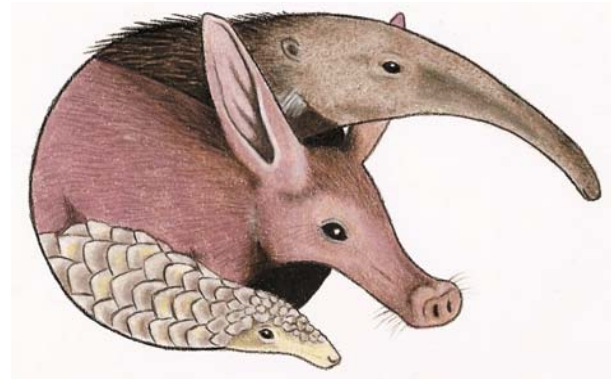


**ASSOCIATION
OF ZOOS &
AQUARIUMS**



PANGOLIN,

AARDVARK &

XENARTHRA

TAXON ADVISORY GROUP

2009 REGIONAL COLLECTION PLAN

(FIRST EDITION)

Edited by: **John Gramieri, San Antonio Zoo**
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AZA Pangolin, Aardvark and Xenarthra Taxon Advisory Group Regional Collection Plan 2009-2012

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2009 Regional Collection Plan for Pangolin, Aardvark and Xenarthra Taxon Advisory Group for Institutions of the Association of Zoos and Aquariums.

INTRODUCTION:

Having once been classified as a single taxonomic family, Edentata, the assemblage of the currently recognized orders (Pholidota, Tubulidentata, and Xenarthra) into one Taxon Advisory Group was developed to maintain consistency with the IUCN Specialist Group designations that prevailed at the time. It presents an odd mixture of mammals for a single managed group. A common thread is that among the pangolins, aardvarks and xenarthrans there is a prevalence of species whose evolutionary, if not current, life history is marked by a preference for very specific insectivorous diets.

Although the three Orders do not contain a large number of species, they each present their own unique set of difficulties for captive management. Pangolins as a group are not represented in a captive program outside of Asia. The sole focus for inclusion of pangolins within this Regional Collection Plan is to offer AZA organizations an opportunity to participate in conservation initiatives and foster support for range country efforts in developing successful husbandry techniques for rescued, rehabilitated and confiscated individuals.

This being the first RCP for the Pangolin, Aardvark and Xenarthra Taxon Advisory Group (PAX TAG), its approach to species management programs is admittedly conservative. With the exception of only one program (the Southern Three-banded Armadillo PMP), the existing captive management programs are in their infancy with new program leaders at their respective helms. As a living document, cautious growth of the TAG is prescribed in the collection plan that follows, so that expanding the number of managed species, or elevating their degree of management, can be considered as existing programs become better established.

MISSION STATEMENT:

The Pangolin, Aardvark and Xenarthra Taxon Advisory supports the conservation of pangolins, aardvarks, and xenarthrans around the world through captive management, conservation education, engagement in *in situ* management and conservation programs, and advocacy for these species—both in captivity and the wild.

GOALS:

The PAX TAG will have, as its initial goals:

1. To facilitate the work of AZA studbook keepers, PMP managers, and (in the future) SSP coordinators for these taxa, and to assure the attainment of mutual goals and best use of resources.
2. To become a North American regional clearinghouse for information on the captive management, propagation and conservation of pangolins, aardvarks and xenarthrans. This includes serving as a resource for individuals and institutions holding these taxa through the development of Animal Care Manuals for the managed species.
3. To act as the principal liaison with other regional specialty groups concerned with these taxa including the European Association of Zoos and Aquaria (EAZA).
4. To collaborate with other organizations worldwide that work with these taxa.
5. To seek consensus on research priorities for captive populations of these taxa in North American zoological institutions.
6. To foster appreciation of these unique species via the development of interpretive program materials that focus on the natural history and conservation of vulnerable and threatened species within this group.
7. To assist range country conservation, rescue and rehabilitation efforts for the covered taxa, through logistical, technical and financial support.

Pangolin, Aardvark and Xenarthra Taxon Advisory Group Structure

The Pangolin, Aardvark and Xenarthra Taxon Advisory Group consists of a 6-member steering committee, and non-voting program managers and advisors.

Pursuant to the 2007 Taxon Advisory Group Chair Handbook (http://www.aza.org/AnMgt/Documents/PLH_TAGs.pdf), each participating AZA facility may designate an **Institutional Representative** (IR) to the PAX TAG if it so chooses.

The primary responsibility of the IR is to communicate with the steering committee and disseminate information from the PAX TAG to their respective institutions. Communication with Institutional Representatives is through a closed electronic listserv paxir@lists.aza.org and at annual and mid-year meetings. This listserv is used to disseminate information from the TAG to the respective institutions, as well as between IRs themselves. A current list of IRs is provided as Appendix I.

The **Steering committee** is elected from the pool of IRs. Steering committee members serve staggered terms with no term limits. Steering committee members are expected to take part in decision-making in TAG operations, assist with the development of the Regional Collection Plan, oversee program management, lead standing and *ad hoc* committees, and serve other administrative functions as needed. Steering committee members are required to have access to electronic communication, and are encouraged to attend at least one meeting of the TAG each year. The Steering Committee and Advisors for the TAG communicate throughout the year via email and a closed listserv (paxsteer@lists.aza.org), which includes the TAG Chair, officers, and Steering Committee members. This listserv is used to provide a confidential method of conducting TAG business.

PAX TAG Officers are elected from the steering committee by the steering committee and serve unlimited terms for as long as they sit on the steering committee. **Advisors** to the TAG include SSP Coordinators, PMP Coordinators and studbook keepers (if they are not elected steering committee members) and specialists in veterinary care, pathology, genetics, nutrition, reproduction, education, behavior management, field conservation and similar disciplines. Advisors are non-voting participants in PAX TAG operations and management.

A third listserv, paxtalk@lists.aza.org is an open listserv that includes any individuals interested in pangolins, aardvarks and xenarthrans. This listserv is used for general communications between members of the TAG and other parties to help promote the exchange of husbandry information, share reports regarding conservation issues and to further interest in these taxa.

The San Antonio Zoo will maintain PAX TAG funds in an audited account. Financial reports will be provided to the Steering Committee quarterly. Distribution of PAX TAG funds requires approval of the Steering Committee. At present, no funds have yet been raised on behalf of the TAG.

Table 1. Taxonomy of the species within the Pangolin, Aardvark and Xenarthra TAG and conservation status (after IUCN 2008, ver 3.1, <http://www.iucnredlist.org>)

ORDER PHOLIDOTA (8 species)	IUCN Listings
Family Manidae	
<i>Manis</i>	
<i>Manis crassicaudata</i> , Indian Pangolin	NT, decreasing
<i>Manis culionensis</i> , Palawan Pangolin	NT, decreasing
<i>Manis javanica</i> , Malayan Pangolin	EN, decreasing
<i>Manis pentadactyla</i> , Chinese Pangolin	EN, decreasing
<i>Phataginus</i>	
<i>Phataginus tricuspis</i> , African Tree Pangolin	NT, decreasing
<i>Smutsia</i>	
<i>Smutsia gigantea</i> , Giant Pangolin	LC, decreasing
<i>Smutsia temminckii</i> , Ground Pangolin	NT, decreasing
<i>Uromanis</i>	
<i>Uromanis tetradactyla</i> , Long-tailed Pangolin	LC, decreasing
ORDER TUBULIDENTATA (1 species)	
Family Orycteropodidae	
<i>Orycteropus</i>	
<i>Orycteropus afer</i> , Aardvark	LC, trend unk.

ORDER XENARTHRA (31 species)

Family Bradypodidae

Bradypus

- Bradypus pygmaeus*, Pygmy Three-toed Sloth CR, decreasing
Bradypus torquatus, Maned Three-toed Sloth EN, decreasing
Bradypus tridactylus, Pale-throated Three-toed Sloth LC, trend unk.
Bradypus variegatus, Brown-throated Three-toed Sloth LC, trend unk.

Family Megalonychidae

Subfamily Choloepinae

Choloepus

- Choloepus didactylus*, Linne's Two-toed Sloth LC, trend unk.
Choloepus hoffmanni, Hoffmann's Two-toed Sloth LC, trend unk.

Family Dasypodidae

Subfamily Chlamyphorinae

Chlamyphorus, Fairy armadillos.

- Chlamyphorus retusus*, Chacoan Fairy Armadillo NT, decreasing
Chlamyphorus truncatus, Pink Fairy Armadillo DD, decreasing

Subfamily Dasypodinae

Cabassous

- Cabassous centralis*, Northern Naked-tailed Armadillo DD, trend unk.
Cabassous chacoensis, Chacoan Naked-tailed Armadillo NT, trend unk.
Cabassous tatouay, Greater Naked-tailed Armadillo LC, trend unk.
Cabassous unicinctus, Southern Naked-tailed Armadillo LC, trend unk.

<i>Chaetophractus</i>	
<i>Chaetophractus nationi</i> , Andean Hairy Armadillo,	VU, decreasing
<i>Chaetophractus vellerosus</i> , Screaming Hairy Armadillo	LC, trend unk.
<i>Chaetophractus villosus</i> , Large Hairy Armadillo	LC, trend unk.
<i>Dasypus</i>	
<i>Dasypus hybridus</i> , Southern Long-nosed Armadillo	NT, decreasing
<i>Dasypus kappleri</i> , Great Long-nosed Armadillo	LC, trend unk.
<i>Dasypus novemcinctus</i> , Nine-banded Armadillo	LC, increasing
<i>Dasypus pilosus</i> , Hairy Long-nosed Armadillo	VU, decreasing
<i>Dasypus sabanicola</i> , Llanos Long-nosed Armadillo	LC, trend unk.
<i>Dasypus septemcinctus</i> , Seven-banded Armadillo	LC, trend unk.
<i>Dasypus yepesi</i> , Yepes Mulita	DD, trend unk.
<i>Euphractus</i>	
<i>Euphractus sexcinctus</i> , Six-banded Armadillo	LC, trend unk.
<i>Priodontes</i>	
<i>Priodontes maximus</i> , Giant Armadillo	VU, decreasing
<i>Tolypeutes</i>	
<i>Tolypeutes matacus</i> , Southern Three-banded Armadillo	NT, decreasing
<i>Tolypeutes tricinctus</i> , Brazilian Three-banded Armadillo	VU, decreasing
<i>Zaedyus</i>	
<i>Zaedyus pichiy</i> , Pichi	NT, decreasing

Family Myrmecophagidae

Cyclopes

Cyclopes didactylus, Silky Anteater

LC, trend unk.

Myrmecophaga

Myrmecophaga tridactyla, Giant Anteater

NT, decreasing

Tamandua

Tamandua mexicana, Northern Tamandua

LC, trend unk.

Tamandua tetradactyla, Southern Tamandua

LC, trend unk.

Diagram 1:
IUCN Red List Categories and Criteria Version 3.1
(http://www.iucnredlist.org/static/categories_criteria_3_1)

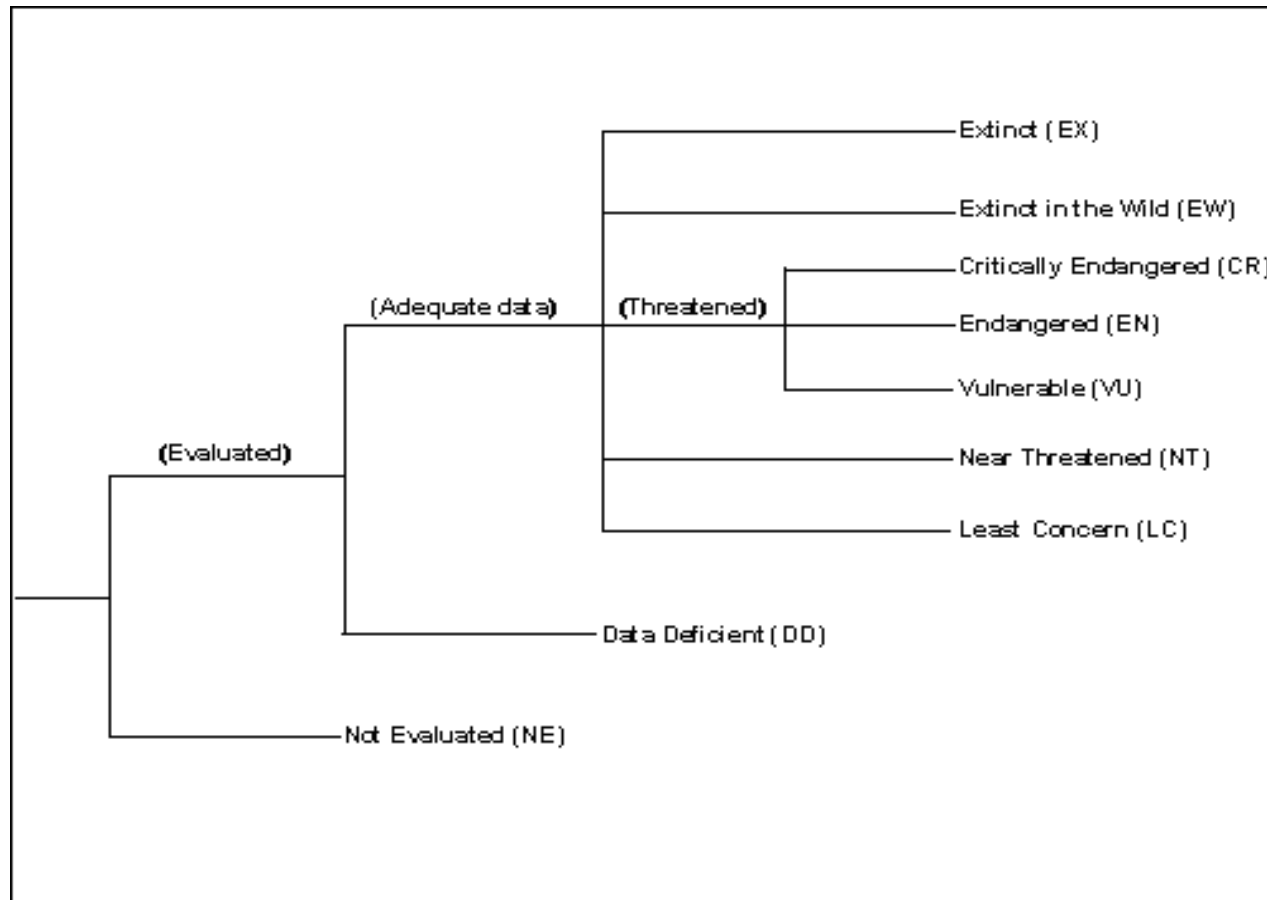


Table 2. 2007 Space Analysis

The 2007 PAX TAG space survey was developed and distributed by Dawn Petefish of Peoria’s Glen Oak Zoo. **The survey includes all 130 AZA-accredited facilities that had designated Institutional Representatives to the TAG at the time of its compilation.** 125 responses were received, providing a 96% response rate. The list of respondents to the Space Survey is provided as Appendix II.

ORDER PHOLIDATA-Pangolins

SPECIES	Current # of animals₁	Current # of spaces₂	# of spaces projected in 5 years₃	Target population size
African Tree Pangolin <i>Phataginus tricuspis</i>	0	9	30	n/a

ORDER TUBULIDENTATA-Aardvark

SPECIES	Current # of animals₁	Current # of spaces₂	# of spaces projected in 5 years₃	Target population size
Aardvark <i>Orycteropus afer</i>	23	40	52	50

ORDER XENARTHRA-Sloths

SPECIES	Current # of animals₁	Current # of spaces₂	# of spaces projected in 5 years₃	Target population size
Pale-throated sloth <i>Bradypus tridactylus</i>	1	2	3	n/a
Brown-throated sloth <i>Bradypus variegatus</i>	0	0	6	n/a
Linne's two-toed sloth <i>Choloepus didactylus</i>	67	124	115	150
Hoffmann's two- toed sloth <i>Choloepus hoffmanni</i>	77	141	144	150

ORDER XENARTHRA (continued)-Armadillos

SPECIES	Current # of animals₁	Current # of spaces₂	# of spaces projected in 5 years₃	Target population size
Screaming armadillo <i>Chaetophractus vellerosus</i>	14	27	18	18
Hairy armadillo <i>Chaetophractus villosus</i>	3	14	13	n/a
Nine-banded armadillo <i>Dasypus novemcinctus</i>	16	46	46	50
Six-banded armadillo <i>Euphractus sexcinctus</i>	10	26	32	32
Southern three- banded armadillo <i>Tolypeutes matacus</i>	108	157	165	150
Pichi <i>Zaedyus pichiy</i>	0	3	6	n/a

ORDER XENARTHRA (continued)-Anteaters

SPECIES	Current # of animals₁	Current # of spaces₂	# of spaces projected in 3-5 years₃	Target population size
Silky Anteater <i>Cyclopes didactylus</i>	0	9	11	n/a
Giant anteater <i>Myrmecophaga tridactyla</i>	90	116	164	150
Tamandua, Mexican <i>Tamandua mexicana</i>	4	15	11	n/a
Tamandua, Southern <i>Tamandua tetradactyla</i>	41	84	102	100

¹ Total number of animals in AZA institutions, from 2007 PAX TAG Space Survey. (Information provided by institutional representatives).

² Total number of adult animals reported by institutions as current maximum capacities.

³ Total number of adult animals reported by institutions as maximum capacities in 3-5 years.

2009 REGIONAL COLLECTION PLAN FOR PAX TAG

Target Population Determinations

Respondents to the 2007 Space Survey provided data that was consistent with that of a less formal survey conducted in 2002. In fact, for nine of the 16 species listed above, the “Current # of Spaces” in 2007 (footnote 2 in Table 2, preceding) actually exceeded that which was predicted in 2002. Consequently, it was felt that the Space Survey data was a reliable, if not conservative, indicator of the maximum captive carrying capacity for each species designated for management programs within this RCP.

Target population sizes for this Regional Collection Plan (depicted in Table 2) were, with one exception, based upon the 3-5 year projected interest in particular species as predicted by the 2007 Space Survey. Using this input, the Population Management Center used a target population size of 150 in its preparation of the 2008 Southern Three-banded Armadillo Population Management Plan and the 2008 Giant Anteater Population Management Plan.

The exception was made for the two Two-toed Sloth species (*Choloepus didactylus* and *C. hoffmanni*). Survey respondents indicated high degree of interest in exhibiting members of this genus, often with a measure of flexibility in terms of which species was desired. In 3-5 years there are 259 spaces projected for animals for *Choloepus*, in total, whereas their current populations number 107 and 92 respectively. For these two species, target populations of 150 were allocated to each during the preparations of their respective 2009 Population Management Plans, despite this number exceeding the number of projected spaces for either.

The management of these two species is challenged in that many of the individuals are older, and likely to be reproductively senescent. Furthermore, many others are untested as potential breeders. In order to quickly improve the demographic and genetic outlook for these species, aggressive Breeding and Transfer Plans for both have been written to address the anticipated near-term shortage of individuals.

Detailed analysis of these two populations, as conducted by the PMC in April, 2009, revealed that neither *Choloepus didactylus* nor *C. hoffmanni* is currently able to meet the projected demand for individuals of this genus. As stated in the Population Management Plan for *Choloepus didactylus*, “To achieve an annual population growth rate of 1.03 (3%), 11-15 births are required in the coming years to reach a target population size of 150 in 10 years.” This number far exceeds the average of 5.7 births per year in the North American population over the period of 1999 to 2008.

Similarly, for *Choloepus hoffmanni*, it was found that the North American population had an average of 3.6 births per year in the period 1998 to 2008. The Population Management Plan states that “To achieve an annual population growth rate of 1.05 (5%), 11-14 births are required in the coming years, to reach a goal of 150 animals in 10 years... Because many of the current animals in the potentially reproducing population are related, additional founders would allow this population to avoid inbreeding and improve gene diversity.”

A Regional Collection Plan is a living document. The PAX TAG advocates that the aggressive population growth of both species of *Choloepus* be attempted, in order to meet near-term demands for the two species. Based upon successes, or failures, of the respective PMPs for *Choloepus didactylus* and *C. hoffmanni* will help guide decisions to be made in future updates of the RCP.

2009 REGIONAL COLLECTION PLAN FOR PAX TAG

Species Selection Process

1. Each of the 40 species falling under the purview of the Pangolin, Aardvark and Xenarthra TAG were assessed under the Decision Key delineated in Table 3 and illustrated as a Decision Tree in Diagram 2.
2. Determinations applied to each of the 40 species pursuant to the Decision Key / Tree are detailed in Table 4, Species Selection Conclusions. Data relative to a given species' representation (Column A) was based upon 2007 Space Analysis data (see Table 2, preceding). Entries relative to conservation imperative (column H, in part) were made consistent with the IUCN Listings provided in Table 1, wherein all species listed Vulnerable (VU), Near Threatened (NT), Endangered (EN) or Critically Endangered (CR) were given affirmative responses (Y) on the basis of conservation imperative.
3. Those nine species for which a formalized program was found to be warranted were subsequently assessed under the Management Assessment Criteria ("MAC Table," illustrated under Table 5). Characteristics for each of the species under consideration were weighted numerically pursuant to the details illustrated in Table 6 (Weighted Management Assessment Criteria).
4. For each of the nine species under consideration, numerical totals were compiled pursuant to the values generated by the assessments depicted in Table 7 (Management Assessment Worksheet).
5. Program Designations, as described in Appendix III, Definition of Program Levels, were determined as follows:
 - Top tier (recommended for SSP status) received 31-39 of 39 possible points (minimum 79.5% of total) from the Weighted Management Assessment Criteria.
 - Middle Tier (recommended as PMP) received 22-30 of 39 possible points (56.4% - 76.9% of total)
 - Bottom Tier (recommended as DERP) received 21 or fewer points (33.3% - 54.4%). Due to the weighting scale, 13 points were the minimum achievable total for any species under consideration).
6. Program recommendations are outlined in the Species Selection Overview, and detailed in Table 8.

Table 3. Decision Key used in Species Selection Process (illustrated in Diagram 2, following page)

A. Is the species currently represented in AZA institutions?

If yes, go to **B**.

If no, go to **H**.

B. Is there a Management Program already in place?

If yes, go to **C**.

If no, go to **F**.

C. Is the captive population of this species genetically and demographically sustainable?

If yes, go to **D**.

If no, go to **G**.

D. Is there sufficient projected interest to establish OR maintain a program for this species?

If yes, go to **E**.

If no, **no program is recommended**.

E. Are there sufficient resources and husbandry expertise for a program to succeed in AZA member institutions?

If yes, **apply MAC table**

If no, **no program is recommended**.

F. Is there a sufficient founder base for this program to succeed?

If yes, go to **D**.

If no, go to **G**.

G. Are founders available from external sources?

If yes, go to **D**.

If no, **no program is recommended**.

H. Is there a scientific, conservation or educational imperative for the maintenance of this species in captivity?

If yes, go to **G**.

If no, **no program is recommended**.

2009 REGIONAL COLLECTION PLAN FOR PAX TAG

Diagram 2: Decision Tree (Illustration of Decision Key described in Table 3.)

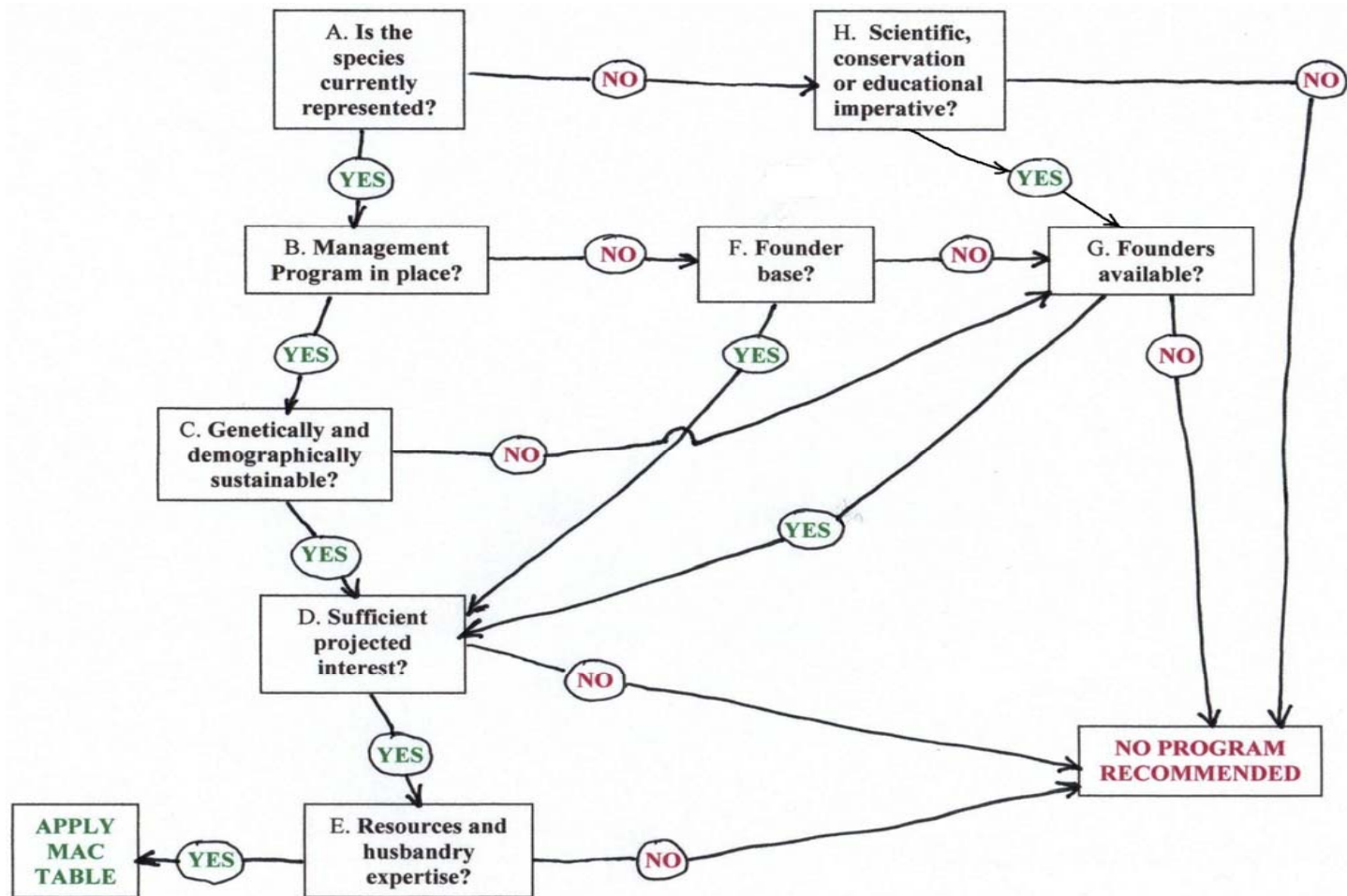


Table 4. Species Selection Conclusions

Species		A	B	C	D	E	F	G	H	Conclusions
PHOLIDOTA										
<i>Manis crassicaudata</i>	Indian Pangolin	N	-	-	-	-	N	N	Y	No program
<i>Manis culionensis</i>	Palawan Pangolin	N	-	-	-	-	N	N	Y	No program
<i>Manis javanica</i>	Malayan Pangolin	N	-	-	-	-	N	N	Y	No program
<i>Manis pentadactyla</i>	Chinese Pangolin	N	-	-	-	-	N	N	Y	No program
<i>Phataginus tricuspis</i>	African Tree Pangolin	N	-	-	-	-	N	N	Y	No program
<i>Smutsia gigantea</i>	Giant Pangolin	N	-	-	-	-	N	N	Y	No program
<i>Smutsia temminckii</i>	Ground Pangolin	N	-	-	-	-	N	N	Y	No program
<i>Uromanis tetradactyla</i>	Long-tailed Pangolin	N	-	-	-	-	N	N	Y	No program
TUBULIDENTATA										
<i>Orycteropus afer</i>	Aardvark	Y	N	-	Y	Y	Y	-	-	Program
XENARTHRA										
<i>Bradypus pygmaeus</i>	Pygmy Three-toed Sloth	N	-	-	-	-	N	N	Y	No program
<i>Bradypus torquatus</i>	Maned Three-toed Sloth	N	-	-	-	-	N	N	Y	No program
<i>Bradypus tridactylus</i>	Pale-throated Three-toed Sloth	N	-	-	-	-	-	-	N	No program
<i>Bradypus variegatus</i>	Brown-throated Three-toed Sloth	N	-	-	-	-	-	-	N	No program
<i>Choloepus didactylus</i>	Linne's Two-toed Sloth	Y	Y	Y	Y	Y	-	-	-	Program
<i>Choloepus hoffmanni</i>	Hoffmann's Two-toed Sloth	Y	Y	N	Y	Y	-	Y	-	Program

Species		A	B	C	D	E	F	G	H	Conclusions
<i>Chlamyphorus retusus</i>	Chacoan Fairy Armadillo	N	-	-	-	-	N	N	Y	No program
<i>Chlamyphorus truncatus</i>	Pink Fairy Armadillo	N	-	-	-	-	-	-	N	No program
<i>Cabassous centralis</i>	Northern Naked-tailed Armadillo	N	-	-	-	-	-	-	N	No program
<i>Cabassous chacoensis</i>	Chacoan Naked-tailed Armadillo	N	-	-	-	-	N	N	Y	No program
<i>Cabassous tatouay</i>	Greater Naked-tailed Armadillo	N	-	-	-	-	-	-	N	No program
<i>Cabassous unicinctus</i>	Southern Naked-tailed Armadillo	N	-	-	-	-	-	-	N	No program
<i>Chaetophractus nationi</i>	Andean Hairy Armadillo	N	-	-	-	-	N	N	Y	No program
<i>Chaetophractus vellerosus</i>	Screaming Hairy Armadillo	Y	N	-	Y	Y	Y	-	Y	Program
<i>Chaetophractus villosus</i>	Large Hairy Armadillo	Y	-	-	-	-	-	-	N	No program
<i>Dasypus hybridus</i>	Southern Long-nosed Armadillo	N	-	-	-	-	N	N	Y	No program
<i>Dasypus kappleri</i>	Great Long-nosed Armadillo	N	-	-	-	-	-	-	N	No program
<i>Dasypus novemcinctus</i>	Nine-banded Armadillo	Y	N	-	Y	Y	Y	-	Y	Program
<i>Dasypus pilosus</i>	Hairy Long-nosed Armadillo	N	-	-	-	-	N	N	Y	No program
<i>Dasypus sabanicola</i>	Llanos Long-nosed Armadillo	N	-	-	-	-	-	-	N	No program
<i>Dasypus septemcinctus</i>	Seven-banded Armadillo	N	-	-	-	-	-	-	N	No program
<i>Dasypus yepesi</i>	Yepes Mulita	N	-	-	-	-	-	-	N	No program
<i>Euphractus sexcinctus</i>	Six-banded Armadillo	Y	N	-	Y	Y	Y	-	-	Program
<i>Priodontes maximus</i>	Giant Armadillo	N	-	-	-	-	N	N	Y	No program
<i>Tolypeutes matacus</i>	Southern Three-banded Armadillo	Y	Y	Y	Y	Y	-	-	-	Program
<i>Tolypeutes tricinctus</i>	Brazilian Three-banded Armadillo	N	-	-	-	-	N	N	Y	No program

Species		A	B	C	D	E	F	G	H	Conclusions
<i>Zaedyus pichiy</i>	Pichi	N	-	-	-	-	N	N	Y	No program
<i>Cyclopes didactylus</i>	Silky Anteater	N	-	-	-	-	-	-	N	No program
<i>Myrmecophaga tridactyla</i>	Giant Anteater	Y	Y	Y	Y	Y	-	-	-	Program
<i>Tamandua mexicana</i>	Northern Tamandua	Y	N	-	N	N	N	Y	-	No program
<i>Tamandua tetradactyla</i>	Southern Tamandua	Y	N	-	Y	Y	Y	-	-	Program

Key

Y: Yes in response to the respective question below

N: No in response to the respective question below.

A. Is the species currently represented in AZA institutions?

B. Is there a Management Program already in place?

C. Is the captive population of this species genetically and demographically sustainable?

D. Is there sufficient projected interest to establish OR maintain a program for this species?

E. Are there sufficient resources and husbandry expertise for a program to succeed in AZA member institutions?

F. Is there a sufficient founder base for this program to succeed?

G. Are founders available from external sources?

H. Is there a scientific, conservation or educational imperative for the maintenance of this species in captivity?

2009 REGIONAL COLLECTION PLAN FOR PAX TAG

TABLE 5 - Management Assessment Criteria

The AZA Management Assessment Criteria, below, depicts the criteria appropriate for designating program levels to the individual species.

CRITERIA	SSP	PMP	No Management (DERP)
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

2009 REGIONAL COLLECTION PLAN FOR PAX TAG

TABLE 6 – Weighted Management Assessment Criteria

CRITERIA	3 POINTS	2 POINTS	1 POINT
Availability within AZA	LOW	MODERATE	EXTREMES
Availability outside AZA	LOW	MODERATE	EXTREMES
Extinction Risk without Management	ENDANGERED/THREATENED	VULNERABLE	EXTREMES
Extinction Risk with Management	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
N.A. Governmental Conservation Program	YES	NO	NO

2009 REGIONAL COLLECTION PLAN FOR PAX TAG

TABLE 7 - Management Assessment Worksheet

CRITERIA	Aardvark	Hoffman's AND Linne's Two-toed Sloth	3-Banded Armadillo	6-Banded AND Screaming Armadillo	9-Banded Armadillo	Giant Anteater	Southern Tamandua
Availability within AZA	Moderate (2)	Moderate (2)	Moderate (2)	Low (3)	Low (3)	Moderate (2)	Low (3)
Availability outside AZA	Low (3)	High (1)	Moderate (2)	Low (3)	High (1)	Moderate (2)	High (1)
Extinction Risk without captive management	Vulnerable (2)	Vulnerable (2)	Threatened (3)	Vulnerable (2)	Extremely Unlikely (1)	Threatened (3)	Vulnerable (2)
Extinction Risk with captive management	Stable (1)	Stable (1)	Decreases (2)	Stable (1)	Stable (1)	Decreases (2)	Stable (1)
Demand within AZA	Moderate (2)	High (3)	High (3)	Low (1)	Low (1)	High (3)	Moderate (2)
Institutional Commitment	High (3)	High (3)	High (3)	Moderate (2)	Moderate (2)	High (3)	Moderate (2)
Ease of Breeding	Low (3)	Moderate (3)	High (2)	Low (3)	Extremely Low (1)	Moderate (3)	Low (3)
Extinction Risk in Wild-IUCN	Least Concern (1)	Least Concern (1)	Near Threatened (2)	Least Concern (1)	Least Concern (1)	Near Threatened (2)	Least Concern (1)
Acquisition cost outside AZA	High (3)	Moderate (2)	Moderate (2)	Moderate (2)	Low (1)	High (3)	Moderate (2)
Program Operating Cost	Moderate (2)	Low (1)	Low (1)	Low (1)	Low (1)	Moderate (2)	Moderate (2)
International Programs	Yes (3)	No (1)	No (1)	No (1)	No (1)	Yes (3)	No (1)
Link to wild population conservation	Indirect (2)	Indirect (2)	Indirect (2)	Indirect (2)	Indirect (2)	Indirect (2)	Indirect (2)
N.A. Govt. Conservation Program	No (1)	No (1)	No (1)	No (1)	No (1)	No (1)	No (1)
TOTALS	28	23	26	23	17	31	27

REGIONAL COLLECTION PLAN FOR PANGOLINS, AARDVARK AND XENARTHRA IN AZA INSTITUTIONS

Species Selection Overview

Twelve of the 40 species within this TAG are presently represented in AZA institutions, but institutional commitment, space, and the availability of founders are sufficient to manage only nine long-term programs as either DERP, PMP or SSP populations. This being the first Regional Collection Plan for the PAX TAG, and with the development of new studbooks and PMPs for a number of these species, the TAG fully expects to further refine these captive management programs in future RCPs. Characteristics of each population that led to informed decision-making (with respect to species selection) are described below and are reiterated in the individual species information sheets later in this document.

Aardvark (Weighted MAC score = 28; 23 individual specimens). Recommend as **PMP**.

The three to five year projection of interest in Aardvarks as an exhibit species in AZA zoos is twice that of the current population. Their zoogeographic uniqueness, and size, places an emphasis on enhancing the numbers within the population in a short timeframe. A recent update of the studbook has been completed, and a Population Management Plan will be pursued.

Hoffman's Two-toed Sloth and Linne's Two-toed Sloth (Weighted MAC score = 23 each; 107 individual Linne's, 92 individual Hoffman's). Recommend continuing both as **PMPs**.

There is a high degree of interest in animals of the genus *Choloepus*. The two species (*Choloepus didactylus* and *C. hoffmanni*) represent readily available and easily maintained forms of a unique morphotype, and each lends itself well to mixed species exhibition.

The first formal population management plan for these two species was held in March, 2009. Detailed analysis of studbook data revealed that neither species can, at present, meet the predicted demand within AZA institutions. Many are older, non-reproductive, individuals and much of the *C. hoffmanni* population is related. Fortunately, wild specimens of both species are readily available and (at least in the case of *C. hoffmanni*) range country collaborators are willing to export non-releasable animals for zoological purposes. As noted in the Linne's Two-toed Sloth PMP "Some confusion exists regarding the actual species of some individuals based on historical records and because they are difficult to differentiate from Hoffman's two-toed sloth (*Choloepus hoffmanni*) based on appearance alone. Genetic testing is available to determine species, as well as maternal lineage for possible hybrids." At least one case of inadvertent captive hybridization of *C. didactylus* and *C. hoffmanni* has been confirmed through this same testing. Questions regarding species status resulted in the exclusion of eleven *C. hoffmanni* from the breeding population. Continued investigation into the genetic composition of these animals may resolve pedigree questions and in the future they could be included in

breeding recommendations. Re-enlistment of these individuals would facilitate attainment of the PMP's genetic and demographic goals. Animals with questionable pedigree should not be bred, and all holders of any *Choloepus* are strongly encouraged to submit samples for genetic testing.

Screaming Armadillo (Weighted MAC score = 23; 11 individual specimens). Recommend as new **PMP**.

This is a widespread species that is susceptible to hunting. Its numbers in the wild are declining, but not at a level that would be considered a threat. Sufficient interest in this species persists, and thus it merits inclusion as a PMP in the role of an Education / Display species (see description in next section).

Nine-banded Armadillo (Weighted MAC score = 17; 25 individual specimens). Recommend as new **DERP**.

Nine-banded Armadillos are a popular exhibit species and, as the only North American representative within the PAX TAG, are a part of many North American exhibits. The species has many unique storylines around which interpretive programming could be developed. It has the rare distinction of being the only species covered by this TAG whose population numbers are known to be increasing, as it is currently undergoing a phenomenal range expansion. Specimens are available from range states, originating as either nuisance or orphaned animals.

Six-banded Armadillo (Weighted MAC score = 23, 12 individual specimens). Recommend as new **PMP**.

A recent influx of potential founder stock could provide the nucleus for a self-sustaining captive population. Demonstrable success in the husbandry and propagation of this species could eventually supply an alternative to the current demand in AZA zoos for other armadillo species. Breeding has recently been successful in some zoological institutions.

Southern Three-banded Armadillo (Weighted MAC score = 26; 123 individual specimens). Recommend continuing as **PMP**.

The Southern Three-banded Armadillo PMP has undergone a number of formal PMPs, the most recent of which was completed in May, 2008. Interest in the species remains very high and breeding institutions will be called upon to produce additional animals, many of which are used in educational programming. Additionally, the species can serve as a model for its more endangered congener, the Brazilian Three-banded Armadillo, should the opportunity arise to develop a captive management program in support of its wild populations.

Giant Anteater (Weighted MAC score = 31; 93 individual specimens). Recommend elevation to **SSP** status.

A large, highly charismatic, unique form has always made the Giant Anteater a species of great interest in zoos. Recent completion of the studbook allowed for the completion of the species' first formal Population Management Plan in December, 2008.

Mandatory breeding and transfer recommendations, implemented under SSP status, will provide the intensive management intrinsic to the long-term sustainability of the North American population. Additionally, the development of a detailed Animal Care Manual for the husbandry of this species is an important goal toward which a number of individuals are currently working.

Southern Tamandua (Weighted MAC score = 23; 27 individual specimens). Recommend as new **PMP**.

Interest in tamanduas remains relatively high. This species, due to its numbers and availability, will occupy those spaces that might otherwise have been used for the Mexican Tamandua. A program coordinator will be sought to develop a studbook and eventual Population Management Plan.

At the time of the 2007 Space Survey there were three additional species reported in respondents' collections that have been designated as **Phase Out** species. These are the **Pale-throated sloth**, *Bradypus tridactylus* (1.0 in 1 institution), **Hairy armadillo** *Chaetophractus villosus* (2.1.0 in 2 institutions), and **Mexican tamandua**, *Tamandua mexicana* (2.1.1 in 2 institutions). Given the very small current holdings (and implicit limitations of founder base), lack of interest by other survey respondents, and similarity to other managed species (for which genetically and demographically viable populations can be established), each has allocated a target population of zero.

REGIONAL COLLECTION PLAN FOR PANGOLINS, AARDVARK AND XENARTHRA IN AZA INSTITUTIONS

Definition of roles

The abbreviations below are utilized in Table 8 (Program Recommendations) to depict the role that each species, for which a program has been prescribed, can serve in a zoological setting.

Conservation link (CL) – Taxa whose inclusion in the RCP is due in large part to conservation efforts ongoing in range countries, as these animals may serve as examples of the *in situ* work of AZA member institutions and their partners. Also may indicate a taxon in need of support for recovery programs.

Education and display (E/D) – Taxa 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. Some species are particularly appropriate as ambassador animals used in education programs as well.

Flagship species (FS) – Taxa particularly likely to generate attention and financial support for field conservation programs for these taxa in their native ranges.

Representative taxon (RT) – Taxa which are the only (or one of few) examples of a specific taxonomic group maintained in captivity.

Research link (RL) – 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.

2009 REGIONAL COLLECTION PLAN FOR PAX TAG

TABLE 8 - Program Recommendations

SPECIES	PROGRAM	ROLE	POPULATION*	COORDINATOR / NOTES
African Tree Pangolin <i>Manis tricuspis</i>	Not recommended	n/a	0 individuals	No holdings. Insufficient husbandry expertise. Pangolins have done poorly in North American institutions, and it is imprudent to recommend a program at this time.
Aardvark <i>Orycteropus afer</i>	PMP	E/D, FS, RT	11.12.0 in 11 inst. (studbook, 2007) Target pop. Size 50	Diane Gierhahn Brookfield Zoo digierha@brookfieldzoo.org (708) 688-8492
Pale-throated sloth <i>Bradypus tridactylus</i>	Phase Out	n/a	1.0 in 1 inst.	Minimal long-term interest exists for this species.
Brown-throated sloth <i>Bradypus variegatus</i>	Not Recommended	n/a	0 individuals	No holdings. Minimal long-term interest exists for this species.
Linne's Two-toed sloth <i>Choloepus didactylus</i>	PMP	E/D, RT	42.60.5 in 60 inst. (PMP, 2009) Target pop. Size 150	Lynn Yakubinis Zoo Atlanta lyakubinis@zooatlanta.org (404) 624-5939
Hoffman's Two-toed sloth <i>Choloepus hoffmanni</i>	PMP	E/D, RT	41.49.2 in 53 inst. (PMP, 2009) Target pop. Size 150	Lynn Yakubinis Zoo Atlanta lyakubinis@zooatlanta.org (404) 624-5939
Screaming armadillo <i>Chaetophractus vellerosus</i>	PMP	E/D	8.5.3 in 4 inst Target pop. Size 18	VACANT (new program)
Hairy armadillo <i>Chaetophractus villosus</i>	Phase Out	n/a	2.1.0 in 2 inst Target pop. Size 0	Minimal long-term interest exists for this species.

* All data per 2007 Space Survey except as otherwise noted.

2009 REGIONAL COLLECTION PLAN FOR PAX TAG
TABLE 8 - Program Recommendations (continued)

SPECIES	PROGRAM	ROLE	POPULATION*	COORDINATOR / NOTES
Nine-banded armadillo <i>Dasypus novemcinctus</i>	DERP	E/D	8.4.4 in 10 inst. Target pop. size 50	VACANT (new program)
Six-banded armadillo <i>Euphractus sexcinctus</i>	PMP	E/D	5.4.1 in 4 inst. Target pop. size 32	VACANT (new program)
Southern three-banded armadillo <i>Tolypeutes matacus</i>	PMP	E/D, RL	60.63.1 in 36 inst. (PMP, 2008) Target pop. size 150	Dave Bernier Lincoln Park Zoo dbernier@lpzoo.org (312) 742-0539
Pichi <i>Zaedyus pichiy</i>	Not Recommended	n/a	0 individuals	No holdings. Minimal long-term interest exists for this species.
Silky anteater <i>Cyclopes didactylus</i>	Not Recommended	n/a	0 individuals	No holdings. Minimal long-term interest exists for this species.
Giant anteater <i>Myrmecophaga tridactyla</i>	SSP	CL, E/D, FS	45.48.0 in 43 inst. (PMP, 2008) Target pop. size 150	Stacey Belhumeur Reid Park Zoo stacey.belhumeur@tucsonaz.gov (520) 791-3204 x15
Mexican tamandua <i>Tamandua mexicana</i>	Phase Out	n/a	2.1.1 in 2 inst. Target pop. size 0	Minimal long-term interest exists for this species. Exhibit needs can be met by <i>T. tetradactyla</i> .
Southern tamandua <i>Tamandua tetradactyla</i>	PMP	E/D, RT	16.22.3 in 24 inst. Target pop. size 100	VACANT (new program)

*All data per 2007 Space Survey except as otherwise noted.

REGIONAL COLLECTION PLAN FOR PAX TAG IN NORTH AMERICA

Species Information Sheets

Aardvark

Orycteropus afer

Program Recommendation: Population Management Plan

Program Coordinator: Dianne Gierhahn, Brookfield Zoo, digierha@brookfieldzoo.org 708-688-8492

Distribution: The aardvark is a widespread species found in most of the sub-Saharan countries in Africa (Skinner and Smithers 1990). Savannah zones of West Africa to E Sudan, Ethiopia and Eritrea; Kenya; Somalia; N and W Uganda to Tanzania; Rwanda; N, E, and C Dem. Rep. Congo; W Angola; Namibia; Botswana; Zimbabwe; Zambia; Mozambique; South Africa.

Conservation Status: **CITES:** No listing

ESA: No listing

IUCN Least Concern, trend unknown

Population threats: Although Aardvarks are not commonly seen, they are often relatively common in suitable habitats. They are sometimes considered rare because of their elusive behavior and not a result of low numbers. Although their numbers undoubtedly are reduced in areas where their habitat is altered by human activities, given their widespread, nearly pan-African distribution south of the Sahara there are few concerns in regard to the species' overall conservation status (<http://www.iucnredlist.org/details/41504>). Three minor threats, which may be important locally, are habitat loss due to agriculture, subsistence hunting for meat and ritual significance to some local peoples (2007 studbook). Another minor threat is that they regularly drown in open water canals in Namibia. (2006 red list assessment)

AZA Population Status:

11.12.0 (23) in 11 institutions, per studbook (2007). Population target: 50, based upon five year projection of 2007 Space Survey.

Other Regional Program status: EAZA: 14.19.2 JAZGA 1.1

Weighted Management Assessment Criteria score: 28

Captive program overview and goals: The fifth edition of the studbook for this species was published in 2007. A modest increase in successful captive propagation is noted. The North American captive population now stands at 23 individuals (from a low of 13 in 1998). To meet the target population for this species a considerable increase in managed captive propagation will need to be undertaken. Inasmuch as the population is very small, it is possible that a Population Management Plan for this species could be completed through the services of the PMC in Chicago. In addition, the development of detailed Animal Care Manual for the husbandry of this species is an important goal toward which to work. A number of individuals have expressed interest in this effort.

REGIONAL COLLECTION PLAN FOR PAX TAG IN NORTH AMERICA

Species Information Sheets

Linne's two-toed sloth
Choloepus didactylus

Program Recommendation: Population Management Plan

Program Coordinator: Lynn Yakubinis, Atlanta Zoo, lyakubinis@zoatlanta.org, (404) 624-5939

Distribution: Brazil; Colombia; Ecuador; French Guiana; Guyana; Peru; Suriname; Venezuela

Conservation Status: **CITES:** No listing

ESA: No listing

IUCN: Least Concern, trend unknown

Population threats: Listed as Least Concern in view of its wide distribution, presumed large population, its occurrence in a number of protected areas, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category (<http://www.iucnredlist.org/details/4777>).

AZA Population Status:

42.60.5 (107) in 60 institutions per PMP (2009). Population target: 150, based upon five year projection of 2007 Space Survey.

Other Regional Program status: ALZPA: 2.4 EAZA: 57.64.15 SEAZA: 4.5

Weighted Management Assessment Criteria score: **23**

Captive program overview and goals:

There is a high degree of interest in animals of the genus *Choloepus*. The two species represent readily available and easily maintained forms of a unique morphotype which lend themselves well to mixed species exhibition. The results of the space survey validated this demand, but its numbers also reflect a high percentage of AZA zoos expressing species flexibility in terms of which of the two congeners is preferred. As a result, the TAG has attempted to set goals for the two *Choloepus* PMPs that, in concert, would meet the needs of member institutions.

The current population of Linne's two-toed sloths (*Choloepus didactylus*) in AZA institutions is 107 specimens. The five-year projected capacity for this species, based upon the 2007 Space Survey is 115. Demographic analyses conducted by the PMC in Chicago indicate that at least seven births are required simply to maintain the current population size.

The 2009 Population Management Plan for Linne's-toed sloths concluded: "To increase the growth rate to meet institutional needs for both this species and *C. hoffmanni*, and to better achieve genetic goals, the TAG has set a target size of 150 for each. An annual population growth rate of 3%, resulting in 11-15 births, would be required in the coming years to reach this target population size of 150 in 10 years." The breeding recommendations in the PMP are intended to help the population reach these demographic goals.

Some confusion exists regarding the actual species of some individuals based on historical records and because they are difficult to differentiate from Hoffman's two-toed sloth (*C. hoffmanni*) based on appearance alone. Genetic testing has just again become available to determine maternal species for possible hybrids and will ultimately allow for some individuals to be re-enlisted in the breeding plan. Nonetheless, it will still be challenging for either of the two *Choloepus* species to meet the projected needs of AZA institutions. This species is often available from sources outside the AZA (dealer, importers, etc.), however the reliability of their origins has been questionable and has exacerbated the species identification question.

In December, 2008, a very productive, multi-day workshop on the husbandry of *Choloepus* was hosted by the Minnesota Zoo. Information gathered from attendees (which included range country collaborators) will be used in the compilation of an Animal Care Manual for the genus and should improve upon current husbandry techniques employed in North American zoological institutions.

REGIONAL COLLECTION PLAN FOR PAX TAG IN NORTH AMERICA

Species Information Sheets

Hoffmann's two-toed sloth *Choloepus hoffmanni*

Program Recommendation: Population Management Plan

Program Coordinator: Lynn Yakubinis, Atlanta Zoo, lyakubinis@zoatlanta.org, (404) 624-5939

Distribution: Bolivia; Brazil; Colombia; Costa Rica; Ecuador; Honduras; Nicaragua; Panama; Peru; Venezuela

Conservation Status: **CITES:** Appendix III (Costa Rica only)

ESA: No listing

IUCN Least Concern, trend unknown

Population threats: Because of ongoing deforestation, the northern population (nominate subspecies) of this species could potentially be assessed as Near Threatened (<http://www.iucnredlist.org/details/4778>).

AZA Population Status:

41.49.2 (92) in 53 institutions per PMP (2009). Population target: 150, based upon five year projection of 2007 Space Survey.

Other Regional Program status: ALZPA: 2.2.1 EAZA: 2.4 JAZPA: 1.2.1 SEAZA: 2.3

Weighted Management Assessment Criteria score: **23**

Captive program overview and goals: There is a high degree of interest in animals of the genus *Choloepus*. The two species represent readily available and easily maintained forms of a unique morphotype which lend themselves

well to mixed species exhibition. The results of the space survey validated this demand, but its numbers also reflect a high percentage of AZA zoos expressing species flexibility in terms of which of the two congeners is preferred. As a result, the TAG has attempted to set goals for the two *Choloepus* PMPs that, in concert, would meet the needs of member institutions.

The current population of Hoffman's Two-toed sloths (*Choloepus hoffmanni*) in North America is 88 specimens. The five-year projected capacity for this species based upon the 2007 Space Survey is 144. Demographic analyses conducted by the PMC in Chicago, as reported in the 2009 Population Management Plan for Hoffman's Two-toed sloths, indicate that at least nine to ten births are required simply to maintain the current population size. To increase the growth rate to meet institutional needs for both this species and *C. didactylus*, and to better achieve genetic goals, the TAG has set a target size of 150 for each. An annual population growth rate of 5%, resulting in 11-14 births, would be required in the coming years to reach a goal of 150 animals in 10 years. The breeding recommendations in the PMP are intended to help the population reach these demographic goals.

Because many of the current animals in the potentially reproducing population are related (one individual male, still alive, sired 45 offspring-- equal to one fourth of the total number of offspring born to all sires). Effectively, therefore, the entire captive population of *C. hoffmanni* is descended from the equivalent of 8 founders. Additional founders would allow this population to avoid inbreeding and improve gene diversity. This assumes that newly imported animals would be unrelated to themselves and to the current population. Fortunately for this species, range country cooperators are a source of known-origin, non-releasable animals that can help serve to bolster the genetics of the existing captive population.

As with *C. didactylus*, some confusion exists regarding the actual species of some individuals based on historical records and because they are difficult to differentiate from Linne's two-toed sloth (*C. didactylus*) based on appearance alone. Genetic testing has just again become available to determine maternal species for possible

hybrids and will ultimately allow for some individuals to be re-enlisted in the breeding plan. Nonetheless, it will still be challenging for either of the two *Choloepus* species to alone meet the projected needs of AZA institutions.

In December, 2008, a very productive, multi-day workshop on the husbandry of *Choloepus* was hosted by the Minnesota Zoo. Information gathered from attendees (which included range country collaborators) will be used in the compilation of an Animal Care Manual for the genus and should improve upon current husbandry techniques employed in North American zoological institutions.

REGIONAL COLLECTION PLAN FOR PAX TAG IN NORTH AMERICA

Species Information Sheets

Screaming armadillo

Chaetophractus vellerosus

Program Recommendation: Population Management Plan

Program Coordinator: VACANT (new program)

Distribution: Argentina; Bolivia; Chile; Paraguay

Conservation Status: CITES: No listing

ESA: No listing

IUCN Least Concern, trend unknown

Population threats: This species is listed as Least Concern. This is a widespread species that is susceptible to hunting. Its numbers in the wild are declining, but not at a level that would be considered a threat. The disjunct population in Buenos Aires Province is susceptible due to habitat modification in its restricted range (<http://www.iucnredlist.org/details/4368>).

AZA Population Status:

6.5.3 (14) in 4 institutions per 2007 Space Survey. Population target: 18, based upon five year projection of same.

Other Regional Program status: ALZPA: 1.2

Weighted Management Assessment Criteria score: 23

Captive program overview and goals: Sufficient interest in this species persists within AZA zoos and thus it merits consideration as a PMP species. A Program Coordinator for this species will need to be identified, and a registry of specimens will need to be developed.

REGIONAL COLLECTION PLAN FOR PAX TAG IN NORTH AMERICA

Species Information Sheets

Hairy armadillo

Chaetophractus villosus

Program Recommendation: Phase Out

Program Coordinator: None

Distribution: Argentina; Bolivia; Chile; Paraguay

Conservation Status: CITES: No listing

ESA: No listing

IUCN Least Concern, trend unknown

Population threats: In some parts of its range it is locally used for food and charangos (musical instruments), it is also persecuted as a pest species and is killed on roads and by dogs.

AZA Population Status:

2.1.0 (3) in 2 institutions, per 2007 Space Survey. Population target: 0, based upon minimal interest reflected by same.

Other Regional Program status: ALZPA: 7.2 EAZA: 58.38.7

Captive program overview and goals: Phase Out population.

REGIONAL COLLECTION PLAN FOR PAX TAG IN NORTH AMERICA
Species Information Sheets

Nine-banded armadillo
Dasypus novemcinctus

Program Recommendation: DERP

Program Coordinator: VACANT (new program)

Distribution: Southeast USA to Uruguay

Conservation Status: **CITES:** No listing

ESA: No listing

IUCN Least Concern, population increasing

Population threats: Widely distributed species, no current threats. Undergoing range expansion.

AZA Population Status:

8.4.4 (16) in 10 institutions, per 2007 Space Survey. Population target: 50, based upon five year projection of same.

Other Regional Program status: ALZPA: 1.2.2 EAZA: 5.4

Weighted Management Assessment Criteria score: **17**

Captive program overview and goals: Proposed as a DERP species due to its interpretive merits. As the only species represented by this TAG that is native to North America, the Nine-banded armadillo will always have a

place in AZA zoos. Its phenomenal range expansion has relegated it a public perception that varies from a folkloric element of the local environment (e.g. the State Mammal of Texas) or a perceived pest (unregulated wildlife species in many states). While most captive breeding has only been successful in laboratory environments, there is a plentiful supply of orphaned / nuisance animals available from range states. A Program Coordinator for this species will need to be identified, and a registry of specimens will be developed.

REGIONAL COLLECTION PLAN FOR PAX TAG IN NORTH AMERICA

Species Information Sheets

Six-banded armadillo

Euphractus sexcinctus

Program Recommendation: Population Management Plan

Program Coordinator: VACANT (new program)

Distribution: Argentina; Bolivia; Brazil; Paraguay; Suriname; Uruguay

Conservation Status: CITES: No listing

ESA: No listing

IUCN Least Concern, trend unknown.

Population threats: Listed as Least Concern in view of its wide distribution, presumed large population, its occurrence in a number of protected areas, tolerance of a degree of habitat modification, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category (<http://www.iucnredlist.org/details/8306>).

AZA Population Status:

5.4.1 (10) in 4 institutions, per 2007 Space Survey. Population target: 32, based upon five year projection of same.

Other Regional Program status: ALZPA: 1.1

EAZA: 15.16.2

Weighted Management Assessment Criteria score: 23

Captive program overview and goals: A recent influx of potential founder stock (post 2007 Space Survey) could provide the nidus for a self-sustaining captive population. Demonstrable success in the husbandry and propagation

of this species could eventually provide an alternative to the current demand in AZA zoos for other armadillo species. A Program Coordinator for this species will need to be identified, and Population Management Plan will need to be developed with the help of the PMC in Chicago.

REGIONAL COLLECTION PLAN FOR PAX TAG IN NORTH AMERICA

Species Information Sheets

Southern three-banded armadillo

Tolypeutes matacus

Program Recommendation: Population Management Plan

Program Coordinator: Dave Bernier, Lincoln Park Zoo, dbernier@lpzoo.org (312) 742-0539

Distribution: Argentina; Bolivia; Brazil; Paraguay

Conservation Status: CITES: No listing

ESA: No listing

IUCN Near Threatened, decreasing

Population threats: Listed as Near Threatened because this species is probably in significant decline (but probably at a rate of less than 30% over ten years). With widespread habitat loss through much of its range, and because of exploitation for food, the species is close to qualifying for IUCN Vulnerable status (<http://www.iucnredlist.org/details/21974>).

AZA Population Status:

60.63.1 (124) in 36 institutions, per Population Management Plan (2008). Population target: 150, based upon five year projection of 2007 Space Survey.

Other Regional Program status: ALZPA: 0.1

EAZA: 13.15.1

JAZPA: 4.1.1

Weighted Management Assessment Criteria score: 26

Captive program overview and goals: There is frequent and consistent demand for this species in AZA institutions. Breeding institutions can provide a sustainable supply of offspring to meet the need for individuals relegated for use in interpretive programming. Research into the reproductive biology of this species (via fecal hormone and vaginal cytology analysis) is also underway, as a better understanding of *Tolypeutes matacus* could benefit its more endangered congener, *Tolypeutes tricinctus*. Since 2003, the program has published a studbook and has undergone a formal PMP annually. We will need to continue to do so in order to meet the level of interest within AZA zoos.

REGIONAL COLLECTION PLAN FOR PAX TAG IN NORTH AMERICA

Species Information Sheets

Giant Anteater

Myrmecophaga tridactyla

Program Recommendation: Species Survival Plan

Program Coordinator: Stacey Belhumeur, Reid Park Zoo, stacey.belhumeur@tucsonaz.gov 520-791-3204 x15

Distribution: Argentina; Bolivia; Brazil; Colombia; Costa Rica; Ecuador; French Guiana; Guyana; Honduras; Nicaragua; Panama; Paraguay; Peru; Suriname; Uruguay; Venezuela

Conservation Status: **CITES:** Appendix II

ESA: No listing

IUCN: Near Threatened, decreasing

Population threats: The species is widespread geographically, but there have been many records of population extirpation, especially in Central America and the southern parts of its range. More research must be done to estimate the total population loss across its range - a 30% or higher population loss cannot be estimated given present information. The dietary specificity, low reproductive rates, large body size, along with threats to many parts of its range, have proved to be significant factors in its decline (<http://www.iucnredlist.org/details/14224>).

AZA Population Status:

45.48.0 (93) in 43 institutions, per Population Management Plan (2008). Population target: 150, based upon five year projection of 2007 Space Survey.

Other Regional Program status: ALZPA: 8.15.4

EAZA: 31.28.2

JAZGA: 4.6.0

Weighted Management Assessment Criteria score: 31

Captive program overview and goals: The Giant Anteater is a species that is highly desired for exhibition in AZA zoos. It is a unique, diurnal, charismatic form that cohabitates well in mixed species exhibits. The species' Near Threatened listing under IUCN is indicative of a conservation imperative that should be addressed within the captive population.

The current Population Manager has recently published the first North American studbook for the species since 2001, and the first formal Population Management Plan was completed in December, 2008.

Several importations within the past decade have resulted in an influx of low mean kinship specimens to the Giant Anteater population. While this has increased gene diversity, these low mean kinship specimens must be paired with mates of similarly low mean kinship. Several mismatched pairs are currently together; whose offspring will (in the long run) accelerate the inbreeding in the population and reduce gene diversity retention.

Mandatory breeding and transfer recommendations, implemented under SSP status, will provide the intensive management intrinsic to the long-term sustainability of the North American population. Additionally, the development of a detailed Animal Care Manual for the husbandry of this species is an important goal toward which a number of individuals are currently working.

REGIONAL COLLECTION PLAN FOR PAX TAG IN NORTH AMERICA
Species Information Sheets

Tamandua, Mexican-Northern
Tamandua mexicana

Program Recommendation: Phase Out

Program Coordinator: None

Distribution: Belize; Colombia; Costa Rica; Ecuador; El Salvador; Guatemala; Honduras; Mexico; Nicaragua; Panama; Peru; Venezuela

Conservation Status: **CITES:** Appendix III (Guatemala)

ESA: No listing

IUCN Least Concern, trend unknown

Population threats: Listed as Least Concern in view of its wide distribution, presumed large population, its occurrence in a number of protected areas, tolerance of a degree of habitat modification, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category (<http://www.iucnredlist.org/details/21349>).

AZA Population Status:

2.1.1 (4) in 2 institutions, per 2007 Space Survey. Population target: 0, based upon minimal interest reflected by same.

Other Regional Program status:

ALZPA: 1.2

Captive program overview and goals: There would appear to be neither interest, conservation imperative, nor captive population base that would justify a program specifically for this species. The current recommendation will be the phase out this population; however, this recommendation may have to be revisited should the management of its congener, *Tamandua tetradactyla*, fail to meet the interest expressed by AZA zoos.

REGIONAL COLLECTION PLAN FOR PAX TAG IN NORTH AMERICA
Species Information Sheets

Tamandua, Southern
Tamandua tetradactyla

Program Recommendation: Population Management Plan
Program Coordinator: VACANT (new program)

Distribution: Argentina; Bolivia; Brazil; Colombia; Ecuador; French Guiana; Guyana; Paraguay; Peru; Suriname; Trinidad and Tobago; Uruguay; Venezuela. This species is found to the east of the Andes from Colombia, Venezuela, Trinidad Island (Trinidad and Tobago), and the Guianas, south to Uruguay and northern Argentina. It ranges from sea level to 1600 m (Bolivia).

Conservation Status: **CITES:** No listing
 ESA: No listing
 IUCN Least Concern, trend unknown

Population threats: There are no major threats to this species, although in some portions of their range they are hunted for meat or by domestic dogs (<http://www.iucnredlist.org/details/21350>).

AZA Population Status:

16.22.3 (39) in 24 institutions, per 2007 Space Survey. Population target: 100, based upon five year projection of same.

Other Regional Program status:

ALZPA: 11.9.3

EAZA: 12.10

JAZGA: 2.0

Weighted Management Assessment Criteria score: 23

Captive program overview and goals: Subject to the approval of this RCP, the Southern Tamandua program will need a coordinator. Some expression of interest has already been received. The new coordinator will have to initiate a studbook for the species (for which none has ever been completed) and pursue the development of a Population Management Plan with the assistance of the PMC in Chicago.

2009 REGIONAL COLLECTION PLAN FOR PAX TAG

TABLE 9 - Program Status Table

Program	Program initiated	Current program leader	Program leadership assumed	Most recent studbook update	Most recent masterplan
Aardvark PMP	2004	Diane Gierhahn Brookfield Zoo digierha@brookfieldzoo.org 708-688-8492	2004	2007	
Linne's Two-toed Sloth PMP	2005	Lynn Yakubinis Zoo Atlanta lyakubinis@zooatlanta.org , 404-624-5939	2005	2007	April, 2009
Hoffmann's Two-toed Sloth PMP	2005	Lynn Yakubinis Zoo Atlanta lyakubinis@zooatlanta.org , 404-624-5939	2005	2007	April, 2009
Screaming Armadillo PMP	2009	VACANT (new program)			
Six-banded Armadillo PMP	2009	VACANT (new program)			

2009 REGIONAL COLLECTION PLAN FOR PAX TAG

TABLE 9 - Program Status Table (continued)

Nine-banded Armadillo DERP	2009	VACANT (new program)			
Southern Three banded Armadillo PMP	2003	Dave Bernier Lincoln Park Zoo dbernier@lpzoo.org 312-742-0539	2003	2007	May, 2008
Giant Anteater SSP	2006	Stacey Belhumeur Reid Park Zoo stacey.belhumeur@tucsonaz.gov 520-791-3204 x15	2006	2007	December, 2008
Southern Tamandua PMP	2009	VACANT (new program)			

2009 REGIONAL COLLECTION PLAN FOR PAX TAG

Guidelines for Institutions

Acquisition and Disposition

Accredited 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 aardvarks and xenarthrans should refer to the foregoing Regional Collection Plan for pangolins, aardvarks and xenarthrans in North America for species selection recommendations. Program managers may be contacted directly for information on program needs, availability and sources of animals, and goals of the program.

Contraception

At present the knowledge base regarding contraception in pangolins, aardvarks and xenarthrans is very limited. The PAX TAG will work with the Contraceptive Task Force as circumstances and opportunities arise.

Surplus

Responsible management of captive pangolins, aardvarks and xenarthrans in North America is an important goal of the PAX TAG. SSP and PMP populations are managed to avoid the production of animals that do not contribute to the genetic or demographic needs of the population. Compliance with SSP Breeding and Transfer Plans is mandatory; compliance with PMP Breeding and Transfer Recommendations is highly encouraged. Propagation of DERP populations is advisable only to the degree that sustainable captive management practices can be established in a scientific fashion. Accredited institutions are required to develop policies on surplus and disposition of animals and AZA offers direction to institutions for their development.

Euthanasia for Population Management

The PAX TAG does not endorse euthanasia as a population management tool. There is sufficient interest within AZA zoos to accommodate all representatives of the species falling under the purview of this TAG. Institutions

facing a critical need to remove a healthy animal from its collection should contact the appropriate species coordinator for placement advice.

Non-member Participation in PAX TAG Programs

Non-member participation in PAX TAG Programs will be guided by the prevailing AZA guidelines for such participation.

POSITION STATEMENT

Pangolins:

The PAX TAG does not presently recommend the acquisition of any species of the family *Manidae* (pangolins). While the pressures (illegal medicinal and food trade) on these species are enormous and unsustainable, there has been insufficient *ex situ* success in the keeping of these species to warrant any further demand upon their wild populations. Nonetheless, the PAX TAG strongly encourages logistical, technical and financial support of range country rescue and rehabilitation efforts for pangolins. Collaborations with these NGOs, some of which are housing pangolins long-term, could eventually lead to stateside captive management programs that aid in developing reserve populations for these species.

Appendix I: Institutional Representatives as of May, 2009

Abilene Zoological Gardens, Liz Kellerman
Adventure Aquarium, Michele Pagel
African Safari Wildlife Park, Laura Bragg
Albuquerque Biological Park, Rick Janser
Aquarium & Rainforest at Moody Gardens, Greg Whittaker
Audubon Zoo, Rick Dietz
Bergen County Zoological Park, Cindy Norton
Binder Park Zoo, Jenny Barnett
Biodôme de Montreal, Chantal Routhier
Birmingham Zoo, Marcia Riedmiller
Blank Park Zoo, Kevin Drees
Brevard Zoo, Michelle Smurl
Bronx Zoo, Claudia Wilson
Buffalo Zoological Gardens, Gerald Aquilina
Busch Gardens Tampa Bay, Mike Boos
Caldwell Zoo, Scotty Stainback
Central Florida Zoological Park, Erin Hale
Central Park Zoo, Tony Brownie
Charles Paddock Zoo, Alan Baker
Chattanooga Zoo at Warner Park, Dardanelle Long
Cheyenne Mountain Zoo, Tracy Leeds
Chicago Zoological Society - Brookfield Zoo, Jay Petersen
Cincinnati Zoo & Botanical Garden, Mike Dulaney
Cleveland Metroparks Zoo, Chris Kuhar
Columbus Zoo and Aquarium, Dusty Lombardi
Como Zoo and Conservatory, Allison Jungheim
Connecticut's Beardsley Zoo, Don Goff

Cosley Zoo, Katy Briggs
Dallas Zoo, Ken Kaemmerer
Denver Zoological Gardens, Beth Jo Schoeberl
Detroit Zoological Society, Michelle Seldon
Dickerson Park Zoo, John Collette
Disney's Animal Kingdom, Jerry Brown
El Paso Zoo, Joe Reza
Elmwood Park Zoo, David Wood
Erie Zoo, Cindy Kreider
Fort Wayne Children's Zoo, Mark Weldon
Franklin Park Zoo, Pete Costello
Fresno Chaffee Zoo, Andy Snider
Gladys Porter Zoo, Jerry Stones
Great Plains Zoo & Delbridge Museum, Jay Tetzloff
Henry Vilas Zoo, Jeff Stafford
Honolulu Zoo, Richard Ball
Houston Zoo, Inc., Peter Riger
International Animal Exchange, Inc., Laura Bragg
Jackson Zoological Park, Dave Wetzel
Jacksonville Zoo and Gardens, Craig Miller
Kansas City Zoo, Liz Harmon
Knoxville Zoological Gardens, Sarah Glass
Lee Richardson Zoo, Kristi Newland
Lehigh Valley Zoo, Tony LaPorte
Lincoln Children's Zoo, Randy Scheer
Lincoln Park Zoo, Diane Mulkerin
Little Rock Zoo, Karen Caster

Living Desert, Kara Akers
Los Angeles Zoo and Botanical Gardens, Jeff Holland
Louisville Zoological Garden, Steve Wing
Maryland Zoo in Baltimore, Rebecca Gullott
Memphis Zoo, Steve Reichling
Mesker Park Zoo & Botanic Garden, Brad Fichter
Miller Park Zoo, John Tobias
Milwaukee County Zoological Gardens, Jan Rafert
Minnesota Zoological Garden, Christine McKnight
Montgomery Zoo, Ken Naugher
Naples Zoo, Jeffrey Carter
Nashville Zoo, Inc., Connie Philipp
National Aquarium in Baltimore, Ken Howell
Newport Aquarium, Ric Urban
Northeastern Wisconsin (NEW) Zoo, Carmen Murach
Ocean Park Corporation, Jason Tang
Oglebay's Good Zoo, Jennifer Newland
Oklahoma City Zoological Park, Darcy Henthorn
Omaha's Henry Doorly Zoo, Dan Cassidy
Palm Beach Zoo, Keith Lovett
Peoria Zoo, Dawn Petefish
Philadelphia Zoo, Christine Bartos
Phoenix Zoo, Kara Schilling
Point Defiance Zoo & Aquarium, Karen Goodrowe
Potawatomi Zoo, Laura Arriaga
Pueblo Zoo, Marilyn McBirney
Reid Park Zoo, Susan Basford
Riverbanks Zoo & Garden, (vacant)
Roger Williams Park Zoo, Mike Jeffries
Rolling Hills Wildlife Adventure, Sandy Walker
Rosamond Gifford Zoo at Burnet Park, Adrienne Whiteley

Sacramento Zoo, Nikki Reichel
Saint Louis Zoo, Anne Bartin
Salisbury Zoological Park, Ann Konopik
San Antonio Zoological Gardens & Aquarium, John Gramieri
San Diego Zoo, Michele Stancer
San Diego Zoo's Wild Animal Park, Randy Rieches
San Francisco Zoological Gardens, Tom Turowski
Santa Ana Zoo, Ethan Fisher
Santa Barbara Zoological Gardens, Alan Varsik
Scovill Zoo, Amanda Hall
Sedgwick County Zoo, Mike Quick
Seneca Park Zoo, David Hamilton
Sequoia Park Zoo, Gretchen Ziegler
Six Flags Discovery Kingdom, Kristin Wasson
Smithsonian National Zoological Park, Bob King
Sunset Zoological Park, Mark Ryan
Tautphaus Park Zoo, Bill Gersonde
Texas State Aquarium, Lori Looper
Toledo Zoological Gardens, Randi Meyerson
Topeka Zoo, Mike Coker
Toronto Zoo, Maria Franke
Tulsa Zoo and Living Museum, Pat Murphy
Turtle Back Zoo, Brint Spencer
Utah's Hogle Zoo, Jane Larson
Vancouver Aquarium Marine Science Centre, Lee Newman
Virginia Zoological Park, Louise Hill
Walter D. Stone Memorial Zoo, Pete Costello
Wildlife World Zoo, Inc., Jack Ewert
Woodland Park Zoo, Helen Shewman
Zoo Atlanta, Lisa Smith

Appendix II: Respondents to 2007 Space Survey

Abilene Zoo Doug Hotle
Adventure Aquarium Michele Pagel
African Safari Wildlife Park Brian Hunt
Albuquerque Biological Park Rick Janser
Audubon CRES Erin Sarrat
Audubon Zoo Rick Dietz
Bergen County Zoo Cindy Norton
Binder Park Zoo Jenny Barnett
Birmingham Zoo Marcia Riedmiller
Blank Park Zoo Kevin Drees
Brandywine Zoo Nancy Falasco
BREC's Baton Rouge Zoo Sam Winslow
Brevard Zoo Michelle Smurl
Buffalo Zoological Gardens Gerald Aquilina
Busch Gardens Tampa Michael Boos
Buttonwood Park Zoo Shara Crook-Martin
Caldwell Zoo Scotty Stainback
Central Florida Zoological Park Erin Hale
Central Park Zoo Anthony Brownie
Charles Paddock Zoo Alan Baker
Chattanooga Zoo Dardenelle Long
Cheyenne Mountain Zoo Tracy Leeds
Chicago ZS - Brookfield Zoo Joan Daniels Tantillo
Cincinnati Zoo Michael W. Dulaney
Cleveland Metroparks Zoo Alan Sironen
Columbus Zoo and Aquarium Dusty Lombardi
Como Zoo Joanne Kelly
Connecticuts Beardsley Zoo Don Goff
Cosley Zoo Colleen Pawlicki
David Traylor Zoo of Emporia Steve Trebilcock
Denver Zoo BJ Schoeberl
Detroit Zoological Society Michelle Seldon
Dickerson Park Zoo Kesha Schreiber
Disney's Animal Kingdom Jerry Brown

Elmwood Park Zoo David Wood
Erie Zoo Cynthia Kreider
Fort Wayne Children's Zoo Mark Weldon
Fossil Rim Wildlife Center Kelley Snodgrass
Fresno Chaffee Zoo Andrew T. Snider
Gladys Porter Zoo Jerry Stones
Gorilla Haven Stewart Dewar
Great Plains Zoo Jay Tetzloff
Grizzly & Wolf Discovery Center John Heine
Have Trunk Will Travel Kari Johnson
Henry Villas Zoo Jeff Strafford
Honolulu Zoo Richard Ball
Houston Zoo Pete Riger
Indianapolis Zoological Society Debbie Olson
Int'l Exotic Feline Sanctuary Richard Gilbreth
Jackson Zoological Park Dave Wetzel
Jacksonville Zoo and Gardens Craig Miller
John Ball Zoological Garden Barb Snyder
John G. Shedd Aquarium Ken Ramirez
Kansas City Zoo Liz Harmon
Knoxville Zoo Sarah Glass
Lee Richardson Zoo Kristi Newland
Lehigh Valley Zoo Anthony LaPorte
Lincoln Park Zoo Diane Mulkerin
Little Rock Zoo Mark Shaw
Los Angeles Zoo Jeff Holland
Louisville Zoo Steve Wing
Lubee Bat Conservancy Allyson Walsh
Memphis Zoo Steve Reichling
Mesker Park Zoo Brad Fichter
Miami Metrozoo Steve Conners
Micke Grove Zoo Matt McKim
Miller Park Zoo John Tobias
Milwaukee County Zoo Jan W. Rafert

Minnesota Zoo Christine McKnight
Montgomery Zoo Ken Naugher
Moody Gardens Greg Whittaker
Nashville Zoo Connie Philipp
National Aquarium in Baltimore Ken Howell
NC Aquarium at Fort Fisher Donna Moffitt
NC Aquarium at Pine Knoll Shores Brian Dorn
NC Aquarium on Roanoke Island J. P. McCann
Northeastern Wisconsin Zoo Carmen Murach
Northwest Trek Wildlife Park Rich Sartor
Ocean Park Corporation Suzanne M. Gendron
Oklahoma City Zoo Bill Savage
Oregon Wildlife Foundation Richard Noble
Palm Beach Zoo at Dreher Park. Gwen Lovett
Peoria's Glen Oak Zoo Dawn Petefish
Philadelphia Zoo Chris Bartos
Phoenix Zoo Geoff Hall
Pittsburgh Zoo & PPG Aquarium Amos Morris
Point Defiance Zoo Karen Goodrowe Beck
Reid Park Zoo Scott Barton
Ripley's Aquarium Joe Choromanski
Ripley's Aquarium of the Smokies Joe Choromanski
Riverbanks Zoo and Garden John Davis
Riverside Zoo Joe Clawson
Roger Williams Park Zoo Michael Jeffries
Rolling Hills Wildlife Adventure Sandy Walker
Roosevelt Park Zoo Dana Gilstad
Saint Louis Zoo Anne Martin
Salisbury Zoological Park Ann Konopik
San Antonio Zoo John Gramieri
San Francisco Zoo Mike Sulak / Tom Turowski
Santa Ana Zoo Ethan Fisher
Santa Barbara Zoo Alan Varsik

Santa Fe Teaching Zoo Kathy Russell
Scovill Zoo Amanda Hall
SDWAP Randy G. Rieches
Seattle Aquarium CJ Casson
SeaWorld San Diego Michele Stancer
Sedgwick County Zoo Jennifer Callahan
Seneca Park Zoo David Hamilton
Sequoia Park Zoo Gretchen Ziegler
Six Flags Discovery Kingdom Crysteena Tillie
St. Augustine Alligator Farm Amanda Whitaker
Sunset Zoo Mark Ryan
Tautphaus Park Zoo Bill Gersonde
Tennessee Aquarium Dave Collins
The Good Zoo at Oglebay Joe Greathouse
The Living Desert Liz Hile
The Maryland Zoo in Baltimore Rebecca Gullott
Toledo Zoo Randi Meyerson
Topeka Zoological Park Michelle Schroeder
Toronto Zoo Maria Franke
Trevor Zoo Johnathan Meigs
Tulsa Zoo Pat Murphy
Turtle Back Zoo Maggie Liguori
Utah's Hogle Zoo Jane Larson
Vancouver Aquarium Lee Newman
Virginia Aquarium W. Mark Swingle
Virginia Zoo Louise Hill
Wild Canid Survival & Research Center Sue Lindsey
Wildlife Conservation Society Claudia Wilson
Wildlife World Zoo Jack Ewert
Woodland Park Zoo Helen Shewman
Zoo New England Pete Costello
ZOOAMERICA Wildlife Park Dale Snyder
Zoological Society of San Diego Michele Stancer

Appendix III: Definition of Program Levels

Species Survival Plan populations - Intense management to maintain the captive population is implemented, with conservation of the species as a consideration. A studbook is required. The program is managed by a Species Coordinator with institutional input through IRs. Breeding and transfer recommendations are communicated through a Master Plan. Compliance by participating institutions is required. Non-member participants must be approved.

Population Management Plan populations - Species in this category are managed less intensively by a PMP manager who offers breeding and move recommendations through a Population Management Plan. Institutional input is through TAG IRs, and compliance is encouraged. Non-member participation follows AZA and institutional Acquisition/Disposition policies.

Display/Education/Research Populations (DERP) - Species in this category are maintained without a managed captive breeding program. Populations are established by acquisition from wild populations or via captive facilities outside AZA. Breeding of these species is conducted on an investigative basis, for later assessment of the species' sustainability in captivity. Registries of living animals are maintained by the population managers.

Phase Out Populations - Species in this category are maintained with no captive breeding with the goal of elimination of the species through attrition, ultimately for replacement with a recommended species.

Phase In Populations - Species in this category are not currently in AZA institutions, but initiation of a captive program is desired. Once in captivity, program management will be assigned as appropriate.

Not Recommended - Species in this category are not currently in AZA institutions and are not recommended for inclusion in AZA institutions.

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