initiating conservation work for the species survival in the wild.

A species may qualify for more than one role or purpose. Taxa that do not qualify under any of these roles will be excluded from the RCP with explanation.

Program Management Categories

The levels at which species are to be managed were selected by the Steering Committee from the commonly-used management categories identified by WCMC and these management categories can be found within the Program Recommendations Summary (Table 11), on the Individual Species Sheets, and are described below as written in the AZA Regional Collection Plan Handbook, 2007 (3).

Taxa must be assigned to one of the following six categories:

Recommendations:

- **Species Survival Plan (SSP)**
- **Population Management Plan (PMP)**
- **Display/Education/Research Population (DERP)**
- **Species of Interest (formerly Phase In)**
- **Phase Out (PO)**
- **Not Recommended (NR)**

SSP Population: Studbook required, intense management to maintain captive population, compliance by participating institutions required, breeding and transfer recommendations communicated through a Master Plan, program managed by a Species Coordinator, non-member participants must be approved, conservation of the species a consideration, institutional input through IRs.

PMP Population: Studbook required, moderate management to maintain captive population, institutional compliance encouraged, breeding and transfer recommendations communicated through a Population Management Plan, program managed by a PMP Manager, institutional input through TAG IRs, non-member participation through AZA and institutional acquisition/disposition policies.

DERP: DERPs are not managed under the auspices of AZA or its programs and are not guaranteed population management advice or support from SPMAG/PMC. No studbook or long-term genetic or demographic management is required for these species, but TAGs may choose to identify species champions who may track DERPs through registries.

Species of Interest Population (Formerly known as Phase In): Taxon not currently in AZA institutions but for which the TAG plans or hopes to initiate a captive population; they have no studbooks and are not guaranteed population management advice or support from SPMAG/PMC. Once in captivity, the taxon will be reassigned to another category as appropriate.

Phase Out Population: Not viewed as a managed program. Currently in AZA institutions but should be phased out through a breeding moratorium; phase-out may be monitored through a registry and a species champion may be assigned to oversee this process; they have no studbooks and are not guaranteed population management advice or support from SPMAG/PMC.

Not Recommended: Taxon not currently in AZA institutions and that the TAG recommends NOT be brought into AZA collections

TABLE 10: Managed Program Status

Program	Date Program Initiated	Current Program Leader	Leader Phone Number	Date Leadership Assumed	Date of last Studbook	Date of last PMP publication
Red Panda SSP	01 Mar '85	Sarah Glass, Knoxville Zoo - SSP	865-216-2243	Nov - 08	18 Aug '08	
Ailurus fulges fulgens, ailurus fulgens refulgens		Mary Noell, Cincinnati Zoo - Studbook	513-569-8255	03 Mar '03		
Asian Small Clawed Otter SSP	1981	Dusty Lombardi, Columbus Zoo - SSP	614-645-3458	1992	28 Jun '05	
Aonyx cinereas		Sarah Duncan, Newport Aquarium - Intl' Studbook	859-261-7444	03 Dec '07	International	
Black Footed Ferret SSP	1991	Della Garelle, Cheyenne Mountain Zoo - SSP	719-633-9925		Mar - 09	
Mustel nigripes		Paul Marinari, USFWS - Studbook	970-897-2730	1997		
Binturong PMP *Arctictis binturong*	14 Dec '99	Tim Hrynewycz, Disney's Animal Kingdom	407-939-6382	16 Feb '04	May - 07	In Process
Ringtail PMP *Bassariscus astutus*	01 Sept '01	Debbie Thompson, Little Rock Zoo	501-661-7206	5 Dec '01	1 Nov '07	15 Aug '08
Fossa PMP *Cryptoprocta ferox*	03 May '05	Mandi Olsen, Omaha's Henry Doorly Zoo	402-738-2026	30 Jan '06	01 Dec '08	29 Dec '06
Wolverine PMP *Gulo gulo*	1998	Chris Kline, Minnesota Zoo	952-431-9328	03 May '04	26 Jan '09	In Process
Dwarf Mongoose PMP *Helogale parvula*	Pre - 1999	Christine McKnight, Minnesota Zoo	952-431-9464	24 Jan '03	08 Jan '09	In Process
North American River Otter PMP *Lontra canadensis*	07 Feb '00	David Hamilton, Seneca Park Zoo	585-336-2502	07 Feb '00	23 Jan '09	06 Jan '09
Spotted-necked Otter *SSP	PMP - 03 May '05	Randi Meyerson, Toledo Zoo	419-385-5721	30 Jan '06	1 Jul '06	
Lutra maculicollis	SSP - 2009 rec.					
Fisher PMP *Martes pennanati*	03 May '05	Margaret Dwyer, Rosamond Gifford Zoo at Burnet Park	315-435-8511	06 Feb '06	20 Dec '08	In Process
White-nosed coati PMP *Nasua narica*	17 Mar '00	Cindy Colling, Detroit Zoological Society	248-541-5717	2004	24 Jun '05	In Process
Kinkajou PMP *Potos flavus*	2006	Liz Toth, Boonshoft Museum of Discovery	937-275-7431	02 Jan '06	8 Oct '08	23 Mar '09
Giant Otter *SSP	PMP - 2006	Kim Lengel, Philadelphia Zoo	215-243-5244	09 Mar '06	3 Mar '09	
Pteronura brasiliensis	SSP - 2009 rec.					
Meerkat PMP *Suricata suricatta*	2000	Katie Kimble, Toledo Zoo	419-385-5721	09 Jan '01	03 Jul '07	Jun - 10 In Process

Species: Red Panda

Scientific Name: *Ailurus fulgens fulgens & Ailurus fulgens refulgens (styani)*

Wild Conservation Status

Geographic Range: Western Nepal thru Myanmar, also southwestern China. (Miles Roberts)

IUCN Vulnerable

CITES Appendix I

North American Population: 55.65 *fulgens*, 26.25.1 *refulgens* (Studbook)

Number of holding Institutions: 50-*fulgens*, 20-*refulgens*

North American Population: 141 (2009 Space Survey)

Number of holding Institutions: 79

North American Population: 107.86.5 (ISIS)

Number of holding Institutions: 76

Other Regional Populations

Europe	Ailurus f.f.: 81.86; f.r.: 1.0
South Africa	Ailurus f.f.: 7.12; f.r.: 0.0
Asia	Ailurus f.f.:1.1; f.r.: 12.10
ARAZPA	Ailurus f.f.:158.170.4; f.r.:0.0

AZA Program

Current Population Management Program: SSP

Population Manager: Sarah Glass

Institution: Knoxville Zoo

E-mail: sglass@knoxville-zoo.org

Studbook Keeper: Mary Noell

Institution: Cincinnati Zoo

E-mail: mary.noell@cincinnatizoo.org

Date of last Master Plan: 15-Aug-08

Date of last Studbook: 18-Aug-08 Regional

Date of last Action Plan:

Date of last Husbandry Manual: Pending, Animal Care Manual in progress

AZA TAG Program Recommendations

Recommended Program: SSP

Program Role: Education and Display

Anticipated 3-5 yr population: 249

Target population: 165 – *fulgens*, 110 - *refulgens*

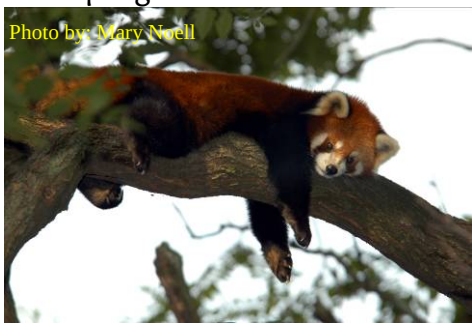


Photo by: Mary Noell

Red Panda to maintain two subspecies – there is regional cooperation – North America, Europe/ UK, India, China, Japan, and South Africa are all cooperating. There are ties between US and captive and wild red panda management in the range states (India, China). There is still more demand for red pandas that there are animals in north America, limiting SSP to one subspecies would exuberate this problem.

Current Field Conservation Programs

Field Conservation Program: Red Panda Network

Field Program Coordinator (& Institution): Brian Williams

North American Contact (& e-mail): Sarah Glass, sglass@knoxville-zoo.org

Species: Asian Small clawed otter
Scientific Name: *Aonyx cinerea*

Wild Conservation Status

Geographic Range: From Palawan through Indonesia, SE Asia, Southern China, westward through the Himalayan foothills of Bangladesh, Bhutan and Nepal (Foster Turley P., Santiapillai C., Action Plan for Otters)

IUCN Vulnerable
CITES Appendix II

North American Population:	204	(Studbook)
Number of holding Institutions:	35(AZA)	
North American Population:	143	(2009 Space Survey)
Number of holding Institutions:	28	
North American Population:	196	(ISIS)
Number of holding Institutions:	32	

Other Regional Populations

Europe	152.165.35
South Africa	0.0
Asia	80.90.8
ARAZPA	21.17

AZA Program

Current Population Management Program: SSP
Population Manager: Dusty Lombardi
Institution: Columbus Zoo and Aquarium
E-mail: Dusty.lombardi@columbuszoo.org
Studbook Keeper: Sarah Duncan
Institution: Newport Aquarium
E-mail: sduncan@newportaquarium.com

Date of last Master Plan: 2007
Date of last Studbook: 28-Jun-05 International
Date of last Action Plan: 2005
Date of last Husbandry Manual: 1998, 2009 Otter Animal Care Manual

AZA TAG Program Recommendations

Recommended Program: SSP
Program Role: Conservation Support
Anticipated 3-5 yr population: 250
Target population: 250

Current Field Conservation Programs

Field Conservation Program: SSP endorses Asian Otter Secretariat, Padma de Silva as coordinator of Asian Otter Conservation
Field Program Coordinator (& Institution): Padma de Silva Asian Otter Secretariat of the IUCN
North American Contact (& e-mail): Dusty Lombardi dusty.lombardi@columbuszoo.org

Species: Black-footed ferret
Scientific Name: *Mustela nigripes*

Wild Conservation Status

Geographic Range: Plains region from Alberta and Saskatchewan to northeastern Arizona and Texas (Walker's Mammals of the World, 6th edition, Nowak 1999)
IUCN Endangered
CITES Appendix 1

North American Population:	133	(studbook)	
Number of holding Institutions:	14 (1 non-AZA)		**Other Regional Populations**
North American Population:	143	(2009 Space Survey)	**Europe** 0.0
Number of holding Institutions:	17		**South Africa** 0.0
North American Population:	60.79.31	(ISIS)	**Asia** 0.0
Number of holding Institutions:	17		**ARAZPA** 0.0

AZA Program

Current Population Management Program: SSP
Population Manager: Della Garelle
Institution: Cheyenne Mountain Zoo
E-mail: dgarelle@cmzoo.org
Studbook Keeper: Paul Marinari
Institution: USFWS' National BFF Conservation Center
E-mail: paul_marinari@fws.gov

Date of last Master Plan: Mar-09
Date of last Studbook: Mar-09 Regional
Date of last Action Plan:
Date of last Husbandry Manual: 2002, Animal Care Manual in progress

AZA TAG Program Recommendations

Recommended Program: SSP
Program Role: Conservation Support
Anticipated 3-5 yr population: 350
Target population: 350

Current Field Conservation Programs

Field Conservation Program: Ongoing reintroduction in USA, MEX, CAN (proposed Fall '09)
Since 1991 released in WY, SD, MT, AZ, CO, UT, KS, NM, Mexico
Field Program Coordinator (& Institution): Pete Gober (USFWS)
North American Contact (& e-mail): Paul Marinari, paul_marinari@fws.gov

Species: Binturong
Scientific Name: *Arctictis binturong*

Wild Conservation Status

Geographic Range: Sikkim, Nepal to Indochina and Malay peninsula, Riau Archipelago, Sumatra, Bangka, Java, Borneo, and Palawan (Walker's Mammals of the World, 6th Edition, Nowak 1999)
IUCN Vulnerable
CITES Appendix III (India)

North American Population: 32.27.2 (Studbook)
Number of holding Institutions: 32

North American Population: 44 (2009 Space Survey)
Number of holding Institutions: 27

North American Population: 28.13 (ISIS)
Number of holding Institutions: 38

Other Regional Populations

Europe 35.28 (ISIS)
South Africa 0.0
Asia 15.14 (ISIS)
ARAZPA 6.3 (ISIS)

AZA Program

Current Population Management Program: PMP
Population Manager: Tim Hrynewycz
Institution: Disney's Animal Kingdom
E-mail: Tim.A.Hrynewycz@disney.com or T_hryne@hotmail.com
Studbook Keeper: Tim Hrynewycz
Institution: Disney's Animal Kingdom
E-mail: Tim.A.Hrynewycz@disney.com or T_hryne@hotmail.com

Date of last Master Plan: In Process
Date of last Studbook: May-07 Regional
Date of last Action Plan:
Date of last Husbandry Manual: Animal Care Manual in progress


Photo by: Cincinnati Zoo & Botanical Garden

AZA TAG Program Recommendations

Recommended Program: PMP
Program Role: Education and Display
Anticipated 3-5 yr population: 73
Target population: 75

Current Field Conservation Programs

Field Conservation Program:
Field Program Coordinator (& Institution):
North American Contact (& e-mail):

Species: Ringtail
Scientific Name: *Bassariscus astutus*

Wild Conservation Status

Geographic Range: Southwestern Oregon and Eastern Kansas to Baja California and southern Mexico (Walker's Mammals of the World, 6th Edition, Nowak 1999)

IUCN Least Concern
CITES

North American Population:	32	(Studbook)
Number of holding Institutions:	17	
North American Population:	40	(2009 Space Survey)
Number of holding Institutions:	20	
North American Population:	22.17	(ISIS)
Number of holding Institutions:	27	

Other Regional Populations

Europe	4.4
South Africa	0.0
Asia	0.0
ARAZPA	0.0

AZA Program

Current Population Management Program: PMP
Population Manager: Debbie Thompson
Institution: Little Rock Zoo
E-mail: dthompson@littlerock.org
Studbook Keeper: Debbie Thompson
Institution: Little Rock Zoo
E-mail: dthompson@littlerock.org

Date of last Master Plan: 15-Aug-08
Date of last Studbook: 1-Nov-07 Regional
Date of last Action Plan:
Date of last Husbandry Manual: Animal Care Manual in Progress

AZA TAG Program Recommendations

Recommended Program: PMP
Program Role: Education & Display
Anticipated 3-5 yr population: 50 (assumption that Cacomistle Phase Out will move to Ringtail population)
Target population: 75

Current Field Conservation Programs

Field Conservation Program: none
Field Program Coordinator (& Institution):
North American Contact (& e-mail):

Species: Fossa
Scientific Name: *Cryptoprocta ferox*

Wild Conservation Status

Geographic Range: Widely distributed within all types of intact, less disturbed forests on the island of Madagascar. (IUCN Red List)

IUCN Vulnerable
CITES Appendix II

North American Population:	28.23.4	(Studbook)
Number of holding Institutions:	22	
North American Population:	36	(2009 Space Survey)
Number of holding Institutions:	12	
North American Population:	19.4.5	(ISIS)
Number of holding Institutions:	16	

Other Regional Populations

Europe	30.26
South Africa	2.4
Asia	0.0
ARAZPA	0.0

AZA Program

Current Population Management Program: PMP
Population Manager: Mandi Olsen
Institution: Omaha's Henry Doorly Zoo
E-mail: fossa@omahazoo.com
Studbook Keeper: Mandi Olsen
Institution: Omaha's Henry Doorly Zoo
E-mail: fossa@omahazoo.com

Date of last Master Plan: 29-Dec-06
Date of last Studbook: 1-Dec-08 Regional
Date of last Action Plan: N/A
Date of last Husbandry Manual: Animal Care Manual in progress

AZA TAG Program Recommendations

Recommended Program: PMP
Program Role: Flagship
Anticipated 3-5 yr population: 52
Target population: 75


Photo by: Mandi Olsen

Current Field Conservation Programs

Field Conservation Program: Malagasy Field Update
Field Program Coordinator (& Institution): Luke Dollar, Duke University, LukeDollar@aol.com
North American Contact (& e-mail): Mandi Olsen, fossa@omahazoo.com

Species: Wolverine
Scientific Name: *Gulo gulo*

Wild Conservation Status

Geographic Range: North west United States, Alaska, Canada, China, Finland, Mongolia, Russia, Sweden & Norway (Walker's Mammals of the World, 6th Edition, Nowak 1999)

IUCN Near Threatened
CITES

North American Population:	13.11.0	(Studbook)
Number of holding Institutions:	10	
North American Population:	18	(2009 Space Survey)
Number of holding Institutions:	8	
North American Population:	13.12.0	(ISIS)
Number of holding Institutions:	11	

Other Regional Populations

Europe	27.38.65
South Africa	0.0
Asia	0.0
ARAZPA	0.0

AZA Program

Current Population Management Program: PMP
Population Manager: Chris Kline
Institution: Minnesota Zoo
E-mail: chris.kline@state.mn.us
Studbook Keeper: Chris Kline
Institution: Minnesota Zoo
E-mail: chris.kline@state.mn.us

Date of last Master Plan: In Process
Date of last Studbook: 26-Jan-09 Regional
Date of last Action Plan: N/A
Date of last Husbandry Manual: Animal Care Manual in progress


Photo by: Deb Arndt

AZA TAG Program Recommendations

Recommended Program: PMP
Program Role: Education and Display
Anticipated 3-5 yr population: 36
Target population: 75

Current Field Conservation Programs

Field Conservation Program: Various projects on Population, Ecology and Distribution
Field Program Coordinator (& Institution):
North American Contact (& e-mail): Chris Kline, chris.kline@state.mn.us

Species: Dwarf Mongoose
Scientific Name: *Helogale parvula*

Wild Conservation Status

Geographic Range: Africa (eastern to south central Africa: northern South Africa to Ethiopia) Source: IUCN

IUCN Least Concern
CITES

North American Population: 37.34.5 (Studbook)
Number of holding Institutions: 11

North American Population: 61 (2009 Space Survey)
Number of holding Institutions: 10

North American Population: 37.34.1 (ISIS)
Number of holding Institutions: 11

Other Regional Populations

Europe	38.39.24
South Africa	0.0
Asia	6.3.4
ARAZPA	3.2.0

AZA Program

Current Population Management Program: PMP
Population Manager: Christine McKnight
Institution: Minnesota Zoo
E-mail: Christine.mcknight@state.mn.us
Studbook Keeper: Christine McKnight
Institution: Minnesota Zoo
E-mail: Christine.mcknight@state.mn.us

Date of last Master Plan: In Process
Date of last Studbook: 8-Jan-09 Regional
Date of last Action Plan: N/A
Date of last Husbandry Manual: Animal Care Manual in Progress

AZA TAG Program Recommendations

Recommended Program: PMP
Program Role: Education & Display
Anticipated 3-5 yr population: 83
Target population: 100

Current Field Conservation Programs

Field Conservation Program: none
Field Program Coordinator (& Institution):
North American Contact (& e-mail):

Species: North American river otter
Scientific Name: *Lontra canadensis (all subspecies)*

Wild Conservation Status

Geographic Range: Conterminous United States, Alaska Canada. (Walker's Mammals of the World, 6th edition, Nowak 1999)
IUCN: Least Concern
CITES: Appendix II

North American Population:	147.137.0	(Studbook)
Number of holding Institutions:	155	
North American Population:	232	(2009 Space Survey)
Number of holding Institutions:	105	
North American Population:	126.139.1	(ISIS)
Number of holding Institutions:	140	(ISIS)

Other Regional Populations

Europe	9.9.1
South Africa	0.0.0
Asia	0.0.0
ARAZPA	0.0.0

AZA Program

Current Population Management Program: PMP
Population Manager: David Hamilton
Institution: Seneca Park Zoo
E-mail: dhamilton@monroecounty.gov
Studbook Keeper: David Hamilton
Institution: Seneca Park Zoo
E-mail: dhamilton@monroecounty.gov

Date of last Master Plan: Jan-6-2009
Date of last Studbook: Jan-23-2009 Regional
Date of last Action Plan: 2005
Date of last Husbandry Manual: Jan-03, 2009 Otter Animal Care Manual

AZA TAG Program Recommendations

Recommended Program: PMP
Program Role: Education & Display
Anticipated 3-5 yr population: 312
Target population: 300


Photo by: Jeff Compston

Current Field Conservation Programs

Field Conservation Program: None initiated by PMP. Several states have previously reintroduced otters and some projects are monitoring success.
Field Program Coordinator (& Institution):
North American Contact (& e-mail):

Species: Spotted necked otter
Scientific Name: *Lutra maculicollis*

Wild Conservation Status

Geographic Range: It occurs in all countries south of Sahara, from Senegal to Ethiopia and south to the Cape provinces where there is suitable habitat. source: IUCN OSG 2008 newsletter

IUCN Least concern
CITES Cites II

North American Population: 12.14 (Studbook)
Number of holding Institutions: 7

North American Population: 19 (2009 Space Survey)
Number of holding Institutions: 8

North American Population: 13.4.1 (ISIS)
Number of holding Institutions: 7

Other Regional Populations

Europe	1.O
South Africa	2.0
Asia	0.0
ARAZPA	0.0

AZA Program

Current Population Management Program: PMP
Population Manager: Randi Meyerson
Institution: Toledo Zoo
E-mail: randi@toledozoo.org
Studbook Keeper: Randi Meyerson
Institution: Toledo Zoo
E-mail: randi@toledozoo.org

Date of last MasterPlan: In Process
Date of last Studbook: 1-Jul-06 Regional
Date of last Action Plan: none
Date of last Husbandry Manual: 2009 Otter Animal Care Manual and 2009 Husbandry Manual

AZA TAG Program Recommendations

Recommended Program: SSP
Program Role: Education & Display
Anticipated 3-5 yr population: 23
Target population: 50 (short term)


Photo by: Leilani O'Brien

Current Field Conservation Programs

Field Conservation Program: Spotted-necked Otters of Rubundo Island
Field Program Coordinator (& Institution): Jan Reed-Smith (Columbus)
North American Contact (& e-mail): Jan Reed-Smith jrsotter@iserv.net

Species: Fisher
Scientific Name: *Martes pennanti*

Wild Conservation Status

Geographic Range: Fishers are found in coniferous or mixed forest from the Sierra Nevada in California to the Appalachians in West Virginia and north to New England, as well as in southern Alaska and across most of Canada. (Roger Powell Fisher Life History, Mustelid Specialist Group 1996, 2006 IUCN Red List)

IUCN Least Concern
CITES

North American Population:	10.8.0	(Studbook)
Number of holding Institutions:	12	
North American Population:	10	(2009 Space Survey)
Number of holding Institutions:	5	
North American Population:	12.7	(ISIS)
Number of holding Institutions:	9	

Other Regional Populations

Europe	0.0
South Africa	0.0
Asia	0.0
ARAZPA	0.0

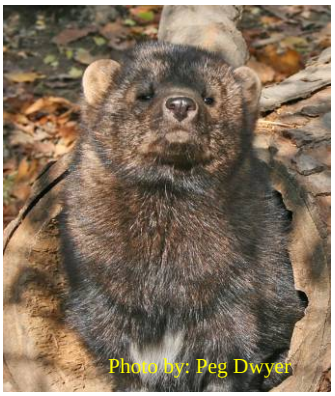
AZA Program

Current Population Management Program: PMP
Population Manager: Margaret Dwyer
Institution: Rosamond Gifford Zoo at Burnet Park
E-mail: MargaretDwyer@ongov.net or mlouer2@twcny.rr.com
Studbook Keeper: Margaret Dwyer
Institution: Rosamond Gifford Zoo at Burnet Park
E-mail: MargaretDwyer@ongov.net or mlouer2@twcny.rr.com

Date of last Master Plan:
Date of last Studbook: 20-Dec-08 Regional
Date of last Action Plan:
Date of last Husbandry Manual: Animal Care Manual in progress

AZA TAG Program Recommendations

Recommended Program: PMP
Program Role: Education and Display
Anticipated 3-5 yr population: 29
Target population: 75



Current Field Conservation Programs

Field Conservation Program: None
Field Program Coordinator (& Institution):
North American Contact (& e-mail):

Species: White-nosed coati (Northern)
Scientific Name: *Nasua narica*

Wild Conservation Status

Geographic Range: Arizona to Gulf of Uraba in northwestern Colombia (Walker's Mammals of the World, 6th edition, Nowak 1999)

IUCN Least Concern
CITES Appendix III (Honduras)

North American Population:	128	(Studbook)
Number of holding Institutions:	45	
North American Population:	81	(2009 Space Survey)
Number of holding Institutions:	32	
North American Population:	52.54.1	(ISIS)
Number of holding Institutions:	44	

Other Regional Populations

Europe	13.21
South Africa	0.0
Asia	0.0
ARAZPA	0.0

AZA Program

Current Population Management Program: PMP
Population Manager: Cindy Colling
Institution: Detroit Zoological Society
E-mail: ccolling@detroitzoo.org
Studbook Keeper: Cindy Colling
Institution: Detroit Zoological Society
E-mail: ccolling@detroitzoo.org

Date of last Master Plan: In Process
Date of last Studbook: 24-Jun-05 Regional
Date of last Action Plan:
Date of last Husbandry Manual: Animal Care Manual in progress


Photo by: Cindy Colling

AZA TAG Program Recommendations

Recommended Program: PMP
Program Role: Education and Display
Anticipated 3-5 yr population: 143 (assumption that *N. nasua* Phase Out will move to *N. narica* population)
Target population: 143 (for both species: *Nasua narica* & *Nasua nasua*)

Current Field Conservation Programs

Field Conservation Program: None
Field Program Coordinator (& Institution): N/A
North American Contact (& e-mail): N/A

Species: Kinkajou
Scientific Name: *Potos flavus*

Wild Conservation Status

Geographic Range: Throughout tropical Middle and South America northward throughout Central America to eastern and parts of western Mexico. (Ford, and Huffman 1988.)

IUCN Least Concern
CITES

North American Population:	45.60 (78 in AZA)	(Studbook)
Number of holding Institutions:	62	
North American Population:	59	(2009 Space Survey)
Number of holding Institutions:	31	
North American Population:	41.52.1	(ISIS)
Number of holding Institutions:	62	

Other Regional Populations

Europe	34.41/ 23 inst (2005)
South Africa	unknown
Asia	unknown
ARAZPA	unknown

AZA Program

Current Population Management Program: PMP
Population Manager: Liz Toth
Institution: Boonshoft Museum of Discovery
E-mail: Ltoth@boonshoftmuseum.org
Studbook Keeper: Liz Toth
Institution: Boonshoft Museum of Discovery
E-mail: Ltoth@boonshoftmuseum.org

Date of last Master Plan: 23-Mar-09
Date of last Studbook: 8-Oct-08 Regional
Date of last Action Plan: N/A
Date of last Husbandry Manual: Draft 2008, Animal Care Manual in progress

AZA TAG Program Recommendations

Recommended Program: PMP
Program Role: Education and Display
Anticipated 3-5 yr population: 59
Target population: 100


Photo by: Liz Toth

Current Field Conservation Programs

Field Conservation Program: unknown
Field Program Coordinator (& Institution): none
North American Contact (& e-mail): none

Species: Giant otter
Scientific Name: *Pteronura brasiliensis*

Wild Conservation Status

Geographic Range: Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, and Venezuela (IUCN)
IUCN Endangered
CITES Appendix I

North American Population: 15 (Studbook)
Number of holding Institutions: 5

North American Population: 11 (2009 Space Survey)
Number of holding Institutions: 3

North American Population: 8.8 (ISIS)
Number of holding Institutions: 4

Other Regional Populations

Europe	studbook not updated
South Africa	0.0
Asia	0.0
ARAZPA	0.0

AZA Program

Current Population Management Program: PMP
Population Manager: Kim Lengel
Institution: Philadelphia Zoo
E-mail: lengel.kim@phillyzoo.org
Studbook Keeper: Kim Lengel/Amanda Egen
Institution: Philadelphia Zoo
E-mail: lengel.kim@phillyzoo.org

Date of last Master Plan: In Progress
Date of last Studbook: 3-Mar-09 Regional
Date of last Action Plan: none
Date of last Husbandry Manual: 2007

AZA TAG Program Recommendations

Recommended Program: SSP
Program Role: Flagship Species
Anticipated 3-5 yr population: 34
Target population: 50

Current Field Conservation Programs

Field Conservation Program: Long term study of giant otters in the Brazilian Amazon.
Field Program Coordinator (& Institution): Dr. Fernando Rosas (INPA)
North American Contact (& e-mail): Kim Lengel, Philadelphia Zoo (lengel.kim@phillyzoo.org)

Species: Meerkat
Scientific Name: *Suricata suricatta*

Wild Conservation Status

Geographic Range: Arid and semi-arid regions of southern Africa. (Macdonald 2001).
IUCN Least Concern
CITES

North American Population:	543 (7/2007)	(Studbook)
Number of holding Institutions:	84 (7/2007)	
North American Population:	399	(2009 Space Survey)
Number of holding Institutions:	66	
North American Population:	219.164.33	(ISIS)
Number of holding Institutions:	73	

Other Regional Populations

Europe	1198
South Africa	71
Central	83
Asia	21
ARAZPA	119

AZA Program

Current Population Management Program: PMP
Population Manager: Katie Kimble
Institution: Toledo Zoo
E-mail: katie.kimble@toledozoo.org
Studbook Keeper: Katie Kimble
Institution: Toledo Zoo
E-mail: katie.kimble@toledozoo.org

Date of last MasterPlan: Jun-10
Date of last Studbook: 3-Jul-07 Regional
Date of last Action Plan:
Date of last Husbandry Manual: Mar-06, Animal Care Manual in progress

AZA TAG Program Recommendations

Recommended Program: PMP
Program Role: Education & Display
Anticipated 3-5 yr population: 654
Target population: 650

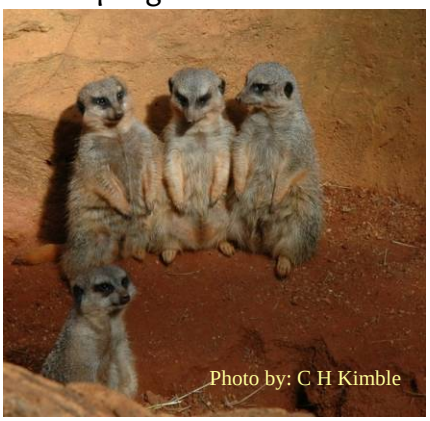


Photo by: C H Kimble

Current Field Conservation Programs

Field Conservation Program: None
Field Program Coordinator (& Institution): N/A
North American Contact (& e-mail): N/A

TAG Guidelines

Acquisition/ Disposition Statement

For those species managed as an SSP or PMP under the TAG – Program Managers must be contacted in the context of all acquisitions, dispositions & breeding recommendations.

AZA Institutions are required to develop policies on acquisition and disposition of animals, and AZA offers direction to institutions for their development. Institutions wishing to acquire small carnivores should refer to the RCP for species selection recommendation. Program managers should be contacted directly for information on a particular species.

The TAG recommends that animals not managed as an SSP be transferred to other AZA accredited institutions.

Euthanasia

The TAG recommends that all institutions develop Euthanasia guidelines as part of their Acquisition/Disposition Policies. Managerial euthanasia for Population Management is at the discretion of the holding institution. The TAG encourages all institutions to work through the respective program managers to exhaust placement options before Euthanasia is employed as a means of Collection Management.

Medical Euthanasia should be considered on a case by case basis.

Euthanasia will be done in accordance with the Report of the American Veterinary Medical Association (2000 Report of the AVMA Panel on Euthanasia. Journal of the American Veterinary Medical Association Mar 2001, Vol. 218, No. 5, Pages 669-696)

Program Animal Policy

The SCTAG has adopted the AZA Program Animal Policy – approved by the board in 2003, updated and approved by the board in 2008.

Importation/Confiscation of Small Carnivore Species

As stated previously, for those small carnivore species managed by an SSP, the individual SSPs should be contacted in the context of all acquisitions, dispositions, and breeding recommendations. In order to most effectively manage those populations not under an SSP umbrella, and to appropriately assist range country conservation efforts the TAG recommends that all importations and/or confiscations of non-SSP species be discussed on a case-by-case basis on the TAG listserv (sctag@lists.aza.org). The Steering Group (sctagsteer@lists.aza.org) will then make a determination by vote as to whether the TAG supports the importation and/or confiscation.

Contraception

The AZA Wildlife Contraception Center (WCC) works closely with the Small Carnivore TAG in order to provide safe and effective methods. The WCC recommends using the GnRH agonist, Suprelorlin (deslorelin) for contraception in all small carnivores. Suprelorin may also be used for behavior management purposes in some male species to decrease aggression. In order to keep most current information the WCC requests feedback on all contraception use through annual surveys. Contact information and product details are available on the webpage: www.stlzoo.org/contraception

THREE-YEAR ACTION PLAN FOR THE SMALL CARNIVORE TAG

2009 - 2012

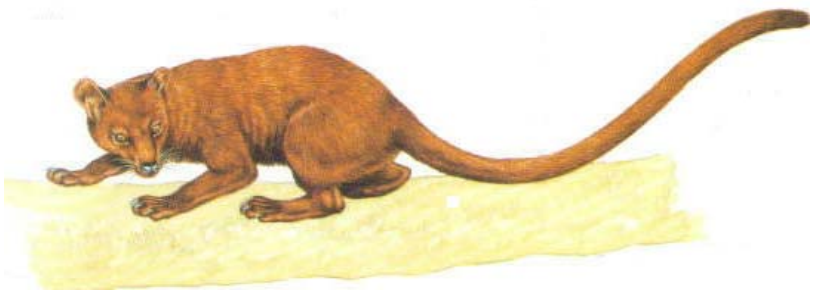
The Small Carnivore TAG Steering Committee has identified the following as priority actions for the Three-year Action Plan, 2009 - 2012.

1. Finish the Animal Care Manuals.
2. Continue soliciting for point people for our DERPs designated by the Regional Collection Plan.
3. Plan and hold a mid-year meeting in 2010.
4. Finalize and Submit the Regional Collection Plan.
5. Continue support for the Red panda SSP Keeper Training Workshop.
6. Continue support for the Asian otter census by Dr. Padma de Silva.
7. Continue support for Otter Keeper Workshop
8. Continue support of the Owston's Palm Civet Conservation Project by Scott Roberton.
9. Continue support for the Fossa Conservation Project by Luke Dollar.
10. Support the Reproductive Physiology work by Helen Bateman for otters.
11. Identify and coordinate all *in situ / ex situ* conservation and research activities for all taxa represented under the TAG RCP.
12. Hold elections for the Steering Committee 2010
13. Identify priorities for Education Advisor.

Target Population Size Analysis (PMC meeting)

Target Population Size Analysis: Several factors were considered in setting the 3 year target population for each species. These include: space survey results, conservation need and population status in the wild, global and regional population status in zoos and private facilities, information provided by the program leader and Studbook keeper, possible life history, the Population Management Center (PMC), and the Steering Committee's expertise. For the species with an AZA program we enlisted the aid of the PMC to assist in evaluating target population sizes. This is the second evaluation of target sizes for this TAG by the PMC. Species Survival Plan (SSP) and Population Management Plan (PMP) demographic and genetic analysis were conducted by using the most current available studbook data and the PM2000 software (Version 1.213) from PMC.

Target Population Size Evaluations for the Small Carnivore Taxon Advisory Group



PMC/SPMAG ADVISORS

Sarah Long, Population Management Center
Kristine Schad, Population Management Center
Cara Groome, Population Management Center
Anne Oiler, Population Management Center

12 May 2009

This report was prepared with assistance from the

PMC Population Management Center

Lincoln Park Zoo ASSOCIATION OF ZOOS & AQUARIUMS

Table of Contents

Acknowledgments

This report details the results of a meeting held at the Lincoln Park Zoo, Chicago, IL on 21-22 April 2009. In attendance were:

Dusty Lombardi, Columbus Zoo and Aquarium (SCTAG Chair)

Jen Compston, Columbus Zoo and Aquarium (SCTAG Secretary)

Mark Weldon, Fort Wayne Zoo (SCTAG Steering Committee)

Mary Noell, Cincinnati Zoo (Red Panda Studbook Keeper)

Jan Reed-Smith (N.A. River Otter Advisor)

Cindy Colling, Detroit Zoo (Coati Studbook Keeper/ Population Manager)

Carol Sodaro, Brookfield Zoo

Katie Kimble, Toledo Zoo (Meerkat Studbook Keeper/ Population Manager)

Debbie Thompson, Little Rock Zoo (Cacomistle/ Ringtail Studbook Keeper/Population Manager)

Sarah Long, Population Management Center

Kristine Schad, Population Management Center

Cara Groome, Population Management Center

Anne Oiler, Population Management Center

Attendees who joined the meeting by phone:

David Hamilton, Seneca Park Zoo (North American River Otter Studbook Keeper/Population Manager)

Randi Meyerson, Toledo Zoo (Spotted-necked Otter Studbook Keeper/Population Manager)

Peg Dwyer, Rosamond Gifford Zoo at Burnet Park (Fisher Studbook Keeper/Population Manager)

Paul Marinari, USFWS (Black Footed Ferrest Studbook Keeper)

Kim Lengel, Philadelphia Zoo (Giant Otter Studbook Keeper/Population Manager)

Mandi Olsen, Omaha Zoo (Fossa Studbook Keeper/Population Manager)

Liz Toth, Boonshoft Museum of Discovery (Kinkajou Studbook Keeper/Population Manager)

Report and Analyses prepared by:
Sarah Long, Kristine Schad, Cara Groome, & Anne Oiler
Population Biologists
Population Management Center, Lincoln Park Zoo, Chicago, IL

This report was prepared and distributed with the assistance of the Population Management Center.
pmc@lpzoo.org

Executive Summary

Objective: To assist the Small Carnivore Taxon Advisory Group with the evaluation of target population sizes in the current draft of the Small Carnivore TAG's Regional Collection Plan.

Methods: This is the second evaluation of target sizes for this TAG by the Population Management Center; previous evaluations were performed in February 2004 at the Lincoln Park Zoo. To evaluate potential management strategies for species that are current or proposed Population Management Plan species (PMPs) or Species Survival Plans® (SSPs), demographic and genetic analyses were conducted using the most current available studbook data and the Goal Setting screen of Population Management 2000 software (PM2000 Version 1.213). The current population size and baseline genetic analyses for each species was obtained from the population studbook or ISIS data as noted, for AZA institutions only unless otherwise stated. In additional modeling scenarios, adjustments to other demographic parameters, such as growth rate, were made based on studbook data of the species in question, similar species, or the expertise of meeting attendants.

Where noted, the number of founders that could reasonably be obtained was added into the projections to determine the impact on the maintenance of gene diversity. A potential founder is considered to be any animal that is unrelated to individuals in the current population, and may be obtained from other managed populations or from the wild. Although the importation of founders is considered in some of the management strategies evaluated, every effort should be made to create self-sustaining populations not reliant on imports. Frequent importations should not be viewed as an alternative strategy to responsible population management for the maintenance of gene diversity over time.

Management Goals: For each species, several different strategies were tested to evaluate population sizes relative to genetic and demographic sustainability over the next 100 years. The first strategy listed in the table for each species is a baseline strategy, demonstrating the projected status of the population assuming no changes to current management or population parameters and using either the population's current size or the estimated current maximum holding capacity from the TAG's 2009 space survey. Other strategies tested include changes to population parameters, including growth rate and effective population size, or the recruitment or acquisition of potential founders.

The target size analyses within this document are based primarily on *genetic* projections, with the assumption that husbandry and cooperation will be adequate for the populations to grow to the target sizes tested. The genetic goal for all populations was the maintenance of 90% gene diversity for 100 years into the future or, if starting gene diversity was unknown or already lower than 90%, long-term management goals are assumed to be the loss of no more than 10% gene diversity relative to the starting gene diversity. When gene diversity falls below approximately 90% of the gene diversity in the founding population, it is expected that reproduction will be increasingly compromised by, among other factors, smaller litter sizes, lower birth weights, and greater juvenile mortality.

Definitions and Explanation of Tables

Demography & Genetics								
Number of holding institutions	N_0	Estimated future holding capacity	T	λ	GD_0	N_e/N	% known before assumptions	% known after assumptions

Number of institutions
This is the number of institutions currently holding specimens of a given species (AZA institutions unless otherwise specified).

N_0 – Current population size
This is the current number of specimens estimated to be living in participating institutions, according to the most current studbook.

Estimated future holding capacity
This is the estimated future population size compiled from the 2009 TAG space survey sent to AZA institutions.

T – Generation time
This represents the average age at reproduction (from first reproduction through to last reproduction), in years.

λ - Population growth rate (λ = 1.0, 0% growth)
This represents the annual rate of increase of the population, as determined by a) demographic analysis of historic studbook data within the date range of modern management, or b) a potential growth rate assumed to be realistic for the species.

GD_0 – Estimated current gene diversity of AZA population (%)
Gene diversity was calculated by genetic analysis of true studbook data or analytical data incorporating pedigree assumptions. The proportional gene diversity (as a proportion of the source population) is the probability that two alleles from the same locus sampled at random from the population will not be identical by descent.

N_e/N – Ratio of effective population size to actual population size.
This ratio represents the approximate proportion of the population that is breeding, calculated from the number of living animals with living offspring in the population.

% Known – Percentage of pedigree known (before and after assumptions and exclusions).
This is the proportion of the pedigree of living specimens descended from known or wild-caught ancestors. If pedigree assumptions were made or if unknown pedigree animals were excluded from the genetic analyses, the percentage known before and after these assumptions/exclusions is noted.

The following table is an example of different projection strategies used for each population to evaluate whether the current population will be able to meet the standard AZA program goal of 90% gene diversity for at least 100 years.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested Target Population Size
A. Baseline				
Strategy A evaluates the genetic status of the population in 100 years under current conditions (historic average annual growth rate, current GD, current Ne/N). This strategy assumes that no founders will be imported. The **tested target population size** *was the number set as the maximum allowable population size on the PM2000 Goals Screen, and was generally the estimated current maximum holding capacity from the TAG's space survey.*				
B. Increase lambda or Ne/N C. Increase target population size tested				
Additional strategies evaluate the genetic status of the population in 100 years with an improvement to population parameters (average annual growth rate, Ne/N) or an increase in the tested target size (set to either the estimated future holding capacity from the TAG's space survey or some larger population size).				
D. Import reasonable # founders				
Other additional strategies evaluate the genetic status of the population based on previous improvements with the addition of a realistic number of founders, based on meeting attendees' expertise, with imports scheduled as described.				

Mustelidae - Asian Small-clawed Otter
Amplonyx cinereus

Proposed program status: SSP
Program role: Conservation Support

Projections for this population were based on the Regional Asian Small-clawed Otter Studbook (current to 30 Jan 2009 and maintained by studbook keeper Sarah Duncan, Newport Aquarium). Genetic data exports for the living population were based the AZA population. Demographic exports were based on AZA data from 1 January 1980 – 21 April 2009 (based on most recent 2007 SSP).

Data was altered by exclusion of three unrealistically older animals (presumed dead) and by re-creation of an overlay used by the PMC for the 2007 breeding and transfer plan. Animals were excluded from the breeding population and the genetic analyses based on a September 2008 MateRx for reasons including sterility, advanced age, unknown pedigree or involvement in education programs. Males over the age of 18 and females older than age 11 are assumed to be post-reproductive. All animals with pedigrees less than 85% known were excluded.

2009 Demography & Genetics

	Number of holding institutions	N	N after exclusions	Estimated future capacity	T	Historic & projected λ	GD (%)	N_e/N	% known before assumptions/ exclusions	% known after assumptions/ exclusions
AZA	34	201	121	250	6.7	1.02	94.6	0.20	66.1	94.6
Variables used in projections						1.045				

N – Current population size based on studbook data
Estimated future capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had a 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size (after/before exclusions)	Minimum population size needed to meet genetic goals
A. Baseline (lambda=1.00, Ne/N = 0.20 and Kt = current population size after exclusions, 121)	69	15	33	121 / 201	N/A
B. Increase Ne/N to 0.30 (by increasing # and proportion of breeding animals)	77	23	50	121 / 201	N/A
C. Ne/N = 0.20, Increase lambda to 1.045, Increase Kt by 50 individuals	76	19	45	171 / 251	N/A
D. Ne/N = 0.20, lambda = 1.045, Kt increased by 50 individuals, add 4 founders every 20 years.	85	23	62	171 / 251	N/A
E. Ne/N = 0.20, lambda = 1.045, Kt increased by 50 individuals, add 4 founders every 10 years.	89	33	> 100	171 / 251	93

[Continued on following page]

Mustelidae - Asian Small-clawed Otter

Amplonyx cinereus

(continued)

Demographic Summary: This population has exhibited a historically healthy growth rate (Figure 1), producing a sufficient number of births each year to offset deaths. Over the past five years, annual births have ranged from 16 – 30 per year. The age pyramid appears stable, with many individuals in the juvenile and reproductive age classes and an even sex ratio (Figure 2).

- Approximately 23 births per year are required to keep this population at its current size (lambda = 1.00).
- Approximately 33 births per year would be required for the population to grow the estimated holding capacity of 250 in five years (lambda = 1.045).

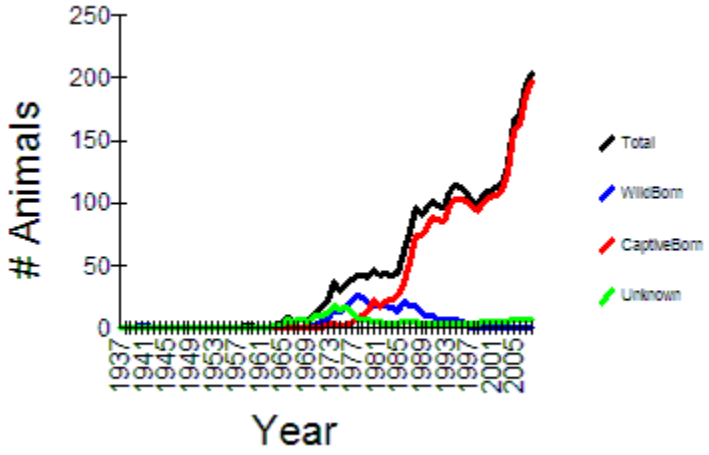


Figure 1. Annual population census of the AZA Asian Small-clawed Otter SSP population.

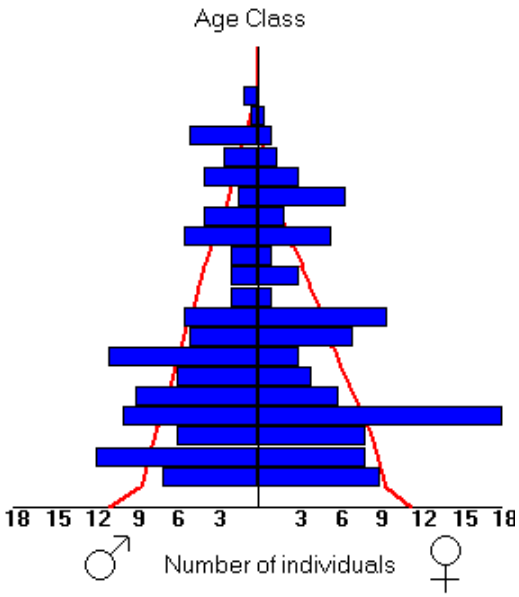


Figure 2. Age structure of the AZA Asian Small-clawed Otter SSP population.

Genetic Summary: This population has a relatively high starting gene diversity (94.6%) derived from a large founder base (33 founders). The effective population size, or proportion of breeding individuals in the population, is moderate (Ne/N = 0.20). The large family sizes common in this population could possibly be suppressing this ratio. However, the effective size has increased since the last management plan, reflecting an increase in the number of individuals contributing to breeding. Based on the TAG's 2009 space survey, this species seems to be in high demand with room to grow into new institutions.

Projections indicate that under current population parameters, this population will **not** meet standard genetic goals of 90% GD for 100 years with the TAG-proposed target size (Scenario A). Improving the Ne/N ratio, increasing the target population size, and improving the growth rate will help retain gene diversity for longer but the population will still not reach standard long term genetic goals (Scenarios B & C). By improving these population parameters as well as adding founders, this population could possibly meet long term genetic goals (Scenarios D & E).

The following strategies will help this population to retain gene diversity for a longer period of time:

- Increase the target population size to reflect increased capacity
- Increase the population growth rate to fill the future capacity
- Select breeding pairs using mean kinship (i.e., prioritizing low mean kinship animals for breeding)
- Increase the effective size (Ne/N) towards 0.30
- Add founders if possible

Mustelidae - North American River Otter
Lontra canadensis

Proposed program status: PMP
Program role: Education and Display

Projections for this population were based on the North American River Otter Studbook (current to 13 January 2009 and maintained by studbook keeper David Hamilton, Seneca Park Zoo). Genetic data exports for the living population were based on the AZA population. Excluded from the genetic analyses were 50 animals that were sterile or post-reproductive (as per 2008/2009 plan). Demographic exports were based on North American data from 1 January 1980 – 21 April 2009 (based on most recent 2008/2009 Breeding and Transfer Plan).

2009 Demography & Genetics

	Number of holding institutions	N	N (after exclusions)	Estimated future capacity	T	Historic & Projected λ	GD (%)	N_e/N	% known before assumptions/ exclusions	% known after assumptions/ exclusions
AZA	99	245 (122.119.4)	195	~300	9.8	0.91	97.7	0.066	68.5	99
Variables used in projections				250, 300		1.02		0.20		

N – Current population size based on studbook data
Estimated holding capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had an 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size (after/before exclusions	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.06 and Kt = current population size after exclusions, 195)	62	17	22	195 / 250	Not attainable
B. Increase Kt by 50	68	20	27	245 / 300	Not attainable
C. Increase Ne/N to 0.20, Kt = current population size after exclusions, 195	86	61	78	195 / 250	348
D. Increase Ne/N to 0.20, Increase Kt by 50	88	76	97	245 / 300	348

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Mustelidae - North American River Otter

Lontra canadensis

(continued)

Demographic Summary: This population has exhibited a historically slightly decreasing growth rate (Figure 1), which is sustained by rehab animals and some births. Breeding in zoos has been sporadic. Over the past five years, annual births have ranged from 4 - 18 per year. The age pyramid appears relatively stable with an even sex ratio, but could use a few more individuals in the juvenile age classes (Figure 2).

- Approximately 22 births per year are required to keep this population at its current size (lambda = 1.00).
- Approximately 33 births per year would be required for the population to grow the estimated holding capacity of 300 in five years (lambda = 1.041)

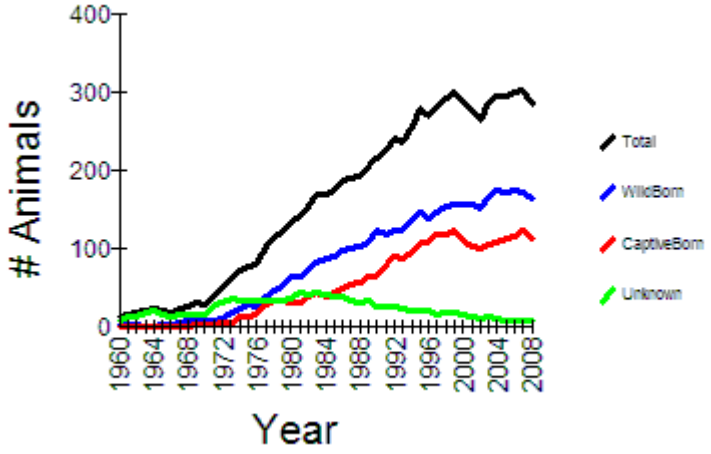

Figure 1. Population census of the AZA North American River Otter PMP population from 1960 to

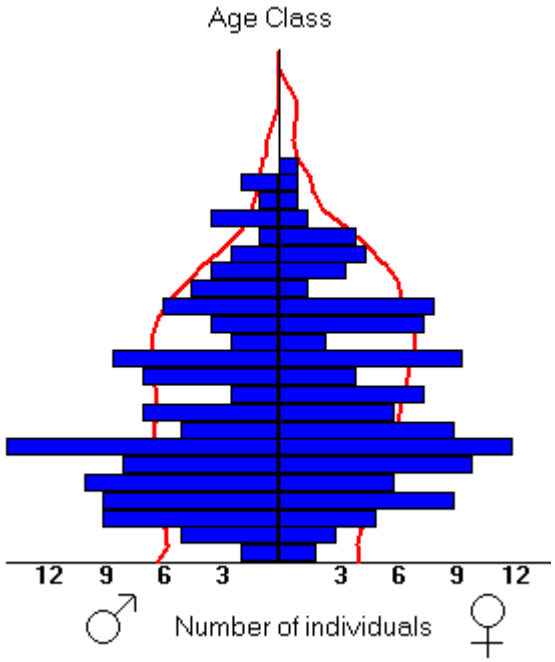

Figure 2. Age structure of the AZA North American River Otter PMP population before exclusions.

Genetic Summary: This is a genetically healthy population with a high starting gene diversity (97.7%) derived from a large founder base (60 founders and 85 potential founders remaining in the population). The effective population size, or proportion of breeding individuals in the population, is very low (Ne/N = 0.066). Rehab animals are consistently added to this population, which allows for a lower Ne/N. However, more focus should be put on developing consistent breeding husbandry in zoos. Based on the TAG's 2009 space survey, this species seems to be in very high demand, in that spaces are unable to be filled with this species. The TAG discussed possibly using vacant spaces for the African otter species.

Projections indicate that under current population parameters, this population will **not** meet standard genetic goals of 90% GD for 100 years (Scenario A). Increasing the target population size will help retain gene diversity for longer (Scenario B and D). Improving the Ne/N ratio would help even more (Scenarios C and D). By improving these population parameters, this population could possibly meet long term genetic goals (Scenarios D). Adding founders was not examined as a strategy because additional founders would not add to the genetic sustainability of this population. However, additional rehab animals coming in from outside the PMP may be able to fill exhibit and education needs.

The following strategies will help this population to retain gene diversity for a longer period of time:

- Increase the effective size (Ne/N) towards 0.30
- Increase the target population size to reflect increased capacity
- Select breeding pairs using mean kinship (i.e., prioritizing potential founders and other low mean kinship animals for breeding)

Mustelidae - Giant Otter
Pteronura brasiliensis

Proposed program status: PMP → SSP
Program role: Flagship

Projections for this population were based on the Giant Otter Studbook (current to 18 February 2009 and maintained by studbook keeper Kim Lengel, Philadelphia Zoo). Genetic data exports were based on the AZA population. Demographic exports were based on data North America from 1 January 1996 – April 2009. Some demographic analyses are unreliable due to this population's small size and limited history in zoos.

2009 Demography & Genetics

	Number of holding institutions	N	N (after exclusions)	Estimated future capacity	Historic/ Projected T	λ	GD (%)	N_e/N	% known pedigree
AZA	4	15 (6.9.0)	15	50	9.18	1.12	70	0.13	100
Variables used in projections				75, 100				0.3	

N – Current population size
Estimated holding capacity was based on the future capacity estimated by the Small Carnivore TAG's space survey and the Species Coordinator.
T – Generation time (years)
λ - Population growth rate based on historic data for this species (λ = 1.0, 0% growth)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to actual population size
% Known – proportion of descendant population with known pedigree

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.13, lambda = 1.0 and Kt = current population size, 15)	1	Initial GD < 90%	2	15	Not attainable
B. Increase lambda = 1.1; Kt = 50	19	Initial GD < 90%	3	50	Not attainable
C. Increase lambda = 1.1; Kt = 50; GD = 80% (recruiting existing founder)	21	Initial GD < 90%	70	50	Not attainable
D. Increase lambda = 1.1; Kt = 50; GD = 80% (recruiting existing founder); Ne/N = 0.3	46	Initial GD < 90%	46	50	Not attainable
E. Increase lambda = 1.1; Kt = 50; GD = 80% (recruiting existing founder); Ne/N = 0.3; add 4 founders every 5 years for 10 years	54	Initial GD < 90%	47	50	Not attainable
F. Increase lambda = 1.1; GD = 80% (recruiting existing founder); Ne/N = 0.3; add 4 founders every 5 years for 10 years; Kt = 75	63	Initial GD < 90%	65	75	Not attainable
G. Increase lambda = 1.1; GD = 80% (recruiting existing founder); Ne/N = 0.3; add 4 founders every 5 years for 10 years; Kt = 100	67	Initial GD < 90%	82	100	Not attainable

Mustelidae - Giant Otter

Pteronura brasiliensis

(continued)

Demographic summary: This population is very small and while breeding in zoos has occurred, most of the growth in AZA zoos has been due to one breeding pair and a handful of imports from other regions (Figures 1 a and b). The age structure of the population deviates from a stable one with few to none animals in all age classes and a sex ratio skewed towards females (Figure 2). To increase demographic stability, the PMP should focus on:

- Growing the population to fill existing spaces
- Increasing the birth rate as much as possible by increasing the number of breeding pairs and reducing infant mortality.

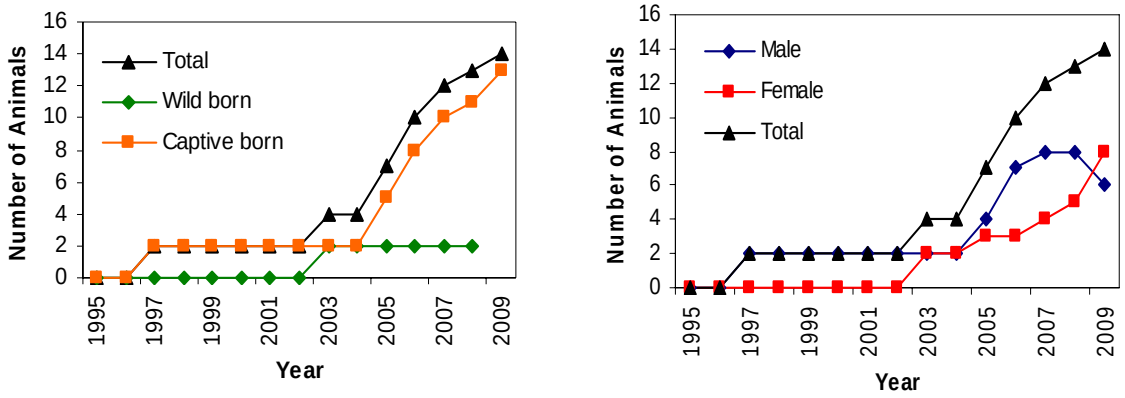

Figure 1. Population census of the giant otter population in AZA from 1995 to present according to a) birth type and b) sex.

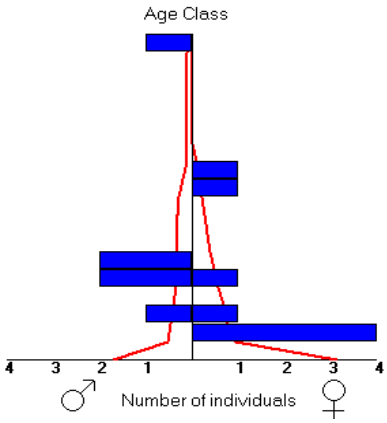

Figure 2: Age structure of Giant otter in N. America, age classes 0-17.

Genetic summary: The living population is descended from only six founders, and current gene diversity is low at 69.5%. Potential gene diversity is 87.5%, and some of this potential could be reached by breeding under-represented founder lines. The following strategies will help this population to retain gene diversity for a longer period of time:

- Increase the target population size to reflect increased capacity
- Increase the population growth rate to fill the future capacity
- Select breeding pairs using mean kinship (i.e., breeding under represented lineages with each other if possible)
- Increase the effective size (Ne/N) towards 0.30 by creating more breeding pairs
- Add founders

Projections indicate that under current population parameters, this population will **not** meet standard genetic goals of 90% GD for 100 years with the TAG-proposed target size (Scenario A). Improving the Ne/N ratio, increasing the target population size, and improving the growth rate will help retain gene diversity for longer but the population will still not reach standard long term genetic goals (Scenarios B, C, D). Founders may be available from South America or Europe, although some animals from other regions may be related to the AZA population. By improving these population parameters as well as adding founders fairly frequently, this population would greatly improve its demographic and genetic outlook (Scenario G).

Mustelidae - African Clawless Otter

Aonyx capensis

Proposed program status: PMP → Phase out
Program role: not applicable

The Regional African Clawless Otter Studbook (current to 1 January 2009 and maintained by studbook keeper Randi Meyerson, Toledo Zoological Gardens) was evaluated. However, demographic and genetic data is lacking for this species due to the small population size and few births. **Target size analyses were not run for this population due to insufficient genetic data.**

Due to decreased demand and space for this species, indicated by the recent TAG space survey results, African clawless otters with be downgraded by the TAG from a PMP to a Phase out program.

2009 Demography & Genetics

	Number of holding institutions	N	N (after exclusions)	Estimated future capacity	T	Historic & Projected λ	GD (%)	N_e/N	% known before assumptions	% known after assumptions
AZA	3	7 (3.4)	7	6	--	--	--	--	--	--
Variables used in projections										

N – Current population size based on studbook data
Estimated holding capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had an 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

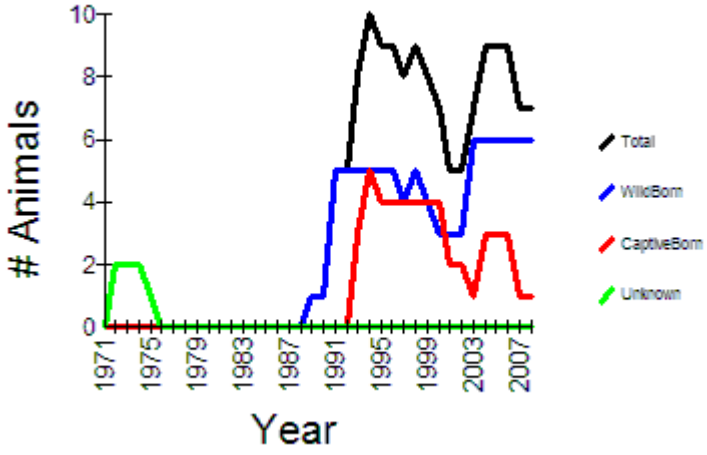

Figure 1. Population census of the AZA African Clawless Otter PMP population from 1970 to present.

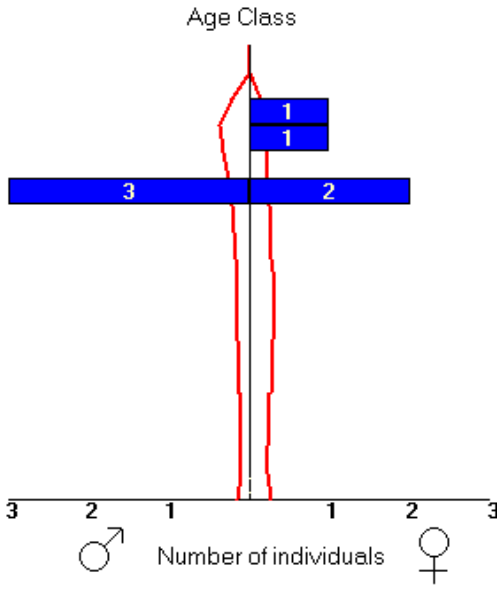

Figure 2. Age structure of the AZA African Clawless Otter PMP population showing classes 0 – 14.

Mustelidae - Spotted-necked Otter
Lutra maculicollis

Proposed program status: PMP → SSP
Program role: Education and Display

Projections for this population were based on analyses from the analytical version of the North American regional Spotted-necked Otter Studbook (current to 1 January 2009 and maintained by studbook keeper Randi Meyerson, Toledo Zoological Gardens). Pedigree assumptions were developed by the PMC for the purposes of these target size analyses. Genetic data exports for the living population were based on the AZA population. For the genetic analyses, an 18 yr old male was excluded and a newborn female was added. Demographic exports were based on North American data from 1 January 1975 – 21 April 2009.

2009 Demography & Genetics

	Number of holding institutions	N	N (after exclusions)	Estimated future capacity	Historic/ Projected T	λ	GD (%)	N_e/N	% known before assumptions	% known after assumptions
AZA	7	27 (12.15)	26	27	7.7	1.04	86.5	0.31	48.4	100
Values used for projections			26	50 / 75	7.7	1.044	86.5	0.3		

N – Current population size based on studbook data
Estimated future capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had a 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.30 and Kt = 26)	36	Initial GD < 90%	12 yrs	26	Not attainable
B. Ne/N = 0.30, increase starting GD to 92% by recruiting most genetically valuable pairs including founder potential founders, increase Kt to 32	45	1	14 yrs	32	Not attainable
C. Ne/N = 0.30, starting GD = 92% by recruiting most genetically valuable pairs including founder potential founders, increase Kt to 50	57	1	18 yrs	50	Not attainable
D. Ne/N = 0.30, starting GD = 92% by recruiting most genetically valuable pairs including founder potential founders, increase Kt = 50, add 4 founders every 10 years	84	1	> 100	50	134
E. Ne/N = 0.30, starting GD = 92% by recruiting most genetically valuable pairs including founder potential founders, **increase Kt = 75**, add 2 founders every 10 years	83	1	> 100	75	1289
F. Ne/N = 0.30, starting GD = 92% by recruiting most genetically valuable pairs including founder potential founders, **increase Kt = 75**, add 4 founders every 10 years	87	1	> 100	75	134

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Mustelidae - Spotted-necked Otter

Lutra maculicollis

(continued)

Demographic Summary: The census data shows a steady increase over past 10 years. A handful of births have been occurring every year for the past five years, sufficient to offset annual deaths without relying on imports. The age pyramid is sparse and illustrates the small size of the population. There is a need to recruit additional spaces to allow the population to continue to grow.

- Approximately 3 – 5 births per year are needed to maintain the population at its current size.
- If there was the opportunity for the population to grow at a rate of 4.4% (lambda = 1.044), to achieve a size of 50 in 15 years, 5-7 births per year would be required.

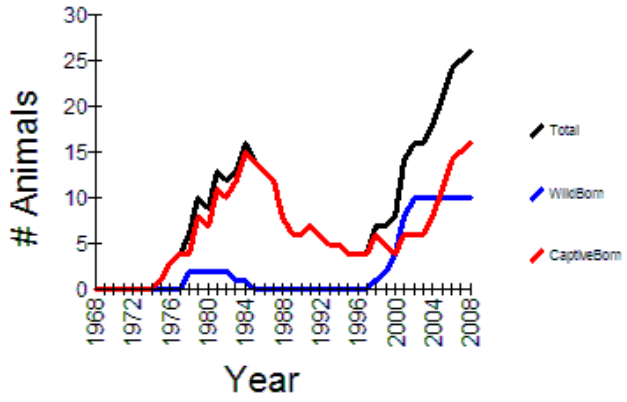

Figure 1. Annual population census of the AZA Oriental Spotted Necked Otter SSP population from 1975 to present.

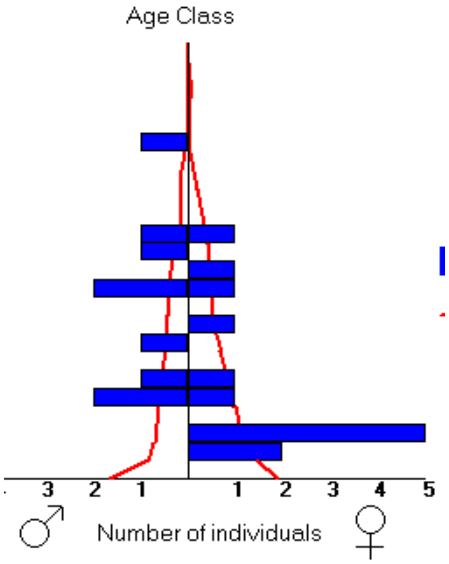

Figure 2. Age structure of the AZA Spotted Necked Otter SSP population from age classes 0-13.

Genetics Summary: Current gene diversity (86.5% after assumptions) is moderate but fairly good for a population descended from 6 founders and with 6 additional founders. The effective population size is also good at 0.3077. With potential founders in the population currently held together, a pair in each of three institutions, there is the possibility to increase GD in near future. If all three current potential founder pairs were to produce two offspring each, GD would increase to 92% (Strategy B). Furthermore there are imports readily available for this population from Bester and from another supplier in South Africa (Strategies D, E and F). The main issue for the population is space availability. Additional institutions and extra space may potentially be obtained from N. American river otter or Oriental small-clawed otter if exhibits are not strictly bio-geographical.

The following strategies will help this population to retain gene diversity for a longer period of time:

- Recruit additional institutions and space
- Select breeding pairs using mean kinship (i.e., prioritizing low mean kinship animals for breeding)
- Breed potential founders
- Import additional founders

Ailuridae - Red Panda
Ailurus fulgens fulgens

Proposed program status: SSP
Program role: Education and Display

Projections for this population were based on the true version of the Regional Red Panda Studbook (current to 21 April 2009 and maintained by Mary Noell, Cincinnati Zoo). Genetic data are based on the SSP population using a user defined field for subspecies (*A. f. fulgens*); 23 animals were excluded based on a list from the last 2008-2009 breeding and transfer plan. Demographic exports were based on North American data for both subspecies combined from 1 January 1970 – 21 April 2009.

2009 Demography & Genetics

	Number of holding institutions	N	N after exclusions	Estimated future capacity	T	Historic & Projected λ	GD (%)	N_e/N	% known
AZA	49	115 (54.61)	93	150 - 200	5.8	1.031	90.2	0.36	100
Variables used in projections				165, 215		1.022			

N – Current population size based on studbook data
Estimated holding capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had an 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size (after/before exclusions)	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.36 and Kt = current population size after exclusions, 93)	69	Initial GD < 90%	45	93	Not attainable
B. Increase Kt by 50 (increased capacity of current holders of *fulgens)*	75	Initial GD < 90%	65	143 / 165	Not attainable
C. Increase Kt by 100 (increased capacity of current holders of *fulgens* + all others interested in obtaining red pandas)	78	Initial GD < 90%	78	193 / 215	Not attainable
D. Increase Kt by 50 (increased capacity of current holders of *fulgens)* and 2 founders in a one-time import event.	76	Initial GD < 90%	71	143 / 165	Not attainable
E. Increase Kt by 50 (increased capacity of current holders of *fulgens)* and 2 founders every five years.	> 90	> 100	> 100	143 / 165	128

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Ailuridae - Red Panda

Ailurus fulgens fulgens

(continued)

Demographic Summary: This population has exhibited a historically positive growth rate (Figure 1). Over the past five years, annual births have ranged from 9 - 25 per year. The age pyramid is relatively stable with an even sex ratio, but could use a few more individuals in the reproductive age classes (Figure 2).

- Approximately 20 births per year are required to keep this population at its current size (lambda = 1.00).
- Approximately 28 births per year would be required for the population to grow the estimated holding capacity of 150 in five years (lambda = 1.055)

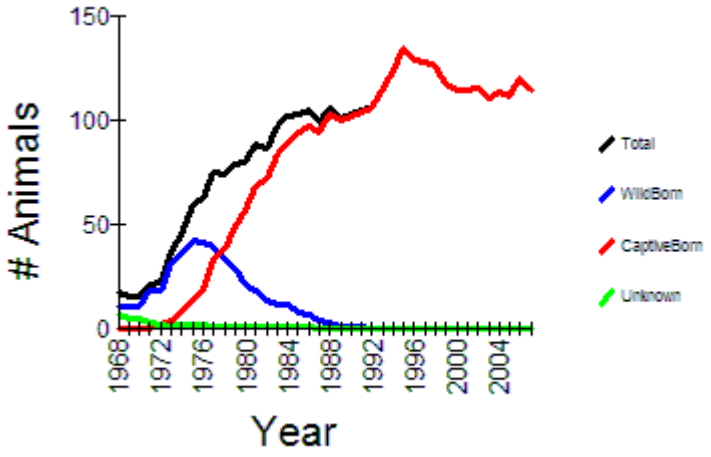

Figure 1. Population census of the AZA Red Panda (*A. f. fulgens* only) SSP population from 1968 to present

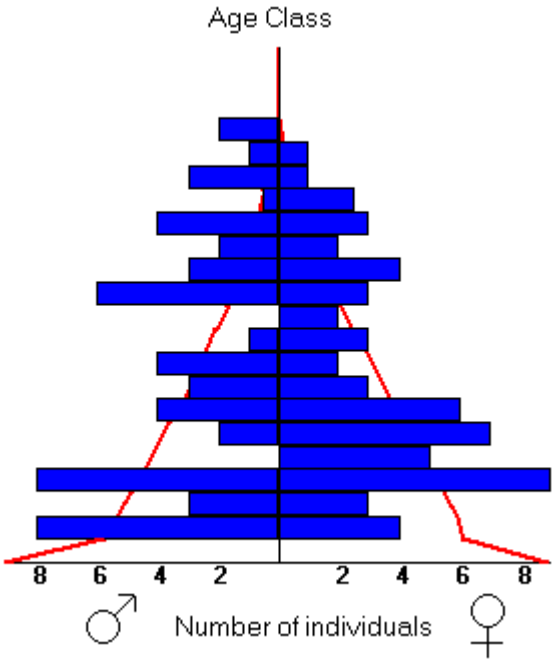

Figure 2. Age structure of the AZA Red Panda (*A. f. fulgens* only) SSP population before exclusions.

Genetic Summary: This population has a good starting gene diversity (90.2%) derived from a large founder base (25 founders). There are currently no additional potential founders remaining in the population. Imports may be available from South African and Indian zoos. These potential imports are probably related to the North American population, but would still contribute unique alleles. Based on the TAG's 2009 space survey, this species seems to be in very high demand. According to the SSP, both subspecific populations are needed to meet exhibit needs; from these analyses it seems that both populations can be maintained without compromising the other.

Projections indicate that under current population parameters, this population will **not** meet standard genetic goals of 90% GD for 100 years (Scenario A). Increasing the target population size to the capacity of the current holders as well as adding new institutions will help retain gene diversity for longer (Scenario B and C).
A mixture of a slightly increased target size and importing animals from outsize North America can help this population to better meet genetic goals (Scenario D and E).

The following strategies will help this population to retain gene diversity for a longer period of time:

- Increase the target population size to reflect increased capacity
- Select breeding pairs using mean kinship (i.e., prioritizing potential founders and other low mean kinship animals for breeding)

Ailuridae - Red Panda

Ailurus fulgens refulgens (styani)

Proposed program status: SSP
Program role: Education and Display

Projections for this population were based on an analytical version of the Regional Red Panda Studbook (current to 21 April 2009 and maintained by Mary Noell, Cincinnati Zoo). Genetic data are based on the SSP population using a user-defined field for subspecies (*A.f.refulgens* or *styani*). Pedigree assumptions were developed by the PMC for the purposes of these TAG analyses (three ancestors brought in from China were assumed to be unrelated founders). Two non-AZA approved SSP members were added into the genetic analyses and animals were excluded from the breeding population based on a list from the 2008-2009 breeding and transfer plan. Demographic exports were based on North American data for both subspecies combined from 1 January 1970 – 21 April 2009.

2009 Demography & Genetics

	Number of holding institutions	N	N after exclusions	Estimated future capacity	T	Historic & Projected λ	GD (%)	N_e/N	% known before assumptions/ exclusions	% known after assumptions/ exclusions
SSP (AZA + approved non-AZA)	20	51 (25.25.1)	43	60 - 110	5.9	0.988	94.5	0.35	86.2	95.6
Variables used in projections				61, 110		1.022				

N – Current population size based on studbook data
Estimated holding capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had an 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size (after/before exclusions)	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.35 and Kt = current population size after exclusions, 43)	52	7	18	43 / 51	Not attainable
B. Increase Kt by 10 (increased capacity of current holders of *refulgens/styani)*	58	7	21	53 / 61	Not attainable
C. Increase Kt by 60 (increased capacity of current holders of *refulgens/styani)* + all others interested in obtaining red pandas)	69	7	24	103 / 110	Not attainable
D. Increase Kt by 10 (increased capacity of current holders of *refulgens/styani)* and 2 founders every five years.	85	10	> 100	53 / 61	141
E. Increase Kt by 60 (increased capacity of current holders of *refulgens/styani)* + all others interested in obtaining red pandas) and import 10 founders in a one-time event.	72	14	38	103 / 110	Not attainable

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Ailuridae - Red Panda

Ailurus fulgens refulgens (styani)

(continued)

Demographic Summary: This population has exhibited a historically slightly decreasing growth rate (Figure 1). Over the past five years, annual births have ranged from 1 - 4 per year. The age pyramid is columnar with an even sex ratio, but needs more individuals in the juvenile and reproductive age classes (Figure 2).

- Approximately 9 births per year are required to keep this population at its current size (lambda = 1.00).
- Approximately 12 births per year would be required for the population to grow the estimated holding capacity of 61 in five years (lambda = 1.037)

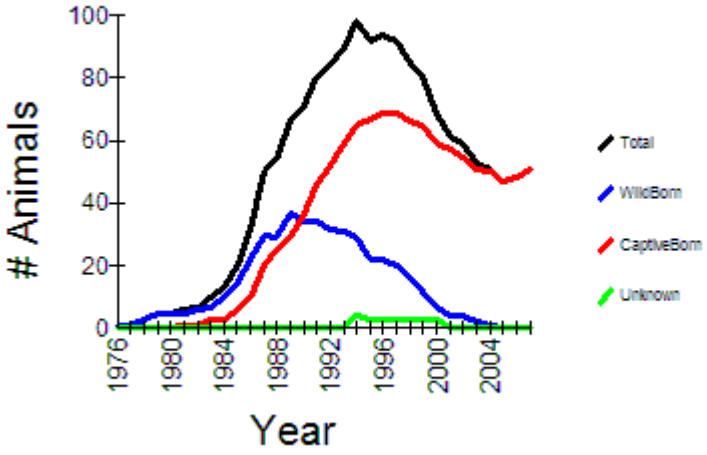

Figure 1. Population census of the AZA Red Panda (*A. f. refulgens* only) SSP population from 1976 to present

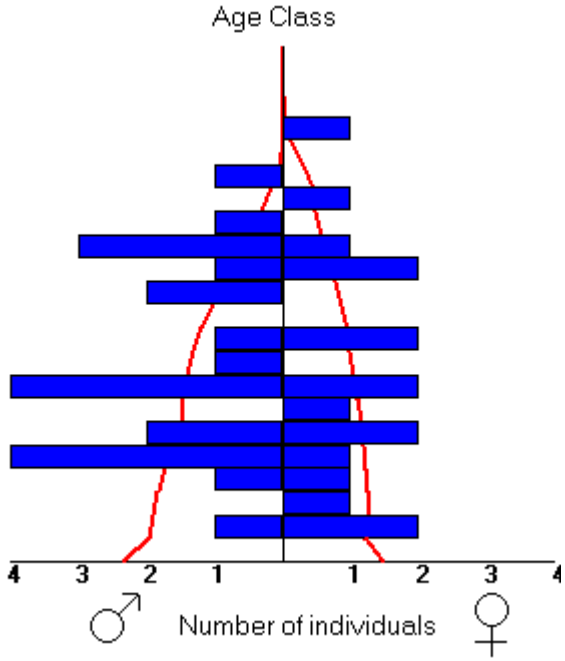

Figure 2. Age structure of the AZA Red Panda (*A. f. refulgens* only) SSP population before

Genetic Summary: This population has a high starting gene diversity (94.5%) derived from a large founder base (37 founders). There are currently no additional potential founders remaining in the population. Imports of rehab animals may be available from China zoos. Based on the TAG's 2009 space survey, this species seems to be in high demand. It is recommended that general requests for red pandas be dedicated and filled with the *A. f. refulgens* subspecies if possible, to help increase the genetic and demographic sustainability of this population. According to the SSP, both subspecific populations are needed to meet exhibit needs; from these analyses it seems that both populations can be maintained without compromising the other.

Projections indicate that under current population parameters, this population will **not** meet standard genetic goals of 90% GD for 100 years (Scenario A). Increasing the target population size to the capacity of the current holders as well as adding new institutions will help retain gene diversity for longer (Scenario B and C). A mixture of a slightly increased target size and importing rehab animals from China can help this population to better meet genetic goals (Scenario D and E).

The following strategies will help this population to retain gene diversity for a longer period of time:

- Increase the target population size to reflect increased capacity
- Select breeding pairs using mean kinship (i.e., prioritizing low mean kinship animals for breeding)

Mustelidae – Black-footed Ferret
Mustela nigripes

Proposed program status: SSP
Program role: Conservation Support

Projections for this population were based on an analytical version of the North American regional Black-footed Ferret Studbook (current to 13 January 2009 and maintained by studbook keeper Paul Marinari, USFWS). This studbook only includes those individuals breeding for release. These animals make up two populations – pre-release (breeders + offspring of year) and post-release (those individuals retained for the following year's breeding). Releases typically take place from September to January. This population is part of a USFWS release program and target sizes and population goals that have been set by the USFWS were further analyzed. There are also an estimated 34 additional animals being held for education and display at AZA institutions, which are permanently sterilized and not transferable back to the breeding population. Demographic exports were based on North American data from 1 January 1980 – 21 April 2009.

2009 Demography & Genetics

	Number of holding institutions	N	N after exclusions	Estimated future capacity	T	Historic & Projected λ	GD (%)	N_e/N	% known
AZA	14	132 = 98 (38.60) breeding + 34 non-breeding animals	98	165 (65 non-breeding & 97 breeding)	1.4	1.9	87	0.26	100
Non-AZA	1	196	186	200	--	--	--	--	--
Variables used in projections		328	284	350 (post-release population), 500 (pre-release population)		1.9			

N – Current population size based on studbook data
Estimated holding capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had an 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

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Mustelidae – Black-footed Ferret

Mustela nigripes

(continued)

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.26; Kt = current holding size of breeding animals in AZA & non-AZA institutions after exclusions, 284)	53	Initial GD < 90%	23 yrs	284	Not attainable
B. Increase Ne/N = 0.26; Kt = 350, representing breeding in AZA & non-AZA institutions and projected future non-breeding spaces in AZA needed to hold the ex-situ population	58	Initial GD < 90%	28 yrs	350	Not attainable
C. Increase Kt = 500, representing all institutional holding of breeders, non-breeders, and temporary holding spaces needed for ~ 220 kits just prior to release	66	Initial GD < 90%	41 yrs	500	Not attainable

Demographic Summary: This program is managed primarily outside of AZA with the majority of specimens held by and population goals set by USFWS. AZA institutions housing black-footed ferrets are dedicated to this species and do not pose competition for other small carnivore spaces. Participating AZA facilities will likely continue to support USFWS recovery efforts for this species by providing the currently allotted breeding space (150) and by housing post-reproductive individuals for exhibit purposes (70 space projected to be available for the next 3 to 5 years).

This population has historically exhibited a positive growth rate (Figure 1). The Studbook Keeper indicates that a pre-breeding population size of approximately 280 (including both AZA and USFWS) is needed to meet reproduction goals for release animals. Additional animals are used for display or education. The age pyramid is an atypical age distribution, showing the effect of management strategies implemented to augment population growth for release (Figure 2).

- Based on our projections, approximately 44 births in the next year are required to keep this population at its current size (lambda = 1.00).
- According to the Studbook Keeper, an additional surplus of approximately 200 kits is necessary each year to maintain the release program.

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Mustelidae – Black-footed Ferret

Mustela nigripes

(continued)

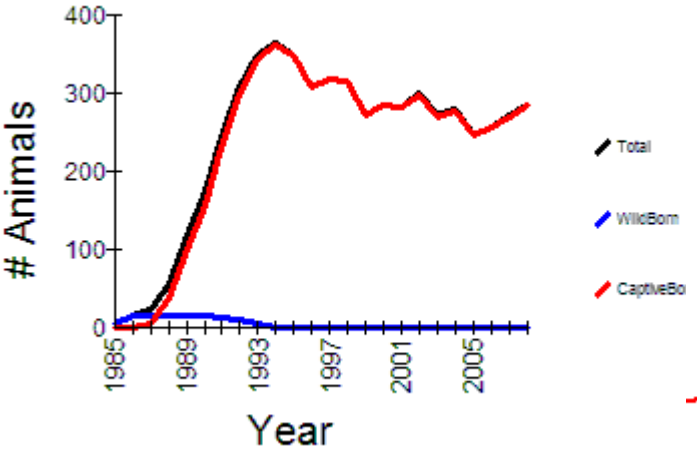

Figure 1. Population census of the North American Black-footed Ferret SSP population from 1985 to present.

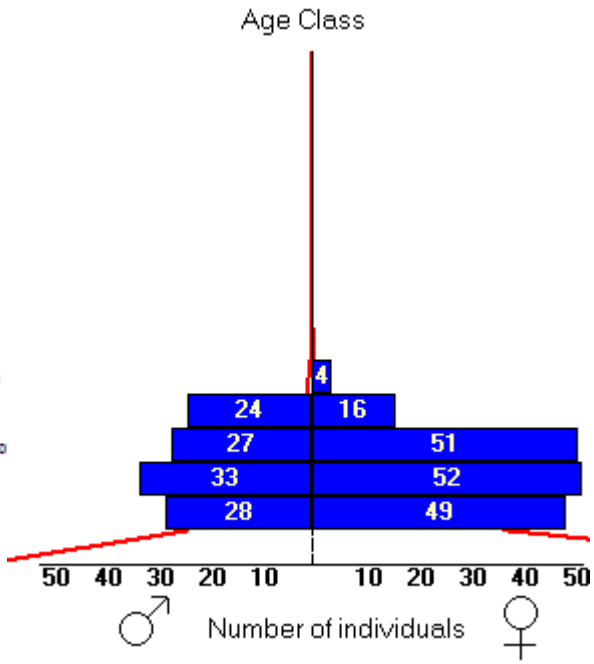

Figure 2. Age structure of the North American Black-footed Ferret SSP population. Note that this is a management induced age structure.

Genetic Summary: This population has a good starting gene diversity (87%) derived from a small founder base (7 founders). There are currently no additional potential founders remaining in the population. There are also no existing wild populations unrelated to this one in which more potential founders could be acquired. Based on the TAG's 2009 space survey, some new institutions are interested in holding non-breeding animals.

Projections indicate that under current population parameters, this potentially breeding population will **not** meet standard genetic goals of 90% GD for 100 years (Scenario A). However, by including the current breeding and non-breeding individuals as well as the future holding capacity of newly interested non-breeding holders, the program may be able to expand into a slightly larger target population size that will help retain gene diversity for longer (Scenario B). An additional scenario with a target size of 500 was modeled to reflect the temporary increase in the population due to production of 200 offspring just prior to release (Scenario C). While a population size of 500 is not realistic for long-term holding, it does reflect the breeding space and genetic potential of the population. The TAG target size of 350 is intended to support the breeding population, animals for release, and the display and education population. Based on the TAG's space survey for the next 3 to 5 years, this target size can be broken down to about 65 non-breeding animals and 97 breeding animals in AZA institutions, as well as 200 breeding animals at the USFWS facility.

Procyonidae - Ringtail
Bassariscus astutus

Proposed program status: PMP
Program role: Education and Display

Projections for this population were based on an analytical version of the Regional Ringtail Studbook (current to 22 June 2008 and maintained by studbook keeper Debbie Thompson, Little Rock Zoological Gardens). An additional assumption was made for one animal (#345 coming in soon from Big Bear). Genetic data exports for the living population were based on the PMP population which includes 1 non-AZA facility; sterile animals and education animals were excluded from the genetic analyses. Demographic exports were based on the AZA data from 1 January 1970 – 22 April 2009.

This studbook keeper also maintains a database for the cacomistle (*Bassariscus sumichrasti*), which is a phase out that should be replaced with ringtails (*Bassariscus astutus)*.

2009 Demography & Genetics

	Number of holding institutions	N	N after exclusions	Estimated future capacity	T	Historic & Projected λ	GD (%)	N_e/N	% known before assumptions/ exclusions	% known after assumptions/ exclusions
AZA	15	33 (16.16)		50	7.1	0.96	92.6	0.26	26.9	100
Non-AZA	1	2 (1.1)								
Variables used in projections	16	35 (17.17)	23	50, 75		1.03		0.3		

N – Current population size based on studbook data
Estimated holding capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had an 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.26 and Kt = current holding size after exclusions, 23)	27	1	7	23	Not attainable
B. Increase Ne/N to 0.30, Kt = 50	53	1	11	50	Not attainable
C. Ne/N = 0.30, increase Kt to 75	60	1	11	75	Not attainable
D. Ne/N = 0.30, increase Kt to 75, add four existing potential founders in a one time event	62	3	15	75	Not attainable
E. Ne/N = 0.30, increase Kt to 75, add 4 founders every 10 years	87	1	> 100	75	158

Procyonidae - Ringtail

Bassariscus astutus

(continued)

Demographic Summary: This population has exhibited a historically decreasing growth rate (Figure 1). Demographically, this population is very fragile. Any growth in the population is from individuals from the pet trade and some births. Breeding in zoos has been sporadic. Over the past five years, annual births have ranged from 0 - 7 per year. The age pyramid is columnar and unstable and needs more individuals in all age classes (Figure 2). The population has an even sex ratio

- Approximately 6 births per year are required to keep this population at its current size (lambda = 1.00).
- Approximately 9 births per year would be required for the population to grow the estimated holding capacity of 50 in five years (lambda = 1.074)

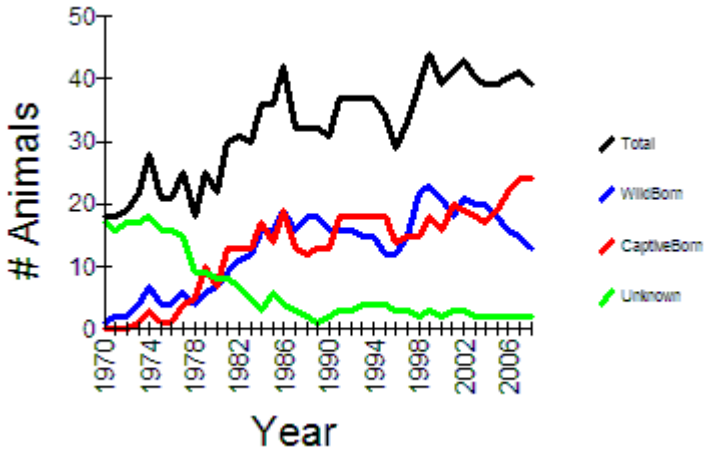

Figure 1. Population census of the AZA Ringtail PMP population from 1970 to present.

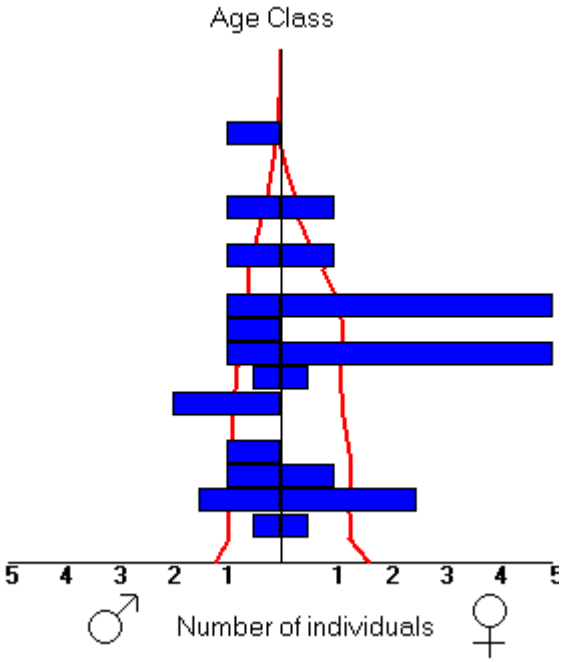

Figure 2. Age structure of the AZA Ringtail PMP population before exclusions.

Genetic Summary: This population has a good starting gene diversity (92.6%) derived from a small founder base (12 founders). There are currently four additional potential founders remaining in the population. Based on the TAG's 2009 space survey, there is an institutional demand to hold more of this species.

Projections indicate that under current population parameters, this population will **not** meet standard genetic goals of 90% GD for 100 years (Scenario A). Increasing the Ne/N and target population size will help retain gene diversity for longer (Scenario B and C). Increasing Ne/N and target size as well as importing animals can help this population to better meet genetic goals (Scenario D and E). Genetically the population could probably be sustainable with periodic imports and a target size of 75 (which is more animals than the 3 – 5 year space survey interest indicates) (Scenario E).

The following strategies will help this population to retain gene diversity for a longer period of time:

- Increase the target population size to reflect increased capacity
- Select breeding pairs using mean kinship (i.e., prioritizing potential founders and other low mean kinship animals for breeding)
- Manage needs of education programs without compromising population stability
    - Discourage permanent sterilization
    - Try using deslorelin
    - Encourage breeding of education animals if possible

Viverridae - Fossa
Cryptoprocta ferox

Proposed program status: PMP
Program role: Flagship

Projections for this population were based on the true version of the North American regional Fossa Studbook (current to 1 December 2008 and maintained by studbook keeper Mandi Olsen, Omaha's Henry Doorly Zoo). Genetic data exports for the living population were based on the AZA population; sterile animals and post-reproductive animals were excluded. Demographic exports were based on the AZA data from 1 January 1988 – 22 April 2009, as per the 2006 PMP Breeding and Transfer Plan.

2009 Demography & Genetics

	Number of holding institutions	N	N after exclusions	Estimated future capacity	T	Historic/ Projected λ	GD (%)	N_e/N	% known pedigree
AZA	16	42 (22.18.2)		~ 62		1.077			
Non-AZA	6	13 (6.5.2)							
Variables used in projections			47	~ 70	7.1	1.077	93	0.29	100

N – Current population size based on studbook data
Estimated future capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had a 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.29 and Kt = current population size after exclusions, 47)	55	5	21	47	Not attainable
B. Increase Kt to 75	66	7	32	75	Not attainable
C. Increase Kt to 100	72	7	40	100	Not attainable
D. Increase Kt = 75; add 2 founders every 10 years	82	9	61	75	290
E. Increase Kt = 100; add 2 founders every 10 years	84	10	> 100	100	290
F. Increase Kt = 75; add 4 founders every 10 years	86	11	> 100	75	141

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Viverridae - Fossa

Cryptoprocta ferox

(continued)

Demographic Summary: Census shows steady growth due to breeding (and some imports) since the current population was founded in late 1980s. The age structure is somewhat unstable due to the small population size but it approximates a pyramidal shape. However it appears as though in recent years there has been a variable amount of births from year to year.

- To maintain the population at its current size, less than one birth per year is required.
- To grow from 55 to 75 in 5 years (lambda = 1.064), approximately 5 births per year is necessary.

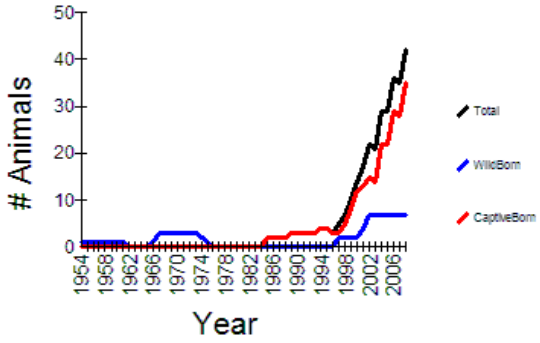

Figure 1. Population census of the AZA Fossa PMP population from 1988 to present.

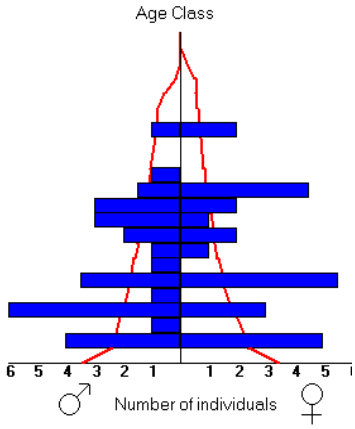

Figure 2. Age structure of the AZA Fossa PMP population showing classes 0 – 12.

Genetic Summary: This population may be capable of maintaining a good quantity of GD over time if managed appropriately. The current gene diversity of the population is 93%, with one potential founder still in the population, and the population has a good effective population size in addition. Some future space availability is also available for the population allowing it to retain more of its starting GD into the future (Strategy B and C). Founders are not readily available from Madagascar due to the illegality of exporting them; however, animals may be available from Europe or private sources in the U.S contributing to more GD over time (Strategies D, E and F).

The following strategies will help this population to retain gene diversity for a longer period of time:

- Increase the target population size to reflect increased capacity
- Maintain the population growth rate at its current level to fill the future capacity
- Select breeding pairs using mean kinship (i.e., prioritizing low mean kinship animals for breeding)
- Maintain of increase the current effective size
- Recruit the one existing potential founder in the population
- Add founders if possible

Herpestidae - Meerkat
Suricata suricatta

Proposed program status: PMP
Program role: Education and Display

Projections for this population were based on the Meerkat Studbook (current to 1 May 2007 and maintained by studbook keeper Katie Kimble, Toledo Zoological Gardens). The pedigree for this population is 28.3% known and 524 of the 542 living animals in the studbook have some level of unknownness. This insufficient pedigree data means that any genetic analyses and projections for the population cannot be accepted as accurate. Gene diversity may actually be higher or lower depending on the lineages and representation of alleles in the unknown portion of the pedigree. Genetic data exports for the living population were based the AZA population. Approximately 56 sterile animals were excluded from the genetic analyses. Demographic exports were based on North American data from 1 January 1970 – present.

2009 Demography & Genetics

	Number of holding institutions	N	N (after exclusions)	Estimated future capacity	T	Historic/ Projected λ	GD (%)	N_e/N	% known
AZA	75	500 (248.214.38)	442	~ 650	4.7	1.058	91	0.13	27.9
Values used for projections			442	442 / 500	4.7	1.058	91	0.2	

N – Current population size based on studbook data
Estimated future capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had a 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.13 and Kt = current living population after exclusions, 442)	75	3	67	442 / 500	Not attainable
B. Increase Ne/N to 0.20 (note that Ne/N is probably actually higher than the baseline due to lack of reporting parental IDs)	80	6	> 100	442 / 500	Not attainable
C. Ne/N = 0.20, Import 10 founders every 5 years	> 90	> 100	> 100	442 / 500	44
D. Ne/N = 0.20, Import 20 founders every 10 years	> 90	> 100	> 100	442 / 500	76

Demographic Summary: The first zoo birth was in 1964 and since this time the population has exhibited a rapid positive growth rate based heavily on zoo births (Figure 1). Although regular imports do supplement this population, imported animals make up only a small portion and often do not reproduce. The age structure appears very robust with a strong base of juvenile and reproductive animals and with an even sex ratio (Figure 2).

- For the population to remain stable (lambda = 1.00), approximately 70 births are required per year.
- For the population to grow to 500 in the next 5 years (lambda = 1.025), over 85 births are needed.

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Herpestidae – Meerkat

Suricata suricatta

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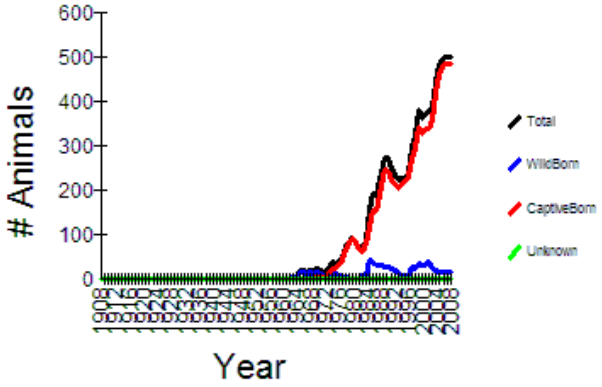

Figure 1. Population census of the AZA Meerkat PMP population (data current to May 2007).

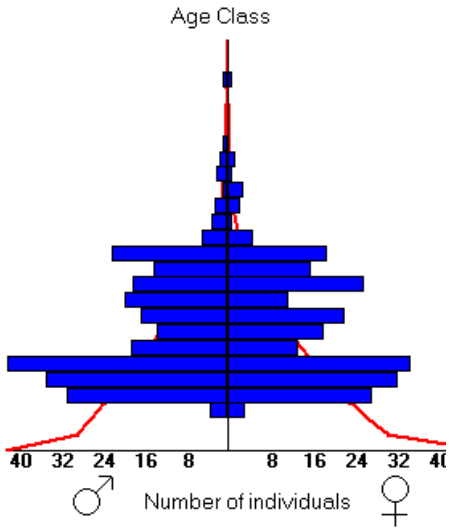

Figure 2. Age structure of the AZA Meerkat PMP population showing classes 0 – 19 (because data are current to May 2007, recent births are not reflected in the youngest age classes).

Genetic Summary: Most of the 500 animals in the Meerkat PMP population have some level of unknownness in their pedigree. The insufficient pedigree data of this population (28% known only) means that any genetic analyses or projections for the population cannot be accepted as accurate. Genetic calculations are based only on the portion of the pedigree that is known and gene diversity may actually be higher or lower than estimated. This population is not a candidate for traditional genetic analyses and animal-by-animal breeding recommendations due to its group management which contributes to the historic and continued lack of parentage tracking.

Despite poor pedigree data, there are several characteristics of the population that indicate it may be able to maintain a high level of gene diversity. With its large population size, high growth rate, and regular imports, this population could possibly meet traditional genetic goals (90% for 100 years) despite lack of traditional genetic planning (Scenarios C & D). Target size in this population is driven by exhibit need more than demographic or genetic goals.

The high demand and large number of future spaces for this species should be considered cautiously. Institutions should work more closely with the Population Manager to more cooperatively meet institutional and animal needs.

- Holding institutions need to keep space available at all times should the need to separate groups arise,
- Institutions interested in obtaining meerkats should contact the Population Manager before importing as there may be animals available in the PMP that need placement.
- Institutions should work with the Population Manager to periodically rotate groups of single sex siblings among breeding groups in order to reduce inbreeding and increase genetic diversity.

Procyonidae - Kinkajou
Potos flavus

Proposed program status: PMP
Program role: Education and Display

Projections for this population were based on the true Kinkajou Studbook (current to 5 December 2008 and maintained by studbook keeper Liz Toth, Boonshoft Museum of Discovery). This population is only 35% known after exclusions. This insufficient pedigree data means that any genetic analyses and projections for the population cannot be accepted as an accurate representation of the population. Gene diversity may actually be higher or lower depending on the lineages and representation of alleles in the unknown portion of the pedigree.
Demographic exports were based on data from 1 January 1964 – 13 February 2009 (based on the 2009 PMP Breeding and Transfer Recommendations draft).

2009 Demography & Genetics

	Number of holding institutions	N	N (after exclusions)	Estimated future capacity	T	Historic/ Projected λ	GD (%)	N_e/N	% known before exclusions	% known after exclusions
AZA	50	78 (37.41)		78			84	0.20	28.7	34.9
Non-AZA	9									
Values used for projections	60	98 (43.55)	85	98	9.5	1.0	84	0.20		

N – Current population size based on studbook data
Estimated future capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had a 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.20 and Kt =current population size after exclusions, 85)	61	Initial GD < 90%	39	85 / 98	Not attainable
B. Ne/N = 0.30, Kt = 100; add two founders every 10 years	82	Initial GD < 90%	> 100	85 / 98	Not attainable

[Continued on following page]

Procyonidae - Kinkajou

Potos flavus

(continued)

Demographic Summary: The population has increased over the last 20 years though in the last ten has appeared to stabilize somewhat. The age structure looks fairly robust, although with a female bias. Some breeding is occuring and recommended to meet educational program needs. Demand for this species is not particularly high but individuals are regularly needed for education programs.

- For the population to remain stable (lambda = 1.00), 4-5 births per year are needed.

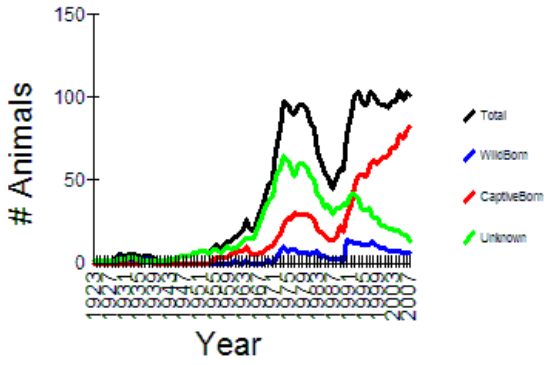

Figure 1. Population census of the Kinkajou PMP population from 1964 to present.

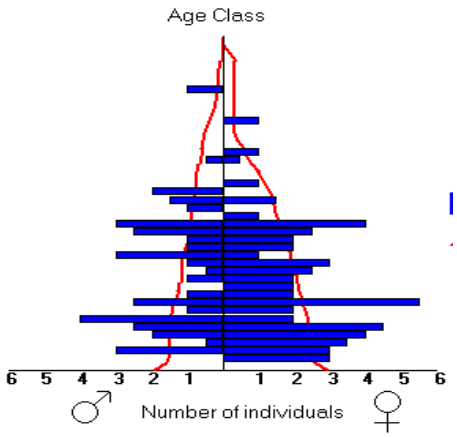

Figure 2. Age structure of the AZA Kinkajou PMP population showing classes 0 – 11.

Genetic Summary: This population is managed more for display / education rather than as a sustainable genetically managed population. The current gene diversity of 84% shown above may actually be higher or lower depending on the lineages and representation of alleles in the unknown portion of the pedigree.
The pedigree of the population is only 36% known after exclusions, and thus genetic analyses and genetic projections cannot be accurate for the population as a whole.

Genetic management strategies cannot be recommended as there is insufficient pedigree data available for the population.

Mustelidae - Fisher
Martes pennanti

Proposed program status: PMP
Program role: Education and display

Projections for this population were based on the analytical Fisher Studbook (current to December 2008 and maintained by studbook keeper Peg Dwyer, Rosamond Gifford Zoo at Burnet Park). Pedigree assumptions were created by the PMC for the purposes of these TAG analyses. Genetic data exports for the living population were based the North American population. Demographic exports were based on North American data from 1 January 1987 – present.

2009 Demography & Genetics

	Number of holding institutions	N	N after exclusions	Estimated holding capacity	T	Historic/ Projected λ	GD (%)	N_e/N	% known before assumptions/ exclusions	% known after assumptions/ exclusions
AZA	5	9 (6.3)	8(6.2)	29	6.4	0.87	73	0.133	50	100
Non-AZA	5	9 (4.5)	7(4.3)							
Variables used in projections			15	29	6.4	1.1	88	0.30		100

N – Current population size based on studbook data
Estimated future capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had a 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size	Minimum population size needed to meet genetic goals
A. Baseline	26	Initial GD < 90%	1 yrs	29	Not attainable
B. Increase starting GD to 88% reflect recruitment of two new breeding pairs (4 potential founders at non-AZA institutions)	26	Initial GD < 90%	3 yrs	29	Not attainable
C. Starting GD = 88%, increase growth rate to 1.10 and increase Ne/N to 0.30	33	Initial GD < 90%	8 yrs	29	Not attainable
D. Starting GD = 88%, growth rate = 1.10, Ne/N = 0.30, increase Kt to 75	56	Initial GD < 90%	8 yrs	75	Not attainable
E. Starting GD = 88%, growth rate = 1.10, Ne/N = 0.30, Kt = 75; add 2 founders every 10 years.	81	Initial GD < 90%	> 100 yrs	75	1005

[Continued on following page]

Mustelidae - Fisher

Martes pennanti

(continued)

Demographic summary: This population is very small and fragile and in recent years the population has seen a decline. The age pyramid is sparse and a slight male bias is evident.

- For the population to remain stable (lambda = 1.00), 2 births per year is needed.
- To grow the population to 29 in 5 years (lambda = 1.14), at least 4 births are required.

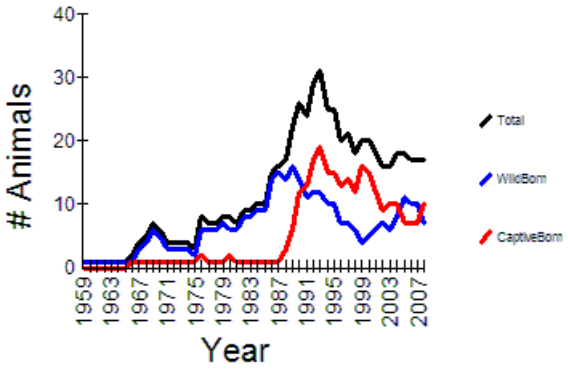

Figure 1. Population census of the Fisher PMP population from 1987 to present.

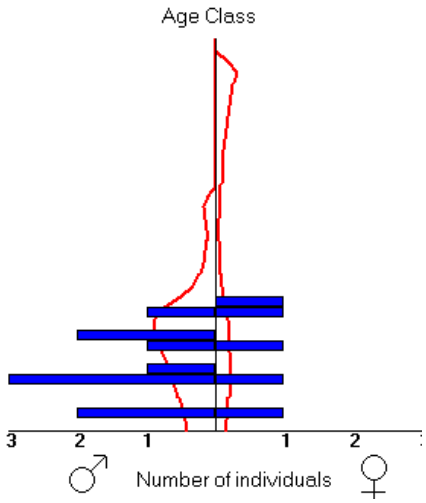

Figure 2. Age structure of the Fisher PMP population showing age classes 0 – 10.

Genetic Summary: Projections indicate that under current population parameters, this population will **not** meet standard genetic goals of 90% GD for 100 years; however there are possibilities for the population to maintain a good amount of GD over this time. Gene diversity is 73% after assumptions based on 5 founders with 9 additional potential founders. A gene diversity of 88% may be obtained if two pairs of those existing potential founders were to have two offspring each (Scenario B). Current effective population size is low. Increasing breeding success in the population or increasing the number of breeding individuals would benefit this population (Scenario C). At present there is only one successful living breeding pair in Minnesota evident from the studbook. Additional founders could be a consideration for this population also and should be researched in the near future (Scenario E).

The following strategies will help this population to retain gene diversity for a longer period of time:

- Increase the target population size to reflect increased capacity
- Increase the population growth rate to fill the future capacity
- Select breeding pairs using mean kinship (i.e., prioritizing low mean kinship animals for breeding)
- Increase the effective size towards 0.30
- Recruit existing potential founders in the population
- Add founders if possible

Viverridae - Binturong
Arctictis binturong

Proposed program status: PMP
Program role: Education and Display

Projections for this population were based on an analytical version of the Binturong Studbook (current to 1 March 2009) and maintained by studbook keeper Tim Hrynewycz, Disney's Animal Kingdom). Pedigree assumptions were developed by the PMC for the purposes of this TAG analysis. After assumptions and exclusions the population was still only 69% known. This insufficient pedigree data may affect the accuracy of analyses and results should be interpreted with caution. Genetic data exports were based on the AZA population. Sterile animals, females older than 16, and males older than 18 were excluded from the genetic analyses. Demographic exports were based on North American data from 1 January 1965 – 23 April 2009. Since the last TAG meeting in 2004, a major binturong breeding institution (PITTSBORO) ended their involvement in holding binturongs. Because of this, many institutions acquired animals from PITTSBORO and also in around 2007 many binturongs became Lost-To-Follow-Up.

2009 Demography & Genetics

	Number of holding institutions	N	N (after exclusions)	Estimated future capacity	T	Historic/ Projected λ	GD (%)	N_e/N	% known before assumptions/ exclusions	% known after assumptions/ exclusions
AZA	28	47 (24.23.0)				1.07			25	69
Non-AZA	4	14 (8.4.2)								
Values used for projections	28	47 (24.23.0)	29	73	5.8	1.07	91.3	0.13		69

N – Current population size based on studbook data
Estimated future capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had a 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.13 and Kt = current population size after exclusions, 29)	8	0	3 yrs	29	Not attainable
B. Increase Ne/N to 0.30	33	0	10 yrs	29	Not attainable
C. Ne/N = 0.30, increase Kt to 75	59	<1 yr	19 yrs	75	Not attainable
D. Ne/N = 0.30, Kt = 75; add 2 founders every 10 years	80	<1 yr	43 yrs	75	621

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Viverridae - Binturong

Arctictis binturong

(continued)

Demographic Summary: This population's needs are more demographic in nature than genetic. The age structure of the population is very unstable, with large gaps in the reproductive age classes and only four births over the past seven years. Many animals are in education programs and may not be available or behaviorally appropriate for breeding situations.

- Projections indicate 4 – 6 births would keep the population at is current size.
- 7 – 9 births per year would be need to grow the population at a rate of 5% (lambda = 1.05) to reach a size of 75 within 10 years.

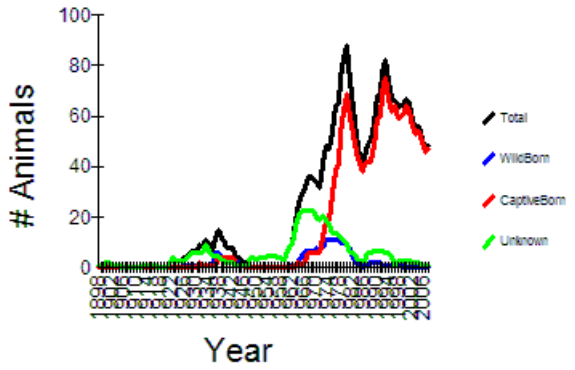

Figure 1. Population census of the AZA Binturong PMP population from 1965 to present.

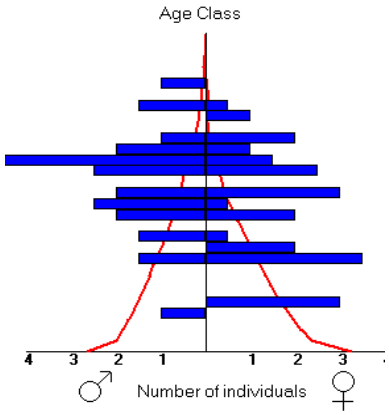

Figure 2. Age structure of the AZA Binturong PMP population showing classes 0 – 18.

Genetic Summary: Projections indicate that under current population parameters, this population will **not** meet standard genetic goals of 90% GD for 100 years. After assumptions, the population's GD was 91.32% with the living population descended from 18 founders. While this is a good starting GD, this level is lost quickly due to the small size of the population and low effective size. There are no additional founders in this population. The effective population size has the potential to be increased if more animals were placed in breeding situations, and less were hand-raised for education (see mangement issues below). This may help to maintain gene diversity over time (Strategy B). Indications of future demand for this species (30 extra spaces) could also contribute to maintaining gene diversity if proper management is in place (Strategy C). Additional animals may be available from European institutions and should be investigated as a source of new founders for the population (Strategy D).
However it should be noted that the population's pedigree is only 69% known after assumptions and thus analyses and projections should be interpreted with caution. Gene diversity may actually be higher or lower depending on the lineages and representation of alleles in the unknown portion of the pedigree.

Management issues: The PMP needs to find out if zoos are still interested in using these as education animals in the future; binturong at times have shown to be poor education animals (aggressive). According to the studbook, 19 animals have been hand-reared. According to the space survey, at least half the population is being used for educational programs.

The following strategies may help this population to retain gene diversity for a longer period of time:

- Increase the target population size to reflect increased capacity
- Increase the population growth rate to fill the future capacity
- Select breeding pairs using mean kinship (i.e., prioritizing low mean kinship animals for breeding)
- Increase the effective size (Ne/N) towards 0.30 – by placing more animals in breeding situations
- Add founders if possible

Mustelidae - Wolverine

Gulo gulo

Proposed program status: PMP
Program role: Education and Display

Projections for this population were based on an analytical version of the Wolverine Studbook (current to 16 June 2007 and maintained by studbook keeper Chris Kline, Minnesota Zoological Garden). Pedigree assumptions were developed by the PMC in consultation with Kevin Willis. Genetic data exports for the living population were based on the AZA population. One post-reproductive female was excluded from the genetic analyses (209). Demographic exports were based on North American data from 1 January 1989 – 23 April 2009.

2009 Demography & Genetics

	Number of holding institutions	N	N (after exclusions)	Estimated future capacity	T	Historic/ Projected λ	GD (%)	N_e/N	% known before assumptions/ exclusions	% known after assumptions/ exclusions
AZA	8	19 (10.9)		~ 39	9.5	0.996	89.2	0.14	47.1	94
Non-AZA	3	6 (3.3)								
Values used for projections	11	25 (13.12)	24	40, 75	9.5	1.03	89.2 / 92	0.3		

N – Current population size based on studbook data
Estimated future capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had a 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.14, lambda = 1.03 and Kt = current population size after exclusions, 24)	14	Initial GD < 90%	5	24	Not attainable
B. Ne/N = 0.14, lambda = 1.03 and increase Kt to 40	29	Initial GD < 90%	6	40	Not attainable
C. Increase Ne/N to 0.30, lambda = 1.03, Kt = 40	55	Initial GD < 90%	20	40	Not attainable
D. Ne/N to 0.30, lambda = 1.03, increase Kt to 75	65	Initial GD < 90%	20	75	Not attainable
E. Ne/N to 0.30, lambda = 1.03, Kt = 75, increase starting GD to 92% to simulate recruiting 4 existing potential founders.	67	1 yr	18	75	Not attainable
F. Ne/N to 0.30, lambda = 1.03, Kt = 75, starting GD = 92%, import 6 new founders in a one time event.	70	1 yr	33	75	Not attainable

Mustelidae - Wolverine

Gulo gulo

(continued)

Demographic Summary: The first zoo birth occurred in 1965 but zoo births did not become common until 1990s. Over the entire history of the program, this population has always been small with few births. The age structure is very unstable due to the small size of the population and few reproductive animals or juveniles. Demographic sample sizes are very small (N < 30). There have been 0 – 3 births per year for the past five years.

- Projections indicate at least 2 – 4 births are needed per year to maintain the population's current size.
- With 3 – 5 births per year, the population would grow to 40 in 15 years (lambda = 1.03).

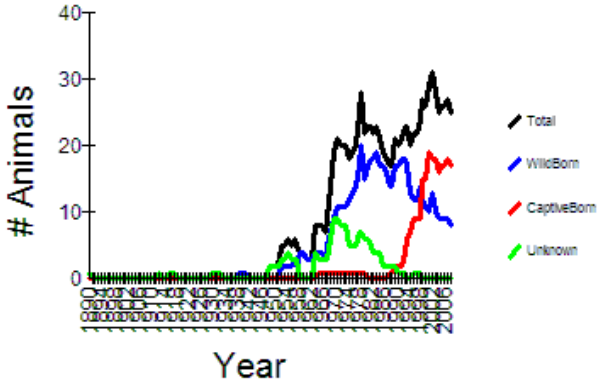

Figure 1. Population census of the Wolverine PMP population from 1989 to present.

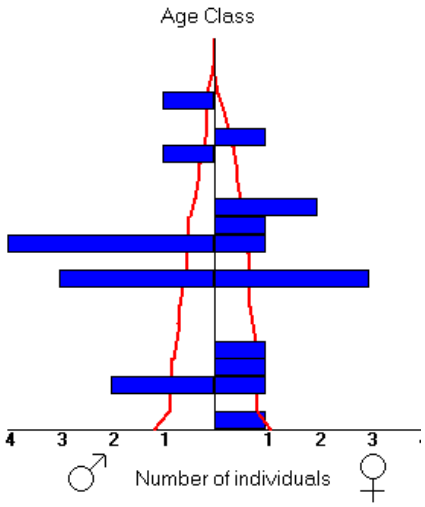

Figure 2. Age structure of the Wolverine PMP population showing classes 0 – 18.

Genetic Summary: Projections indicate that under current population parameters, this population will **not** meet standard genetic goals of 90% GD for 100 years. However there are strategies that may help to maintain GD into the future. Current gene diversity is estimated to be 89.2% after assumptions, with the living population descended from 11 founders. The effective population size has the potential to be increased (Scenario C), and institutional training in species husbandry may allow for more breeding success and a higher rate of offspring survival in the population. This population has the opportunity to grow as six new institutions are interested in joining this PMP in the future (Scenario D). Five additional potential founders remain in the population. If two pairs of these founders were to have 2 offspring each, GD could be increased to about 92% (Scenario E). The addition of new imports into this population may be of benefit (Scenario F), though possibly difficult due to restrictions importing from Canada.

The following strategies will help this population to retain gene diversity for a longer period of time:

- Increase the target population size to reflect increased capacity
- Increase the population growth rate to fill the future capacity
- Select breeding pairs using mean kinship (i.e., prioritizing low mean kinship animals for breeding)
- Increase the effective size (Ne/N) towards 0.30
- Recruit existing potential founders in the population
- Add founders if possible

Herpestidae - Dwarf Mongoose
Helogale parvula

Proposed program status: PMP
Program role: Education and display

Projections for this population were based on an analytical version of the Dwarf Mongoose Studbook (current to 6 Jan 2009 and maintained by studbook keeper Christine McKnight, Minnesota Zoological Garden). Pedigree assumptions were created by the PMC for the purposes of these analyses, in order to better estimate gene diversity. After assumptions and exclusions the population was still only 54% known. This insufficient pedigree data may affect the accuracy of analyses and results should be accepted with caution. Animals older than 11 were excluded from the genetic analysis (which is a generous estimate of post-reproductive age). Genetic exports were based on the AZA population. Demographic exports were for North American data 1 January 1983 – 23 April 2009.

2009 Demography & Genetics

	Number of holding institutions	N	N (after exclusions)	Estimated future capacity	T	Historic/ Projected λ	GD (%)	N_e/N	% known before assumptions/ exclusions	% known after assumptions/ exclusions
AZA	10	74 (36.33.5)	61	93	5.1	1.028	78	0.074	1.4	53.5
Values used for projections			61	100	5.1	1.028	78 / 83	0.15		

N – Current population size based on studbook data
Estimated future capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had a 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Projection strategy	% GD at 100 years	Years to 90% GD	Years to 10% GD loss	Tested target population size	Minimum population size needed to meet genetic goals
A. Baseline (Ne/N = 0.074 and Kt = current size after exclusions)	7	Initial GD < 90%	4 yrs	61	Not attainable
B. Increase Ne/N to 0.15 and increase starting GD to 83% to estimate recruitment of 4 existing potential founders	27	Initial GD < 90%	10 yrs	61	Not attainable
C. Ne/N = 0.15, starting GD = 83%, increase Kt to 100	41	Initial GD < 90%	12 yrs	100	Not attainable
D. Ne/N = 0.15, starting GD = 83%, Kt = 100, import 4 founders every 10 years	81	Initial GD < 90%	> 100 yrs	100	516

This population's starting gene diversity is based on a largely unknown pedigree; however the benchmark GD of 90% was used for the purposes of these analyses. This population has had reasonable breeding success in the past. If the number of breeding individuals in the population is increased, this population should be able to retain a great deal of the starting gene diversity (Scenario B). The 2009 TAG space survey indicates there is available space and institutional interest in obtaining more individuals and a larger target size will help gene diversity retention extend even further (Scenarios C & D).

Herpestidae - Dwarf Mongoose

Helogale parvula

(continued)

Demographic Summary: The first zoo birth occurred in 1970 but growth didn't become common until the early 1980s. For the last decade, the population appears to have reached a plateau of around 70 – 75 animals. There are few wild born animals existing in the population. Sex ratio is even, but the age structure is somewhat unstable due to inconsistent births. Records indicate that births are occurring annually but are not sufficient to offset deaths.

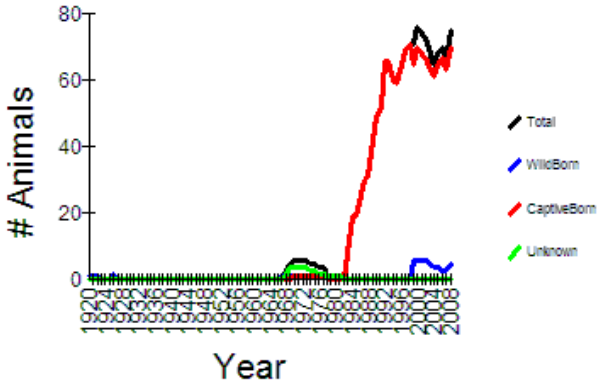

Figure 1. Population census of the AZA Dwarf Mongoose PMP population from 1983 to present.

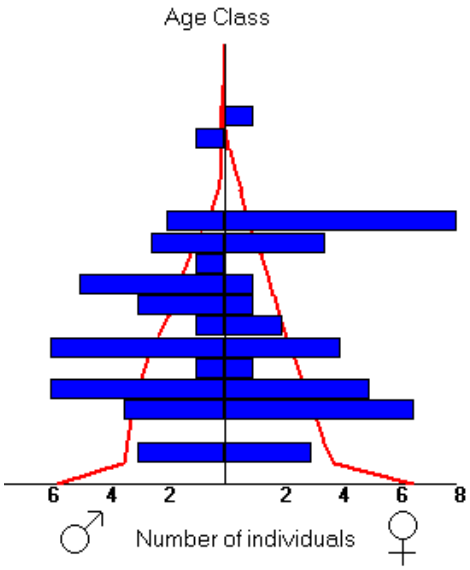

Figure 2. Age structure of the AZA Dwarf Mongoose PMP population showing classes 0 – 11.

Management issues: Injurious wildlife permits may restrict movements throughout the country for management recommendations.

Genetic Summary: Genetic diversity of the 53.5% known portion of the pedigree is 73%, based on 5 founders estimated in PMC assumptions, with 4 true potential founders remaining. Gene diversity may actually be higher or lower depending on the lineages and representation of alleles in the unknown portion of the pedigree. The effective population size is low and an emphasis should be placed on increasing this value. Currently the potential founders are together in appropriate locations. If two pairs of these potential founders were to produce two offspring each, the GD could be increased to 83%.
Projections indicate that under current population parameters, this population will **not** meet standard genetic goals of 90% GD for 100 years. However it should be noted that the population's pedigree is only 54% known and thus analyses should be interpreted with caution.

The following strategies will help this population to retain gene diversity for a longer period of time:

- Increase the target population size to reflect increased capacity
- Increase the effective size (Ne/N) towards 0.15 (appropriate value for group living animals)
- Select breeding pairs using mean kinship (i.e., prioritizing low mean kinship animals for breeding)
- Recruit existing potential founders
- Add new founders if possible

Procyonidae - White-nosed or Northern Coati
Nasua narica

Proposed program status: PMP
Program role: Education and Display

The northern / white-nosed (*N. narica*) and southern / brown-nosed (*N. nasua*) subspecies of coati have separate studbooks and are managed as separate populations. The brown-nosed coati is currently a phase out program and was not analyzed. Preliminary analyses for the white-nosed coati were based on the White-nosed Coati Studbook (current to 30 January 2009 and maintained by studbook keeper Cindy Colling, Detroit Zoological Park). This population's pedigree is only 6.1% known, with 132 of the 145 animals in the studbook having some level of pedigree unknownness. **Target size analyses were not run for this population due to insufficient genetic data.**

2009 Demography & Genetics

	Number of holding institutions	N	N after exclusions	Estimated future capacity	T	Historic & Projected λ	GD (%)	N_e/N	% known before assumptions/ exclusions	% known after assumptions/ exclusions
AZA	44	128 (61.64.3)	113	143	--	0.997	--	--	6.1	4.9
Non-AZA	11	39 (16.23.0)								

N – Current population size based on studbook data
Estimated holding capacity was based on the projected changes in future number of individuals indicated by the Small Carnivore TAG's 2009 space survey (since the space survey had an 82% response rate, there may be significant under-reporting of current and future holdings).
T – Generation time (years) (estimated)
λ - Potential population growth rate (λ = 1.0, 0% growth) (historic rate based on demographic exports, projected rate based on a realistic growth rate)
GD – Estimated current gene diversity of AZA population
N_e/N – Ratio of effective population size to total population size, an indication of the proportion of breeding animals in the population.
% Known – proportion of the living population with known pedigree.

Procyonidae - White-nosed Coati

Nasua narica

(continued)

Demographic Summary: This population has historically exhibited a slightly decreasing growth rate (Figure 1), but has shown positive growth over the last 20 years due to acquisitions from private breeders and some zoo births. The age pyramid is columnar and unstable, with more individuals needed in the juvenile and reproductive age classes (Figure 2).

- Approximately 17 births per year are required to keep this population at its current size (lambda = 1.00).

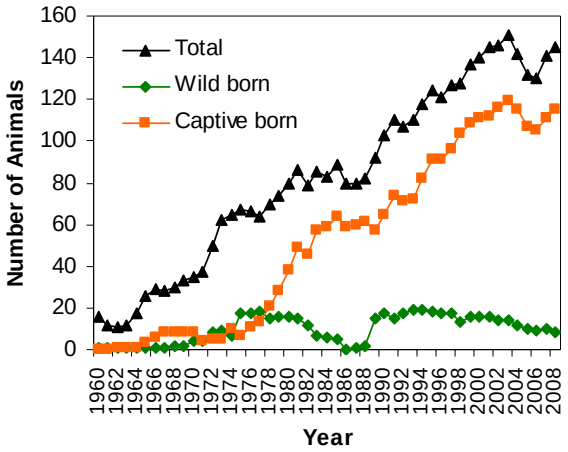

Figure 1. Population census of the AZA White-nosed Coati PMP population from 1960 to present.

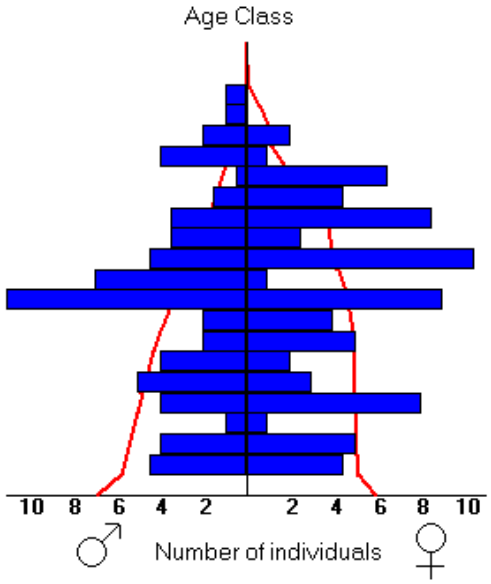

Figure 2. Age structure of the AZA White-nosed Coati PMP population.

Genetic Summary: Data are insufficient to determine the gene diversity of the current population. Pedigree information is generally unknown for a majority of the individuals in this population. This was an issue historically and continues to be so as 132 of the 145 currently living animals have some level of pedigree unknownness. A PMP is currently being created with pedigree assumptions that may help address some of these issues. Based on the TAG's 2009 space survey, there is a demand to hold more individuals of this species.

The following strategies will help this population to retain gene diversity for a longer period of time:

- Increase the population growth rate to fill the future capacity
- Select breeding pairs using mean kinship (i.e., prioritizing low mean kinship animals for breeding)
- Increase breeding in zoos
- Recommend trying temporary contraception to control temperament of education animals rather than permanently castrating them

TABLE 11 Program Recommendations Changes Summary

Common Name	IUCN Taxa	2009 Program Recommendation	2003 Program Recommendation	Program Change	Program Leader	Explanation
Owston's palm civet	Chrotogale owstoni	Species Of Interest	Phase In	Downgrade Phase In to Species of Interest		Program leader changes resulting in change in focus from civets to pangolins at the center. Numbers have dropped due to deaths from bird flu and no breeding pairings. Lack of government infrastructure has placed hold on animals moving into the states
Cusimanse	Crossarchus obscurus	Not recommended	Phase Out	Downgrade PO to NR		No animals available anywhere
Abyssinian Genet	Genetta abyssinica	Not recommended	Phase Out	Downgrade PO to NR		No animals available anywhere
European Otter	Lutra lutra	Not Recommended	Phase Out	Downgrade PO to NR		No longer available in NA population
Banded Mongoose	Mungos mungo	DERP	Phase Out	Upgrade PO to DERP		Survey shows increase in interest and ISIS shows 17.9.4 in three zoos
Masked palm civet	Paguma larvata	Not Recommended	Phase Out	Downgrade PO to NR		No animals available anywhere
Banded Linsang	Prionodon linsang	Not recommended	Phase Out	Downgrade DERP to NR		No animals available anywhere
Small spotted genet	Genetta genetta	Not Recommended	DERP	Downgrade DERP to NR		Only 2 left in population and no interest on the survey
African Clawless Otter	Aonyx capensis	Phase Out	PMP	Downgrade PMP to PO	Randi Meyerson randi@toledozoo.org	Space survey shows decrease, the focus is on Spotted necked otters.
Spotted Necked otter	Lutra maculicollis	SSP	PMP	Upgrade to SSP	Randi Meyerson randi@toledozoo.org	Phased out of other African Otter species. Breeding well, increased interest since last RCP, need to increase #'s and institutions. Cannot fill NA & Asian needs. Need to recruit for Africans. Strong Genetic Diversity with current population. Evidence of founder population.
Giant Otter	Pteronura brasiliensis	SSP	PMP	Upgrade to SSP	Kim Lengel Lengel.kim@phillyzoo.org	Making effort to be global. # of animals increased, interest in institutions, still problems with genetic diversity.

Explanation of changes to SCTAG Taxa Management Level:

Otters – All otters are managed under the Otter SSP. The TAG recommends the following for the Otter SSP.

African Otters: The 2005 RCP states "African clawless and spotted-necked otter – The SCTAG is monitoring the status of these species; while the TAG recognizes that they are both African, there appears to be sufficient room, and interest in, both of these species at this time. Realistically, no otter species breeds reliably in captivity and while the TAG will work towards recommending a specific African species to be managed, at this point we feel there is not enough information available to make the decision as to which species will do better in captivity. Therefore we recommend these species become a PMP and a studbook be maintained to facilitate an informed decision in the future. The 2000 RCP recommended the African clawless otter as a DERP and the Spotted-necked was recommended as a Phase Out species. While the status of each species has essentially reversed since 2000, based on the previously stated facts, the SCTAG continues to feel there is insufficient information to rule out either species at this time." After reviewing the current space analysis, meeting with the PMC manager, the TAG has decided to phase out the African clawless otter and focus on the Spotted-necked otter, upgrading it from a PMP to an SSP. They are breeding well in zoos, there is an *insitu* component, the SSP can not fill all of the otter spaces, the demand is too strong for North American and Asian otters. The TAG will heavily recruit institutions not locked into a zoogeographic theme to move to Spotted-necked otters.

Giant otters: The giant otter is being upgraded from a PMP to an SSP. There is a high level of interest amongst US facilities in working with this species and a high degree of emphasis on working cooperatively internationally. There are *insitu* and *exsitu* conservation programs ongoing. The giant otter serves as one of the most visable flagship species for their zoogeographic region.

Banded Mongoose – In the 2005 RCP, the space analysis showed no interest from US institutions. The 2009 Space analysis shows a marked increase in interest as well as 30 animals in US institution collections. The TAG determined with sustained increase this species should now be a DERP.

TABLE 12 TAG Species in Phase Out or Not Recommended

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)	Red List	CITES	USFWS	NA (ISIS)	NA (Space Survey)	TAG Recs
African clawless otter	*Aonyx capensis*	*Aonyx capensis*	*Aonyx capensis*	Least Concern	Appendix II, Appendix III (Ghana)		2.1	8	PO
Three-striped palm civet	*Arctogalidia trivirgata*	*Arctogalidia trivirgata*	*Arctogalidia trivirgata*	Least Concern			2		PO
Central American cacomistle	*Bassariscus sumichrasti*	*Bassariscus sumichrasti*	*Bassariscus sumichrasti*	Least Concern	Appendix III		1.5		PO
African civet	*Civettictis civetta*	*Civettictis civetta*	*Civettictis civetta*	Least Concern	Appendix III		6.6		PO
Large spotted genet	*Genetta tigrina*	*Genetta tigrina*	*Genetta tigrina*	Least Concern			2		PO
Banded palm civet	*Hemigalus derbyanus*	*Hemigalus derbyanus*	*Hemigalus derbyanus*	Vulnerable	Appendix II		1.1	3	PO
American marten	*Martes americana*	*Martes americana*	*Martes americana*	Least Concern	Appendix II		2	0	PO
Ermine	*Mustela erminea*	*Mustela erminea*	*Mustela erminea*	Least Concern	Appendix III		1.1		PO
Steppe polecat	*Mustela eversmanii*	*Mustela eversmanii*	*Mustela eversmanii*	Least Concern			1.1		PO
Long-tailed weasel	*Mustela frenata*	*Mustela frenata*	*Mustela frenata*	Least Concern			1.1		PO
Brown-nosed coati	*Nasua nasua*	*Nasua nasua*	*Nasua nasua*	Least Concern	Appendix III		11.13	34	PO
American mink	*Neovison vison*	*Neovison vison*	*Neovison vison*	Least Concern			1		PO
Eastern spotted skunk	*Spilogale putorius*	*Spilogale putorius*	*Spilogale putorius*	Least Concern			4.4	3	PO
Hog badger	*Arctonyx collaris*	*Arctonyx collaris*	*Arctonyx collaris*	Near Threatened			0		NR
Marsh mongoose	*Atilax paludinosus*	*Atilax paludinosus*	*Atilax paludinosus*	Least Concern			0		NR
Allen's Olingo	*Bassaricyon alleni*	*Bassaricyon alleni*	*Bassaricyon alleni*	Least Concern			0		NR

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)	Red List	CITES	USFWS	NA (ISIS)	NA (Space Survey)	TAG Recs
Beddard's Olingo	*Bassaricyon beddardi*	*Bassaricyon beddardi*	*Bassaricyon beddardi*	Least Concern			0		NR
Olingo	*Bassaricyon gabbi*	*Bassaricyon gabbi*	*Bassaricyon gabbi*	Least Concern			0		NR
Harris olingo	*Bassaricyon lasius*	*Bassaricyon lasius*	*Bassaricyon lasius*	Data Deficient			0		NR
Chiriqui olingo	*Bassaricyon pauli*	*Bassaricyon pauli*	*Bassaricyon pauli*	Data Deficient			0		NR
Bushy-tailed mongoose	*Bdeogale crassicauda*	*Bdeogale crassicauda*	*Bdeogale crassicauda*	Least Concern			0		NR
Jackson's mongoose	*Bdeogale jacksoni*	*Bdeogale jacksoni*	*Bdeogale jacksoni*	Near Threatened			0		NR
Black-legged mongoose	*Bdeogale nigripes*	*Bdeogale nigripes*	*Bdeogale nigripes*	Least Concern			0		NR
Molina's hog-nosed skunk	*Conepatus chinga*	*Conepatus chinga*	*Conepatus chinga*	Least Concern			0		NR
Humboldt's hog-nosed skunk	*Conepatus humboldtii*	*Conepatus humboldtii*	*Conepatus humboldtii*	Least Concern			0		NR
American hog-nosed skunk	*Conepatus leuconotus*	*Conepatus leuconotus mesoleucus*	*Conepatus leuconotus*	Least Concern			0		NR
Striped hog-nosed skunk	*Conepatus semistriatus*	*Conepatus semistriatus*	*Conepatus semistriatus*	Least Concern			0		NR
Alexander's cusimanse	*Crossarchus alexandri*	*Crossarchus alexandri*	*Crossarchus alexandri*	Least Concern			0		NR
Ansorge's cusimanse	*Crossarchus ansorgei*	*Crossarchus ansorgei*	*Crossarchus ansorgei*	Data Deficient			0		NR
Common cusimanse	*Crossarchus obscurus*	*Crossarchus obscurus*	*Crossarchus obscurus*	Least Concern					NR
Cameroon cusimanse	*Crossarchus platycephalus*	*Crossarchus platycephalus*	*Crossarchus platycephalus*	Least Concern			0		NR
Yellow mongoose	*Cynictis penicillata*	*Cynictis penicillata*	*Cynictis penicillata*	Least Concern			0		NR
Otter civet	*Cynogale bennettii*	*Cynogale bennettii*	*Cynogale bennettii*	Endangered			0		NR
Hose's Palm Civet	*not listed*	*Dipogale hosei*	*Dipogale hosei*				0		NR

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)	Red List	CITES	USFWS	NA (ISIS)	NA (Space Survey)	TAG Recs
Pousargues' mongoose	*Dologale dybowskii*	*Dologale dybowskii*	*Dologale dybowskii*	Data Deficient			0		NR
Falanouc	*Eupleres goudotii*	*Eupleres goudotii*	*Eupleres goudotii*	Near Threatened			0		NR
Malagasy civet	*Fossa fossana*	*Fossa fossana*	*Fossa fossana*	Near Threatened	Appendix II		0		NR
Angolan Slender Mongoose	*Galarella flavescens*	*Galarella flavescens*	*Galarella flavescens*				0		NR
Cape grey mongoose	*Herpestes pulverulentus*	*not listed*	*Galarella pulverulentus*	Least Concern			0		NR
Slender mongoose	*Herpestes sanguineus*	*Galarella sanguineus*	*Galarella sanguineus*	Least Concern			0		NR
Somalian Slender Mongoose	*Herpestes ochraceus*	*not listed*	*Galerella ochracea*	Least Concern			0		NR
Grison	*Galictis vittata*	*Galictis vittata*	*Galictis vittata*	Least Concern	Appendix III		0		NR
Little grison	*not listed*	*Galictus cuja*	*Galictus cuja*				0		NR
Ring-tailed mongoose	*Galidia elegans*	*Galidia elegans*	*Galidia elegans*	Least Concern			1.1 at 1 zoo		NR
Broad-striped mongoose	*Galidictis fasciata*	*Galidictis fasciata*	*Galidictis fasciata*	Near Threatened			0		NR
Giant striped mongoose	*Galidictis grandidieri*	*Galidictis grandidieri*	*Galidictis grandidieri*	Endangered			0		NR
Abyssinian Genet	*Genetta abyssinica*	*Genetta abyssinica*	*Genetta abyssinica*	Least Concern			0		NR
Angolan genet	*Genetta angolensis*	*Genetta angolensis*	*Genetta angolensis*	Least Concern			0		NR
Bourlon's Genet	*Genetta bourloni*	*Genetta bourloni*	*Genetta bourloni*	Near Threatened			0		NR
Crested Servaline Genet	*not listed*	*Genetta cristata*	*Genetta cristata*	Vulnerable			0		NR
Small spotted genet	*Genetta genetta*	*Genetta genetta*	*Genetta genetta*	Least Concern					NR
Johnston's genet	*Genetta johnstoni*	*Genetta johnstoni*	*Genetta johnstoni*	Vulnerable			0		NR

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)	Red List	CITES	USFWS	NA (ISIS)	NA (Space Survey)	TAG Recs
Central African Large-spotted Genet	*Genetta maculata*	*Genetta maculata*	*Genetta maculata*	Least Concern			0		NR
Pardine Genet	*Genetta pardina*	*Genetta pardina*	*Genetta pardina*	Least Concern			0		NR
Aquatic Genet	*not listed*	*Genetta piscivora*	*Genetta piscivora*	Data Deficient			0		NR
King Genet	*not listed*	*Genetta poensis*	*Genetta poensis*	Data Deficient			0		NR
Servaline genet	*Genetta servalina*	*Genetta servalina*	*Genetta servalina*	Least Concern			0		NR
Housa genet	*Genetta thierryi*	*Genetta thierryi*	*Genetta thierryi*	Least Concern			0		NR
Giant forest genet	*not listed*	*Genetta victoriae*	*Genetta victoriae*				0		NR
Somali dwarf mongoose	*Helogale hirtula*	*Helogale hirtula*	*Helogale hirtula*	Least Concern			0		NR
Short-tailed mongoose	*Herpestes brachyurus*	*Herpestes brachyurus*	*Herpestes brachyurus*	Least Concern			0		NR
Indian grey mongoose	*Herpestes edwardsii*	*Herpestes edwardsii*	*Herpestes edwardsii*	Least Concern	Appendix III		0		NR
Indian brown mongoose	*Herpestes fuscus*	*Herpestes fuscus*	*Herpestes fuscus*	Vulnerable	Appendix III		0		NR
Large grey mongoose	*Herpestes ichneumon*	*Herpestes ichneumon*	*Herpestes ichneumon*	Least Concern			0		NR
Small Asian Mongoose	*Herpestes javanicus*	*Herpestes javanicus*	*Herpestes javanicus*	Least Concern	Appendix III		0		NR
Long-nosed mongoose	*Herpestes naso*	*Herpestes naso*	*Herpestes naso*	Least Concern			0		NR
Collared mongoose	*Herpestes semitorquatus*	*Herpestes semitorquatus*	*Herpestes semitorquatus*	Data Deficient			0		NR
Ruddy mongoose	*Herpestes smithii*	*Herpestes smithii*	*Herpestes smithii*	Least Concern	Appendix III		0		NR
Crab-eating mongoose	*Herpestes urva*	*Herpestes urva*	*Herpestes urva*	Least Concern	Appendix III		0		NR

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)	Red List	CITES	USFWS	NA (ISIS)	NA (Space Survey)	TAG Recs
Stripe-necked mongoose	*Herpestes vitticollis*	*Herpestes vitticollis*	*Herpestes vitticollis*	Least Concern	Appendix III		0		NR
White-tailed mongoose	*Ichneumia albicauda*	*Ichneumia albicauda*	*Ichneumia albicauda*	Least Concern			0		NR
Saharan striped weasel	*not listed*	*Ictonyx libyca libyca*	*Ictonyx libyca*				0		NR
Zorilla	*Ictonyx striatus*	*Ictonyx striatus*	*Ictonyx striatus*	Least Concern			0		NR
Liberian mongoose	*Liberiictis kuhni*	*Liberiictis kuhni*	*Liberiictis kuhni*	Vulnerable			0		NR
Marine Otter	*Lontra felina*	*Lontra felina*	*Lontra felina*	Endangered	Appendix I	Endangered			NR
Neotropical Otter	*Lontra longicaudis*	*Lontra longicaudis*	*Lontra longicaudis*	Data Deficient	Appendix I	Endangered	0		NR
European Otter	*Lutra lutra*	*Lutra lutra*	*Lutra lutra*	Near Threatened	Appendix I (Russia) Appendix III Tanisia		0		NR
Japanese Otter	*not listed*	*not listed*	*Lutra nippon*	Near Threatened	Appendix I		0		NR
Southern River otter	*Lutra provocax*	*not listed*	*Lutra provocax*	Endangered	Appendix I		0		NR
Hairy-nosed otter	*Lutra sumatrana*	*Lutra sumatrana*	*Lutra sumatrana*	Endangered	Appendix II		0		NR
Smooth-coated otter	*Lutrogale perspicillata*	*Lutrogale perspicillata*	*Lutrogale perspicillata*	Vulnerable	Appendix II		0		NR
Patagonian weasel	*Lyncodon patagonicus*	*Lyncodon patagonicus*	*Lyncodon patagonicus*	Data Deficient			0		NR
Sulawesi Palm Civet	*Macrogalidia musschenbroekii*	*Macrogalidia musschenbroekii*	*Macrogalidia musschenbroekii*	Vulnerable			0		NR
Yellow-throated Marten	*Martes flavigula*	*Martes flavigula*	*Martes flavigula*	Least Concern	Appendix III	Endangered	0		NR
Stone Marten	*Martes foina*	*Martes foina*	*Martes foina*	Least Concern	Appendix III		0		NR
Nilgiri Marten	*not listed*	*Martes gwatkinsi*	*Martes gwatkinsi*		Appendix III		0		NR
Pine marten	*Martes martes*	*Martes martes*	*Martes martes*	Least Concern			0	0	NR

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)	Red List	CITES	USFWS	NA (ISIS)	NA (Space Survey)	TAG Recs
Japanese marten	*Martes melampus*	*Martes melampus*	*Martes melampus*	Least Concern			0		NR
Japanese sable	*Martes zibellina*	*Martes zibellina*	*Martes zibellina*	Least Concern			0		NR
Japanese Badger	*Meles anakuma*	*Meles meles anakuma*	*Meles anakuma*	Least Concern			0		NR
Asian Badger	*Meles leucurus*	*Meles meles leucurus*	*Meles leucurus*	Least Concern			0		NR
Eurasian badger	*Meles meles*	*Meles meles*	*Meles meles*	Least Concern			0		NR
Honey Badger	*Mellivora capensis*	*Mellivora capenses*	*Mellivora capensis*	Least Concern			3.6 at 4 NA zoos		NR
Everett's ferret badger	*not listed*	*Melogale everetti*	*Melogale everetti*				0		NR
Small tooth ferret badger	*Melogale moschata*	*Melogale moschata*	*Melogale moschata*	Least Concern			0		NR
Javan Ferret-badger	*Melogale orientalis*	*Melogale orientalis*	*Melogale orientalis*	Data Deficient			0		NR
Burmese ferret badger	*not listed*	*Melogale personata*	*Melogale personata*				0		NR
Hooded skunk	*Mephitis macroura*	*Mephitis macroura*	*Mephitis macroura*	Least Concern			0		NR
Gambian mongoose	*Mungos gambianus*	*Mungos gambianus*	*Mungos gambianus*	Least Concern			0		NR
Narrow-striped mongoose	*Mungotictis decemlineata*	*Mungotictis decemlineata*	*Mungotictis decemlineata*	Vulnerable			1.3 at 1 zoo		NR
Amazon weasel	*Mustela africana*	*Mustela africana*	*Mustela africana*	Least Concern			0		NR
Mountain weasel	*Mustela altaica*	*Mustela altaica*	*Mustela altaica*	Near Threatened	Appendix III		0		NR
Columbian weasel	*Mustela felipei*	*Mustela felipei*	*Mustela felipei*	Vulnerable			0		NR
Japanese Weasel	*Mustela itatsi*	*Mustela itatsi*	*Mustela itatsi*	Least Concern			0		NR
Yellow-bellied weasel	*Mustela kathiah*	*Mustela kathiah*	*Mustela kathiah*	Least Concern	Appendix III		0		NR

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)	Red List	CITES	USFWS	NA (ISIS)	NA (Space Survey)	TAG Recs
European mink	*Mustela lutreola*	*Mustela lutreola*	*Mustela lutreola*	Endangered			0		NR
Indonesian Mountain Weasel	*Mustela lutreolina*	*Mustela lutreolina*	*Mustela lutreolina*	Data Deficient			0		NR
Least weasel	*Mustela nivalis*	*Mustela nivalis*	*Mustela nivalis*	Least Concern			0	4	NR
Malaysian weasel	*not listed*	*Mustela nudipes*	*Mustela nudipes*				0		NR
Siberian weasel	*Mustela sibirica*	*Mustela sibirica*	*Mustela sibirica*	Least Concern			0		NR
Black striped weasel	*not listed*	*Mustela strigidorsa*	*Mustela strigidorsa*				0		NR
Egyptian Weasel	*Mustela subpalmata*	*Mustela subpalmata*	*Mustela subpalmata*	Least Concern			0		NR
Sunda Stink badger	*Mydaus javanensis*	*Mydaus javanensis*	*Mydaus javanensis*	Least Concern			0		NR
Palawan stink badger	*Mydaus marchei*	*Mydaus marchei*	*Mydaus marchei*	Least Concern			0		NR
African palm civet	*Nandinia binotata*	*Nandinia binotata*	*Nandinia binotata*	Least Concern			0		NR
Mountain Coati	*Nasuella olivacea*	*Nasuella olivacea*	*Nasuella olivacea*	Data Deficient					NR
Sea Mink	*Neovision macrodon*	*Neovision macrodon*	*Neovision macrodon*				0		NR
Masked Palm Civet	*Paguma larvata*	*Paguma larvata*	*Paguma larvata*	Least Concern	Appendix III		0		NR
Selous meerkat	*not listed*	*Paracynictis selousi*	*Paracynictis selousi*				0		NR
Common palm civet	*Paradoxurus hermaphroditus*	*Paradoxurus hermaphroditus*	*Paradoxurus hermaphroditus*	Least Concern			0		NR
Jerdon's palm civet	*Paradoxurus jerdonii*	*Paradoxurus jerdonii*	*Paradoxurus jerdonii*	Least Concern			0		NR
Golden palm civet	*Paradoxurus zeylonensis*	*Paradoxurus zeylonensis*	*Paradoxurus zeylonensis*	Vulnerable			0		NR
White-naped weasel	*not listed*	*Poecilogale albinucha*	*Poecilogale albinucha*				0		NR

Common Name	IUCN Taxa	ARKS Taxa	Wilson & Reeder (2)	Red List	CITES	USFWS	NA (ISIS)	NA (Space Survey)	TAG Recs
Leighton's Linsang	*Poiana leightoni*	*Poiana leightoni*	*Poiana leightoni*	Data Deficient			0		NR
African linsang	*Poiana richardsonii*	*Poiana richardsonii*	*Poiana richardsonii*	Least Concern			0		NR
Banded linsang	*Prionodon linsang*	*Prionodon linsang*	*Prionodon linsang*	Least Concern	Appendix II		0		NR
Spotted linsang	*Prionodon pardicolor*	*Prionodon pardicolor*	*Prionodon pardicolor*	Least Concern	Appendix I	Endangered	0		NR
Crab-eating raccoon	*not listed*	*Procyon cancrivorous*	*Procyon cancrivorous*				0		NR
Cozumel raccoon	*Procyon pygmaeus*	*Procyon pygmaeus*	*Procyon pygmaeus*	Critically endangered			0		NR
Meller's mongoose	*Rhynchogale melleri*	*Rhynchogale melleri*	*Rhynchogale melleri*	Least Concern			0		NR
Brown-tailed Mongoose	*Salanoia concolor*	*Salanoia concolor*	*Salanoia concolor*	Vulnerable			0		NR
Southern Spotted Skunk	*Spilogale angustifrons*	*Spilogale angustifrons*	*Spilogale angustifrons*	Least Concern			0		NR
Western Spotted Skunk	*Spilogale gracilis*	*Spilogale gracilis*	*Spilogale gracilis*	Least Concern			0		NR
Pigmy spotted skunk	*Spilogale pygmaea*	*Spilogale pygmaea*	*Spilogale pygmaea*	Vulnerable			0		NR
Malabar civet	*Viverra civettina*	*Viverra civettina*	*Viverra civettina*	Critically endangered	Appendix III		0		NR
Large spotted civet	*not listed*	*Viverra megaspila*	*Viverra megaspila*				0		NR
Malay civet	*Viverra tangalunga*	*Viverra tangalunga*	*Viverra tangalunga*	Least Concern			0		NR
Large Indian civet	*Viverra zibetha*	*Viverra zibetha*	*Viverra zibetha*	Near Threatened	Appendix III		0		NR
Small Indian civet	*Viverricula indica*	*Viverricula indica*	*Viverricula indica*	Least Concern			0		NR
Marbled polecat	*Vormela peregusna*	*vormela peregusna*	*Vormela peregusna*						NR

**IUCN Red List of Threatened Species web site, www.redlist.org/
~UNEP-WCMC. 24 April, 2009. *UNEP-WCMC Species Database: CITES-Listed Species*
*Wilson, D. E. & D. M. Reeder. 2005. Mammal Species of the World, A Taxonomic and Geographic Reference, 3rd Edition. Smithsonian Institution Press, Washington D. C. and London.
+ U.S. Fish and Wildlife Website, Endangered and Threatened Species Listing: http://endangered.few.gov/wildlife.html