RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

A Joint Endeavor of the

Regional Captive Propagation Programs

IUCN/SSC Asian Rhino Specialist Group

IUCN/SSC African Rhino Specialist Group

IUCN/SSC Captive Breeding Specialist Group

Regional Captive
Propagation Programs

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

TABLE OF CONTENTS

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

SECTION 1

AGENDA & PROBLEM STATEMENT

Captive Breeding Specialist Group

Species Survival Commission
IUCN -- The World Conservation Union

U. S. Seal, CBSG Chairman

CBSG GLOBAL CAPTIVE ACTION PLAN
RHINOS

LONDON, U.K.
9-10 MAY 1992

DRAFT AGENDA

- Goals & Objectives:
  - Captive Propagation:
    - Taxa Recommended
    - Target Population Objectives
      - Global
      - Regional
  - Research Priorities
  - In Situ Support:
    - Prioritization of Needs
    - Coordination of Efforts
- Global SSP's
  - Status of Regional Programs
  - Development of Global Masterplans
  - Formation of Management Committees & Selection of Global Coordinators.
- Studbook Matters
- Subspecies Issues
- Husbandry/Health Problems
  - Black Rhino
  - Other Taxa
- Reintroductions

12101 Johnny Cake Ridge Road, Apple Valley, MN 55124, USA tel. 612-431-9325 fax 612-432-2757
(home) 9801 Pillsbury Ave. S., Bloomington, MN 55420, USA tel. 612-888-7267 fax 612-888-5550

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

T.J. Foose, Ph.D. - CBSG Executive Officer

A Global Captive Action Plan Workshop for Rhino will occur at the London Zoo 9-10 May 1992 immediately after the Sixth World Conference on Breeding Endangered Species on the Isle of Jersey.

The purpose of this Workshop is to provide strategic guidance for intensive management techniques to threatened taxa in these groups. As populations of many of these taxa are reduced and fragmented in the wild, more intensive management becomes necessary for their survival and recovery. This intensive management may include, but is not limited to, captive breeding.

Therefore, the Workshop will formulate recommendations about which taxa are in need of various kinds of intensive management attention both *ex situ* and *in situ* with which the captive community can realistically assist. The kinds of attention include:

(A) Population and Habitat Viability Assessment and Conservation Management Plan (PHVA/CMP) Workshops.
(B) Intensive (captive-type) protection and management in the wild.
(C) *In situ* and *ex situ* research where the captive community can reasonably assist: e.g., taxonomic clarification, some survey support.
(D) Captive propagation programs that sooner or later hopefully can be linked to interactions with wild populations.
(E) Experimental re-introduction projects.

In terms of captive propagation, this Global Action Plan Workshop would include consideration of how the various Regional programs for rhino would interact and combine to form truly global efforts. An important aspect would be establishment of target population size goals (i.e. how many rhino to ultimately try to maintain) on a global basis and in each of the regions. These target population goals will be largely determined by demographic and genetic goals adopted for the program. The Workshop will also attempt to recommend responsibilities for captive programs might best be distributed among organized Regions of the global captive community. Finally, there will be an attempt to initiate integration of the Regional Propagation Programs into Global Programs.

While the emphasis in Global Captive Action Plans is on *ex situ* activities, the Workshop will also consider how to more strategically develop and coordinate *in situ* conservation activities by zoos, especially financial support for field efforts. In particular, there will be an attempt (1) to identify where and how the captive community can assist with transfer of intensive management information and technology (2) to develop priorities for the limited financial support the captive community can provide for *in situ* conservation (e.g., adopt-a-protected-area program).

Participants for this Workshop are all International and Regional Studbook Keepers and Species Coordinators for each of the rhino taxa, African and Asian. It is also considered important that representatives of the management authorities in major countries of origin of the various rhino be involved if possible. A number of field conservationists will be at the Jersey Conference and hopefully can attend the Global Captive Action Plan Workshop.

Captive Breeding Specialist Group

Species Survival Commission
IUCN – The World Conservation Union

U. S. Seal, CBSG Chairman

30 January 1992

TO: Attached List of Rhino Conservationists:
- International & Regional Studbook Keepers
- Coordinators Regional Rhino Captive Breeding Programs
- Regional Rhino Taxon Advisory Group Chairs
- Conservation Coordinators Regional Zoo Programs
- Chairs & Selected Members SSC Rhino Specialist Groups
- Other Selected Rhino Experts

FROM: Tom Foose, CBSG Executive Officer

SUBJECT: **RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP**

You are cordially invited to attend a Global Captive Action Plan Workshop for rhinos at the London Zoo 9-10 May 1992 immediately after the Sixth World Conference on Breeding Endangered Species on the Isle of Jersey which many of you will be attending. Such a workshop has been contemplated by the CBSG Rhino Working Group for some time and has beenn specifically recommended by them to occur at this time.

A draft agenda for this Workshop is attached.

The purpose of this Workshop is to provide strategic guidance for intensive management techniques to threatened taxa in these groups. As populations of many of these taxa are reduced and fragmented in the wild, more intensive management becomes necessary for their survival and recovery. This intensive management may include, but is not limited to, captive breeding.

Therefore, the Workshop will formulate recommendations about which taxa are in need of various kinds of intensive management attention both *ex situ* and *in situ* with which the captive community can realistically assist. The kinds of attention include:

(A) Population and Habitat Viability Assessment and Conservation Management Plan (PHVA/CMP) Workshops.

(B) Intensive (captive-type) protection and management in the wild.

(C) *In situ* and *ex situ* research where the captive community can reasonably assist: e.g., taxonomic clarification, some survey support.

(D) Captive propagation programs that sooner or later hopefully can be linked to interactions with wild populations.

(E) Experimental re-introduction projects.

12101 Johnny Cake Ridge Road, Apple Valley, MN 55124, USA tel. 612-431-9325 fax 612-432-2757
(home) 9601 Pillsbury Ave. S., Bloomington, MN 55420, USA tel. 612-888-7267 fax 612-888-5550

In terms of captive propagation, this Global Action Plan Workshop would include consideration of how the various Regional programs for rhino would interact and combine to form truly global efforts. An important aspect would be establishment of target population size goals (i.e. how many rhino to ultimately try to maintain) on a global basis and in each of the regions. These target population goals will be largely determined by demographic and genetic goals adopted for the program. The Workshop will also attempt to recommend responsibilities for captive programmes might best be distributed among organized Regions of the global captive community. Finally, there will be an attempt to initiate integration of the Regional Programs into a Global one.

While the emphasis in Global Captive Action Plans is on *ex situ* activities, the Workshop will also consider how to more strategically develop and coordinate *in situ* conservation activities by zoos, especially financial support for field efforts. In particular, there will be an attempt (1) to identify where and how the captive community can assist with transfer of intensive management information and technology (2) to develop priorities for the limited financial support the captive community can provide for *in situ* conservation (e.g., adopt-a-sanctuary programmes).

Proposed participants for this workshop are all International and Regional Studbook Keepers and Species Coordinators for each of the rhino taxa, African and Asian. It is also considered important that representatives of the management authorities in major countries of origin of the various rhino be involved if possible. A number of field conservationists will be at the Jersey Conference and hopefully can attend the Global Captive Action Plan Workshop.

Attached is a draft agenda for this Workshop. Also attached are two preliminary tables to guide further thought toward these objective.

Table 1 The numbers on current sizes of the captive populations in each identified Region has been derived by data in the International Studbooks, the information provided at the 1990 San Diego Rhino Conference, and refined by some direct communication with Regional Coordinators. What is not included in this table are any estimates of the projected (future) space that may be available for each taxon of rhino.

Table 2 The data on the number of critical sanctuaries for each taxon of rhino has been concluded from the SSC Action Plans for African and Asian Rhinos. The data on the support being provided by the captive community for in situ rhino conservation is my own crude compilation and will need to be improved at the Workshop.

All participants are requested to provide any updates to these tables to me before, or carry their additional data, to the Workshop.

The Workshop will be conducted in the Meeting Rooms at the Zoological Society of London, Regent's Park. Lunches and refreshment breaks will be provided. Alexandra Dixon has graciously agreed to coordinate the local logistics for the meeting and will be able to arrange accommodations for you in the vicinity upon request. To help defray costs incurred by the host, a registration fee of £25 is being requested. Attached is a form to facilitate your response.

Thanks very much. Please don't hesitate to contact me for any further information.

cc: L. Calvo, R. Khan, C. Padua, W. Conway, G. Rabb, S. Stuart

INVITED PARTICIPANTS - RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

Rashid Amar	Rhino Geneticist
George Amaro	Rhino Geneticist
B.M. Arora	Conservation Coordinator Indian Zoos
General Ashari	Conservation Coordinator S.E.Asia Zoo Association
Rob Brett	Kenya Wildlife Service Rhino Coordinator
Martin Brooks	Chairman IUCN SSC African Rhino Specialist Group
Koen Brouwer	EEP Executive Office
Tom Foose	International Studbook Sumatran Rhino/CBSG
Mike Dee	Coordinator Indian/Nepali Rhino SSP (N. America)
Alexandra Dixon	Conservation Officer London Zoological Society
Jim Doherty	Co-Coordinator Sumatran Rhino SSP (N. America)
Jim Dolan	Co-Coordinator Sumatran Rhino SSP (N. America)
Ellen Dierenfeld	Rhino Nutritionist
Betsy Dresser	Rhino Reproductive Specialist
Don Ferst	Sub-Coordinator Southern Black Rhino SSP
Richard Faust	Director Frankfurt Zoological Society
Reinhardt Frese	International Studbook Keeper African Rhinos
Chris Furley	Howlett's-Port Lympne Sumatran Rhino Programme
Paul Garland	Chair ASMP Rhino TAG/Coordinator White Rhino ASMP
Anthony Hall-Martin	Elephant & Rhino Foundation (S. Africa)
Keith Hodges	Rhino Reproductive Biologist
Michael Hutchins	AAZPA Director Conservation & Science
Jim Jackson	President, International Black Rhino Foundation
David Jones	Rhino Coordinator JMSG (U.K.)
John Kelly	ASMP Coordinator Black Rhino (Australasia)
Mohd Khan	Chairman IUCN SSC Asian Rhino Specialist Group
Larry Killmar	SSP Subspecies Coordinator, Northern White Rhino
Heinz-Georg Klös	African Rhino Species Coordinator EEP (Europe)
John Knowles	Deputy Chair of CBSG
Michael Kock	Zimbabwe Rhino Program
Richard Kock	Rhino Specialist Z.S.L. & Kenya Wildlife Service
Atsushi Komori	Conservation Coordinator SSCJ (Japan)
Jansen Manansang	Taman Safari Indonesia
Andrew Laurie	Member African & Asian Rhino Specialist Group
Nigel Leader-Williams	Member African Rhino Specialist Group
Nick Lindsay	JMSC TAG Coordinator, Black & White Rhino
Sukianto Lusli	Indonesian Rhino Foundation
Georgina Mace	Rhino Population Biologist
Mitsuko Masui	Rhino Coordinator SSCJ (Japan)
Ed Maruska	Coordinator Black Rhino SSP (N. America)
Daryl Miller	Australasian ASMP Coordinator for Asian Rhinos
Eric Miller	Rhino Health Specialist
William Nduku	Zimbabwe Rhino Program
Barbara Porter	Conservation Coordinator ASMP (Australasia)
Linda Prasetyo	Indonesia PHPA Rhino Specialist
Mark S. Price	Chair IUCN SSC Reintroduction Specialist Group
Robert Reece	Chair AAZPA Rhino TAG/Coordinator White Rhino SSP
Randy Rockwell	Prospective Coordinator White Rhino SSP
Alex Rubel	Director Zoo Zurich
Dieter Ruedi	Coordinator Indian/Nepali Rhino EEP (Europe)
Ollie Ryder	Rhino Geneticist
Christian Schmidt	Asst. Director Zoo Zurich
Kes H. Smith	Garamba White Rhino Specialist
Peter Spala	Dvur Kralove Rhino Coordinator
Miranda Stevenson	Chair, Joint Management of Species Committee (JMSC) U.K.
Mohd Tajuddin	Sumatran Rhino Studbook Keeper
Ron Tilson	CBSG "Adopt-A-Park" Catalyst/Coordinator
Kathleen Tobler	International Studbook Keeper Indian Rhino
Kristina Tomasova	Dvur Kralove Rhino Coordinator
Nico Van Strien	Member Asian Rhino Specialist Group

INVITED PARTICIPANTS - RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP
(Continued)

Tim Sullivan	IUCN Species Survival Commission (SSC)
Sally Walker	Zoo Outreach Organization India
Karen Wachs	Co-Editor AROUND THE HORN
Vivian Wilson	Species Coordinator for African APE (Sub-Saharan Africa)
Stefano Zago	Sibuh Rhino Program

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

SECTION 2

OVERVIEW OF CAPTIVE PROGRAMS FOR RHINOS

GLOBAL AND REGIONAL
CURRENT AND TARGET POPULATIONS FOR
RHINO IN CAPTIVITY

	WORLD			AFRICA		ASIA		AUSTRALASIA		EUROPE		N. AMERICA		C.& S. AMERICA	
RHINO TAXON	WILD POP	CPTV POP	CPTV TRGT	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP
Eastern Black	600	163		5		35		2		48		67		6	
Southern Black	2,300	42		4		22		0		6		30		0	
Southwestern Black	400	0		0		0		0		0		0		0	
North & West Black	<100	0		0		0		0		0		0		0	
Northern White	34	10		0		0		0		6		4		0	
Southern White	4,700	560		16		152		14		206		132		40	
Indian/Nepali	1,700	118		0		45		0		32		40		1	
Javan	< 100	0		0		0		0		0		0		0	
Mainland Sumatran	150	8		0		8		0		0		0		0	
Sumatran Sumatran	600	15		0		7		0		2		6		0	
Borneo Sumatran	100	3		0		3		0		0		0		0	
African Rhino	**8,134**	**775**		**25**		**189**		**16**		**266**		**233**		**46**	
Asian Rhino	**2,650**	**144**		**0**		**63**		**0**		**34**		**46**		**1**	
All Rhino Taxa	**10,784**	**919**		**25**		**252**		**16**		**300**		**279**		**47**	

T.J. Foose
1 May 1992

RHINO INSTITUTIONS

TAXON	WORLD	AFRICA	ASIA					AUSTRALASIA	EUROPE	N.A.	S.A.
			CHN	IND	JPN	S.E.	M.E.				
Eastern Black	55	3	2	3	4	1	1	1	11	24*	4
Southern Black	14	1	0	0	1?	0	0	1	2	9	0
Southwestern Black	0	0	0	0	0	0	0	0	0	0	0
North/West Black											
Northern White	2	0	0	0	0	0	0	0	1	1	0
Southern White	214 **	12	6	3	21	6	6	6	86	45*	26
Indian/Nepali	42 *	0	1	11	3	1	0	0	14	11*	1
Mainland Sumatran	2	0	0	0	0	1	0	0	0	0	0
Sumatra Sumatran	9	0	0	0	0	5	0	0	1	4	0
Borneo Sumatran	1										
Javan	0	0	0	0	0	0	0	0	0	0	0
African Rhino	266	16	8	5	29	6	8	7	95	78	23
Asian Rhino	48	0	1	12	3	5	0	0	15	11*	1
All Rhino	256 ***	16	8	13	30	7	8	7	101	74*	23

* San Diego Zoo & San Diego Wild Animal Park = 1 Institution
** 139 of the white rhino institutions maintain ≤ 2 individuals
*** ~ 200 "Hard Currency" Zoos with rhinos
~ $ 1 billion annual operation budgets

T.J. Foose
1 May 1992

MAJOR NORTH AMERICAN FACILITIES WITHOUT RHINO

Audubon Zoo Breeding Center
Minnesota Zoo
St. Paul Como
Boston
Buffalo
Seattle Woodland Park
The Wilds
Springfield Dickerson Park
Nashville
Indianapolis
Kansas City
Topeka
Syracuse Burnet Park
Providence Roger Williams Park
Front Royal CRC
St. Catherine's or Successor
Canyon Colorado Sanctuary Gruenerwald
Point Defiance

DEMOGRAPHIC PERFORMANCE OF GLOBAL AND REGIONAL POPULATIONS OF RHINO IN CAPTIVITY

	WORLD		AFRICA		ASIA		AUSTRALASIA		EUROPE		N. AMERICA		S. & C. AMERICA	
TAXON	λ		λ		λ		λ		λ		λ		λ	
	HIST	81-92	HIST	81-92	HIST	81-92	HIST	81-92	HIST	81-92	HIST	81-92	HIST	81-92
E. Black	.97	.97	-	-	.94	.9	-	-	.96	.98	.97	.99	-	-
E. Black Cure											1.02	1.03		
S. Black	< 1	< 1	-	-	-	-	-	-	-	-	< 1	< 1	-	-
S.W. Black	-	-	-	-	-	-	-	-	-	-	-	-	-	
N.W. Black	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N. White	0	0	0	0	-	-	-	-	-	-	-	-	-	-
S. White	?	?	?	?	?	?	?	?	?	?	< 1	< 1	?	?
Indian/Nepali	1.02	1.02			1	.98			1.04	1.02	~ 1	1.03	-	-
Javan	-	-	-	-	-			-	-		-		-	-
M.Sumatran	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.Sumatran	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B.Sumatran	-	-	-	-	-	-	-	-	-	-	-	-	-	-

λ < 1 = decreasing population
λ = 1 = stationery population
λ > 1 = increasing population
e.g. 1.02 = 2% increase/year
.97 = 3% decrease/year

T.J. Foose
1 May 1992

GENETIC COMPOSITION IN TERMS OF FOUNDERS OF GLOBAL AND REGIONAL POPULATIONS OF RHINO IN CAPTIVITY

	WORLD		AFRICA		ASIA		AUSTRALASIA		EUROPE		N. AMERICA		S. & C. AMERICA	
TAXON	FOUNDERS		FOUNDERS		FOUNDERS		FOUNDERS		FOUNDERS		FOUNDERS		FOUNDERS	
	#	Unq	#	Unq	#	Unq	#	Unq	#	Unq	#	Unq	#	Unq
E. Black	95	80	7	7	24	15	3	3	36	25	44	26	9	4
S. Black	38	38	4	4	2	2	0	0	4	4	28	28	0	0
S.W. Black														
N/W Black														
N. White	7	4	0	0	0	0	0	0	4	1	4	3	0	0
S. White	> 100	0	?	?	?	?	?	?	?	?	99	?	?	?
Indian/Nepali	62	44	0	0	38	22	0	0	14	6	26	16	3	0
Javan														
M.Sumatran	8.5	8.5	0	0	8.5	8.5	0	0	0	0	0	0	0	0
S.Sumatran	15	15	0	0	7	7	0	0	2	2	6	6	0	0
B.Sumatran	3	3	0	0	3	3	0	0	0	0	0	0	0	0

# = Number of Potential Founders
Unq = Founders Unique to Region

T.J. Foose
1 May 1992

GENETIC COMPOSITION
IN TERMS OF FOUNDER GENOME EQUIVALENTS
OF GLOBAL AND REGIONAL POPULATIONS OF
RHINO IN CAPTIVITY

	WORLD		AFRICA		ASIA		AUSTRALASIA		EUROPE		N. AMERICA		S. & C. AMERICA	
TAXON	F.G.E.		F.G.E.		F.G.E.		F.G.E.		F.G.E.		F.G.E.		F.G.E.	
	A	P	A	P	A	P	A	P	A	P	A	P	A	P
E. Black	30	80	1	5	8.3	21	1	2	14.8	24.9	15	32	1	4.5
S. Black	11	34	50	87.5	50	75	0	0	2	4	8	24.5	0	0
S.W. Black														
N/W Black														
N. White	2	7	0	0	0	0	0	0	2	3.4	0	4	0	0
S. White			?	?	?	?	?	?	?		18	97	?	?
Indian/Nepali	7	55	0	0	4.9	34.5	0	0	3.7	9.4	5.7	20	1	0
Javan														
M.Sumatran	.5	8.5	0	0	0	8.5	0	0	0	0	0	0	0	0
S.Sumatran	0	15	0	0	0	7	0	0	0	2	0	6	0	0
B.Sumatran	0	3	0	0	0	3	0	0	0	0	0	0	0	0

F.G.E. = Founder Genome Equivalents
A = Actual
P = Potential

T.J. Foose
1 May 1991

GENETIC COMPOSITION IN TERMS OF GENE DIVERSITY OF GLOBAL AND REGIONAL POPULATIONS OF RHINO IN CAPTIVITY

	WORLD		AFRICA		ASIA		AUSTRALASIA		EUROPE		N. AMERICA		S. & C. AMERICA	
TAXON	GENE DIVERSITY		GENE DIVERSITY		GENE DIVERSITY		GENE DIVERSITY		GENE DIVERSITY		GENE DIVERSITY		GENE DIVERSITY	
	A	P	A	P	A	P	A	P	A	P	A	P	A	P
E. Black	98.3	99.4	50	92.9	94	97.6	50	0	96.6	98	96.7	98.4	50	89
S. Black	95.1	98.5	0	87.5	50	50	0	0	75	87.5	93.8	98	0	0
S.W. Black														
N.W. Black														
N. White	75	92.9	0	0	0	0	0	0	71.5	85.3	0	87.5	0	0
S. White	99	99	?	?	?	?	?	?	?	?	96.5	99.5	?	?
Indian/Nepali	92.8	99	0	0	89.7	98.6	0	0	86.5	94.7	91.2	97.5	50	0
Javan														
M.Sumatran	0	94.1	0	0	0	94.1	0	0	0	0	0	0	0	0
S.Sumatran	0	96.7	0	0	0	96.7	0	0	0	0	0	91.7	0	0
B.Sumatran														

T.J. Foose
1 May 1992

STRATEGIC SUPPORT OF *IN SITU* PROTECTED AREAS FOR RHINO BY THE GLOBAL AND REGIONAL CAPTIVE COMMUNITIES

TAXON	NUMBER OF SIGNIFICANT *IN SITU* SANCTUARIES	SUPPORTED BY ZOOS FROM					
		AFRICA	ASIA	AUSTRALASIA	EUROPE	N. AMERICA	S. AMERICA
Eastern Black	7				3	2+ ?	
Southern Black	7			1		1 ?	
Southwestern Black	2						
North/West Black	?						
Northern White	1				1		
Southern White	5						
Indian/Nepali	6					1	
Javan	6					1	
Mainland Sumatran	2						
Sumatra Sumatran	3						
Borneo Sumatran	4						
African Rhino	20						
Asian Rhino	20						
All Rhino Taxa	40						

T.J. Foose
1 May 1992

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

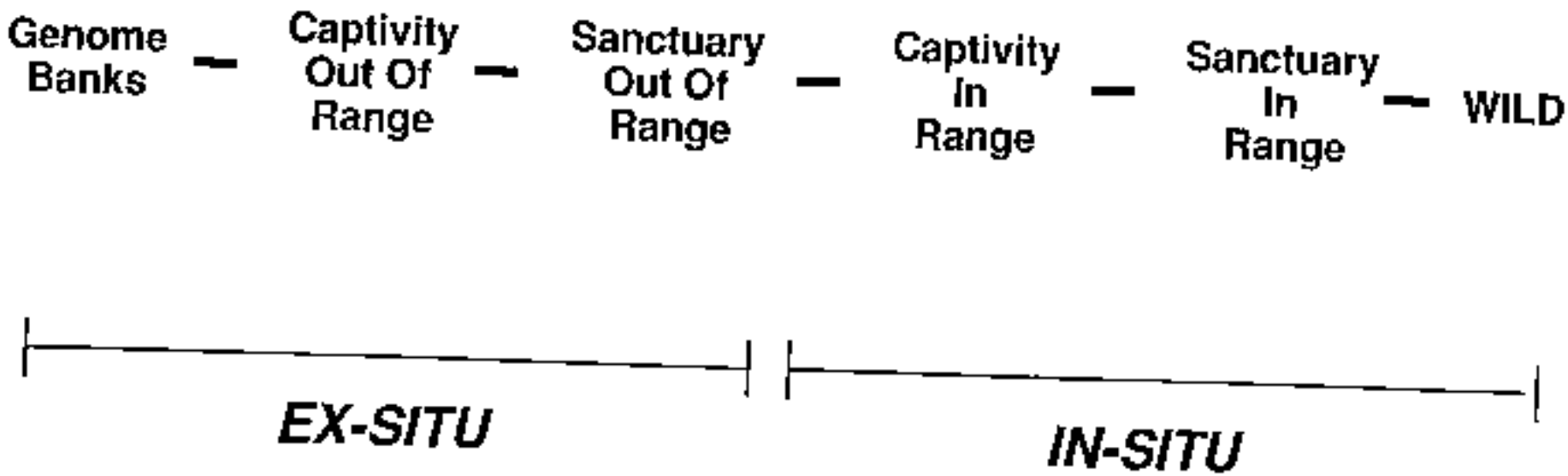
BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

SECTION 3

GLOBAL MANAGEMENT OF RHINOS

OPTIONS FOR RHINO CONSERVATION



Modified from Mark Stanley-Price (1991)

GLOBAL MANAGEMENT OF RHINOS

Thomas J. Foose, Ph.D.
Executive Officer
IUCN SSC Captive Breeding Specialist Group

INTRODUCTION

The 5 extant species of rhinoceros provide spectacular examples of the rapid and accelerating disappearance of wildlife on this planet. The immediate causes of this endangerment and extinction of wildlife are habitat destruction and unsustainable exploitation. In the case of the rhinos, the second cause, in the form of decimation by poachers, is the primary problem. Rhinos, like so many of the megavertebrates, are species that actually vanish well before their habitat disappears. To preserve the species of rhino, it is obviously necessary to protect them from poacher activity and habitat destruction.

However, while such protection is necessary, it is not sufficient. It is no longer enough to protect rhinos and their habitat *in situ*. Surviving rhino populations must also be managed if they are to survive over the long-term, i.e. at least the next several centuries.

Indeed, there is to a great extent no longer any wild, at least for the larger vertebrates. For them and for many other species what survives on the planet is a spectrum of situations and scenarios that vary only in the level of human exploitation and management applied to them. It will still be convenient to refer to populations more or less free ranging in natural habitats as being in the wild, but with the realization that species are not in unexploited or unmanaged situations.

PROBLEMS OF SMALL POPULATIONS

The reason management is necessary is that the populations that can be maintained of under the pressures of unsustainable exploitation and habitat degradation are small, i.e. a few tens to a few hundreds, or at best a few thousands depending on the species. Small populations are vulnerable to stochastic problems that can imperil survival just as much as the more deterministic threats of habitat degradation and unsustainable exploitation. These problems are random or stochastic in nature. Hence, they are difficult to predict. However, there are remedial measures possible through management. The problems of small populations apply to species in both the wild and in captivity, although much of the management methodology is being developed in zoos.

Stochastic problems can be environmental, demographic, or genetic in nature. Environmentally, small populations can be devastated by catastrophes or decimated by less drastic fluctuations in environmental conditions that can impair survival and fertility of individuals. Catastrophes (e.g., droughts, floods, epidemics) are increasingly recognized as severe threats to small populations (Thorne 1991). Demographically, even in the absence of deleterious fluctuations in the environment, small populations may develop intrinsic demographic problems (e.g., biased sex ratios, unstable age distributions, or random failures in survival and fertility) that can fatally disrupt propagation and persistence. Genetically, small populations also can rapidly lose heritable diversity that is necessary for fitness under existing environmental conditions and adaptation to changed environments in the future. The smaller the population and the more limited it is in distribution, i.e. the more fragmented it is, the greater these stochastic risks will be.

For the shorter term, environmental and demographic problems are likely to be more serious for small populations of rhino (Lacy 1987 b). Over the longer term, the genetic problems will become significant if rhino populations remain small.

VIABLE POPULATION STRATEGIES

Because of these problems, conservation strategies for species which are reduced in number, and which most probably will remain that way for a long time, must be based on maintaining certain viable populations, i.e. populations sufficiently large and well distributed to survive the stochastic as well as the deterministic threats. An critical characteristic of a viable population strategy is that it provides explicit and quantitative objectives, e.g.

- 99% probability of survival and 95% preservation of diversity for next 100 years
- 99% probability of survival and achieve recovery of evolutionary potential by end of next 100 years
- Consequently, populations of quantitatively specified size and distribution to achieve these objectives.

There are at least two major reasons to be as numerate or as quantitative as possible. Action plans (captive and wild) ultimately must establish numerical objectives for population sizes and distribution as countermeasures to the stochastic problems if populations are to be viable. Numbers also provide for more objectivity, less ambiguity, more comparability, better communication and hence cooperation.

There is no single magic number that represents a viable population size for all taxa. Indeed there is no single number that represents a minimum viable population for any one taxon all the time. Rather viable population size depends on several sets of factors:

(1) Genetic and demographic objectives of the conservation program;
   (a) The probability of survival of the population;
   (b) The kinds and amounts of genetic diversity to be preserved;
   (c) The period of time over which this genetic diversity and survival probability are to be maintained.
(2) Biological characteristics of the population;
   (a) The generation time (average age at which animals produce their offspring) in the population;
   (b) Growth rate of the population;
   (c) Number of founders;
   (d) Ratio of genetically effective size N_e to the total size N.
   (e) The degree of subdivision or fragmentation.
(3) The kinds and levels of stochasticity operating.

While the exact sizes for population viability will vary depending on these factors, it may be possible to provide some useful generalizations and guidelines. Mace and Lande (1991) have recently proposed such a general scheme of guidelines as a basis for reformulating the IUCN Red Data Categories in a more quantitative way to reflect small population problems (Figure 1). The Mace-Lande scheme provides quantitative criteria in terms of population sizes, distribution, trends, stochasticity.

These criteria are formulated in terms of both effective (N_e) and total population sizes (N). Effective size is critical with respect to the stochastic problems, in particular the loss of genetic diversity. The effective size of a population is not the same as the actual number of animals. Instead, the (genetically) effective size is a measure of how the members of the population reproduce with one another to transmit their genes to future generations. Normally, the effective population size, denoted by N_e, is much smaller than the total number of animals. Such normal occurrences as failure of some/many animals to reproduce, disparities in lifetime production of offspring (lifetime family sizes) or biases in the sex ratio of breeding animals will depress N_e well below the census number. For example, N_e may be as low as 10 to 25% of the total population number. Mace and Lande use a general N_e/N ratio of .2 which may be low for some taxa. But conservatism is prudent. Thus, a recommended N_e of 500 to provide genetic and demographic viability for each distinct kind of rhino may require that, using the Mace-Lande guidelines, a population of at least 2500, or better more, actually be maintained. It is important to realize the minimum that is scientifically recommended as necessary for long-term survival under the best information available is just that, a minimum. More is always better and safer.

In terms of these Mace-Lande criteria, all extant taxa of rhino (Table 1) are in a category of threat or concern, most of them are critical or endangered. Rhino populations would need to be expanded to the 5,000 to 10,000 range for reasonable viability and security.

Naturally, the number of evolutionarily significant units or subspecies of rhino recognized as separate entities to be conserved is critical for conservation efforts. For the short term, splitting is better than lumping. Units initially accepted can be merged or eliminated later if necessary for viability. Whatever the decisions about what constitutes an evolutionarily significant unit and therefore conservation units, each "taxon" should be managed as a viable population.

It will be difficult or impossible to maintain single, contiguous populations in the hundreds or thousands required for viability. However, it is possible for smaller populations and sanctuaries to be viable if they are managed as a single larger population (a so-called metapopulation). Hence viable population strategies for megavertebrates like the rhino will require development of metapopulations (Figure 2) to achieve populations that are large and widely distributed enough to have an acceptable probability of surviving the stochastic risks. Metapopulation strategies will entail interactively managing the subpopulations to maximize the probability of survival of the species.

A metapopulation strategy (or survival plan) must recommend the number, sizes, and distribution of the subpopulations and the level of interchange among them to achieve the goals of the conservation program. Population viability assessments can provide recommendations on the number, size, and interaction of the separate subpopulations that are being managed collectively and interactively to constitute the metapopulation. Preliminary analyses suggest that a viable number for each separate subpopulation of rhino should perhaps be at least 100 animals (Foose 1987; Foose and Seal 1989; Khan 1989). However, this recommendation does not necessarily refer to the actual number of rhinos existing in some defined protected area of the natural range of the species now. Instead, this guideline for subpopulation size represents a minimum number that the protected area must be able to sustain if the rhinos can be protected and hence permitted to grow to the carrying capacity of the habitat.

As an example of application of this kind of strategy, the IUCN SSC Asian Rhino Action Plan for each of the 3 species of Asian rhinos recommends (Khan 1989):

Effective Population Size (N_e) $\geq$ 500
Total Population Size $\geq$ 2500
Number of Subpopulations $\geq$ 10
Size of Each Subpopulation $\geq$ 100

These population biology considerations in conjunction with the acuteness of the crisis for rhinoceros species suggests a conservation strategy for rhinos that consists of 2 major components.

(1) One component is to concentrate field efforts and available resources on protection and management of those wild populations and their sanctuaries that are large and/or protectable enough to be viable for the long-term.

It will be lethal to continue to diffuse limited resources trying to save inviable remnants (Leader-Williams and Albon 1988).

(2) The other is to employ animals that are located outside the viable populations and sanctuaries for either captive propagation or for careful translocation into larger or securer areas.

Such animals have been designated "doomed". A rhino is doomed if it cannot contribute to the long-term survival of the species because

(A) It cannot be protected from poacher activity or habitat degradation with feasible resources and/or

(B) It is not part of a population large enough to be viable genetically or demographically.

Employing doomed rhino for either captivity or translocation can reinforce the viable populations.

RHINO ACTION PLANS

To be more explicit, action plans to achieve these viable population strategies should therefore entail:

(1) Protection of Larger (> 100) Populations in Wild

Based on the discussion in the previous section, this goal would translate into trying to secure enough subpopulations, normally of at least 100 rhinos each, to produce a metapopulation at least equivalent to the MVP recommended for the species.

(2) Intensive *In Situ* Management of Smaller (< 100) Populations in Wild

Metapopulation management will entail moving animals around to correct genetic and demographic problems. Actually, distributing animals over multiple "subpopulations" will actually increase the effective size of the total

number maintained in terms of the capacity to tolerate the stochastic problems. (Figure 2). Any one subpopulation may become extinct or nearly so due to these causes; but through recolonization or reinforcement from other subpopulations, the metapopulation will survive.

As new populations are established or reestablished a very important consideration is the number of founders. A founder is an animal from a source population that establishes a derived population. There must be care to insure that the founders represent a viable sample genetically from the source population. Again preliminary analyses suggest that at least 20-30 effective founders should be employed to establish new populations (Foose 1987; Lacy 1989).

This type of managed migration is one example of the kinds of intensive management and protection of viable populations in the wild. More intensive management may also be possible and needed within small wild populations (Foose 1989). It will be necessary to intervene in small "wild" populations to apply corrective measures if and when stochastic problems are detected. Some examples might be to: accelerate turnover in dominant males that might be monopolizing breeding of multiple females and thereby causing distortion of sex ratios and depression of N_e; translocation of otherwise doomed dispersing young animals to available habitat to which they could not migrate naturally; relocation of animals to prevent reproduction by close relatives; action to improve juvenile survival. As traditional zoos become larger and more naturalistic, sanctuaries in the wild are becoming smaller and more artificial. In essence they are becoming megazoos. The same kinds of intensive management in genetic and demographic terms will need to be applied to both zoos and wild. In Kenya, the 500 or so rhino that survive are most in sanctuaries that are now completely enclosed with fences and are further protected by frequent guard patrols. Intensive management will require much sophisticated genetic and demographic analysis of populations and will require more detailed data compilation on wild populations including the possibility of "studbooks". Studbooks are already being compiled and applied to these megazoo situations (Brett 1990).

(3) *Ex Situ* Programs To Reinforce Wild Populations

This kind of strategy has been adopted for conservation of the Sumatran rhino by the IUCN Asian Rhino Specialist Group (Khan), especially for the Sumatran rhino. Although, the estimated 900 Sumatran rhinos are widely distributed over much of Southeast Asia, 7-9 main sanctuaries and populations, each capable of accommodating 100 or more rhino for a total of at least 2500, have been recognized as viable in terms of priorities for allocation of resources and effort on the species in the wild.

The African Elephant and Rhino Specialist Group (Cumming et al. 1990) has also developed priorities for conservation efforts based in large part on population viability considerations. Population viability considerations also emphasize the importance of national, or better regional and continental, strategies and programs for rhino conservation. Again, both the Asian and African Rhino Specialist Groups have proposed and delineated such strategies. Such strategies have been proposed for black rhino (*Diceros bicornis*) in particular nations of Africa (Leader Williams & Albon 1988; Martin, this volume) and for the rhino in Indonesia (Widodo, this volume).

Based on a viable population strategy, there currently are collectively for all rhino perhaps 35 viable populations and hence significant sanctuaries in 10 countries that should receive priority for conservation action and resources.

ROLE OF CAPTIVE PROGRAMS

Applying the second component of a viable population strategy and action plan, metapopulations of rhino will often, perhaps usually, contain captive as well as wild populations, i.e. real zoos, at least for some period of time (Figure 2). The IUCN (IUCN 1987) recommends that captive propagation be invoked for any taxon whose wild population declines below 1000 individuals, an admittedly simplistic and arbitrary number but one that at least provides a point of departure. The new Mace-Lande categories suggests that this threshold should in general perhaps be 2500.

When numbers decline to very low levels, as in the case of the Javan rhino (*Rhinoceros sondaicus*), how to manage the population becomes a very real dilemma (Seal & Foose 1989; Widodo et al., this volume). It is far better to initiate captive programs when populations are larger as in the case of the Sumatran rhino.

Captive propagation can and must contribute to the conservation strategies for rhinos. There are a number of advantages to captivity: animals can be protected from poachers; environmental variance can be moderated; there can be more genetic management, specifically the N_e of any given number of animals can be maximized; numbers can be securely expanded, ultimately to provide rhino for return to natural habitats.

The purpose of captive propagation is to reinforce survival of wild populations of rhino, i.e. populations of rhinos surviving in natural habitats within their historic range. In other words, zoos must serve as reservoirs of both genetic and demographic material that can periodically be transfused into natural habitats to re-establish rhino populations that have been extirpated or to revitalize populations that have been debilitated by genetic, demographic, or environmental problems. Indeed, what appears optimal and inevitable are conservation strategies for the rhino species incorporating both captive and wild populations that are interactively managed for mutual support and survival (Figure 2).

It will be important to retain or to restore some populations to the wild as soon as possible with the goal of allowing natural selection to operate. The goal of enabling natural selection to occur will impose minimum size constraints on the wild populations reintroduced. Simulation models can suggest what these minimum size constraints will be under any particular set of conditions. Based on one such model, Lacy (1987b) demonstrates that under the assumptions of his simulations, populations normally must be greater than 100 breeding individuals for natural selection to predominate over random genetic drift.

The formal programs operate through masterplans that perform sophisticated genetic and demographic analyses to formulate animal-by-animal recommendations for the entire managed captive population (Foose & Ballou 1988; Dee 1989; Ballou & Foose 1992). The objectives of formally organized captive propagation programs for rhino are to propagate and manage *ex situ* populations of highly endangered taxa with prescribed levels of demographic stability and genetic diversity for defined periods of time to prevent extinction of the taxa and to fulfill the goal of establishing or restoring viable populations in the wild. Captive propagation programs all attempt to minimize the amount of genetic change that may occur in a taxa during its time in captivity. The challenge is to insure that the animals emerge from the ark in some semblance of how they entered. A very important element in every masterplan is to establish target population sizes that are large enough to achieve the genetic and demographic objectives.

Such propagation and management programs for 4 of the 5 species of rhino have been formally organized in many parts of the zoo world: the Species Survival Plan (SSP) in North America, the Europaiesches Erhaltungszucht Program (EEP) in Europe, the Australasian Species Management Program (ASMP) in Australia/New Zealand; the Species Survival Committees of Japan (SSCJ) (Foose, 1988; Reece, this volume). The importance accorded to rhino conservation by the zoo world is reflected in the logo that has been adopted by 3, and it is hoped eventually all, of the organized regions to designate their programs (Figure 3).

These regional programs are integrating into global efforts through a Global Captive Action Plan for Rhino being developed by the CBSG. A Global Captive Action Plan provides a strategic framework for effective and efficient application and allocation of captive resources to conservation of the broad group of taxa of concern, in this case the rhino. In North America, a Rhino Taxon Advisory Group (TAG) has also been formed for more strategic and coordinated program development and resource allocation collectively for rhino taxa. The CBSG Action Plan will encourage formation of more regional multi-taxa coordination groups in other regions. The Global Captive Action Plan will also recommend how responsibility for the captive programs for each rhino taxon might optimally be distributed over the various organized regions of the global captive community. Finally, the Global Captive Action Plan will also consider how genome banks and reproductive technology might be incorporated into the conservation strategy for various taxa

Currently, there are about 650 of 4 species in zoos worldwide (Table 2). In most cases, these numbers are considerably below satisfactory target population objectives for captive programs that have been established through appropriate population viability analyses (Foose 1987). More space and resources, i.e. money, are required if zoo programs are going to be able to fulfill their function in rhino conservation strategies. Existing space and resources must be utilized as effectively and efficiently as possible.

Formally organized and scientifically managed programs for population management and propagation have only been in progress for last 5-10 years. Already these intensified efforts are producing results. Nevertheless, rhino populations in captivity need to be managed better for propagation (Reece, this volume). The highest rate of increase yet demonstrated for a rhino taxon in captivity is for the North American population of *Rhinoceros unicornis* which has grown at a rate of about 4.5% over the last 15 years (Dee 1989). This rate of increase is equivalent to the Nepal *Rhinoceros unicornis* population (Dinerstein & Price 1991) but is only about 60% what has been observed for vigorous growth in 3 wild *Rhinoceros* populations (Dinerstein & Price 1991, Amman 1985); only about 45% of most rapid rates of stable growth observed and biologically possible (Owen-Smith 1981; Martin, this volume; Foose, in prep); and about 33% of what can be achieved for short periods in favorably unstable wild populations (Brett 1990, this volume). achieved. However, reproduction is good in all 3 species of rhino for which adequate of numbers of both sexes have been available. Captivity may not be the most conducive environment in which to reproduce rhino. However, it may be the most secure for the neat future. It contributes to a strategy of maximizing options and minimizing regrets for the future.

Even maximal participation and coordination of the world's zoos, may not provide enough captive habitat and resources to assist all the rhino taxa in need. Captive propagation programs must be not merely internationalized but also globalized in the sense that

governmental wildlife departments and other non-zoo organizations must also apply these techniques. Captive propagation need not occur only in traditional zoos. There is great merit in wildlife departments developing captive propagation programs, often in collaboration with traditional zoos, especially within or near natural habitat of taxon. A major problem is that such endeavors will divert resources that might otherwise be applied to freer ranging populations. Quantitative cost benefit analyses must be conducted to resolve the conflicts. Captive propagation programs operated by wildlife departments are in progress for the Sumatran rhino in Peninsular Malaysia and Sabah and are under development for black rhino in Zimbabwe.

Another area where zoos can contribute is in research applicable to conservation for rhino in both captive situations and in more natural habitats. Some research of note includes: nutrition, where vitamin E deficiencies are being elucidated; disease, where a strange hemolytic anemia syndrome afflicting wild as well as captive black rhino is being investigated; taxonomic clarification. Particularly notable is reproductive technology, where development of artificial insemination and embryo transfer techniques could greatly facilitate management of rhino in the wild as well as captivity and especially in interactions between the two (Figure 4). Reproductive technology may also greatly facilitate the "readaptation" process from captivity to the wild. There may be significant difficulties for captive-bred animals to readapt to wild conditions. However, where remnant natural populations survive, it may be possible to infuse "new blood" from the genetic reservoirs in captivity into individuals in the wild which still retain survival skills that are acquired by experience rather than inheritance. Thus, the reproductive technology may permit conservation management to achieve the best of both worlds. Unfortunately, progress on reproductive technology has been slow.

In North America, the SSP has recently organized a comprehensive and coordinated program of research in these areas on rhino. However, this kind of activity is expensive and often difficult or impossible for zoos to support out of their own budgets. Exacerbating the problem is the difficulty of securing research support from funding agencies, such as the National Science Foundation in the United States, for projects that are primarily conservation.

Yet another way zoos can contribute to conservation of rhinos is by transfer intensive-management, i.e. captive-type, technology to wildlife managers in Africa and Asia. The same kinds of intensive management in genetic and demographic terms will need to be applied to both kinds of places where rhinos are being preserved. A start in this direction was generated out of the African Rhino Workshop conducted in Cincinnati in 1986. Attempts are now in progress to organize small population biology workshops in Africa, and the semblance of one has actually occurred in Malaysia. The traditional zoos can help substantially with this need of the new megazoos.

Zoos can contribute to *in situ* conservation of rhino in other ways. One is to provide limited financial support for actual protection in the wild. An eminent example is the Minnesota Zoo's program to provide assistance for protection and management of Ujung Kulon. Included is support for equipment and education. Adopt-a-park programs are a trend for the future (Tilson 1991). Another is the proposed International Black Rhino Foundation which is being established to develop a cooperative program between Zimbabwe and the captive community in North America and Australia and eventually other parts of the world. The program has both *in situ* and *ex situ* components. *Ex situ*, As recommended by the Zimbabwe National Conservation Strategy (Martin, this volume), it will translocate 40 more black rhino into the captive program outside Zimbabwe. It will also assist Zimbabwe to initiate its own captive propagation programs for this species. *In situ*, it will provide support for acquisition, maintenance, and operation of helicopters for anti-poaching activities for a period of at least 7 years. Yet a third example is the Rhino Walk being co-sponsored by the AAZPA and its member institutions in collaboration with many field conservation organizations.

All these programs are examples of an emerging partnership between zoos and field conservation. Unfortunately, zoos are not likely to become a major funding agency for field conservation although their modest financial support may be catalytic and critical. However, zoos can be a major force in conservation education that will generate more public support, morale and material, for protection and management of wild places and populations.

In summary, each rhino taxa should be managed as a global metapopulation incorporating the animals both in the wild and in captivity. A preliminary chart of evolving relationships among various levels and kinds of action plans, PVA's, and captive and wild programs is provided in Figure 5. Particularly noteworthy is the parallelism between animal-by-animal recommendations in zoos and protected area-by-protected area recommendations in wild.

FLAGSHIPS, UMBRELLAS, AND HERITAGE SPECIES

Conservation strategies and programs for rhino have significance beyond survival of these magnificent creatures. Megavertebrates like the rhino are both flagship and umbrella species for conservation of many other kinds of wildlife. They are flagships because they have the charisma to secure support for conservation. They are umbrella species because the habitat required to sustain their viable populations is sufficiently large to encompass appreciable parts of natural ecosystems. This function as umbrella species can ameliorate, in part, the concern that investing so much money for the preservation of a few megavertebrates like the rhinos is unjustified while the greater number, and perhaps more important but less charismatic, species may be neglected.

Such flagship and umbrella species are the inspiration for the developing Global Heritage Species Programme of the IUCN Species Survival Commission. The GHSP concept of a Global Heritage Species Program (GHSP) is to carefully select a group of ecologically significant, culturally important, and publicly charismatic species that can be used as flagship and umbrella taxa to attract support for conservation not only of the species themselves but also their ecosystems.

The GHSP has recommended that a conservation action plan based on population viability assessment and conservation biology principles must be developed for each heritage species. These plans can formulate explicit and preferably quantitative goals and objectives can be formulated which will also facilitate evaluation of performance toward achieving its ends. Further to this end, the plans should also be organized with modularized components and budgets, to facilitate implementation, funding, and evaluation. Finally, the GHSP has recognized that there will be benefits of selecting taxa whose survival definitely depends on both *in situ* protection/management and captive propagation so that both the field and zoo communities can be actively involved.

In April 1990, the Captive Breeding Specialist Group (CBSG) was invited by the Chairman of the IUCN Species Survival Commission (SSC) to lead preparation of one or two proposals for conservation action plans that could be used as prototypes for GHSP.

CBSG immediately proposed the Sumatran rhino (*Dicerorhinus sumatrensis*) as a species which eminently qualified as a candidate under GHSP criteria. A first draft of a GHSP conservation action plan prototype employing Sumatran rhino was prepared in October 1991 by the CBSG in collaboration with scientists and managers in Indonesia and Malaysia. This draft plan was based closely on the Asian Rhino Specialist Group Action Plan (Khan 1989). The prototype plan provides for quantitative objectives for population and protected area size (Table 3). It also provides for explicit mechanisms to implement the plan (Figure 6)

The first draft of this prototype action plan was presented at the IUCN SSC meetings in Perth, Australia 24-27 November 1991 by representatives of CBSG, the Asian Rhino Specialist Group, the Department of Forest Protection and Nature Conservation of Indonesia (PHPA), and the Department of Wildlife and National Parks (DWNP) of Malaysia. At Perth, the Steering Committee of the SSC encouraged further development of the prototype, especially at and through the Indonesian Rhino Conservation Workshop now proposed for Bogor, Indonesia 3-5 October 1991. A second draft of this prototype plan has just been completed and will serve to continue the development process. The objective is a full proposal for a prototype action plan for presentation to SSC Steering Committee. All rhino taxa would be good candidates for the GHSP.

CONCLUSIONS

In conclusion, rhino conservation needs to be developed in a more strategic and global manner than has occurred to date. Each rhino taxa should be managed as a global metapopulation incorporating the animals both in the wild and in captivity (Figure 2).

Highest priority for field conservation efforts should be extended to the 35 most viable populations and sanctuaries in about 10 countries worldwide (15 in 5 Asian nations; 20 in 5 African nations). Eventually, priority status should probably be expanded to another about 15 sanctuaries and 5 countries to improve further the viability of rhino (Table 4).

Captive programs need to be expanded and improved. More coordination and integration of regional efforts into global programs will be most beneficial.

Very generally, numbers of rhino in the wild and in captivity need to be increased at least twofold and probably fourfold for long-term viability and security.

In developing global strategies and programs, political vicissitudes must be accepted as an important source of stochastic risk for rhino or any threatened taxa. Hence, one important guideline for conservation strategies is that no taxa of rhino should be dependant on a single political authority for its survival.

Are such global strategies feasible biologically, logistically, financially, politically? Biologically, the science, although still evolving, is probably adequate to the task. Logistically, the program is feasible if the funds are available.

Financially, some very crude, general, and preliminary estimates for conserving viable populations of rhino in the wild (Tables 5 & 6). These estimates are based on some estimates and assumptions about viable population objectives, rhino carrying capacities, and operation costs per unit area (Cumming et al 1990; Leader-Williams and Albon 1988; Martin, this volume; PHPA). While in no sense precise, these estimates probably provide fairly good approximations of the overall costs. These estimates suggest that about U.S.$17,000,000/ year will be needed to protect and manage viable populations of 2500 rhino/taxon for the 8 taxa being recognized or a total of 20,000 rhino (about double the current number) on the planet. If a higher goal of 5000 for viable population size for each taxon is adopted, the annual cost is about U.S.$34,000,000. To this can be added $14,000,000/year, the annual costs for maintaining 1200 rhino recommended for viable captive populations (Conway 1986). In other words, about $30,000,000-50,000,000/year may be needed to conserve rhinos globally. For perspective the annual operating budget of the San Diego Zoo is about $34,000,000 and for the Zoo and the Wild Animal Park combined about $50,000,000. Resources for conservation are limited but

these figures are probably not unattainable, particularly if rhinos are indeed used as umbrella and flagship taxa.

The most difficult problems for rhino conservation, as is almost always the case with threatened species, will be political. The problems are all those personality conflicts, competing agendas, power struggles, and ego sensitivities that characterize all human endeavors and which seem to intensify in inverse proportion as the numbers of an endangered species decline. This Conference is testimony to the fact that there are many organizations, agencies, institutions, and individuals interested in rhino conservation. Moreover, the crisis for rhino survival is intensifying. It is time for the most effective and efficient action possible. The kind of global strategy delineated above is intended to respond to this need but will need great cooperation and coordination to succeed.

What is needed are greater coalitions interested and involved in rhino conservation so they could at least communicate and optimally coordinate to implement the global management strategies. There would be significant benefit from global management committees for each of the taxa of rhino. These committees should consist of the representatives of each of the range states for the wild populations as well as the captive community involved in *ex situ* programs and other experts. The Specialist Groups of the IUCN SSC are a start in this direction but more is needed.

REFERENCES

Ammann, H. 1985. Contributions to the Ecology and Sociology of the Javan Rhinoceros. Inaugural Dissertation. University of Basel.

Ballou, J.D.; Foose, T.J. 1991. Demographic and Genetic Management of Captive Populations. In MANAGEMENT OF WILD MAMMALS IN CAPTIVITY, edited by M. Allen. University Press, Chicago. In press.

Brett, R.A. 1990. The Black Rhino Sanctuaries of Kenya. PACHYDERM 13.

Brett, R.A. 1992? The Management of Rhinos in Sanctuaries in Kenya. San Diego Rhino Conference Proceedings.

Conway, W.G. 1986. The Practical Difficulties and Financial Implications of Endangered Species Breeding Programmes. INTERNATIONAL ZOO YEARBOOK: 24-25: 210-222..

Cumming, D.H.M.; DuToit, R.F.; Stuart, S.N. 1990. AFRICAN ELEPHANTS AND RHINOS: STATUS SURVEY AND CONSERVATION ACTION PLAN. IUCN, Gland, Switzerland.

Dee, M. 1989. The AAZPA Species Survival Plan for Greater One-Horned Asian Rhinoceros. Los Angeles Zoo, Los Angeles CA.

Dinerstein, E. & Price, L. 1991. Population Size and Trend of Greater One-Horned Rhinoceros in Nepal. In Press.

Foose, T.J. 1983. AAZPA Uberlebensplan fur Nashorner. In Internationales Zuchtbuch fur Afrikanische Nashorner 2 (International Studbook for African Rhinoceroses 2). Zoo Berlin, Berlin.

Foose, T.J. 1987. Small Population Management of Black Rhino. Proceedings of African Rhino Workshop. PACHYDERM 9, pp 31-34. IUCN SSC African Elephant and Rhino Specialist Group, Harare Zimbabwe.

Foose, T.J. 1988. Viable Strategies for Conservation of Rhinos. Technologies for Conserving Species: Saving the Endangered Rhinoceros. U.S. Government Printing Office, Washington D.C. pp. 89-106.

Foose, T.J. and Ballou, J.D. 1988. Management of Small Populations. INTERNATIONAL ZOO YEARBOOK 27: 26-41.

IUCN. 1987. Captive breeding. IUCN Policy Statement. IUCN, Gland.

Khan, M. 1989. ASIAN RHINOS: AN ACTION PLAN FOR THEIR CONSERVATION. IUCN, Gland.

Lacy, R.C. 1987a Loss of genetic diversity from managed populations: interacting effects of drift, mutation, immigration, selection, and population subdivision. CONSERVATION BIOLOGY 1: 143-158.

Leader-Williams, N. & Albon, S.D. 1988. Allocation of resources for conservation. NATURE 336: 533-535.

Leader-Williams, N. 1992. Theory and Pragmatism in Conservation of Rhinos. San Diego Rhino Conference Proceedings.

Lacy, R.C. 1987b. Further Genetic and Demographic Analyses of Small Rhino Populations. Proceedings of African Rhino Workshop. PACHYDERM 9: pp. 16-19. IUCN SSC African Elephant and Rhino Specialist Group, Harare Zimbabwe.

Lacy, R.C. 1989. Analysis of founder representation in pedigrees: founder equivalents and founder genome equivalents. ZOO BIOLOGY 8: 111-124.

Martin, R. 1992. Conservation Management Plan for Rhinos in Zimbabwe. San Diego Rhino Conference Proceedings.

Mace, G.M. & Lande R. Assessing Extinction Threats: Towards a Re-evaluation of IUCN Threatened Species Categories. CONSERVATION BIOLOGY. 1991. In press.

Owen-Smith, N. 1981. The White Rhino Overpopulation Problem and a Proposed Solution. In PROBLEMS IN MANAGEMENT OF LOCALLY ABUNDANT WILD MAMMALS, edited by P.A. Jewell & S. Holt.. Academic Press.

Seal, U.S. & Foose, T.J. (1989). Javan Rhinoceros: Population Viability Analysis.

Thorne, E. T. (1990). Black-footed Ferret ? In Beyond Captive Breeding ? (Eds Gipps, J.). Oxford University Press, Oxford.

Widodo, R.; MacKinnon, K.; Santiapillai, C. 1992 Conservation of Javan Rhino in Indonesia. San Diego Rhino Conference Proceedings.

TABLE 1

MACE/LANDE CATEGORIES AND CRITERIA OF THREAT

POPULATION TRAIT	CRITICAL	ENDANGERED	VULNERABLE
Probability of Extinction	50% within 5 years or 2 generations, whichever is longer	20% within 20 years or 10 generations whichever is longer	10% within 100 years
	Or	Or	Or
	Any 2 of following criteria	Any 2 of following criteria or any 1 CRITICAL criterion	Any 2 of following criteria or any 1 ENDANGERED criterion
Effective Population N_e	$N_e < 50$	$N_e < 500$	$N_e < 2,000$
Total Population N	$N < 250$	$N < 2,500$	$N < 10,000$
Subpopulations	$\leq$ 2 with $N_e > 25$, $N > 125$ with immigration < 1/gen.	$\leq$ 5 with $N_e > 100$, $N > 500$ or $\leq$ 2 with $N_e > 250$, $N > 1,250$ with immigration < 1/gen.	$\leq$ 5 with $N_e > 500$, $N > 2,500$ or $\leq$ 2 with $N_e > 1,000$, $N > 5,000$ with immigration < 1/gen.
Population Decline	> 20%/yr. for last 2 yrs or > 50% in last generation	> 5%/yr. for last 5 years or > 10%/gen. for last 2 gens.	> 1%/yr. for last 10 years
Catastrophe: Rate & Effect	> 50% decline per 5-10/yrs or 2-4 gens.; subpops. highly correlated	> 20% decline/5-10 yr, 2-4 gen > 50% decline/10-20 yrs, 5-10 gen. with subpops. correlated.	> 10% decline/5-10 yrs, > 20% decline/10-20 yrs, or > 50% decline/50yrs. with subpops. correlated.
Or			
Habitat Change	resulting in above pop. effects	resulting in above pop. effects	resulting in above pop. effects
Or			
Commercial Exploitation or Interaction/Introduced Taxa	resulting in above pop. effects	resulting in above pop. effects	resulting in above pop. effects

TABLE 2

RHINOS IN THE WILD

TAXON	CURRENT POPULATION
Northern Black	600
Southern Black	2,300
South Western Black	400
Northern White	28
Southern White	4,700
Indian/Nepali	1,700
Sumatran	700
Javan	75
TOTALS	10,628

TABLE 3

RHINOS IN CAPTIVITY

TAXON POPULATION	CURRENT POPULATION	TARGET
Northern Black	160	150
Southern Black	22	150
Northern White	10	150
Southern White	550	150
Indian/Nepali	114	200
Sumatran	24	200
Javan	0	200
TOTALS	880	1200

TABLE 4

PROTECTED AREA OBJECTIVES SUMATRAN RHINO

Country	Protected Area	Size (km^2)	Current Population	Target Population
Indonesia	Gunung Leuser	8,000	130-200	400
	Kerinci Seblat	10,000	250-500	500
	Barisan Selatan	3,600	25-60	100
	Kayan Mentarang	16,000	Some	500
Malaysia				
Peninsula	Endau Rompin	1,600	10-25	100
	Taman Negara	4,400	22-36	200
Sabah	Tabin	1,200	20+	100
	Danum Valley	2,000	10	100
Sarawak	Ulu Limbang	1,000 *	5-15	100

* Will require enlargement of protected area from current 600 km^2

TABLE 5

PRIORITY PROTECTED AREAS FOR RHINO

CONTINENT	COUNTRY	PROTECTED AREA
Africa	Kenya	Aberdare
		Masai Mara
		Nairobi
		Nakuru
		Tsavo
		Solio
		Laikipia
	Namibia	Etosha
		Kaokoland
	South Africa	Hluhluwe/Umfolozi
		Kruger
		Mkuzi
	Tanzania	Selous
	Zaire	Garamba
	Zimbabwe	Hwange/Matetsi
		Sebungwe
		Zambezi
		Central Highlands
Asia	Indonesia	Kerinci Seblat
		Gunung Leuser
		Barisan Selatan
		Kayan Mantarang
		Ujung Kulon
		Way Kambas
	Peninsular Malaysia	Taman Negara
		Endau Rompin
	Sabah	Tabin
		Danum Valley
	Sarawak	Ulu Limbang
	Vietnam	Nam Cat Tien
		Bugiamap
	India	Dudhwa
		Kaziranga
		Manas
		Orang
	Nepal	Chitawan
		Bardia

TABLE 6

ANNUAL COSTS FOR CONSERVATION OF VIABLE POPULATIONS OF RHINO IN THE WILD

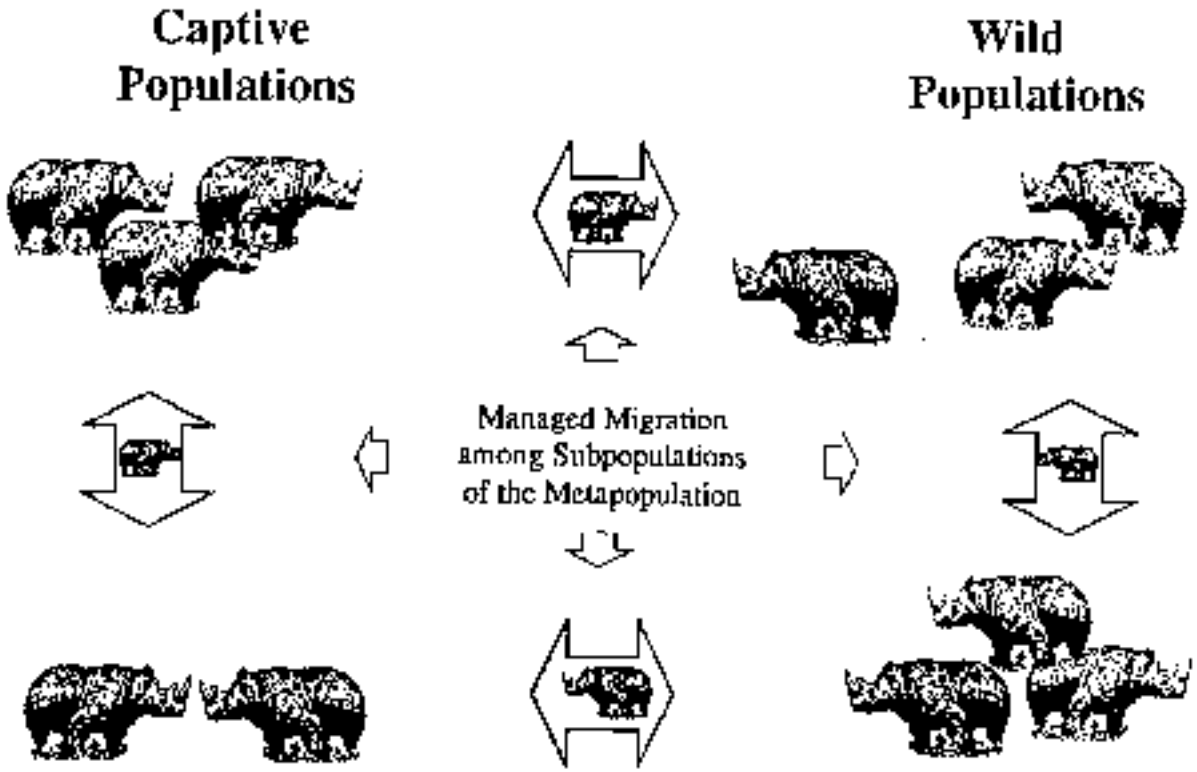
TAXON	TARGET POPULATION	DENSITY (km/rhino)	AREA (km²) REQUIRED	COST per km²	ANNUAL COST
N. Black	2,500	3	7,500	$400	$3,000,000
S. Black	2,500	3	7,500	$400	$3,000,000
S.W. Black	2,500	3	7,500	$400	$3,000,000
N. White	2,500	1.5	3,750	$400	$1,500,000
S. White	2,500	1.5	3,750	$400	$1,500,000
Indian/Nepali	2,500	0.5	1,250	$250	$300,000
Sumatran (2 subspecies)	5,000	10	50,000	$100	$5,000,000
Javan	2,500	5	12,500	$200	$2,500,000
TOTALS	22,500		93,750		$19,800,000

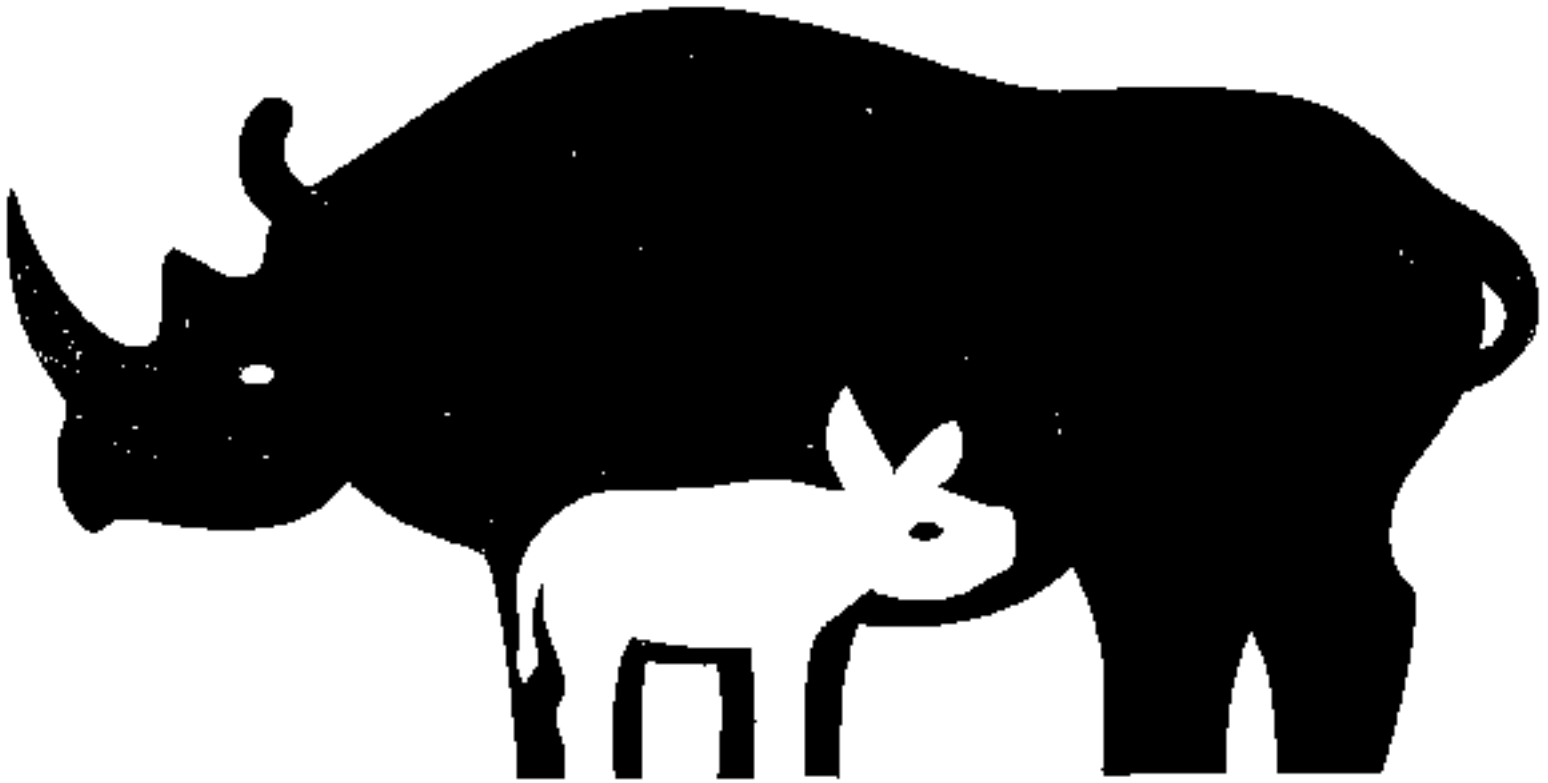
TABLE 7

ANNUAL COSTS FOR CONSERVATION OF VIABLE POPULATIONS OF RHINO IN THE WILD

TARGET POPULATION PER TAXON	TOTAL RHINOS	AREA REQUIRED (km^2)	ANNUAL COST
2,500	22,500	94,000	$ 20,000,000
5,000	45,000	188,000	$ 40,000,000

Metapopulation

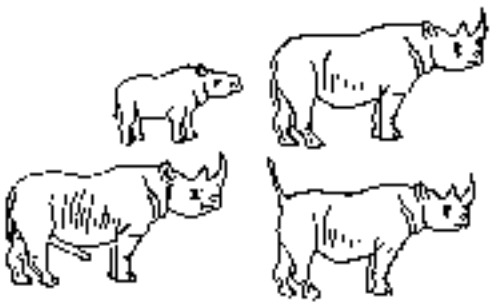


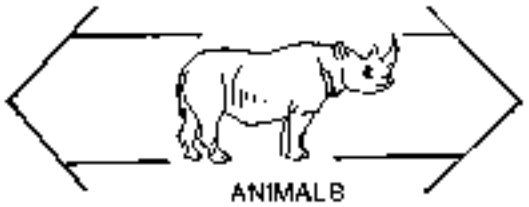


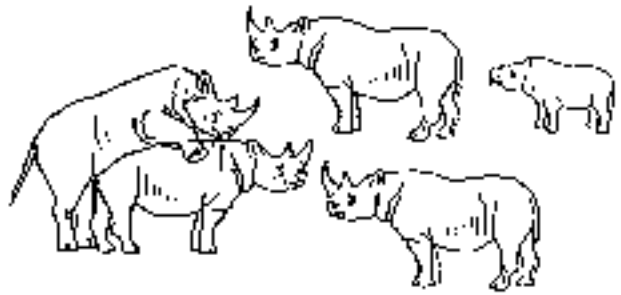
Species Survival Plan

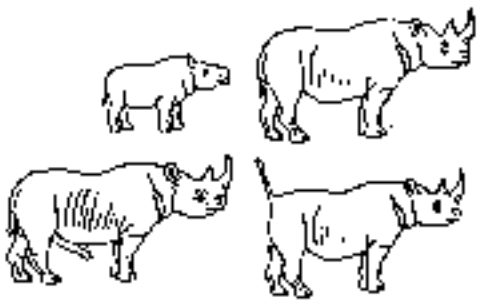
CAPTIVITY

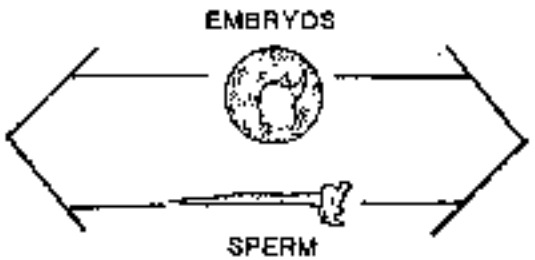
WILD

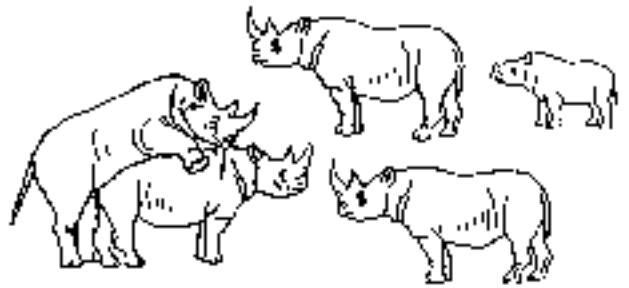


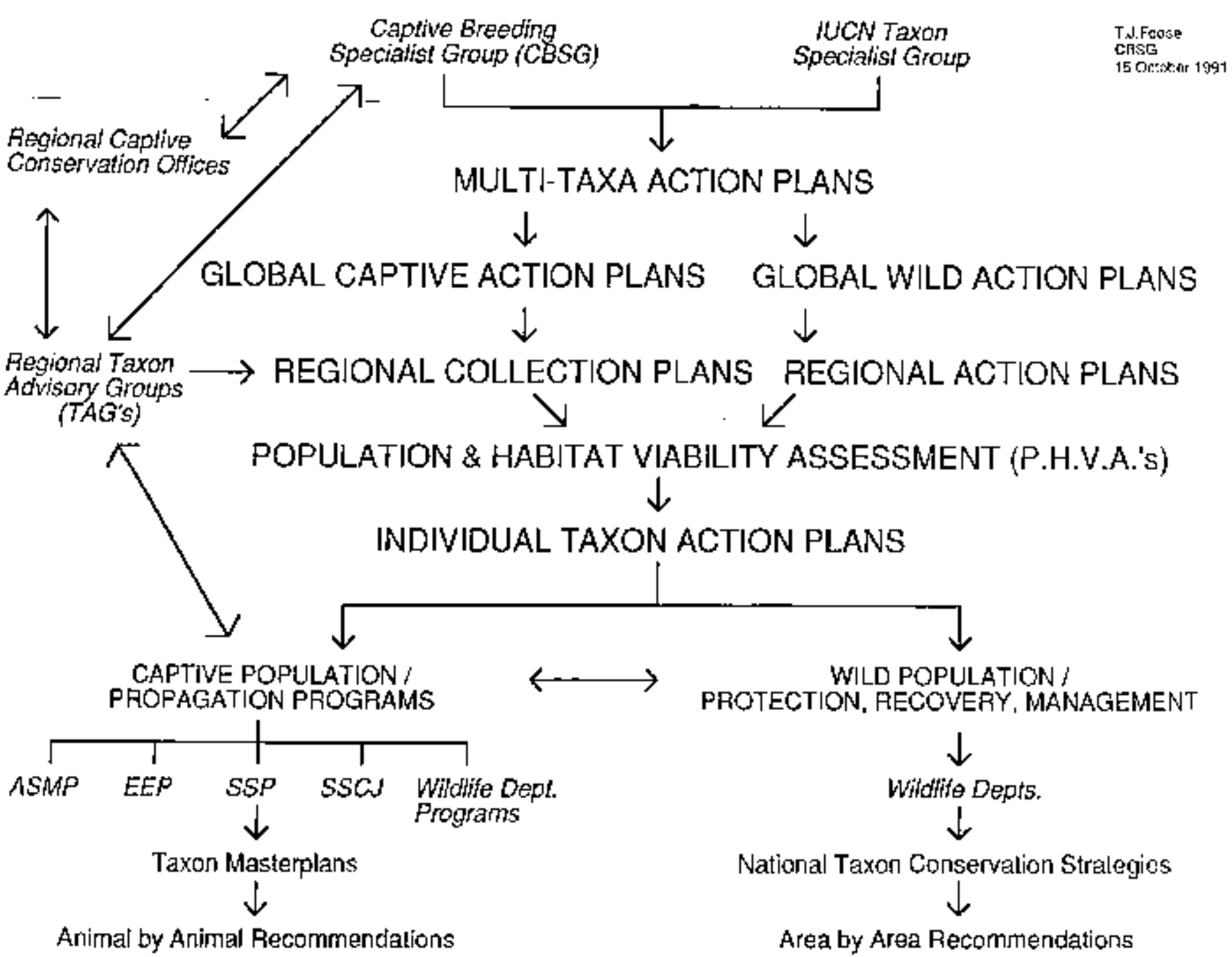











Captive Breeding Specialist Group (CBSG)
IUCN Taxon Specialist Group
T.J.Foose
CBSG
15 October 1991
Regional Captive Conservation Offices
MULTI-TAXA ACTION PLANS
GLOBAL CAPTIVE ACTION PLANS
GLOBAL WILD ACTION PLANS
Regional Taxon Advisory Groups (TAG's)
REGIONAL COLLECTION PLANS
REGIONAL ACTION PLANS
POPULATION & HABITAT VIABILITY ASSESSMENT (P.H.V.A.'s)
INDIVIDUAL TAXON ACTION PLANS
CAPTIVE POPULATION / PROPAGATION PROGRAMS
WILD POPULATION / PROTECTION, RECOVERY, MANAGEMENT
ASMP
EEP
SSP
SSCJ
Wildlife Dept. Programs
Wildlife Depts.
Taxon Masterplans
National Taxon Conservation Strategies
Animal by Animal Recommendations
Area by Area Recommendations

Tentative Organization of Indonesian Rhino Conservation Service

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

SECTION 4

REGIONAL PROPAGATION PROGRAMS

AMERICAN ASSOCIATION OF ZOOLOGICAL PARKS AND AQUARIUMS
A·A·Z·P·A 1924

AAZPA ANNUAL REPORT

on conservation and science

RHINOCEROS ADVISORY GROUP

Chair:
Robert W. Reece, Wild Animal Habitat, Kings Island

Primary Goals

The AAZPA Rhinoceros Advisory Group was officially recognized in January 1991 by the AAZPA's Wildlife Conservation and Management Committee (WCMC). While still in the formative stages, the group has the following long term objectives: (1) to establish a regional management plan for rhinos which focuses on the efficient use of existing resources, the development of new resources, and the encouragement of effective relationships with other regional breeding programs (e.g., EEP, ASMP, etc.); (2) to develop strategies for the support of *in situ* conservation efforts through increased communication and interaction between SSP institutions, range country managers, NGO's and field scientists; (3) to identify research priorities and assist in the development and implementation of an aggressive research program with specific objectives in those areas of greatest concern; (4) to maintain current information on the status of all captive and wild rhino populations; and (5) to assess the implementation of all rhino SSP Master Plans and provide assistance wherever possible.

Data Table

	Current year
# of meetings	0
# of studbooks under umbrella	4
# of SSPs under umbrella	4
# of new studbook petitions submitted	0
# of new studbooks approved	0
# of new SSP petitions submitted	0
# of new SSPs approved	0

Special Concerns

It has become increasingly apparent that there is a real need to facilitate communication among and between people and programs involved with rhino conservation. Many are convinced that there are conflicting and competing agendas at work and that to support one aspect or approach necessarily detracts from another. Misinformation concerning the efficacy of the various approaches, especially captive breeding, needs to be eliminated. The AAZPA Rhino Advisory Group will use *Around The Horn, The Rhino Conservation Newsletter* to disseminate factual information and serve as a conduit through which individuals and institutions can communicate with everyone involved in the preservation of rhinos.

There must be a concerted effort to increase the amount of resources available to rhino conservation, especially in terms of money and space. While space allocation can be more efficient, the cost of developing and maintaining rhino programs such as research and *in situ* projects will be considerable. As a result, methods will have to be developed to provide these resources.

Progress Toward Goals

(1) The Rhino Advisory Group is in it's formative stages and has only begun to develop specific long- and short-range objectives. The membership selection process is nearly complete and is intended to be flexible so as to allow for the greatest influx of ideas and discussion.

(2) A Rhino strategic planning meeting was held at the New York Zoological Park in July 1991. Much progress was made in identifying major concerns and in outlining various programmatic needs. An additional meeting will be held in connection with the 1991 AAZPA Annual Conference in San Diego.

Short-term Goals for Upcoming Year

(1) Complete an assessment of captive holding space and how it is currently allocated in the North American region.

(2) Initiate an assessment of the rhino husbandry and management practices in institutions holding black and white rhinos.

(3) Formalize a research subcommittee and charge it with the responsibility of developing an aggressive research strategy designed to assist in the veterinary, husbandry and reproductive management of rhinos.

(4) In conjunction with the CBSG Rhino Captive Action Plan Working Group, initiate a concerted effort to address and resolve the black rhino subspecies question.
(5) Begin the development of a unified Regional Collection Plan for all rhinos under the TAG umbrella.

BLACK RHINOCEROS (*Dicerus bicornis michaeli* and *D. bicornis minor*)

Species Coordinator: Edward J. Maruska, Cincinnati Zoo and Botanical Garden
Subspecies coordinator: Dan First, D.V.M., Gladys Porter Zoo
International Studbook Keeper: H.G. Kloss, Berlin Zoo

Introduction

Population genetic analyses have shown that the minimum viable population size (MVP) for black rhinos necessary to maintain 90% of original genetic diversity for 200 years is 150 animals split up into 75 *michaeli* and 75 *minor*. At the present time, there are 67 *michaeli* in 23 institutions and 19 *minor* in seven institutions for a total of 86 animals in 30 institutions in North America. Even though the goal is to preserve 90% of the average heterozygosity in the gene pool for 200 years, in the case of the black rhino, there seems to be some "intuitive logic" in modifying this objective in terms of rhino generations; 10 rhino generations would represent 150–170 years.

At present growth rates, *michaeli* , with a population of 67, should be expected to reach the target "carrying capacity" of 75 in about five years. With a current population of *minor* at 19, it will obviously be some time before the SSP population can attain its target "carrying capacity" of 75. The black rhino SSP is in the mature stage.

In summary, the long-term goals of the Black Rhino SSP are: (1) to propegate black rhino in North America to reinforce wild populations in Africa as part of the IUCN global strategy; (2) toward this goal, to attempt to preserve 90% of the average heterozygosity obtained from wild populations for a period of at least 170 years (10 black rhino generations) and perhaps longer; (3) to respect, at least initially, the four geographical varieties and potential e.s.u.'s recognized by the 1986 Cincinnati African Rhino Workshop; (4) to develop an SSP population of 150 black rhino in North America; (5) to expand the captive habitat for black rhino in North America and emphasize reproduction of black rhino in the management recommendations to insure the self-sustainment and expansion of the captive population against the appreciable mortality still occurring.

Data Table (current through 1 July 1991)

D.b. michaeli

	One year ago	Current year
Participating institutions	22	23
Captive Population	31.35	31.36
# SSP animals managed	66	67
# SSP animals not required to meet goals	0	0
# animals in non-participant collections but desirable to SSP	2	2
Total births in SSP program	5	1
# surviving to one year	4	1
# of desired births	5	1
# of undesired births	0	0
# of deaths of SSP animals	2	1
# of imports	0	0
# of exports	0	0
# of founders with represented descendants	78	78

D.b. minor

	One year ago	Current year
Participating institutions	7	7
Captive Population	7.12	7.12
# SSP animals managed	19	19
# SSP animals not required to meet goals	0	0
# animals in non-participant collections but desirable to SSP	0	0
Total births in SSP program	1	1
# surviving to one year	1	0
# of desired births	1	1
# of undesired births	0	0
# of deaths of SSP animals	0	1
# of imports	0	0
# of exports	0	0
# of founders with represented descendants	11	11

Current Population Status

The population of *michaeli* is approaching the proposed MVP of 75 animals as it currently numbers 67. The birth rate is minimum at best with an increase of only three animals in 1990 and one born in 1991 to date. Because the black rhino population in the wild dropped 85% in only thirty years, from 60,000 in 1960 to under 3,000 today, more emphasis needs to be focused on captive breeding in order to increase the birth rate for both *michaeli* and *minor*. In 1990, only one *minor* was born and in 1991, to date, only one has been born but it died the same day. There have been no imports or exports in 1990-1991. All black rhinos in the population are SSP non-surplus animals and two *michaeli* in the Mexico City Zoo have not been included in the North American population because they have not signed a Memorandum of Participation. The population size of *minor* needs to be increased.

Demographic Trends

The Black Rhino SSP is attempting to manage two of the four potential evolutionarily significant units (e.s.u.'s) for black rhino: *michaeli* and *minor*. Reproduction is occurring as explained above, but at a slower rate than is desirable. There have been no recommendations made to remove any animals from the breeding population. The Black Rhino Master Plan has been closely followed and almost every recommendation has been quickly accomplished.

Population Genetics

The addition of ten new founders of *minor* for the North American population is being planned through the International Black Rhino Foundation agreement with the Zimbabwean government. The U.S. Fish and Wildlife Service received a permit number on 1 July 1991 and it is anticipated that they will issue the permit by October. At the present time there are only 11 founders with represented descendants of *minor* in the North American population. There is an ongoing effort to increase founder representation. In Malaysia at Zoo Negra there is an adult male *michaeli* that may become available for import (in exchange for a pair of white rhino) and there is a 15 year-old female *michaeli* at the Buenos Aires Zoo, Argentina that may be available (in exchange for a young pair of black rhino).

Special Concerns

The population of *minor* needs to be increased and currently there is a dearth of space for *michaeli* which may have an eventual impact on space for *minor*. The Black Rhino SSP has been working with the White Rhino SSP in hopes of moving white rhino from selected institutions to open up more space for black rhino. The Black Rhino SSP may be forced to send some animals out of the U.S. in order to solve this problem. Presently there is a request from the San Diego Zoo to send a male to Japan. This male will probably be sent with the prerequisite that the Yokohama Zoo participate in the SSP. The question of whether or not to keep *michaeli* and *minor* as two subspecies still begs an answer and genetic analyses are ongoing even though there are no apparent morphological differences. Also, biochemical analyses to date have not yet demonstrated any differences between *michaeli* and *minor*.

It will be extremely important to evaluate and determine, over the next five years, the nutritional requirements for captive black rhino.

Research

Current research involves reproduction studies such as hormonal evaluations of urines, bloods, saliva, feces; ultrasound evaluations for pregnancy, ovarian observations and anatomy; semen freezing; anatomical studies at necropsy; development of instrumentation for embryo transfer; nutritional studies involving vitamin E; and disease related studies. There needs to be an increased focus on nutritional studies and problems involving diseases such as hemolytic anemia.

Field Conservation

The International Black Rhino Foundation agreement with the Zimbabwean government will help support field operations in Zimbabwe. Monies raised from the efforts of Michael Werikhe as he walks across the U.S. will benefit black rhino conservation in Africa.

Progress Toward Goals

(1) Completion of negotiations (through the Black Rhino Foundation) with the Zimbabwean government to obtain 10 new founders for the SSP population.

Short-term Goals for Upcoming Year

(1) Make all recommended transfers. The proposed number of *michaeli* transfers during the upcoming year should be approximately six or more depending upon numbers of births and sexes of calves.
(2) Attempt to breed to conception all recommended females.
(3) Make and communicate recommendation to wean calves as soon as possible to be able to expose post-lactational cows to bulls.
(4) Carefully evaluate management of new *minor* founders so that the entire population will be enhanced.
(5) Seek more space for both *michaeli* and *minor* in order to achieve the MVP of 150 animals.

GREATER ONE-HORNED RHINOCEROS (*Rhinoceros unicornis*)

Species Coordinator: Michael Dee, Los Angeles Zoo
International Studbook Keeper: Kathleen Tobler, Basel Zoo, Switzerland

Introduction

There are currently 12 institutions participating in the Greater One-horned or Indian Rhinoceros SSP. However, only seven institutions are breeding this species due to the fact that two have single animals, two have animals that have not yet reached sexual maturity and one has a newly acquired male that has yet to breed.

Population genetic analysis has shown that the minimum viable population size (MVP) in order to maintain 90% of original genetic diversity for 200 years is approximately 294 animals, about eight times the current population size in North America. Under these conditions, each participating institution would need to allocate space for 24 animals. Even if the current number of participating institutions was doubled, 12 animals would have to be maintained at each in order to meet the SSP's goals.

At the 1989 Master Plan session, a more realistic approach of maintaining 50 animals was discussed. Ideally, at least 84 animals will need to be maintained through births and importations to meet the minimum objectives of the SSP.

Data Table (current through 1 January 1991)

	One year ago	Current year
Participating institutions	12	12
Captive Population	150	155
# SSP animals managed	34	36
# SSP animals not required to meet goals	1	0
# animals in non-participant collections but desirable to SSP	-	-
Total births in SSP program	22	22
# surviving to 1 yr.	13	13
# of desired births	3	1
# of undesired births	0	0
# of deaths of SSP animals	-	-
# of imports	2	0
# of exports	1	0
# of founders with represented descendancy	14	14

Current Population Status

At present, the SSP population appears to be somewhat secure. Competition with other rhino species has occurred, but does not appear to be serious at this time. At the 1989 Master Plan session, future breeding, surplus and management priorities were discussed. Another meeting is planned for early 1992.

There are no non-SSP animals in North America. The wild population appears to be somewhat stable, although poaching has occurred in India (present population about 1500) and the Nepal population in Chitwan National Park is expanding by about 4.0% per year. Forty-three animals have been translocated from Chitwan to the Royal Bardia National Park in the past three years. The species coordinator is working with the Nepalese government to obtain at least six more founder animals for the SSP.

Demographic Trends

Life history table analysis of the North American studbook population indicates a growth rate (r) of 1.043, a generation time (T) of 17.5 years, a rate of population increase per generation (R_0) of 2.122, and a life expectancy at birth of 20 years. The Greater One-horned Rhino SSP population has grown at the annual rate of 1.3 animals per year since 1982. All recruitment has been through births and two importations (1987 and 1990). The San Diego Wild Animal Park recorded three births in 1990.

Population Genetics

Inbreeding coefficients (ICs) for each living animal have been calculated. There are several founder animals with ICs of 0.22000. If the founder population is to effectively meet the SSP's goals, then 6-8 new founders need to be brought into the SSP.

Research

Research into rhino reproduction is ongoing at a number of facilities, notably the Cincinnati Zoo, San Diego Zoo and National Zoological Park. Nutritional research is also a priority, particularly as it relates to Vitamin E levels in captive animals.

Short-term Goals for Upcoming Year

(1) Update the Master Plan.
(2) Pair single animals where possible.
(3) Encourage research on rhino nutrition, especially as it relates to Vitamin E.
(4) Encourage more institutions to become participants in the SSP. At present, three institutions have expressed interest in joining if animals become available.

SUMATRAN RHINO (*Dicerorhinus sumatrensis*)

Species Coordinators: James Doherty, New York Zoological Park
International Studbook Keeper: Thomas Foose, Ph.D., IUCN CBSG

Introduction

In 1985, the New York, Cincinnati, San Diego and Los Angeles Zoos established a cooperative agreement with the Indonesian government. Thus, the Sumatran Rhino Trust and SSP was born to help ensure the survival of this rapidly declining species. Currently, there are four animals in North America with an agreement from the Indonesians to establish breeding groups both in the United States and Indonesia.

Data Table (current through 1 July 1991)

	Two years ago	One year ago	Current year
Participating institutions	4	3	4
Captive Population	5	3	24
# SSP animals managed	0.3	0.3	1.3
# SSP animals not required to meet goals	0	0	0
# animals in non-participant collections but desirable to SSP		-	-
Total births in SSP program	0	0	0
# surviving to one year	-	-	-
# of desired births	-	-	-
# of undesired births	-	-	-
# of deaths of SSP animals	0	0	0
# of imports	3	0	1
# of exports	0	0	0
# of founders with represented descendants	-	-	-

Current Population Status

SSP population levels are still quite low as we continue to assemble the breeding nucleus of 10 (5.5) founders. This fall, the male which currently resides with the female in San Diego, will be moved to the Cincinnati Zoo. In the captive population outside of North America, only one birth has occurred in the Malacca Zoo to a female who was captured during pregnancy. This lack of reproduction may be attributable to skewed sex ratios in nearly all the Southeast Asian facilities. Port Lympne in England has 1.1 animals. The female there seems to have experienced an unsuccessful pregnancy but no full-term births have occurred to date. The female in the Jakarta Zoo may be pregnant as a result of a breeding that occurred at the end of 1990.

Demographic Trends

In the last 12 months, field capture has progressed much more smoothly and two additional females are waiting for export to North America. They will arrive in August or September. There is a pressing need to get more males into the North American population.

Population Genetics

The 10 (5.5) founders currently sought for North America are still below an ideal minimum. Eventually, either more founders will be required from the wild or from the captive population outside of North America.

Special Concerns

An important consideration in regard to eventual exchanges is the subspecies issue. Sumatran rhinos are separated into three geographically isolated subspecies from Borneo, Sumatra and Peninsular Malaysia. Geographical separation suggests that evolutionary divergence could have taken place. Genetic studies by the New York Zoological Society are currently in progress, specifically to determine whether or not significantly large genetic differences among the subspecies justify their maintenance as separate populations.

Research

An Asian Rhino Conservation Workshop, to be held in Bogor, Indonesia in October 1991, will address research and conservation of the Sumatran and Javan rhinos.

Field Conservation

The survey and salvage operation in Sumatra continues. Poaching is still a serious problem for this species.

Progress Toward Goals

(1) Three additional animals, including one male, have been captured this year, pushing us beyond the half-way mark for completing our breeding nucleus of ten animals.
(2) Two rhinos (1,1) are to be transferred from Sumatra to Java for pairing with animals in collections there.

Short-term Goals for Upcoming Year

(1) Facilitate breeding by all existing females in the SSP population.
(2) Complete capture and translocation operation in Sumatra.
(3) Attend and participate in the Asian Rhino Conservation Workshop in Bogor, Indonesia in October 1991.

WHITE RHINOCEROS (*Ceratotherium simum simum*)

Species Coordinator and Studbook Keeper:
Robert W. Reece, Wild Animal Habitat, Kings Island

Introduction

The overall objective of the southern white rhino SSP is to develop a captive self-sustaining population to reinforce the wild populations in Africa as part of a global strategy. To that end, we will attempt to preserve 90% of the average heterozygosity obtained from the wild populations for a period of 170-200 years or 10-12 white rhino generations. Since there is a need to coordinate the use of resources by all of the rhino SSP programs, the southern white population will be reduced gradually over the next several years to approximately 100 individuals. Accomplishing this reduction will require that we also attain a minimum of 35 effective founders in order to achieve the demographic and genetic goals mention earlier.

The white rhino program was blessed initially with an unusually large number of potential founders as a result of the large influx of importations which occurred in the late 1960s and early 1970s. Unfortunately, most of these very young animals were placed as pairs where they remained into adulthood. A recently completed analysis of these animals indicates that none of the animals so placed has reproduced in it's original location. With one exception, the same holds true for animals placed as trios. Institutions with multiple male/multiple female groups have invariably experienced breeding success. Since there is a limited number of facilities large enough to accommodate these groups, the SSP has endeavored to induce breeding by translocating specific animals. This usually has involved switching males between "pair" institutions and moving previously non-breeding animals to institutions which have enjoyed successful programs in exchange for animals that are sufficiently represented, at least for the near term. In terms of increasing founder representation, the white rhino SSP is still developing even though we have, through attrition, reduced the total number of animals currently managed by the SSP.

Data Table (current through 1 December 1990)

	Two years ago	One year ago	Current year
Participating institutions	48	41	40
Captive Population	61.75	58.74	58.70
# SSP animals managed	136	132	124
# SSP animals not required to meet goals	0	0	4
# animals in non-participant collections but desirable to SSP	0	0	0
Total births in SSP program	7	2	3
# surviving to one year	7	1	3
# of desired births	7	2	3
# of undesired births	0	0	0
# of deaths of SSP animals	3	3	3
# of imports	0	0	0
# of exports	1	1	8
# of founders with represented descendants	36	36	37

Current Population Status

The captive white rhino population is currently being reduced through attrition and by exporting selected animals to the new Australasian program. Several non-productive animals have been placed in breeding situations and in some cases given reproduction examinations to determine their value to the SSP. There are indications that animals which have not bred by the time they are in excess of 25 years of age, probably will not breed. In 1988 and 1989, 34 potential founders were transferred to new locations in an attempt to stimulate breeding. The success of that project has not been determined as yet.

Demographic Trends

Reproduction has fallen off during the past two years primarily due to the translocation program which has taken some of the more prolific breeders out of circulation. Additionally, we are attempting to insure that we don't produce surplus animals. Australia is still in need of more white rhinos but the animals which

are producing are well represented in the Australasian program. The population has remained stable, growing at a rate of slightly less than two percent if exports and planned surpluses are discounted. However, the population is aging and emphasis will soon need to be shifted to producing second generation offspring.

Population Genetics

While the current founder base is probably adequate, the fact that the remaining potential founders are approaching 25-30 years of age means that unless the transfers mentioned above provide sufficient stimuli to induce breeding in the very near future there is little likelihood that the founder base will increase perceptibly.

Special Concerns

As was mentioned earlier, in the late 1960s and early 1970s many of the imported white rhinos were placed as young pairs in zoos which could not accommodate larger groups. None of these animals ever bred in their original locations. The situation was nearly as bad for animals placed as trios. Institutions where animals were received in larger multiple male/multiple female groups invariably experienced breeding success. Much of the emphasis in the Master Plan has been placed on attempting to move animals previously kept in pairs or unproductive trios into breeding groups. Cooperation in this respect has been good and the effort is ongoing. However, some institutions are reluctant to transfer animals because of the costs involved.

Research

Research efforts have been sporadic and have emphasized primarily the need to gather reproductive data (on all species of rhino). It is anticipated that within the coming months the Rhino TAG will produce a set of priorities for research and provide the leadership necessary to develop a comprehensive program in which many institutions will be able to participate.

Short-term Goals for Upcoming Year

(1) There are still eight animals which have been recommended for transfer and it is anticipated that at least four of these transfers will occur during the coming year.
(2) A space allocation study already underway will be completed. This analysis will result in recommendations for each individual institution regarding what the propagation group feels is that institution's role in rhino captive breeding. It is expected that many of those facilities which only have accommodations for a pair of animals will be asked to consider switching to another species of rhino or to expand their facilities to accommodate a larger group of whites.

EEP Yearbook 1990

with

Summaries of Contributions and Discussions

of the

8th EEP Conference, Budapest

12-15 May 1991

EEP

Published by the EEP Executive office, Amsterdam; October 1991
Compiled and edited by Koen Brouwer, Simone Smits and Leobert de Boer

Black rhinoceros (*Diceros bicornis*) EEP Annual Report 1990

1. Information on organization, structure and activities of the programme

Species coordinator:	Prof. Dr. Dr. h.c. H.-G. Klös Zoologischer Garten und Aquarium Berlin Hardenbergplatz 8 D-1000 Berlin 30 Germany
Studbook keeper:	Prof. Dr. Dr. h.c. H.-G. Klös (International)
Species committee:	H.-G Klös, Berlin Zoo Jiri Vahala, Dvur Kralové Christian R. Schmidt, Zürich Zoo
Committee meetings:	No meetings were held in 1990
Studbook:	The International Studbook for African Rhinoceroses, Volume 4 is in press.
Husbandry guidelines:	Not yet available
Research:	The Berlin Zoo, in cooperation with the Institute of Biochemistry of the Veterinary Faculty of the University of Vienna, has successfully researched the possibilities to detect pregnancy in black rhino through analysis of hormone levels in faecal matters.

2. Information on status and developments in the programme population in 1990

Status and development of the EEP population: see Table 1

Age and sex distribution of the EEP population: not available

Summary:
Three calves were born in continental Europe in 1990: 0.1 at Berlin Zoo, 0.1 at Dvur Kralové Zoo and 1.0 at Zürich Zoo. A male calf was also born at Port Lympne, but unfortunately died at approximately six weeks of age.

Two deaths were reported to the coordinator: a + 36 year old bull at Vienna Zoo and the previously mentioned bull calf at Port Lympne.

The following transfers were made:
0.1 Nr. 35 from Alma Ata to Tallin Zoo

Table 1: Status and development of the Black rhinoceros (*Diceros bicornis*) EEP population in 1990

Participants	Status 1 Jan.	Births (Dn5)	Transfers between EEP zoos		Transfers with non EEP zoos		Deaths	Status 31 Dec.
			in	out	in	out		
Berlin (Zoo)/G	3.5	0.1	-	-	-	-		3.6
Dvur Kralové/CS	4.0	0.1	-	-	-	1.0	-	3.7
Frankfurt/G	2.1	-		-	-	-	-	2.1
Leipzig/G	-	-	-	-	-	-	-	-
Magdeburg/G	2.2	-	-	-	-	-	-	2.2
Rome/I	0.1	-	-	-	-	-	-	0.1
Tallin/USSR	1.0	-			0.1	-	-	1.1
Zürich/CH	1.4	1.0	-	-	-	-	-	2.4
Totals 9 participants	13.10	1.2	-	-	0.1	1.0	-	13.22

1.0 Nr. 164 from London Zoo to Port Lympne
1.0 Nr. 245 from Port Lympne to London Zoo
1.0 Nr. 391 from Dvur Kralové Zoo to London Zoo
The EEP population of black rhinos consists of 13.20 animals. The total European population is 23.33 individuals.

3. Recommendations for the next year(s)

Hannover Zoo has requested participation in the Black Rhino EEP. Dvur Kralové Zoo has offered a bull for sale (Suggested price: DM 60.000,=). Rome Zoo is prepared to exchange its single female for a pair of square-lipped rhinos *Ceratotherium s. simum*. Leipzig will receive a pair of black rhinos from Berlin Zoo. Ownership of the Leipzig Zoo bull "Klaus" will then be transferred to Berlin Zoo. This bull was already on breeding loan at Berlin Zoo.
The unification of the two Germanies and the changes in Berlin will result in closer cooperation between the two Berlin zoos. Berlin Zoo plans to send a female on loan to Tierpark Berlin-Friedrichsfelde. The coordinator propose to send the Zürich born male, currently at Frankfurt Zoo to Tierpark Berlin-Friedrichsfelde to join the female.

The good breeding results over the past years have resulted in need to expand the EEP "Carrying Capacity". It is necessary that a number of European zoos that have rhino experience make facilities available for black rhinos.

4. Problems: not specified

Indian rhinoceros (*Rhinoceros unicornis*) EEP Annual Report 1990

1. Information on organization, structure and activities of the programme

Species coordinator:	Kathleen Tobler Zoologischer Garten Basel 4054 Basel Switzerland
Studbook keeper:	Kathleen Tobler (International)
Species committee:	Consists of representatives of all participants
Committee meetings:	No meetings were held in 1990
Studbook:	Last published in 1988. New edition in preparation.
Husbandry guidelines:	Not yet available
Research:	Not specified

2. Information on status and developments in the programme population in 1990

Status and development of the EEP population: see Table 1

Age and sex distribution of the EEP population: not available

Table 1: Indian rhinos (*Rhinoceros unicornis*) in European collections on 31 December 1990

Antwerp (Planck.)/B	1.2	Hamburg/G	1.1
Basel/CH	2.3	Liberec/CS	1.0
Berlin (Tierpark)/G	2.1	Munich/G	1.1
Berlin (Zoo)/G	1.2	Nuremberg/G	1.0
Chester/GB	1.0	Rotterdam/NL	1.0
Cologne/G	1.1	Stuttgart/G	1.1
Dvur Kralove/CS	2.1	Whipsnade/GB	2.1

3/4. Recommendations/Problems: not yet identified

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

SECTION 5

TARGET POPULATION

CAPACITY
Version 3.0 (Quicksilver)
February, 1992

J. Ballou
National Zoological Park
(202) 673-4815

GENERAL DESCRIPTION:

CAPACITY Version 3.00 is a Quicksilver Compiled dBASE program to calculate the captive population size needed to maintain desired amounts of heterozygosity (e.g. 90%) for specified time periods (e.g. 200 years) given the population's current status. The concept of defining population size objectives using goals for maintaining heterozygosity is discussed by M. Soulé, M. Gilpin, W. Conway and T. Foose in "The millennium ark: how long a voyage, how many staterooms, how many passengers?", Zoo Biology 5:101-114. 1986.

The program models the theoretical growth of a population from its current status to the end of the time period. The population is grown in discrete generation length (T) time periods (at the rate of λ^T) until it reaches a size that, if maintained at that size (K) for the rest of the program length, will allow it to maintain the desired amount of genetic diversity. Once at K, the population experiences no further growth (see Figure 1).

In order to make these calculations using the population's current status, it is necessary to know how much of the diversity has already been lost and how many years have already passed to determine how much of the current diversity needs to be retained in the remaining time.

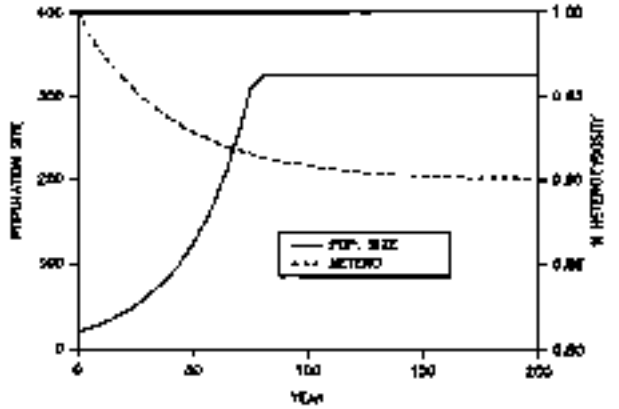


Figure 1: This population needs to grow to about 325 animals to maintain 90% of its original heterozygosity.

Depending on the current status of the population, four different scenarios may result:

1) Further growth of the population is required and a realistic target size is attainable given the parameters entered (as in Figure 1).

2) The current population size exceeds (or is exactly at) the number needed. The model does not impose further growth on the population. Rather, λ is ignored and the actual reduced number of animals required is calculated.

3) The heterozygosity goal is achievable given the current parameters but the required number of animals may be greater than can be realistically managed (> 9999) (Figure 2). If this is the case, the program reports "**** = Not possible with these parameters". To reduce the number of animals required, you can improve the conditions by increasing the growth rate, the effective size of the current population, the generation time, or the amount of heterozygosity retained to date. Alternatively (or in addition), you can decrease the length of the program, and/or the % heterozygosity to be retained.

4) Given the current parameters and maximum growth, heterozygosity still drops below the target level before the time period ends (Figure 3). The program returns the message "**** = Not possible with these parameters." The parameters are insufficient to retain enough heterozygosity. To retain the desired amount of heterozygosity, use the same solutions mentioned in scenario 3.

The calculations are based on data from the population as well as the goals of the program. The data required to run the program are:

STATUS OF THE POPULATION:
Generation Length
Minimum Likely Growth Rate
Current Effective Population Size
N_e/N Ratio
Heterozygosity Retained to Date
No. of Years Since the Beginning of Program

PROGRAM OBJECTIVES:
Length of the Program
% of Original Heterozygosity to Retain

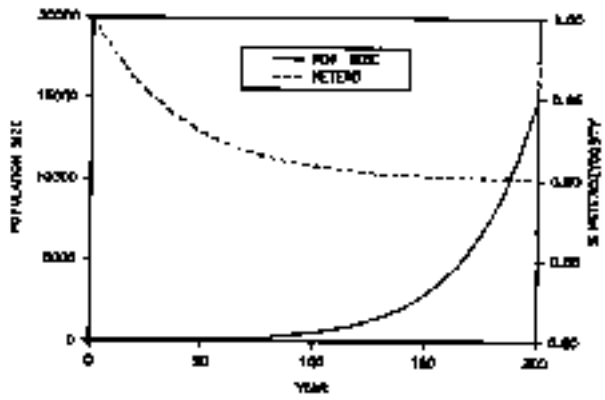


Figure 2: Population size required to maintain 90% of the original heterozygosity exceeds realistic numbers.

CAPACITY 3.00 Changes: This version takes into consideration the loss of diversity that has already occurred in the population. Previous versions modeled the population only from its founding event. This version also allows output to be written to files, as well as the printer.

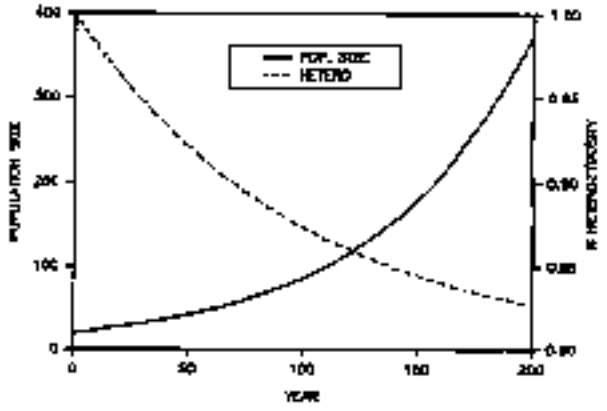


Figure 3: Heterozygosity drops below target (90%) before program ends, despite maximum growth of the population.

INSTRUCTIONS AND OPTIONS:

The only required file is CAPACITY.EXE. Type "CAPACITY" at the DOS prompt to begin the program. Provide the following information:

Generation Length (in years): Defined as the average age at which a breeder produces young. Enter a value between 1 and 99.

Annual Growth Rate (λ): The factor which when multiplied to one year's population size results in the following year's population size. $\lambda = 1.00$ results in no growth. Values less than 1 are negative growth, values greater than one are positive growth. λ values less than 1.00 (negative population growth) can not be used in the model: questions of maintaining genetic diversity are moot because the population will go extinct. Enter the λ that best represents the maximum realistic growth rate achievable by the population.

Effective Size of Current Population: Enter the effective size (N_e) of the current population. This is difficult to estimate. As a very rough estimate, (likely to be an underestimate), you can use the following formula with the number of living males (N_m) and females (N_f) that are proven breeders to calculate the effective size:

$$N_e = \frac{4 \times N_f \times N_m}{N_f + N_m}$$

The program uses this effective size, rather than the actual size, to model loss of genetic diversity.

Estimated N_e/N ratio: The ratio of the effective population size to the real population size. This theoretically ranges between 0 and almost 2.0 but is realistically rarely over 1.0. This ratio will be applied over the entire history of the modeled population. Enter what you think is a reasonable ratio under future population management.

Heterozygosity Retained to Date: Enter the gene diversity or expected heterozygosity of the current population. This should be entered in terms of the % of the original heterozygosity brought in by the population's founders. This can be calculated from the population's pedigree using GENES or similar pedigree analysis software. If the current population consists only of the founders, heterozygosity retained to date is 100%.

% Heterozygosity To Be Retained: Enter the percent of heterozygosity to be retained over the time period of the population's management. Try 90% as a starting point (see the Soul| et al. reference mentioned above).

Number of Years Since Program Began: Enter how many years have elapsed since the initiation of the program. If the current population is the founders, enter 0. This will be used to determine how many years remain in the program.

Length of Program: The duration of the captive breeding program in years. 200 years is often used as a starting point (see the Soul— et al. reference mentioned above). Note that the program need not necessarily start with the current population since the program may have already been in effect for several years.

These definitions are also provided on screen by pressing "D" from the menu that appears at the bottom of the screen after values are entered.

RANGE TABLES:

Range Tables allow the user to vary two different parameters at the same time to calculate target population sizes for a variety of conditions. See the example at the end of this documentation.

MODEL LIMITATIONS:

1) Does not allow for migrants - all founders are assumed to enter the population at the beginning of the program (generation 0).

2) Allows for only one N_e/N ratio which is applied to both the current population and future population sizes. Therefore, it does not consider any changes in N_e/N once the population reaches its target size. This is likely to be unrealistic. N_e/N ratios can be drastically different when a population is managed for zero population growth.

EXAMPLE:

Capacity 3.0

Effective Size and Actual Population Size Necessary for Maintaining the Specified Amount of Genetic Diversity for the Specified Amount of Time

No. of Years per Generation (T):	6.0	**PROGRAM GOALS:**	
Annual Growth Rate (lambda):	1.250	Length of Program (Years):	200
Estimated Ne/N Ratio:	0.30	% Hetero. To Retain:	90.0
Effective Size of Population:	34.0		
% Diversity Retained to Date:	97.5	Growth rate per Generation:	3.81
Current Year:	7	# Generations during 200 Years:	33

Effective Size Required to Maintain 90.0% of the Original Founder's Heterozygosity for 200 Years: 244

Actual Population Size Required (Based on Ne/N Ratio): 813

=02/26/92== j.ballou Feb'92 ===

EXAMPLE OF RANGE TABLE OPTION VARYING LENGTH OF PROGRAM AND POPULATION'S EFFECTIVE SIZE:

Capacity 3.0

ACTUAL POPULATION SIZES Required to Maintain 90.0% of the Original Heterozygosity for Various Time Periods Given Various Ne Sizes

		LENGTH OF PROGRAM (YEARS)				
		50	75	100	150	200
Population's Effective Size	30	160	263	370	523	850
	40	150	247	347	573	780
	50	147	240	333	550	743
	60	147	233	327	537	720
	70	147	230	320	527	710

Model Parameters	
Lambda:	1.250
Gen. Length:	6.0
Ne/N Ratio:	0.30
Het. to Date:	97.5
Years Elapsed:	7

== 02/26/92 == j.ballou-NZP Feb 92 =

EASTERN BLACK RHINO - NORTH AMERICA - CURRENT PARAMETERS

Effective Size and Population Size Necessary for Maintaining the Specified Amount of Genetic Diversity for the Specified Amount of Time

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.030	Length of Program (Years):	100
% Diversity Retained to Date:	96.7	% Hetero. To Retain:	90.0
Effective Size of Population:	30.0		
Estimated Ne/N Ratio:	0.40	Growth rate per Generation:	1.56
Current Year:	10	# Generations during 100 Years:	6

Effective Size Required to Maintain 90.0% of the Original Founder's Heterozygosity for 100 Years: 46

Actual Population Size Required (Based on Ne/N Ratio): 115

ACTUAL POPULATION SIZES Required to Maintain Various Levels of Heterozygosity for Various Time Periods Given a Current Ne of 30.0

% Hetero. To Be Retained	LENGTH OF PROGRAM (YEARS) 50	100	150	200	250
70.0	13	25	40	50	63
75.0	15	30	50	65	80
80.0	20	40	68	88	110
85.0	30	60	100	135	173
90.0	53	115	235	343	458

Model Parameters	
Lambda:	1.030
Gen. Length:	15.0
Ne/N Ratio:	0.40
Het. to Date:	96.7
Years Elapsed:	10

Actual Population Sizes Required to Maintain 90.0% of the Original Heterozygosity for Various Time Periods Under Various Ne/N Ratios

Ne/N Ratio	LENGTH OF PROGRAM (YEARS) 50	100	150	200	250
0.30	70	153	313	457	610
0.40	53	115	235	343	458
0.50	42	92	188	274	366
0.60	35	77	157	228	305
0.70	30	66	134	196	261

Model Parameters	
Lambda	1.030
Gen. Length:	15.0
Effective Size:	30
Het. to Date:	96.7
Years Elapsed:	10

Capacity 3.0 == 04/24/92 ======= j.ballou-

EASTERN BLACK RHINO - WORLD - EXPECTED PARAMETERS

Effective Size and Population Size Necessary for Maintaining the Specified Amount of Genetic Diversity for the Specified Amount of Time

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.030	Length of Program (Years):	100
% Diversity Retained to Date:	98.0	% Hetero. To Retain:	90.0
Effective Size of Population:	40.0		
Estimated Ne/N Ratio:	0.40	Growth rate per Generation:	1.56
Current Year:	10	# Generations during 100 Years:	6

Effective Size Required to Maintain 90.0% of the Original Founder's Heterozygosity for 100 Years: 35

Actual Population Size Required (Based on Ne/N Ratio): 88

ACTUAL POPULATION SIZES Required to Maintain Various Levels of Heterozygosity for Various Time Periods Given a Current Ne of 40.0

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
% Hetero. To Be Retained	70.0	13	23	38	50	60
	75.0	15	28	48	63	75
	80.0	20	38	63	80	100
	85.0	28	53	88	115	145
	90.0	45	88	155	215	275

Model Parameters

Lambda:	1.030
Gen. Length:	15.0
Ne/N Ratio:	0.40
Het. to Date:	98.0
Years Elapsed:	10

Capacity 3.0 == 04/24/92 == j.ballou-

INDIAN RHINO - NORTH AMERICA - CURRENT PARAMETERS

Effective Size and Population Size Necessary for Maintaining the Specified Amount of Genetic Diversity for the Specified Amount of Time

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.030	Length of Program (Years):	100
% Diversity Retained to Date:	91.2	% Hetero. To Retain:	90.0
Effective Size of Population:	13.0		
Estimated Ne/N Ratio:	0.33	Growth rate per Generation:	1.56
Current Year:	10	# Generations during 100 Years:	6

Effective Size Required to Maintain 90.0% of the Original Founder's Heterozygosity for 100 Years: Not Possible With

Actual Population Size Required (Based on Ne/N Ratio): These Parameters

Actual Population Sizes Required to Maintain 90.0% of the Original Heterozygosity for Various Time Periods Under Various Ne/N Ratios

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
Ne/N Ratio	0.33	****	****	****	****	****
	0.40	****	****	****	****	****
	0.50	****	****	****	****	****
	0.60	****	****	****	****	****
	0.70	****	****	****	****	****

Model Parameters	
Lambda	1.030
Gen. Length:	15.0
Effective Size:	13
Ret. to Date:	91.2
Years Elapsed:	10

**** = Not Possible with these parameters

ACTUAL POPULATION SIZES Required to Maintain Various Levels of Heterozygosity for Various Time Periods Given a Current Ne of 13.0

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
% Hetero. To Be Retained	75.0	24	48	94	133	173
	80.0	36	91	224	358	506
	85.0	****	****	****	****	****
	90.0	****	****	****	****	****

Model Parameters	
Lambda:	1.030
Gen. Length:	15.0
Ne/N Ratio:	0.33
Het. to Date:	91.2
Years Elapsed:	10

**** - Not Possible with these parameters

INDIAN RHINO - NORTH AMERICA - CURRENT GROWTH RATE - MAXIMUM F.G.E.

Effective Size and Population Size Necessary for Maintaining the Specified Amount of Genetic Diversity for the Specified Amount of Time

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.030	Length of Program (Years):	100
% Diversity Retained to Date:	97.5	% Hetero. To Retain:	90.0
Effective Size of Population:	13.0		
Estimated Ne/N Ratio:	0.33	Growth rate per Generation:	1.56
Current Year:	10	# Generations during 100 Years:	6

Effective Size Required to Maintain 90.0% of the Original Founder's Heterozygosity for 100 Years: Not Possible With

Actual Population Size Required (Based on Ne/N Ratio): These Parameters

Actual Population Sizes Required to Maintain 90.0% of the Original Heterozygosity for Various Time Periods Under Various Ne/N Ratios

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
Ne/N Ratio	0.33	****	****	****	****	****
	0.40	****	****	****	****	****
	0.50	****	****	****	****	****
	0.60	****	****	****	****	****
	0.70	****	****	****	****	****

Model Parameters	
Lambda	1.030
Gen. Length:	15.0
Effective Size:	13
Het. to Date:	97.5
Years Elapsed:	10

**** = Not Possible with these parameters

ACTUAL POPULATION SIZES Required to Maintain Various Levels of Heterozygosity for Various Time Periods Given a Current Ne of 13.0

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
% Hetero. To Be Retained	70.0	15	27	48	64	79
	75.0	18	36	61	85	109
	80.0	24	48	91	130	170
	85.0	33	85	194	303	421
	90.0	****	****	****	****	****

Model Parameters	
Lambda:	1.030
Gen. Length:	15.0
Ne/N Ratio:	0.33
Het. to Date:	97.5
Years Elapsed:	10

**** - Not Possible with these parameters

INDIAN RHINO - NORTH AMERICA - IMPROVED GROWTH RATE - CURRENT GENE DIVERSITY

Effective Size and Population Size Necessary for Maintaining the Specified Amount of Genetic Diversity for the Specified Amount of Time

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.050	Length of Program (Years):	100
% Diversity Retained to Date:	91.2	% Hetero. To Retain:	90.0
Effective Size of Population:	13.0		
Estimated Ne/N Ratio:	0.40	Growth rate per Generation:	2.08
Current Year:	10	# Generations during 100 Years:	6

Actual Population Sizes Required to Maintain 90.0% of the Original Heterozygosity for Various Time Periods Under Various Ne/N Ratios

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
Ne/N Ratio	0.30	****	****	****	****	****
	0.40	****	****	****	****	****
	0.50	****	****	****	****	****
	0.60	****	****	****	****	****
	0.70	****	****	****	****	****

**** = Not Possible with these parameters

Model Parameters

Lambda	1.050
Gen. Length:	15.0
Effective Size:	13
Het. to Date:	91.2
Years Elapsed:	10

ACTUAL POPULATION SIZES Required to Maintain Various Levels of Heterozygosity for Various Time Periods Given a Current Ne of 13.0

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
% Hetero. To Be Retained	70.0	15	30	50	68	85
	75.0	20	40	73	100	128
	80.0	30	70	138	195	255
	85.0	100	****	****	****	****
	90.0	****	****	****	****	****

**** = Not Possible with these parameters

Model Parameters

Lambda:	1.050
Gen. Length:	15.0
Ne/N Ratio:	0.40
Het. to Date:	91.2
Years Elapsed:	10

INDIAN RHINO - NORTH AMERICA - IMPROVED GROWTH RATE - MAXIMUM GENE DIVERSITY

Effective Size and Population Size Necessary for Maintaining the Specified Amount of Genetic Diversity for the Specified Amount of Time

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.050	Length of Program (Years):	100
% Diversity Retained to Date:	97.5	% Hetero. To Retain:	90.0
Effective Size of Population:	13.0		
Estimated Ne/N Ratio:	0.40	Growth rate per Generation:	2.08
Current Year:	10	# Generations during 100 Years:	6

Effective Size Required to Maintain 90.0% of the Original Founder's Heterozygosity for 100 Years: 114

Actual Population Size Required (Based on Ne/N Ratio): 285

Actual Population Sizes Required to Maintain 90.0% of the Original Heterozygosity for Various Time Periods Under Various Ne/N Ratios

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
Ne/N Ratio	0.30	83	380	1217	1987	2843
	0.40	63	285	913	1490	2133
	0.50	50	228	730	1192	1706
	0.60	42	190	608	993	1422
	0.70	36	163	521	851	1219

Model Parameters

Lambda	1.050
Gen. Length:	15.0
Effective Size:	13
Het. to Date:	97.5
Years Elapsed:	10

ACTUAL POPULATION SIZES Required to Maintain Various Levels of Heterozygosity for Various Time Periods Given a Current Ne of 13.0

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
% Hetero. To Be Retained	70.0	13	23	40	53	65
	75.0	15	30	50	68	85
	80.0	20	40	73	100	125
	85.0	28	65	128	178	233
	90.0	63	285	913	1490	2133

Model Parameters

Lambda:	1.050
Gen. Length:	15.0
Ne/N Ratio:	0.40
Het. to Date:	97.5
Years Elapsed:	10

INDIAN RHINO - WORLD - CURRENT PARAMETERS

Effective Size and Population Size Necessary for Maintaining the Specified Amount of Genetic Diversity for the Specified Amount of Time

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.030	Length of Program (Years):	100
% Diversity Retained to Date:	92.8	% Hetero. To Retain:	90.0
Effective Size of Population:	35.0		
Estimated Ne/N Ratio:	0.40	Growth rate per Generation:	1.56
Current Year:	10	# Generations during 100 Years:	6

Effective Size Required to Maintain 90.0% of the Original Founder's Heterozygosity for 100 Years: Not Possible With

Actual Population Size Required (Based on Ne/N Ratio): These Parameters

Actual Population Sizes Required to Maintain 90.0% of the Original Heterozygosity for Various Time Periods Under Various Ne/N Ratios

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
Ne/N Ratio	0.30	237	****	****	****	****
	0.40	178	****	****	****	****
	0.50	142	****	****	****	****
	0.60	118	****	****	****	****
	0.70	101	****	****	****	****

Model Parameters	
Lambda	1.030
Gen. Length:	15.0
Effective Size:	35
Het. to Date:	92.8
Years Elapsed:	10

**** = Not Possible with these parameters

ACTUAL POPULATION SIZES Required to Maintain Various Levels of Heterozygosity for Various Time Periods Given a Current Ne of 35.0

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
% Hetero. To Be Retained	70.0	15	28	45	58	73
	75.0	18	35	60	78	95
	80.0	25	50	85	113	140
	85.0	43	85	158	215	280
	90.0	178	****	****	****	****

Model Parameters	
Lambda:	1.030
Gen. Length:	15.0
Ne/N Ratio:	0.40
Het. to Date:	92.8
Years Elapsed:	10

**** = Not Possible with these parameters

= 04/24/92 ========== ----- ========== j.ballou-NZP Feb 92 ==

INDIAN RHINO - WORLD - IMPROVED GROWTH RATE - MAXIMUM GENE DIVERSITY

Effective Size and Population Size Necessary for Maintaining the Specified Amount of Genetic Diversity for the Specified Amount of Time

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.050	Length of Program (Years):	100
% Diversity Retained to Date:	98.0	% Hetero. To Retain:	90.0
Effective Size of Population:	35.0		
Estimated Ne/N Ratio:	0.40	Growth rate per Generation:	2.08
Current Year:	10	# Generations during 100 Years:	6

Effective Size Required to Maintain 90.0% of the Original Founder's Heterozygosity for 100 Years: 36

Actual Population Size Required (Based on Ne/N Ratio): 90

Actual Population Sizes Required to Maintain 90.0% of the Original Heterozygosity for Various Time Periods Under Various Ne/N Ratios

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
Ne/N Ratio	0.30	60	120	213	287	367
	0.40	45	90	160	215	275
	0.50	36	72	128	172	220
	0.60	30	60	107	143	183
	0.70	26	51	91	123	157

Model Parameters

Lambda	1.050
Gen. Length:	15.0
Effective Size:	35
Het. to Date:	98.0
Years Elapsed:	10

ACTUAL POPULATION SIZES Required to Maintain Various Levels of Heterozygosity for Various Time Periods Given a Current Ne of 35.0

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
% Hetero. To Be Retained	70.0	13	23	38	50	60
	75.0	15	28	48	63	75
	80.0	20	38	63	80	100
	85.0	28	53	88	118	148
	90.0	45	90	160	215	275

Model Parameters

Lambda:	1.050
Gen. Length:	15.0
Ne/N Ratio:	0.40
Het. to Date:	98.0
Years Elapsed:	10

apacity 3.0 == 04/24/92 == j.ballou

INDIAN RHINO - NORTH AMERICA - IMPROVED BREEDING (= HIGHER GROWTH RATE AND N

Effective Size and Population Size Necessary for Maintaining the Specified Amount of Genetic Diversity for the Specified Amount of Time

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.040	Length of Program (Years):	100
% Diversity Retained to Date:	95.0	% Hetero. To Retain:	90.0
Effective Size of Population:	25.0		
Estimated Ne/N Ratio:	0.40	Growth rate per Generation:	1.80
Current Year:	10	# Generations during 100 Years:	6

Effective Size Required to Maintain 90.0% of the Original Founder's Heterozygosity for 100 Years: 91

Actual Population Size Required (Based on Ne/N Ratio): 228

Actual Population Sizes Required to Maintain 90.0% of the Original Heterozygosity for Various Time Periods Under Various Ne/N Ratios

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
Ne/N Ratio	0.30	100	303	767	1193	1650
	0.40	75	228	575	895	1238
	0.50	60	182	460	716	990
	0.60	50	152	383	597	825
	0.70	43	130	329	511	707

Model Parameters	
Lambda	1.040
Gen. Length:	15.0
Effective Size:	25
Het. to Date:	95.0
Years Elapsed:	10

ACTUAL POPULATION SIZES Required to Maintain Various Levels of Heterozygosity for Various Time Periods Given a Current Ne of 25.0

		LENGTH OF PROGRAM (YEARS)				
		50	100	150	200	250
% Hetero. To Be Retained	70.0	13	25	43	55	68
	75.0	18	33	53	70	88
	80.0	23	45	75	100	125
	85.0	35	70	125	173	220
	90.0	75	228	575	895	1238

Model Parameters	
Lambda:	1.040
Gen. Length:	15.0
Ne/N Ratio:	0.40
Het. to Date:	95.0
Years Elapsed:	10

Capacity 3.0 == 04/24/92 ========== j.ballou-

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

SECTION 6

IN SITU SUPPORT

STRATEGIC SUPPORT OF *IN SITU* PROTECTED AREAS FOR RHINO BY THE GLOBAL AND REGIONAL CAPTIVE COMMUNITIES

TAXON	NUMBER OF SIGNIFICANT *IN SITU* SANCTUARIES	SUPPORTED BY ZOOS FROM					
		AFRICA	ASIA	AUSTRALASIA	EUROPE	N. AMERICA	S. AMERICA
Eastern Black	7				3	2+ ?	
Southern Black	7			1		1 ?	
Southwestern Black	2						
North/West Black	?						
Northern White	1				1		
Southern White	5						
Indian/Nepali	6					1	
Javan	6					1	
Mainland Sumatran	2						
Sumatra Sumatran	3						
Borneo Sumatran	4						
African Rhino	**20**						
Asian Rhino	**20**						
All Rhino Taxa	**40**						

T.J. Foose
1 May 1992

PRIORITY PROTECTED AREAS FOR RHINO

CONTINENT	COUNTRY	PROTECTED AREA
Africa	Kenya	Aberdare
		Masai Mara
		Nairobi
		Nakuru
		Tsavo
		Solio
		Laikipia
	Namibia	Etosha
		Kaokoland
	South Africa	Hluhluwe/Umfolozi
		Kruger
		Mkuzi
	Tanzania	Selous
	Zaire	Garamba
	Zimbabwe	Hwange/Matetsi
		Sebungwe
		Zambezi
		Central Highlands
Asia	Indonesia	Kerinci Seblat
		Gunung Leuser
		Barisan Selatan
		Kayan Mantarang
		Ujung Kulon
		Way Kambas
	Peninsular Malaysia	Taman Negara
		Endau Rompin
	Sabah	Tabin
		Danum Valley
	Sarawak	Ulu Limbang
	Vietnam	Nam Cat Tien
		Bugiamap
	India	Dudhwa
		Kaziranga
		Manas
		Orang
	Nepal	Chitswan
		Bardia

The Javan Rhino as a Flagship Species

Not surprisingly, the Javan rhino has been chosen as the official symbol for Ujung Kulon National Park. But efforts mounted to protect the Javan rhino and its habitat will do much more than safeguard a living symbol of this wilderness, they will help preserve one of the most diverse ecosystems in the world.

Java is an island of Indonesia, an archipelago nation in the Asian Pacific which occupies little more than one percent of the globe's land surface, but harbors one eighth of the world's mammal, bird, reptile, amphibian, and plant species. Most of Java's natural forests, and virtually all of its lowland rainforests, have been logged to support the 100 million people living there. Ujung Kulon constitutes the largest and most pristine natural ecosystem remaining on this biologically important island.

Some 40 mammal species are known to inhabit the Park. In addition to the Javan rhino, the Javan gibbon, two species of leaf monkey and the Javan tree shrew are found nowhere else in the world. Other important species include the flying lemur, banteng (a form of wild cattle), and several carnivore species such as the wild dog, leopard, binturong, small-toothed palm civet, Asian small-clawed otter and hairy-nosed otter.

More than 250 bird species are found in Ujung Kulon. Among the many species of interest to conservationists in this region are three types of hornbills, eight each of kingfishers and bulbuls, and ten of babblers. The green peafowl, green junglefowl and white-winged wood duck are also recorded.

The Park also shelters populations of many rare or threatened species of reptiles and amphibians, including most notably the green sea turtle and saltwater crocodile, and more than 50 rare species of plants.

How You Can Help

You can play a direct role in the Minnesota Zoo's efforts to protect Ujung Kulon National Park, the last refuge of the Javan rhino. The continued success of the Zoo's **Adopt-A-Park** program depends on your financial contribution.

In the first year, donations to the Minnesota Zoo Foundation and contributions from Steve Martin's "World of Birds Show" for this program totaled $25,000. These funds purchased a field communication system (complete with two-way radios, antennas, cables, boosters, speakers and solar power generators) for the guard posts, field bikes for patrolling the edge of the Park, two diesel marine engines and an accompanying boat (built locally) for ferrying staff and supplies to remote areas, and smaller boats or canoes for patrolling in-land rivers.

Next year's contributions will be used to complete the purchase of field equipment for Park staff, and begin developing education materials for a local conservation outreach program. The third year will be devoted to expanding this program. Fund-raising goals for both years have been set at $25,000 per year.

This **Adopt-A-Park** program has attracted international attention for Ujung Kulon. The Zoo's initiative has rekindled World Wildlife Fund's long-term interest in the region, and the New Zealand government has also offered technical assistance to improve park management.

To help protect this threatened jungle, send your tax-deductible contribution to:

Minnesota Zoo Foundation
Adopt-A-Park
13000 Zoo Boulevard
Apple Valley, MN 55124 USA

Printed on recycled paper.

Ujung Kulon

Last Refuge of the Javan Rhino

An **Adopt-A-Park** Program of the Minnesota Zoo

In 1990, the Minnesota Zoo charted a new course for wildlife conservationists in zoos worldwide by "adopting" Ujung Kulon National Park in Java, Indonesia. Through this first-of-its-kind *in situ* (on location) conservation project, the Zoo provides direct assistance to the Indonesian Department of Nature Conservation's (PHPA) efforts to protect the unique and threatened ecosystem of Ujung Kulon, the last refuge of the Javan rhino.

Several features of the **Adopt-A-Park** program distinguish it from other zoo wildlife conservation initiatives:

- the program is based on a long-term commitment to support *in situ* conservation actions
- it emphasizes a grass-roots approach to give financial support directly to Park programs
- costs are modest, yet the program is having a major and immediate impact
- the program is <u>not</u> linked to bringing animals back to the Minnesota Zoo in return for our support

Why would the Minnesota Zoo concern itself with a conservation dilemma located half a globe away? This outreach program is a natural extension of the Zoo's conservation policy, which pledges to "support the preservation and restoration of endangered species' natural habitats."

Ujung Kulon is a perfect choice. In addition to the critically endangered Javan rhino, this national park provides refuge for several threatened wildlife species displayed in the Zoo's premiere exhibit, the Asian Tropics. Zoo staff also have considerable expertise in this region. Most compelling, this important area of biological diversity is in clear need of support.

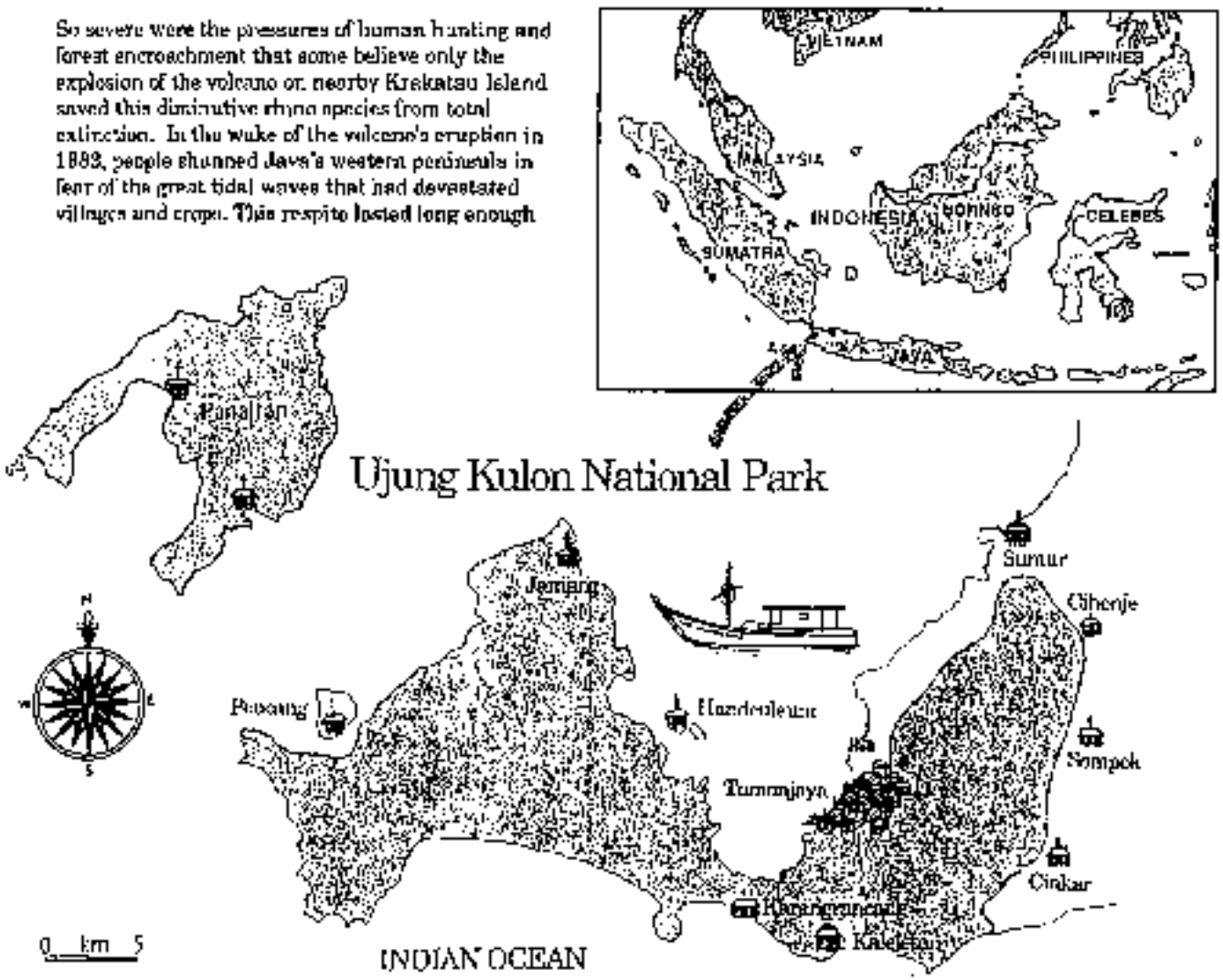
The Javan Rhino

Once ranging from Assam in northern India through much of Indochina, the Javan rhino had already disappeared from all but Java's Ujung Kulon peninsula by the turn of the last century. Less than 60 Javan rhinos are believed to exist in the world today, all in the swampy lowland forests of this small wilderness (one fourth the size of Yellowstone National Park) on the western tip of Java. A handful of animals may also persist in the jungles of southern Vietnam.

So severe were the pressures of human hunting and forest encroachment that some believe only the explosion of the volcano on nearby Krakatau Island saved this diminutive rhino species from total extinction. In the wake of the volcano's eruption in 1883, people shunned Java's western peninsula in fear of the great tidal waves that had devastated villages and crops. This respite lasted long enough for Ujung Kulon to receive official protection as a nature reserve in 1921, (expanded in 1980 to 300 square mile Ujung Kulon National Park).

Unfortunately, not even this last remote island population of the Javan rhino can be considered safe from extinction. Beyond the risks of natural disaster, genetic problems and disease that all small, isolated populations must face (five Javan rhinos succumbed to an unknown disease in 1982), the threat of poaching still looms large in Ujung Kulon. Poachers killed two rhinos in the Park as recently as 1965 and 1967.

The **Adopt-A-Park** program helps to protect this critically endangered species and its natural habitat.



A Model Program

The Minnesota Zoo's Adopt-A-Park program officially began in September 1990 when the Zoo entered into a formal agreement with Indonesia's PHPA to work together to protect the ecological stability of Ujung Kulon National Park, and thus ensure the long-term survival of the Javan rhino.

Reflecting the most urgent needs of the Park, the Zoo's first year goal in its three-year commitment was to assist PHPA in purchasing field communication and transportation equipment so that Ujung Kulon staff could more effectively guard against poaching. Next on the agenda is the development of education materials suitable for use in a conservation outreach program both for the Javanese people living on the borders of the Park and the 3,000 international tourists who visit Ujung Kulon each year. Future goals will be identified in cooperation with PHPA.

Recognizing the benefits and goodwill generated by this *in situ* program, the Sumatran Rhino Trust, a consortium of North American zoos working for the conservation of the Sumatran rhino, has decided to similarly support Kerinci National Park in northern Sumatra.

AROUND THE HORN

The Rhino Conservation Newsletter

SUMMER 1991 Volume 2 Number 1

SAN DIEGO RHINO CONFERENCE HIGHLIGHTS

An International Conference on Rhinoceros Biology and Conservation was held in San Diego May 9-11, 1991. Sponsored by the San Diego Zoo, the conference attracted over 300 registrants from 30 different countries. Those in attendance and participating included zoo biologists, field biologists, governmental representatives, representatives of non-governmental conservation organizations, veterinarians, and academics. Conference organizer, Dr. Oliver Ryder, and his staff should be commended for putting together an excellent conference. Not only was the program interesting, but details like the daily conference news bulletins and the immediate availability of session summaries were also much appreciated.

The sessions covered a variety of concerns, ranging from disease, nutrition, reproduction, and other biological aspects of rhino conservation, to short and long range strategic planning for rhino conservation. Although the sessions were marked by controversy as well as consensus, the conference seemed to be well-received by those in attendance. Still knee-deep in post-conference details more than a week later, Dr. Ryder said that he was pleased with the outcome and that he felt that the conference "pointed some future directions where parties interested in both *in situ* and *ex situ* conservation can work together to provide a more secure future for rhinos."

It is not possible to summarize the presentations of all of the plenary session and keynote speakers in this publication. That has already been done very ably in Dr. Ryder's Conference Report. In addition, an edited volume, consisting of 30 manuscripts, as well as additional contributions that were not included at the conference, is being assembled for future publication. In this space, we shall instead randomly select a few topics.

One somewhat controversial subject that arose several times during the conference was the concept of sustainable utilization. Several field managers from Africa, including Rowan Martin from Zimbabwe, and Jeremy Anderson from South Africa, advocated using practices such as horn harvesting or trophy hunting as a means of getting rhino programs to pay for themselves. Anderson estimated the proceeds from the sale of one horn to be about $8,000, and the profits realized from one trophy-hunting expedition at over $30,000. Horns could be considered a renewable resource because, according to Peter Morkel, the regrowth rate ranges

(See CONFERENCE on Page 6)

WANTED: Funding requests for *in situ* rhino research, management, or conservation projects. Requests should include a 50-word abstract which summarizes the project (for publication in AROUND THE HORN), a project narrative (not to exceed three pages) which explains in more detail what you want to do, why you want to do it, and how much money you are requesting, and a *curriculum vitae* for the project coordinator. We will publish quarterly the funding requests we receive in an effort to facilitate zoo participation in *in situ* rhino conservation efforts. (See Editorial on page 2.) Send requests to Karen Wachs, Cincinnati Zoo CREW, 3400 Vine Street, Cincinnati, Ohio, 45220, USA.

IN SITU RHINO CONSERVATION PROPOSALS

In the last issue of AROUND THE HORN, we asked you to submit funding requests for *in situ* rhino research, management or conservation projects. Our purpose is to serve as a communication vehicle between zoos and persons involved in rhino field projects, in an effort to foster more zoo participation in support of these projects. Anyone interested in funding a project should contact the ATH editors for further information. Those deciding to fund projects are free to request additional information or set their own reporting and documentation requirements.

PROJECT: Conservation of White Rhinoceros (*Ceratotherium simum*) in Zimbabwe: Effects of Horn Removal

ABSTRACT: In response to an increased poaching threat, an experimental dehorning exercise was approved by the Ministry of the Environment and Tourism, in April, 1991, for Kazuma Pan and Hwange National Parks in northwestern Zimbabwe. In the first phase, 72 white rhinoceros were immobilized and dehorned in 1991. The second phase, to be implemented in 1992, will involve the re-immobilization of a selected number of the dehorned animals to monitor horn regrowth and dehorning of those animals that were missed in 1991. A major research project has been implemented in conjunction with the horn removal. Objectives include: 1) to evaluate the effectiveness of dehorning in reducing the poaching risk; 2) to characterize phenotypic variation in horn size and growth, and to document rates and form of regrowth; 3) to examine interactions of both horned and dehorned rhinos with predators; and 4) to investigate the influence of horn and body size variation in dominance and reproductive performance. Additionally, research into chemical capture methodology and stress will be conducted along with collection of baseline biological data.

FUNDS REQUESTED: $47,000 (U.S.)

PROJECT COORDINATOR: Dr. Michael D. Kock

PROJECT: Veterinary Assistance for Black Rhino Conservation in Zimbabwe and Namibia

ABSTRACT: Veterinarians working for the governments of Zimbabwe and Namibia (Mike Kock and Pete Morkel, respectively) have a continuing need for darts, immobilization drugs, medical equipment and supplies, and treatment drugs to help them better care for black rhino during capture and relocation efforts, follow-up and/or routine exams, and dehorning operations.

FUNDS REQUESTED: $12,000/year (U.S.)

PROJECT COORDINATOR: Dr. David A. Jessup

PROJECT: Field Sampling and Importation of Blood Samples from Free-Ranging Black and White Rhino from Namibia and Zimbabwe

ABSTRACT: The 1986 African Rhinoceros Workshop in Cincinnati, Ohio identified a number of promising fields for biomedical research that could enhance the health and long term survival of both black and white rhinoceros. Many of these areas of research require the ability to obtain and compare tissues, blood, or components of blood from free living animals to captive animals, or to compare samples from several populations. Capture of rhino for relocation, marking, or dehorning presents the opportunity to obtain these samples at little additional expense and risk. Samples can be field frozen in dry nitrogen shippers and returned to the United States or to other appropriate locations.

FUNDS REQUESTED: $10,000/year (U.S.)

PROJECT COORDINATOR: Dr. David A. Jessup

PROJECT: Radio Collaring of Five Northern White Rhino in Zaire

ABSTRACT: A de-horning operation is planned for five northern white rhino in Garamba National Park in Zaire. The project is planned for the spring of 1992. The immobilization required for horn removal provides the opportunity for equipping the animals with radio collars to facilitate tracking. Funds are being sought to cover the cost of the radio collars and receivers.

FUNDS REQUESTED: $5,074 (U.S.)

PROJECT COORDINATOR: Dr. Peter Morkel

PROJECT: Conservation of Greater One-Horned Asian Rhino in Nepal
ABSTRACT: Field scientists in Nepal have a critical need for a vehicle to facilitate travel between and within Chitwan and Bardia National Parks for tracking and translocation projects involving the greater one-horned Asian rhino. Funds are also needed for immobilization drugs and medical equipment which are in short supply.
FUNDS REQUESTED: Amount not specified.
PROJECT COORDINATOR: Dr. Sunder Shrestha

PROJECT: Tanzania Rhino Project
ABSTRACT: It is estimated that 95% of Tanzania's black rhinos were killed by poachers between 1975 and 1989. The Tanzania Rhino Project was originally conceived as an emergency rescue operation for Tanzanian rhinos when poaching was at its height. The plan was to capture rhinos from all over Tanzania and airlift them to Rubondo Island, Ngorongoro Crater, or to sanctuary areas established in the northern sector of the Selous Game Reserve. As poaching became less of an immediate threat, the translocation plan was abandoned to allow time for gathering information on the distribution and numbers of remaining rhinos and assessing their prospects for survival and reproduction if left *in situ* versus being translocated to the proposed release sites. A detailed nationwide survey of the remaining scattered individuals and populations of black rhino has been initiated to determine their population structure, reproductive status, and threats to survival. Potential release areas for translocated rhino are also being surveyed in terms of their ecology, security, and carrying capacity. The survey is scheduled to cover the time period from July, 1991 to December, 1992. This will be followed by the preparation and implementation of a rhino conservation plan for the whole country, that may or may not include proposals for translocating animals. During the survey period, interim conservation measures may be implemented if considered necessary for the immediate interest of the rhinos.
FUNDS REQUESTED: Amount not specified.
PROJECT COORDINATOR: Andrew Laurie

Please continue to submit funding requests for *in situ* rhino research, management, or conservation projects. Requests should include a 50 word abstract which summarizes the project (for publication in AROUND THE HORN), a project narrative (not to exceed three pages) which explains in more detail what you want to do, why you want to do it, and how much money you are requesting, and a *curriculum vitae* for the project coordinator. Send proposals to AROUND THE HORN, c/o Ms. Karen Wachs, Cincinnati Zoo CREW, 3400 Vine Street, Cincinnati, Ohio. 45220. USA.

AROUND THE HORN is published by
The Wilds, in association with the
Cincinnati Zoo Center for Reproduction of
Endangered Wildlife.

EDITORS
Robert W. Reece
Karen B. Wachs

Contributors to this edition are Drs. Evan Blumer and Adam Eyres, Fossil Rim Wildlife Center; Dr. Thomas Foose, Executive Officer, CBSG, IUCN; Dr. Michael Hutchins, Director of Conservation and Science, AAZPA; Mohd Khan Bin Momin Khan, Dir. General for Wildlife & National Parks, Malaysia; Dr. Eric Miller, St. Louis Zoo; Dr. Kent Oakes, Sr. Forensics Specialist, NJ Fish & Wildlife Forensics Laboratory; Mr. Robert Reece, Executive Director, The Wilds; Dr. Charles Santiapillai, WWF International-Asia Programme; Dr. Jiri Vahala, Dvur Kralove Zoo; and Ms. Karen Wachs, Conservation Officer, Cincinnati Zoo Center for Reproduction of Endangered Wildlife. Comments and inquiries are encouraged and should be directed to the editors c/o Mr. Robert Reece, The Wilds, 85 E. Gay Street, Columbus, Ohio 43215 USA.

PRINTED ON RECYCLED PAPER

VETERINARY from Page 7

In summary, there should be veterinary participation in the management of captive and wild rhino populations. This participation should be an integral part of a multidisciplinary approach to their care, and is particularly relevant to their capture and translocation. Such efforts will contribute to the long term survival of both *in situ* and *ex situ* rhino populations.

Help! We're looking for information!

OCT - 1994

CBSG is seeking information on zoo support of protected areas. If your institution is actively involved in the support of wildlife parks, reserves, or other habitats supporting critical flora and/or fauna, we would like to know about it. The results of this survey will be presented in a future issue of CBSG News. For an example of the type of program that is of interest, see the article entitled, "Minnesota Zoo Reaches Out to Aid Ujung Kulon National Park" appearing in this issue. Please send us any project summaries or reports describing such activities.

YOUR NAME: DR. CHRIS S. WANZIE

ADDRESS: INSTITUTE OF ANIMAL RESEARCH, P.M.B. 77

CITY: LIMBE COUNTRY: CAMEROON POSTAL CODE: _____ TELEPHONE: _____

PROGRAM NAME/AREA SUPPORTED: Conservation of the Black Rhinoceros

SUPPORTING INSTITUTION: INSTITUTE OF ANIMAL RESEARCH

INSTITUTION ADDRESS: P.M.B. 77, LIMBE, S.W. PROVINCE, CAMEROON.

OTHER INFORMATION: _____

Institute of Animal Research
P.M.B. 77, Limbe
S.W. Province
C A M E R O O N
September 6, 1991.

CESG News
12101 Johnny Cake Ridge Road
Apple Valley, MN 55124, U.S.A.

Dear Sir,

Subsecuent to your request for information on Zoo support of protect areas, I am herewith submitting same and soliciting assistance towards the protection and conservation of the Black rhinoceros (Diceros bicornis) in Bouba Ndjida National Park, Cameroon.

Flizot (1962) estimated a population of between 400 and 500 in the park, but the most recent survey Bosch (1976) estimated a population of between 25 and 50; and the number should be lesser than that today. Poaching, habitat destruction through bush fires, stock raring and farming have contributed in such a rapid drop.

Other than the species' importance as a monitor of biodiversity and game viewing as a tourist attraction, it is worth noting that Bouba Ndjida constitutes the western limit of the species' distribution within its range.

Thank you very much and I look forward to hearing from you.

Sincerely,

Chris S. Wenzie, Ph.D.

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

SECTION 7

EASTERN BLACK RHINO

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
1	M	1 Jan 1956	WILD	WILD	WILD	1 Jan 1956	UNK	Wild Born	OFF ISIS			
					BERLIN W	2 Jul 1957	BE 01		W.GERMANY			
						4 Feb 1975 (died)				4 Feb 1975		
2	F	1 Jan 1953	WILD	WILD	WILD	1 Jan 1953	UNK	Wild Born	OFF ISIS			
					BERLIN W	5 Aug 1954	BE 02		W.GERMANY			
					JOS ZOO	28 Oct 1976	UNK		NIGERIA			
						5 Jul 1977 (died)				5 Jul 1977		
3	M	1 Jan 1960	WILD	WILD	WILD	1 Jan 1960	UNK	Wild Born	OFF ISIS			
					BERLIN TP	6 Sep 1961	TL 01		E.GERMANY			
						6 Nov 1969 (died)				6 Nov 1969		
4	F	1 Jan 1955	WILD	WILD	WILD	1 Jan 1955	UNK	Wild Born	OFF ISIS			
					BERLIN TP	17 Oct 1956	TL 02		E.GERMANY			
						18 May 1970 (died)				18 May 1970		
5	M	1 Jan 1949	WILD	WILD	WILD	1 Jan 1949	UNK	Wild Born	OFF ISIS			
					FRANKFURT	5 May 1950	FRA 01		W.GERMANY			
						2 Feb 1978 (died)				2 Feb 1978		
6	F	10 Dec 1958	5	UNK	FRANKFURT	10 Dec 1958	FRA 02	Captive Born	W.GERMANY			
						29 Nov 1971 (died)				29 Nov 1971		
7	M	1 Jan 1960	WILD	WILD	WILD	1 Jan 1960	UNK	Wild Born	OFF ISIS			
					HANNOVER	12 Jun 1961	HAJ 01		W.GERMANY			
						29 Jan 1973 (died)				29 Jan 1973		
8	F	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS			
					JOS ZOO	20 Jul 1960	HAJ 02		NIGERIA			
						25 Mar 1986 (died)				25 Mar 1986		
9	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					GELSENKRKN	25 May 1966	HAJ 05		W.GERMANY			
					HANNOVER	1 Jan 1967	HAJ 03		W.GERMANY			
					MAGDEBURG	29 Aug 1967	HAJ 03		E.GERMANY			
10	M	1 Jan 1957	WILD	WILD	WILD	1 Jan 1957	UNK	Wild Born	OFF ISIS			
					KOBENHAVN	22 Jul 1958	CPH 01		DENMARK			
						1 Jan 1969 (died)				1 Jan 1969		
12	F	1 Jan 1958	WILD	WILD	WILD	1 Jan 1958	UNK	Wild Born	OFF ISIS			
					AMSTERDAM	2 Oct 1959	AMS 02		NETHERLND			
						13 Apr 1967 (died)				13 Apr 1967		
13	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					ARNHEM	9 Jan 1966	ARN 01		NETHERLND			
						1 Jan 1969 (died)				1 Jan 1969		
14	F	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					ARNHEM	9 Jan 1966	ARN 02		NETHERLND			
					ALMA-ATA	25 Jun 1970	ARN 02		USSR			
						17 Jan 1971 (died)				17 Jan 1971		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
15	F	1 Jan 1955	WILD	WILD	WILD	1 Jan 1955	UNK	Wild Born	OFF ISIS			
					ANTWERP	3 Aug 1954	ANT 01		BELGIUM			
						5 Nov 1969	(died)			5 Nov 1969		
16	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					LONDON RP	14 Jul 1966	LON 01		ENGLAND			
						18 Dec 1973	(died)			18 Dec 1973		
17	F	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					LONDON RP	15 Jul 1966	LON 02		ENGLAND			
18	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					LONDON RP	15 Jul 1966	WHI 01		ENGLAND			
					WHIPSNADE	24 Jun 1975	WHI 01		ENGLAND			
					LONDON RP	16 Oct 1978	WHI 01		ENGLAND			
					WHIPSNADE	14 May 1985	WHI 01		ENGLAND			
					LYMPNE	7 Jun 1988	WHI 01		ENGLAND			
19	F	1 Jan 1962	WILD	WILD	WILD	1 Jan 1962	UNK	Wild Born	OFF ISIS			
					WHIPSNADE	26 Jul 1963	WHI 02		ENGLAND			
					LONDON RP	19 Jan 1988	WHI 02		ENGLAND			
					LYMPNE	8 Mar 1989	WHI 02		ENGLAND			
20	M	1 Jan. 1951	WILD	WILD	WILD	1 Jan '1951	UNK	Wild Born	OFF ISIS			
					BRISTOL	18 Oct '1952	BRI 01		ENGLAND			
						7 Apr '1972	(died)			7 Apr 1972		
21	F	1 Jan 1951	WILD	WILD	WILD	1 Jan 1951	UNK	Wild Born	OFF ISIS			
					BRISTOL	18 Oct 1952	BRI 02		ENGLAND			
						25 Jun 1971	(died)			25 Jun 1971		
22	M	28 Jun 1965	7	8	HANNOVER	28 Jun 1965	HOL 01	Captive Born	W.GERMANY			
					BRISTOL MY	27 Jun 1966	HOL 01		ENGLAND			
					BRISTOL	8 May 1974	HOL 01		ENGLAND			
					LONDON RP	22 Mar 1978	HOL 01		ENGLAND			
					WHIPSNADE	16 Oct 1978	HOL 01		ENGLAND			
						26 Feb 1984	(died)			26 Feb 1984		
23	F	24 Aug 1964	20	21	ALMA-ATA	24 Aug 1964	HOL 02	Captive Born	USSR			
						28 Oct 1971	(died)			28 Oct 1971		
24	M	22 Aug 1958	20	21	BRISTOL	22 Aug 1958	CHE 01	Captive Born	ENGLAND			
					CHESTER	7 Mar 1960	CHE 01		ENGLAND			
						3 Jun 1980	(died)			3 Jun 1980		
25	F	1 Jan 1958	WILD	WILD	WILD	1 Jan 1958	UNK	Wild Born	OFF ISIS			
					CHESTER	3 Oct 1959	CHE 02		ENGLAND			
						19 May 1975	(died)			19 May 1975		
26	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					MANCHESTR	15 Jul 1966	MAN 01		ENGLAND			
						1 Mar 1974	(died)			1 Mar 1974		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth Origin	Country	Death Date	Name	Breeder #
27	F	1 Jan 1963	WILD	WILD	WILD	1 Jan 1963	UNK	Wild Born	OFF ISIS			
					MANCHESTR	13 Aug 1964	MAN 02		ENGLAND			
						1 Mar 1975 (died)				1 Mar 1975		
28	M	28 Dec 1961	20	21	BRISTOL	28 Dec 1961	DUB 01	Captive Born	ENGLAND			
					DUBLIN	26 May 1965	DUB 01		IRELAND			
						27 Oct 1971 (died)				27 Oct 1971		
29	F	1 Aug 1960	UNK	UNK	ROTTERDAM	1 Aug 1960	DUB 02	Captive Born	NETHERLND			
					DUBLIN	14 May 1962	DUB 02		IRELAND			
						19 Nov 1976 (died)				19 Nov 1976		
30	F	1 Jan 1958	WILD	WILD	WILD	1 Jan 1958	UNK	Wild Born	OFF ISIS			
					PARIS ZOO	6 Oct 1959	VIN 01		FRANCE			
						21 Nov 1974 (died)				21 Nov 1974		
31	M	1 Jan 1948	WILD	WILD	WILD	1 Jan 1948	UNK	Wild Born	OFF ISIS			
					ARUSHA CT	1 Jan 1949	ZRH 01		TANZANIA			
					ZURICH	24 Sep 1949	ZRH 01		SWITZRLND			
						10 May 1983 (died)				10 May 1983		
32	F	1 Jan 1964	WILD	WILD	WILD	1 Jan 1964	UNK	Wild Born	OFF ISIS			
					ZURICH	30 May 1965	ZRH 02		SWITZRLND			
33	F	1 Jan 1948	WILD	WILD	WILD	1 Jan 1948	UNK	Wild Born	OFF ISIS			
					ARUSHA CT	1 Jan 1949	ZRH 03		TANZANIA			
					ZURICH	24 Sep 1949	ZRH 03		SWITZRLND			
						31 Dec 1982 (died)				31 Dec 1982		
34	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS		SAM	ATA 4
					TURIN	5 Jul 1966	TOR 01		ITALY			
					ATLANTA	26 Sep 1972	UNK		U.S.A.			
						23 Apr 1987 (died)				23 Apr 1987		
35	F	1 Jan 1969	WILD	WILD	WILD	1 Jan 1969	UNK	Wild Born	OFF ISIS			
					TURIN	25 Jun 1970	TOR 02		ITALY			
					GELSENKRCN	1 Sep 1972	TOR 02		W.GERMANY			
					ALMA-ATA	14 Oct 1972	TOR 02		USSR			
					TALLIN	1 Aug 1990	TOR 02		USSR			
36	M	1 Jan 1963	WILD	WILD	WILD	1 Jan 1963	UNK	Wild Born	OFF ISIS			
					NAPLES	6 Jul 1964	NAP 01		ITALY			
37	F	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS			
					NAPLES	6 Oct 1960	UNK		ITALY			
38	F	1 Jan 1961	WILD	WILD	WILD	1 Jan 1961	UNK	Wild Born	OFF ISIS		ROSIE/ROSENAP 3	
					NAPLES	26 Dec 1962	NAP 03		ITALY			
					ATLANTA	23 Nov 1968	UNK		U.S.A.			
					METROZOO	1 Jul 1990	M00966		U.S.A.			
						28 Oct 1989 (died)				28 Oct 1989		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
39	M	1 Jan 1953	WILD	WILD	WILD	1 Jan 1953	UNK	Wild Born	OFF ISIS			
					VIENNA	2 Dec 1954	VIE 01		AUSTRIA			
						29 Apr 1990	(died)			29 Apr 1990		
40	M	1 Jan 1966	WILD	WILD	WILD	1 Jan 1966	UNK	Wild Born	OFF ISIS			
					ZAGREB	18 May 1967	ZAG 01		YUGOSLAV.			
						5 Mar 1982	(died)			5 Mar 1982		
41	F	1 Jan 1963	WILD	WILD	WILD	1 Jan 1963	UNK	Wild Born	OFF ISIS			
					ZAGREB	10 Oct 1964	ZAG 02		YUGOSLAV.			
						28 Mar 1981	(died)			28 Mar 1981		
42	M	1 Jan 1953	WILD	WILD	WILD	1 Jan 1953	UNK	Wild Born	OFF ISIS			
					PRAGUE C	24 Dec 1954	PRG 01		CZECHOSLO			
						24 Sep 1969	(died)			24 Sep 1969		
43	F	1 Jan 1958	WILD	WILD	WILD	1 Jan 1958	UNK	Wild Born	OFF ISIS			
					PRAGUE C	21 Oct 1959	PRG 02		CZECHOSLO			
					SOEST	1 Jan 1972	PRG 02		NETHERLND			
						1 May 1972	(died)			1 May 1972		
44	M	1 Jan 1956	WILD	WILD	WILD	1 Jan 1956	UNK	Wild Born	OFF ISIS			
					LENINGRAD	6 Jul 1957	LED 01		USSR			
					GRODNO	1 Aug 1973	LED 01		USSR			
						24 Dec 1982	(died)			24 Dec 1982		
45	M	1 Jan 1954	WILD	WILD	WILD	1 Jan 1954	UNK	Wild Born	OFF ISIS			
					NY BRONX	10 Jun 1955	NYC 01		U.S.A.			
					(PITTSBURG)	25 Mar 1975	NYC 01		U.S.A.			
						20 Dec 1976	(died)			20 Dec 1976		
46	M	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS			
					NZP-WASH	27 Jul 1960	WAS 01		U.S.A.			
						5 Jun 1979	(died)			5 Jun 1979		
47	F	1 Jan 1960	WILD	WILD	WILD	1 Jan 1960	UNK	Wild Born	OFF ISIS			
					NZP-WASH	30 Aug 1961	WAS 02		U.S.A.			
						23 Jul 1978	(died)			23 Jul 1978		
48	M	1 Jan 1953	WILD	WILD	WILD	1 Jan 1953	UNK	Wild Born	OFF ISIS			
					PITTSBURG	23 May 1954	PIT 01		U.S.A.			
						17 Aug 1974	(died)			17 Aug 1974		
49	F	1 Jan 1953	WILD	WILD	WILD	1 Jan 1953	UNK	Wild Born	OFF ISIS			
					PITTSBURG	23 May 1954	PIT 02		U.S.A.			
						26 Nov 1968	(died)			26 Nov 1968		
50	M	1 Oct 1965	48	49	PITTSBURG	1 Oct 1965	PIT 03	Captive Born	U.S.A.			
					ATLANTA	17 Dec 1967	PIT 03		U.S.A.			
						6 Apr 1972	(died)			6 Apr 1972		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth Origin	Country	Death-Date	Name	Breeder #
51	M	1 Jan 1954	WILD	WILD	WILD	1 Jan 1954	UNK	Wild Born	OFF ISIS			
					CLEVELAND	22 Oct 1956	CLE 01		U.S.A.			
						27 Dec 1975 (died)				27 Dec 1975		
52	M	1 Jan 1966	WILD	WILD	WILD	1 Jan 1966	UNK	Wild Born	OFF ISIS		WATU	DTT 1
					DETROIT	19 Jun 1967	DTT 01		U.S.A.			
					METROZOO	16 Jul 1965	MC0442		U.S.A.			
						5 Sep 1988 (died)				1 Sep 1988		
53	F	1 Jan 1962	WILD	WILD	WILD	1 Jan 1962	UNK	Wild Born	OFF ISIS		BIBI	DTT 2
					FERNDALE	5 Sep 1965	UNK		U.S.A.			
					DETROIT	30 Sep 1965	DTT 02		U.S.A.			
					(OKLAHOMA)	5 Jun 1965	UNK		U.S.A.			
					(SEDGWICK)	2 Aug 1988	3527					
54	M	19 Apr 1962	12070	T2071	DETROIT	19 Apr 1962	309	Captive Born	U.S.A.		HARVEY/CLYDE	1
					OKLAHOMA	28 Jun 1963	024701		U.S.A.			
						1 Nov 1986 (died)				1 Nov 1986		
55	F	27 Jul 1961	56	57	CINCINNAT	27 Jul 1961	UNK	Captive Born	U.S.A.		LOTTIE	OKC 2
					ZEEHANDLR	19 Jun 1962	UNK		U.S.A.			
					CHICAGOLP	- 1963	UNK		U.S.A.			
					OKLAHOMA	28 Jun 1963	UNK		U.S.A.			
					(DETROIT)	5 Jun 1985	1442		U.S.A.			
56	M	1 Apr 1956	WILD	WILD	W.GERMANY	1 Apr 1956	UNK	Captive Born	W.GERMANY		JOHNNY	CVG 1
					MIAMIBCH	- 1957	UNK		U.S.A.			
					CINCINNAT	14 May 1957	A14004		U.S.A.			
					OKLAHOMA	20 Apr 1989	490219		U.S.A.			
						18 Aug 1989 (died)				18 Aug 1989		
57	F	1 Jan 1956	WILD	WILD	WILD	1 Jan 1956	UNK	Wild Born	OFF ISIS			
					MIAMIBCH	1 Apr 1957	CVG 02		U.S.A.			
					CINCINNAT	14 Apr 1957	CVG 02		U.S.A.			
						1 Mar 1971 (died)				1 Mar 1971		
58	M	30 Sep 1964	56	57	CINCINNAT	30 Sep 1964	CVG 03	Captive Born	U.S.A.			
						6 Dec 1970 (died)				6 Dec 1970		
60	M	1 Jan 1934	WILD	WILD	WILD	1 Jan 1934	UNK	Wild Born	OFF ISIS			
					CHICAGOBR	1 May 1935	CHI 01		U.S.A.			
						16 Aug 1967 (died)				16 Aug 1967		
61	F	1 Jan 1934	WILD	WILD	WILD	1 Jan 1934	UNK	Wild Born	OFF ISIS			
					CHICAGOBR	1 May 1935	CH. 02		U.S.A.			
						18 Mar 1980 (died)				18 Mar 1980		
62	M	1 Jan 1960	WILD	WILD	WILD	1 Jan 1960	UNK	Wild Born	OFF ISIS			
					KANSASCITY	8 Jun 1961	MKC 01		U.S.A.			
						17 Jan 1972 (died)				17 Jan 1972		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
63	F	1 Jan 1962	WILD	WILD	WILD	1 Jan 1962	UNK	Wild Born	OFF ISIS			
					KANSASCTY	26 Apr 1963	MKC 02		U.S.A.			
					WICHITA	24 May 1972	UNK		U.S.A.			
					OKLAHOMA	15 Jan 1974	UNK		U.S.A.			
						12 May 1981	(died)			12 May 1981		
64	M	14 Apr 1963	48	49	PITTSBURG	14 Apr 1963	DLH 01	Captive Born	U.S.A.			
					MILWAUKEE	3 Jun 1964	DLH 01		U.S.A.			
					DULUTH	18 Jun 1964	DLH 01		U.S.A.			
						28 Dec 1977	(died)			28 Dec 1977		
65	M	1 Jan 1961	WILD	WILD	WILD	1 Jan 1961	UNK	Wild Born	OFF ISIS			
					FRESNO	3 Nov 1962	MEM 01		U.S.A.			
					MEMPHIS	24 Aug 1964	MEM 01		U.S.A.			
						22 Jun 1967	(died)			22 Jun 1967		
66	M	1 Jan 1953	WILD	WILD	WILD	1 Jan 1953	UNK	Wild Born	OFF ISIS		ROSCOE	DAL 1
					DALLAS	1 Oct 1959	001043		U.S.A.			
						1 Nov 1986	(died)			1 Nov 1986		
67	F	1 Jan 1955	WILD	WILD	WILD	1 Jan 1955	UNK	Wild Born	OFF ISIS		MARSHA	DAL 2
					ZEEHANDLR	- 1956	UNK		U.S.A.			
					DALLAS	1 Sep 1956	001029		U.S.A.			
68	M	1 Jan 1950	WILD	WILD	WILD	1 Jan 1950	UNK	Wild Born	OFF ISIS		CLYDE	CHM 1
					BASEL	- 1951	UNK		SWITZRLND			
					COLUMBUS	1 Jan 1954	542001		U.S.A.			
69	M	23 Oct 1960	48	49	PITTSBURG	23 Oct 1960	JAX 01	Captive Born	U.S.A.			
					JACKSONVL	1 Jan 1961	JAX 01		U.S.A.			
						29 Mar 1970	(died)			29 Mar 1970		
70	F	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS			
					JACKSONVL	14 Feb 1960	JAX 02		U.S.A.			
						6 Apr 1970	(died)			6 Apr 1970		
71	M	1 Jan 1956	WILD	WILD	WILD	1 Jan 1956	UNK	Wild Born	OFF ISIS			
					COLO SPRG	21 May 1957	CHM 01		U.S.A.			
						5 Nov 1982	(died)			5 Nov 1982		
72	F	1 Jan 1966	WILD	WILD	WILD	1 Jan 1966	UNK	Wild Born	OFF ISIS			
					COLO SPRG	26 Jun 1967	CHM 02		U.S.A.			
						13 Jan 1983	(died)			13 Jan 1983		
73	F	1 Jan 1963	WILD	WILD	WILD	1 Jan 1963	UNK	Wild Born	OFF ISIS			
					FRESNO	25 Aug 1964	FAT 01		U.S.A.			
						29 Dec 1970	(died)			29 Dec 1970		
74	M	1 Jan 1955	WILD	WILD	WILD	1 Jan 1955	UNK	Wild Born	OFF ISIS		STONEWALL	SFO 1
					SAN FRAN	22 Nov 1958	1564		U.S.A.			
						7 Nov 1991	(died)			7 Nov 1991		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth Origin	Country	Death Date	Name	Breeder #
75	F	1 Jan 1966	WILD	WILD	WILD	1 Jan 1966	UNK	Wild Born	OFF ISIS			
					SAN FRAN	20 Jan 1967	SFO 02		U.S.A.			
						3 Mar 1973	(died)			3 Mar 1973		
76	F	' Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS		BVINKLE TOLAX 1	
					FERNDALE	- Mar 1966	UNK		U.S.A.			
					LOSANGELE	3 Oct 1966	02776		U.S.A.			
77	M	1 Jan 1952	WILD	WILD	WILD	1 Jan 1952	UNK	Wild Born	OFF ISIS			
					SANDIEGO2	8 Jul 1953	SAN 01		U.S.A.			
						14 Aug 1968	(died)			14 Aug 1968		
78	F	1 Jan 1951	WILD	WILD	WILD	1 Jan 1951	UNK	Unk Birth Type	OFF ISIS		SALLY	SAX 2
					SANDIEGO2	30 Aug 1952	15200?		U.S.A.			
						7 Feb 1985	(died)			7 Feb 1985		
79	M	- 1962	WILD	WILD	AFRICAN	- 1962	UNK	Wild Born	AFRICAN		BULLET	GKA 1
					GRANBY	'1 May 1966	23863B		CANADA			
						- 1986	(died)			- 1986		
80	M	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS			
					CAIRO ZOO	20 Dec 1960	CAI 01		EGYPT			
81	F	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS			
					CAIRO ZOO	20 Dec 1960	CAI 02		EGYPT			
						21 Jan 1970	(died)			21 Jan 1970		
82	M	1 Jan 1963	WILD	WILD	WILD	1 Jan 1963	UNK	Wild Born	OFF ISIS			
					MWANZA	8 Oct 1964	MWA 01		TANZANIA			
						30 Sep 1967	(died)			30 Sep 1967		
85	M	1 Jan 1962	WILD	WILD	WILD	1 Jan 1962	UNK	Wild Born	OFF ISIS			
					JERUSALEM	1 Jan 1963	JER 01		ISRAEL			
						20 Sep 1968	(died)			20 Sep 1968		
86	M	1 Jan 1955	WILD	WILD	WILD	1 Jan 1955	UNK	Wild Born	OFF ISIS			
					MYSORE	17 Jan 1956	MYS 01		INDIA			
87	F	1 Jan 1955	WILD	WILD	WILD	1 Jan 1955	UNK	Wild Born	OFF ISIS			
					MYSORE	17 Jan 1956	MYS 02		INDIA			
88	M	26 Aug 1966	86	87	MYSORE	26 Aug 1966	MYS 03	Captive Born	INDIA			
						1 Jan 1969	(died)			1 Jan 1969		
90	M	1 Jan 1954	WILD	WILD	WILD	1 Jan 1954	UNK	Wild Born	OFF ISIS			
					OSAKA	25 May 1955	OSA 01		JAPAN			
						20 Oct 1961	(died)			20 Oct 1961		
92	M	1 Jan 1958	WILD	WILD	WILD	1 Jan 1958	UNK	Wild Born	OFF ISIS			
					KOBE	1 Sep 1959	UCB 01		JAPAN			
						19 Feb 1970	(died)			19 Feb 1970		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
93	F	1 Jan 1966	WILD	WILD	WILD	1 Jan 1966	UNK	Wild Born	OFF ISIS			
					KOBE	25 May 1967	UKB 02		JAPAN			
						3 Aug 1977	(died)			3 Aug 1977		
94	M	2 Nov 1965	UNK	UNK	KOBE	2 Nov 1965	UKB 03	Captive Born	JAPAN			
						27 Jan 1968	(died)			27 Jan 1968		
95	F	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					NAGOYA	23 Apr 1966	NGO 01		JAPAN			
					FUKUOKA	10 May 1966	NGO 01		JAPAN			
						2 Feb 1967	(died)			2 Feb 1967		
98	M	16 Nov 1963	92	UNK	KOBE	16 Nov 1963	NGO 02	Captive Born	JAPAN			
					NAGOYA	20 Nov 1964	NGO 02		JAPAN			
						24 Aug 1970	(died)			24 Aug 1970		
99	M	1 Jan 1946	WILD	WILD	WILD	1 Jan 1946	UNK	Wild Born	OFF ISIS			
					SYDNEY	10 Jul 1947	SID 01		AUST AUST			
						14 Jun 1978	(died)			14 Jun 1978		
100	F	1 Jan 1947	WILD	WILD	WILD	1 Jan 1947	UNK	Wild Born	OFF ISIS			
					SYDNEY	28 May 1948	SID 02		AUST AUST			
						5 Aug 1974	(died)			5 Aug 1974		
101	F	2 May 1965	99	100	SYDNEY	2 May 1965	SID 03	Captive Born	AUST AUST			
						24 Sep 1980	(died)			24 Sep 1980		
102	F	11 Jan 1963	99	UNK	STANLEY	11 Jan 1963	SID 04	Captive Born	AUST AUST			
					ASHTON	14 Aug 1969	UNK		AUSTRALIA			
					MELBOURNE	1 Jan 1975	SID 04		AUST AUST			
						1 Jan 1978	(died)			1 Jan 1978		
103	M	10 Sep 1967	24	25	CHESTER	10 Sep 1967	CHL 03	Captive Born	ENGLAND			
					ALMA-ATA	30 Jun 1970	CHE 03		USSR			
						15 Jan 1989	(died)			15 Jan 1989		
104	F	3 Jan 1968	7	8	HANNOVER	3 Jan 1968	UNK	Captive Born	W.GERMANY			
					BUDAPEST	20 Jun 1969	UNK		HUNGARY			
					SD-WAP	25 Jun 1983	UNK		U.S.A.			
						21 Mar 1984	(died)			21 Mar 1984		
105	F	1 Jan 1953	WILD	WILD	WILD	1 Jan 1953	UNK	Wild Born	OFF ISIS			
					MOSCOW	4 Jul 1954	MOW 01		USSR			
						14 Jul 1971	(died)			14 Jul 1971		
106	M	26 May 1967	99	100	SYDNEY	26 May 1967	SID 05	Captive Born	AUST AUST			
						24 Jun 1972	(died)			24 Jun 1972		
107	M	1 Jan 1962	WILD	WILD	WILD	1 Jan 1962	UNK	Wild Born	OFF ISIS			
					BARCELONA	1 May 1963	BCN 01		SPAIN			
					BERLIN ZP	24 Jun 1970	BCN 01		E.GERMANY			
						19 Oct 1970	(died)			19 Oct 1970		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
108	F	1 Jan 1962	WILD	WILD	WILD	1 Jan 1962	UNK	Wild Born	OFF ISIS			
					BARCELONA	1 May 1963	BCN 02		SPAIN			
						1 Jan 1964	(died)			1 Jan 1964		
109	M	8 Mar 1958	48	49	PITTSBURG	8 Mar 1958	PIT 04	Captive Born	U.S.A.			
					MEMPHIS	7 Mar 1969	PIT 04		U.S.A.			
						29 Jul 1969	(died)			29 Jul 1969		
110	M	31 Aug 1967	46	47	WSP-WASH	31 Aug 1967	UNK	Captive Born	U.S.A.		DILLON	WAS 3
					SD-WAP	18 Apr 1970	100285		U.S.A.			
					SANDIEGO2	11 Jan 1983	100285		U.S.A.			
111	F	1 Jan 1966	WILD	WILD	WILD	1 Jan 1966	UNK	Wild Born	OFF ISIS			
					BERLIN TP	10 Nov 1967	TI 03		E.GERMANY			
					SOEST	17 Nov 1983	TI 03		NETHERLND			
					HAVANA	5 Dec 1983	TI 03		CUBA			
						1 Dec 1983	(died)			1 Dec 1983		
112	M	1 Jan 1947	WILD	WILD	WILD	1 Jan 1947	UNK	Wild Born	OFF ISIS			
					PHILADELP	11 May 1948	PHL 01		U.S.A.			
						1 Nov 1972	(died)			1 Nov 1972		
117	F	1 Jan 1947	WILD	WILD	WILD	1 Jan 1947	UNK	Wild Born	OFF ISIS			
					BUENOSAIR	20 Oct 1948	BUE 01		ARGENTINA			
						21 Dec 1970	(died)			21 Dec 1970		
118	M	3 Jan 1958	UNK	117	BUENOSAIR	3 Jan 1958	BUE 02	Captive Born	ARGENTINA			
						8 Dec 1973	(died)			8 Dec 1973		
119	F	22 Mar 1962	UNK	117	BUENOSAIR	22 Mar 1962	BUE 03	Captive Born	ARGENTINA			
						2 Nov 1973	(died)			2 Nov 1973		
120	M	1 Jan 1964	WILD	WILD	WILD	1 Jan 1964	UNK	Wild Born	OFF ISIS			
					ST LOUIS	16 Jun 1965	STL 01		U.S.A.			
						19 Apr 1976	(died)			19 Apr 1976		
121	F	1 Jan 1961	WILD	WILD	WILD	1 Jan 1961	UNK	Wild Born	OFF ISIS		OLIVE	SF. 2
					ST LOUIS	16 Jun 1963	065911		U.S.A.			
					(OKLAHOMA)	26 Jun 1991	UNK		U.S.A.			
122	F	1 Jan 1937	WILD	WILD	WILD	1 Jan 1937	UNK	Wild Born	OFF ISIS			
					ST LOUIS	15 Jul 1953	STL 03		U.S.A.			
						16 Jul 1969	(died)			16 Jul 1969		
123	F	1 Jan 1937	WILD	WILD	WILD	1 Jan 1937	UNK	Wild Born	OFF ISIS			
					ST LOUIS	15 Jul 1938	STL 04		U.S.A.			
						11 Aug 1968	(died)			11 Aug 1968		
124	M	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS		TOMBO	DEA 1
					DENVER	c 1960	UNK		U.S.A.			
					GARDEACITY	14 Jul 1984	00456		U.S.A.			
						11 Jul 1987	(died)			11 Jul 1987		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
125	F	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS		MOMBA	DEN 2
					DENVER	26 Feb 1960	DEN 02		U.S.A.			
					(GARDENCITY)	14 Jul 1984	UUU2		U.S.A.			
126	F	20 Jan 1968	124	125	DENVER	20 Jan 1968	DEN 05	Captive Born	U.S.A.			
					MEMPHIS	25 Feb 1969	UNK		U.S.A.			
						10 Jun 1979	(died)			10 Jun 1979		
127	F	16 Jun 1968	20	21	BRISTOL	16 Jun 1968	BRI 03	Captive Born	ENGLAND			
						19 Feb 1969	(died)			19 Feb 1969		
128	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					TELAVIV R	27 Aug 1966	TLV 01		ISRAEL			
					RAMAT GAN	1 Jan 1981	UNK		ISRAEL			
					SANDTON	26 Dec 1989	UNK		AFRICAN			
129	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					TELAVIV R	27 Aug 1966	TLV 02		ISRAEL			
					RAMAT GAN	1 Jan 1981	UNK		ISRAEL			
						14 Apr 1983	(died)			14 Apr 1983		
130	M	1 Jan 1954	WILD	WILD	WILD	1 Jan 1954	UNK	Wild Born	OFF ISIS			
					MUNICH	3 Nov 1955	MUC 01		W.GERMANY			
					SAO PAULO	1 Jan 1974	MUC 01		BRAZIL			
						27 May 1975	(died)			27 May 1975		
131	F	1 Jan 1954	WILD	WILD	WILD	1 Jan 1954	UNK	Wild Born	OFF ISIS			
					MUNICH	3 Nov 1955	MUC 02		W.GERMANY			
					SAO PAULO	1 Jan 1974	MUC 02		BRAZIL			
						19 Jul 1975	(died)			19 Jul 1975		
132	M	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS			
					COLOMBO	17 Dec 1960	CEY 01		SRI LANKA			
133	F	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					COLOMBO	1 Jan 1966	CEY 02		SRI LANKA			
134	F	11 Aug 1968	132	133	COLOMBO	11 Aug 1968	CEY 03	Captive Born	SRI LANKA			
135	M	1 Jan 1955	WILD	WILD	WILD	1 Jan 1955	UNK	Wild Born	OFF ISIS			
					SAN ANTON	1 Jan 1956	STA 01		U.S.A.			
						9 Jul 1977	(died)			9 Jul 1977		
137	F	11 Nov 1969	5	6	FRANKFURT	11 Nov 1969	FRA 03	Captive Born	W.GERMANY			
						9 Jul 1977	(died)			9 Jul 1977		
138	F	1 May 1968	54	55	OKLAHOMA	1 May 1968	OKC 03	Captive Born	U.S.A.			
					BUSCH TAN	7 Sep 1969	UNK		U.S.A.			
						7 Jan 1971	(died)			7 Jan 1971		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
139	F	20 Feb 1970	46	47	WZP-WASH	20 Feb 1970	WAS 04	Captive Born	U.S.A.			
						12 Dec 1980	(died)			12 Dec 1980		
140	F	17 May 1970	20	21	BRISTOL	17 May 1970	BRI 04	Captive Born	ENGLAND			
						12 Feb 1971	(died)			12 Feb 1971		
141	M	8 Sep 1969	92	93	KOBE	8 Sep 1969	UKB 04	Captive Born	JAPAN			
						20 Jan 1980	(died)			20 Jan 1980		
142	M	9 Jul 1969	28	29	DUBLIN	9 Jul 1969	DUB 03	Captive Born	IRELAND			
					LYMPNE	3 Apr 1971	DUB 03		ENGLAND			
143	F	1 Jan 1967	WILD	WILD	WILD	1 Jan 1967	UNK	Wild Born	OFF ISIS			
					GRANBY	1 Jan 1968	GRA 02		CANADA			
						5 Dec 1979	(died)			5 Dec 1979		
145	M	29 Jun 1970	7	8	HANNOVER	29 Jun 1970	HAJ 05	Captive Born	W.GERMANY			
					ZURICH	2 Apr 1981	HAJ 05		SWITZERLAND			
					HANNOVER	25 Apr 1985	HAJ 05		W.GERMANY			
						10 Oct 1985	(died)			10 Oct 1985		
146	M	1 Jan 1968	WILD	WILD	WILD	1 Jan 1968	UNK	Wild Born	OFF ISIS			
					SANDIEGO2	25 May 1969	SAN 03		U.S.A.			
						29 Jun 1980	(died)			29 Jun 1980		
147	F	1 Jan 1969	WILD	WILD	WILD	1 Jan 1969	UNK	Wild Born	OFF ISIS			
					BRISTOL	21 Mar 1973	UNK		ENGLAND			
					CHESTER	18 Mar 1977	UNK		ENGLAND			
					BRISTOL	4 Oct 1978	UNK		ENGLAND			
					CHESTER	29 Oct 1981	UNK		ENGLAND			
						2 Oct 1983	(died)			2 Oct 1983		
148	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					LODZ	25 Jul 1966	LOD 01		POLAND			
					SAOLEOPOL	1 Jul 1995	UNK		BRAZIL			
						29 May 1986	(died)			29 May 1986		
150	F	27 Aug 1970	31	32	ZURICH	27 Aug 1970	ZRH 04	Captive Born	SWITZERLAND			
151	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					GRANBY	1 Jan 1966	UNK		CANADA			
					LOSANGELE	16 Sep 1968	LAX 02		U.S.A.			
						3 Mar 1979	(died)			3 Mar 1979		
152	F	20 Mar 1970	151	76	LOSANGELE	20 Mar 1970	LAX 03	Captive Born	U.S.A.			
					COLUMBUS	6 Nov 1970	UNK		U.S.A.			
						10 Sep 1971	(died)			10 Sep 1971		
153	F	1 Jan 1969	WILD	WILD	WILD	1 Jan 1969	UNK	Wild Born	OFF ISIS			
					MAGDEBURG	30 Aug 1970	MAG 01		E.GERMANY			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
155	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS		JOE	TAM 1
					BUSCH TAM	22 May 1969	15317		U.S.A.			
						5 Jan 1985 (died)				5 Jan 1985		
156	F	24 Dec 1970	40	41	ZAGREB	24 Dec 1970	ZAG 03	Captive Born	YUGOSLAV.			
					OSIJEK	1 Jan 1972	UNK		YUGOSLAV.			
						31 Dec 1972 (died)				31 Dec 1972		
157	M	25 Nov 1970	18	19	WHIPSNADE	25 Nov 1970	WHI 03	Captive Born	ENGLAND			
					DUBLIN	20 Apr 1972	UNK		IRELAND			
						2 May 1973 (died)				2 May 1973		
158	M	1 Jan 1963	WILD	WILD	WILD	1 Jan 1963	UNK	Wild Born	OFF ISIS			
					TEHERAN	1 Jan 1964	TEH 01		IRAN			
159	F	1 Jan 1967	WILD	WILD	WILD	1 Jan 1967	UNK	Wild Born	OFF ISIS			
					TEHERAN	1 Jan 1968	TEH 02		IRAN			
160	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					TEHERAN	17 May 1971	TEH 03		IRAN			
161	M	1 Jan 1972	74	75	SAN FRAN	1 Jan 1972	SFO 03	Captive Born	U.S.A.		RHINESTONESFD	3
					DENVER	6 Sep 1973	00457		U.S.A.			
162	M	1 Jan 1964	WILD	WILD	WILD	1 Jan 1964	UNK	Wild Born	OFF ISIS			
					WROCLAW	1 Jan 1965	WRO 01		POLAND			
						7 Dec 1972 (died)				7 Dec 1972		
163	F	6 Jan 1971	124	125	DENVER	6 Jan 1971	00459	Captive Born	U.S.A.		LIJ	DEN 4
164	M	22 Feb 1971	24	25	CHESTER	22 Feb 1971	CHC 04	Captive Born	ENGLAND			
					PAIGNTON	27 Mar 1973	UNK		ENGLAND			
					CHESTER	30 Jun 1981	CHE 04		ENGLAND			
					LONDON RP	15 Nov 1987	UNK		ENGLAND			
					LYMPNE	17 Jan 1990	UNK		ENGLAND			
165	F	20 Oct 1971	36	37	NAPLES	20 Oct 1971	NAP 04	Captive Born	ITALY			
					ROMA	12 Mar 1974	UNK		ITALY			
166	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					LEIPZIG	27 Nov 1971	LEJ 01		E.GERMANY			
					BERLIN W	5 Apr 1988	UNK		W.GERMANY			
167	F	1 Jan 1967	WILD	WILD	WILD	1 Jan 1967	UNK	Wild Born	OFF ISIS			
					THOIRY	1 Apr 1968	LEJ 02		FRANCE			
					LEIPZIG	25 Jun 1971	LEJ 02		E.GERMANY			
						14 Jan 1986 (died)				14 Jan 1986		
169	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS		LOMO	DVU 1
					DVURKRALY	22 Aug 1971	DVS 01		CZECHOSLO			
					JACKSONVL	22 Jun 1972	UNK		U.S.A.			
					SAN ANTON	22 Apr 1978	781454		U.S.A.			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
170	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					DVURKRALV	22 Aug 1971	DVU 02		CZECHOSLO			
						8 Nov 1979	(died)			8 Nov 1979		
171	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					DVURKRALV	22 Aug 1971	DVU 03		CZECHOSLO			
					WROCLAW	13 Feb 1976	UNK		POLAND			
					DVURKRALV	2 Oct 1980	DVU 03		CZECHOSLO			
					ZURICH	23 Apr 1983	UNK		SWITZRLND			
					TALLIN	12 Sep 1988	UNK		USSR			
172	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					DVURKRALV	22 Aug 1971	DVU 04		CZECHOSLO			
						22 Apr 1978	(died)			22 Apr 1978		
173	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					DVURKRALV	22 Aug 1971	DVU 05		CZECHOSLO			
						26 Jun 1978	(died)			26 Jun 1978		
174	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					DVURKRALV	22 Aug 1971	DVU 06		CZECHOSLO			
						7 Apr 1978	(died)			7 Apr 1978		
175	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					DVURKRALV	22 Aug 1971	DVU 07		CZECHOSLO			
176	F	1 Jan 1968	WILD	WILD	WILD	1 Jan 1968	UNK	Wild Born	OFF ISIS		BONNIE	DVU 8
					DVURKRALV	22 Aug 1971	UNK		CZECHOSLO			
					JACKSONVL	22 Jun 1972	167		U.S.A.			
					(COLUMBUS)	14 May 1978	782005		U.S.A.			
						17 Apr 1982	(died)			17 Apr 1982		
177	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					DVURKRALV	22 Aug 1971	DVU 09		CZECHOSLO			
						24 May 1978	(disc)			24 May 1978		
178	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					DVURKRALV	22 Aug 1971	DVU 10		CZECHOSLO			
179	F	30 Apr 1970	120	121	ST LOUIS	30 Apr 1970	STL 05	Captive Born	U.S.A.			
					MEMPHIS	8 Jun 1971	UNK		U.S.A.			
					SD-WAP	18 Feb 1982	UNK		U.S.A.			
						28 May 1982	(died)			28 May 1982		
180	F	21 Mar 1970	56	57	CINCINNAT	21 Mar 1970	M14C05	Captive Born	U.S.A.		PRINCESS	CVR 5
					(COLUMBUS)	10 Apr 1989	UNK		U.S.A.			
					CINCINNAT	30 Jan 1990	M14C05		U.S.A.			
181	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					HIROSHIMA	14 Jul 1971	HIR 02		JAPAN			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
182	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					HIROSHIMA	14 Jul 1971	HIR 01		JAPAN			
186	F	5 Mar 1972	*20	121	ST LOUIS	5 Mar 1972	STL 06	Captive Born	U.S.A.			
						20 May 1981	(died)			20 May 1981		
187	F	3 May 1972	71	72	COLD SPRG	3 May 1972	130435	Captive Born	U.S.A.		MAYBELLE	CSM 3
						13 Dec 1986	(died)			13 Dec 1986		
188	F	1 Jan 1971	WILD	WILD	WILD	1 Jan 1971	UNK	Wild Born	OFF ISIS			SAM 4
					FERNDALE	~ 1972	UNK		U.S.A.			
					SD-WAP	30 Sep 1972	100287		U.S.A.			
					SANDIEGOZ	19 May 1982	100287		U.S.A.			
					(COLUMBUS)	2 May 1989	B92041		U.S.A.			
189	M	12 Aug 1972	52	53	DETROIT	12 Aug 1972	DTT 03	Captive Born	U.S.A.			
					WICHITA	1 Nov 1973	UNK		U.S.A.			
						7 Jan 1978	(died)			7 Jan 1978		
190	F	26 Nov 1969	16	17	LONDON RP	26 Nov 1969	LDN 03	Captive Born	ENGLAND		LUANA	LDN 3
					DUBLIN	19 Apr 1972	UNK		IRELAND			
					TORONTO	7 Jun 1974	UNK		CANADA			
					SAN ANTON	28 Dec 1976	761258		U.S.A.			
191	F	15 Nov 1972	16	17	LONDON RP	15 Nov 1972	LDN 04	Captive Born	ENGLAND			
						14 Jan 1974	(died)			14 Jan 1974		
192	F	2 May 1972	54	55	OKLAHOMA	2 May 1972	OKC 04	Captive Born	U.S.A.		EDITH ANN	OKC 4
					SEDGWICK	5 Nov 1973	UNK					
					(SANDIEGOZ)	6 Oct 1988	588371		U.S.A.			
193	F	1 Jan 1971	WILD	WILD	WILD	1 Jan 1971	UNK	Wild Born	OFF ISIS			
					WROCLAW	17 Sep 1972	WRO 02		POLAND			
						12 Apr 1979	(died)			12 Apr 1979		
194	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					LYMPNE	26 Jul 1971	BEK 01		ENGLAND			
195	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					LYMPNE	20 Oct 1971	DEK 02		ENGLAND			
197	F	23 Aug 1958	99	100	SYDNEY	23 Aug 1958	SID 07	Captive Born	AUST AUST			
198	M	31 Aug 1973	18	19	WHIPSNADE	31 Aug 1973	WHI 04	Captive Born	ENGLAND			
						21 Nov 1974	(died)			21 Nov 1974		
199	M	1 Jan 1972	WILD	WILD	WILD	1 Jan 1972	UNK	Wild Born	OFF ISIS			
					MEMPHIS	22 Nov 1973	MEM 02		U.S.A.			
						20 Jun 1979	(died)			20 Jun 1979		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
200	F	30 Nov 1973	24	25	CHESTER	30 Nov 1973	CHE 05	Captive Born	ENGLAND			
						18 Mar 1976 (died)				18 Mar 1976		
201	M	1 Jan 1973	WILD	WILD	WILD	1 Jan 1973	UNK	Wild Born	OFF ISIS			
					METROZOO	20 Apr 1974	MIA 01		U.S.A.			
						16 Jun 1980 (died)				16 Jun 1980		
202	F	1 Jan 1972	WILD	WILD	WILD	1 Jan 1972	UNK	Wild Born	OFF ISIS		CORA	MIA 2
					FERNDALE	~ 1973	UNK		U.S.A.			
					METROZOO	15 Jun 1973	'10		U.S.A.			
203	M	1 Jan 1973	WILD	WILD	WILD	1 Jan 1973	UNK	Wild Born	OFF ISIS			
					ROMA	15 Mar 1974	ROM 01		ITALY			
						12 Feb 1983 (died)				12 Feb 1983		
204	M	31 Oct 1974	124	125	DENVER	31 Oct 1974	DEN 05	Captive Born	U.S.A.			
					TORONTO	6 Dec 1975	UNK		CANADA			
						25 Jul 1977 (died)				25 Jul 1977		
205	F	1 Jan 1966	WILD	WILD	WILD	1 Jan 1966	UNK	Wild Born	OFF ISIS			
					AMSTERDAM	3 May 1967	AMS 03		NETHERLND			
					KUALA LUM	7 Jul 1979	D70719		MALAYSIA			
						30 Nov 1979 (died)				30 Nov 1979		
206	F	27 Aug 1971	151	76	LOSANGELE	27 Aug 1971	LAX 04	Captive Born	U.S.A.			
					SANDIEGO2	10 Feb 1972	UNK		U.S.A.			
						5 Feb 1974 (died)				5 Feb 1974		
207	F	~ 1968	WILD	WILD	WILD	~ 1968	UNK	Wild Born	OFF ISIS		BARSTI	CVG 6
					CINCINNAT	12 Jul 1973	#14007		U.S.A.			
						28 Jun 1989 (died)				28 Jun 1989		
208	M	10 May 1975	54	55	OKLAHOMA	10 May 1975	OKC 05	Captive Born	U.S.A.			
					CLEVELAND	19 Jul 1976	UNK		U.S.A.			
						7 Jul 1977 (died)				7 Jul 1977		
209	M	23 Jun 1975	151	76	LOSANGELE	23 Jun 1975	LAX 05	Captive Born	U.S.A.			
					FERNDALE	12 Dec 1975	UNK		U.S.A.			
					OSAKA	14 Dec 1975	UNK		JAPAN			
						14 Jul 1984 (died)				14 Jul 1984		
210	F	28 Nov 1975	18	17	LONDON ZP	28 Nov 1975	LON 05	Captive Born	ENGLAND			
					CHESTER	15 Nov 1977	UNK		ENGLAND			
						19 May 1978 (died)				19 May 1978		
212	F	9 Sep 1975	57	53	DETROIT	9 Sep 1975	313	Captive Born	U.S.A.		BEIST	DT: 4
					(ST LOUIS)	30 Oct 1984	084437		U.S.A.			
213	F	1 Jan 1971	WILD	WILD	WILD	1 Jan 1971	UNK	Wild Born	OFF ISIS		ELLY	SFG 4
					FERNDALE	~ 1974	UNK		U.S.A.			
					SAN FRAN	16 Apr 1974	17415		U.S.A.			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
214	F	1 Jan 1972	WILD	WILD	WILD	1 Jan 1972	UNK	Wild Born	OFF ISIS			
					FERNDALE	1 Jan 1973	UNK		U.S.A.			
					SAN ANTON	9 Jan 1973	SIA 02		U.S.A.			
						12 May '976	(died)			12 May 1976		
215	M	1 Jan 1964	WILD	WILD	WILD	1 Jan 1964	UNK	Wild Born	OFF ISIS			
					NAIROBI	1 Jan 1965	DUB 04		KENYA			
					GREETHORP	1 Jan 1968	UNK		ERELAND			
					DUBLIN	5 Sep 1973	CUS 04		ERELAND			
						13 Oct 1976	(died)			13 Oct 1976		
216	M	1 Jan 1973	WILD	WILD	WILD	1 Jan 1973	UNK	Wild Born	OFF ISIS			
					DVURKRALV	2 Jul 1974	DVU 11		CZECHOSLO			
					LESNA-GOT	5 Apr 1976	UNK		CZECHOSLO			
						31 Jan 1978	(died)			31 Jan 1978		
217	F	1 Jan 1973	WILD	WILD	WILD	1 Jan 1973	UNK	Wild Born	OFF ISIS			
					DVURKRALV	26 Jun 1974	DVU 12		CZECHOSLO			
					ZURICH	23 Apr 1983	UNK		SWITZRLND			
218	F	1 Jan 1973	WILD	WILD	WILD	1 Jan 1973	UNK	Wild Born	OFF ISIS			
					DVURKRALV	2 Jul 1974	DVU 13		CZECHOSLO			
					LESNA-GOT	5 Apr 1976	UNK		CZECHOSLO			
					DVURKRALV	14 Jul 1979	DVU 13		CZECHOSLO			
						24 Apr 1981	(died)			24 Apr 1981		
219	M	1 Jan 1974	WILD	WILD	WILD	1 Jan 1974	UNK	Wild Born	OFF ISIS			
					BERLIN W	19 Oct 1975	BE 03		W.GERMANY			
						15 Jan 1988	(died)			15 Jan 1988		
220	F	1 Jan 1974	WILD	WILD	WILD	1 Jan 1974	UNK	Wild Born	OFF ISIS			
					BERLIN W	19 Oct 1975	BE 04		W.GERMANY			
221	F	1 Jan 1974	WILD	WILD	WILD	1 Jan 1974	UNK	Wild Born	OFF ISIS			
					LANGATO	5 May 1975	UNK		EUROPE			
					BERLIN W	6 May 1975	BE 05		W.GERMANY			
						4 Feb 1983	(died)			4 Feb 1983		
222	M	1 Jan 1974	WILD	WILD	UNKNOWN	1 Jan 1974	UNK	Wild Born				
					LANGATO	5 May 1975	UNK		EUROPE			
						5 May 1975	UNK					
					(BERLIN W)	6 May 1975	BE 06		W.GERMANY			
						6 May 1975	BE 06					
					JOS ZOO	29 Oct 1976	UNK		NIGERIA			
223	M	1 Oct 1972	B6	B7	MYSORE	1 Oct 1972	MYS 04	Captive Born	INDIA			
224	F	29 Oct 1975	B6	B7	MYSORE	29 Oct 1975	MYS 05	Captive Born	INDIA			
225	F	1 Jan 1968	WILD	WILD	WILD	1 Jan 1968	UNK	Wild Born	OFF ISIS		JULIE	TAM 2
					BUSCH TAM	24 Jul 1971	3551A		U.S.A.			
					(CINCINNAT)	16 Aug 1990	900189		U.S.A.			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
226	F	11 Nov 1974	155	225	BUSCH TAM	11 Nov 1974	TAM 03	Captive Born	U.S.A.		FRANCES	TAM 3
					ST FELICI	19 Jul 1978	UNK		CANADA			
						1 Jan 1986	(died)			1 Jan 1986		
227	F	1 Jan 1976	WILD	WILD	UNKNOWN	1 Jan 1976	UNK	Wild Born				
					LANGATO	1 Jun 1975	UNK		EUROPE			
					YESZPREN	21 Apr 1979	BEN 01		HUNGARY			
						21 Apr 1979	(died)			21 Apr 1979		
228	M	1 Jan 1974	WILD	WILD	MAIDUGURI	1 Jan 1974	MDG 01	Wild Born	NIGERIA			
						14 Jan 1977	(died)			14 Jan 1977		
229	F	1 Jan 1974	WILD	WILD	MAIDUGURI	1 Jan 1974	MDG 02	Wild Born	NIGERIA			
230	F	7 Aug 1976	228	229	MAIDUGURI	7 Aug 1976	MDG 03	Captive Born	NIGERIA			
231	F	23 Apr 1973	118	119	BUENOSAIR	23 Apr 1973	BUE 04	Captive Born	ARGENTINA			
232	F	20 Aug 1974	120	121	ST LOUIS	20 Aug 1974	STL 07	Captive Born	U.S.A.			
					TORONTO	2 Dec 1975	UNK		CANADA			
						26 Jul 1977	(died)			26 Jul 1977		
233	F	1 Jan 1969	WILD	WILD	WILD	1 Jan 1969	UNK	Wild Born	OFF ISIS		JUDY	CHI 3
					CHICAGOBR	23 Nov 1973	CHI 03		U.S.A.			
					(SD-WAP	10 Nov 1986	037693		U.S.A.			
234	M	1 Jan 1972	WILD	WILD	WILD	1 Jan 1972	UNK	Wild Born	OFF ISIS			
					CHICAGOBR	11 Dec 1973	CHI 04		U.S.A.			
						16 May 1978	(died)			16 May 1978		
235	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS		BROOKE	CHI 5
					CHICAGOBR	11 Dec 1973	22624		U.S.A.			
236	F	1 Jan 1967	WILD	WILD	UNKNOWN	1 Jan 1967	UNK	Wild Born				
					NAGOYA	18 May 1968	NGO 03		JAPAN			
237	F	1 Jan 1967	WILD	WILD	UNKNOWN	1 Jan 1967	UNK	Wild Born				
					NAGOYA	18 May 1968	NGO 04		JAPAN			
238	M	1 Jan 1971	WILD	WILD	UNKNOWN	1 Jan 1971	UNK	Wild Born				
					NAGOYA	25 Jun 1972	NGO 05		JAPAN			
						23 May 1986	(died)			23 May 1986		
239	F	15 Oct 1976	110	188	SD-WAP	15 Dec 1976	101929	Captive Born	U.S.A.		NANYUKI	SAM 1
						12 Jun 1991	(died)			12 Jun 1991		
240	F	1 Jan 1974	WILD	WILD	UNKNOWN	1 Jan 1974	UNK	Wild Born				
					LANGATO	1 Mar 1975	UNK		EUROPE			
					BERLIN W	6 May 1977	BE 07		W.GERMANY			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
241	M	1 Jan 1974	WILD	WILD	WILD	1 Jan 1974	UNK	Wild Born	OFF ISIS			
					FERNDALE	28 Apr 1975	UNK		U.S.A.			
					(COLUMBUS)	22 Sep 1975	UNK		U.S.A.			
					ZURICH	17 Aug 1976	ZEH 05		SWITZERLND			
						30 Sep 1980	(died)			30 Sep 1980		
242	F	14 Dec 1975	36	37	NAPLES	14 Dec 1975	NAP 05	Captive Born	ITALY			
					PASAND	2 Nov 1976	UNK		ITALY			
					SAOLEOPOL	7 Jun 1978	UNK		BRAZIL			
243	M	31 Oct 1976	155	225	BUSCH TAN	31 Oct 1976	TAM 04	Captive Born	U.S.A.		MACHO	TAM 4
					ST FELICI	19 Jul 1978	UNK		CANADA			
						1 Jan 1986	(died)			1 Jan 1986		
244	F	2 Oct 1977	170	174	DVURKRALV	2 Oct 1977	DVU 14	Captive Born	CZECHOSLO			
245	M	11 Aug 1977	142	194	LYMPNE	11 Aug 1977	BEK 03	Captive Born	ENGLAND			
					(LONDON RP)	17 Jan 1990	UNK		ENGLAND			
246	F	25 Aug 1977	161	163	DENVER	25 Aug 1977	DEN 06	Captive Born	U.S.A.			
						7 Feb 1978	(died)			7 Feb 1978		
247	M	29 Jun 1970	WILD	WILD	W.GERMANY	29 Jun 1970	UNK	Captive Born	W.GERMANY		RALPH	CVG 7
					CINCINNAT	19 Jul 1972	NI4GD6		U.S.A.			
249	F	1 Jan 1975	WILD	WILD	UNKNOWN	1 Jan 1975	UNK	Wild Born				
					PRETORIA	5 Sep 1976	PRY 04		S.AFRICAR			
					ADDO	4 May 1983	UNK		AFRICAN			
250	M	2 Nov 1977	74	213	SAN FRAN	2 Nov 1977	SFO 06	Captive Born	U.S.A.			
					COLOMBO	17 Aug 1978	UNK		SRI LANKA			
251	M	- 1974	WILD	WILD	WILD	1 Jan 1974	UNK	Wild Born	OFF ISIS		TOKO	STL 8
					FERNDALE	22 May 1976	UNK		U.S.A.			
					ST LOUIS	12 Sep 1976	076444		U.S.A.			
252	M	4 Dec 1976	120	121	ST LOUIS	4 Dec 1976	STL 09	Unk Birth Type	U.S.A.			
					FRANKFURT	26 Jun 1978	UNK		W.GERMANY			
					(ZURICH)	28 Jul 1987	UNK		SWITZRLND			
253	M	1 Jan 1967	WILD	WILD	UNKNOWN	1 Jan 1967	UNK	Wild Born				
					KUALA LUM	6 Jul 1968	KUA 05		MALAYSIA			
254	M	1 Jan 1969	WILD	WILD	WILD	1 Jan 1969	UNK	Wild Born	OFF ISIS			
					OKAPANDJA	1 Jan 1970	UNK		NAMIBIA			
					FRANKLINP	9 Jul 1973	UNK		U.S.A.			
					BUFFALO	6 Nov 1976	UNK		U.S.A.			
						18 Jan 1983	(died)			18 Jan 1983		
255	F	1 Jan 1972	WILD	WILD	WILD	1 Jan 1972	UNK	Wild Born	OFF ISIS		BABY/LULU	BOS 2
					FERNDALE	- 1973	UNK		U.S.A.			
					FRANKLINP	- 1973	BOS 02		U.S.A.			
					BUFFALO	6 Nov 1976	UNK		U.S.A.			
					METROZOO	21 Jan 1983	MDO392		U.S.A.			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
256	F	1 Jan 1969	WILD	WILD	UNKNOWN	1 Jan 1969	UNK	Wild Born				
					OKAHANDJA	1 Jan 1970	BOE 03		NAMIBIA			
						5 Apr 1978 (died)				5 Apr 1978		
257	M	9 Dec 1977	254	255	BUFFALO	9 Dec 1977	BUF 31	Captive Born	U.S.A.			
					(TULSA)	26 Nov 1979	UNK		U.S.A.			
						16 Jan 1980 (died)				16 Jan 1980		
258	M	16 Dec 1977	54	55	OKLAHOMA	16 Oct 1977	OKC 06	Captive Born	U.S.A.			
					GELSENKRKN	28 Aug 1979	UNK		W.GERMANY			
					HAVANA	5 Oct 1979	UNK		CUBA			
259	M	10 Apr 1977	182	181	HIROSHIMA	10 Apr 1977	HIR 03	Captive Born	JAPAN		30543	MIA 4
					METROZOO	30 Nov 1983	MQQ208		U.S.A.			
260	M	20 May 1975	99	101	SYDNEY	20 May 1975	SID 08	Captive Born	AUST AUS1			
					(BERLIN %)	19 Jul 1988	UNK		W.GERMANY			
261	M	1 Jan 1973	WILD	WILD	UNKNOWN	1 Jan 1973	UNK	Wild Born				
					DELHI	24 Feb 1975	MDL 01		INDIA			
262	F	1 Jan 1973	WILD	WILD	UNKNOWN	1 Jan 1973	UNK	Wild Born				
					DELHI	24 Feb 1975	MDL 02		INDIA			
263	F	1 Jan 1956	WILD	WILD	UNKNOWN	1 Jan 1956	UNK	Wild Born				
					PEKING	27 Jul 1957	PKG 01		CHINA			
264	F	26 Jan 1965	276	265	PEKING	26 Jan 1965	PKG 02	Captive Born	CHINA			
						1 Jan 1990 (died)				1 Jan 1990		
265	F	4 Sep 1970	276	265	PEKING	4 Sep 1970	PKG 03	Captive Born	CHINA			
266	M	4 Jan 1978	46	139	WASHINGTO	4 Jan 1978	WAS 05	Captive Born	U.S.A.			
					FERNDALE	17 Apr 1984	UNK		U.S.A.			
					SEOUL	25 Apr 1984	UNK		KOREA S			
267	F	16 Sep 1976	56	207	CINCINNAT	16 Sep 1976	H14008	Captive Born	U.S.A.		SWEET PEA	CVT 8
					LOSANGELE	27 Oct 1979	09851		U.S.A.			
268	M	3 Nov 1977	247	180	CINCINNAT	3 Nov 1977	CVG 09	Captive Born	U.S.A.			
					DVURKRALV	13 Nov 1978	UNK		CZECHOSLO			
269	M	20 Sep 1978	18	17	LONDON RP	20 Sep 1978	LDN 06	Captive Born	ENGLAND			
					MARWELL	3 Dec 1980	UNK		ENGLAND			
						26 Feb 1986 (died)				26 Feb 1986		
270	F	25 Jul 1978	36	37	NAPLES	25 Jul 1978	NAP 06	Captive Born	ITALY			
					FRANKFURT	10 Jun 1982	UNK		W.GERMANY			
						7 Dec 1986 (died)				7 Dec 1986		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
271	M	18 Sep 1978	243	150	ZURICH	18 Sep 1978	UNK	Captive Born	SWITZRLND		EMBU	ZRH 06
					CHICAGOBR	5 Aug 1980	24401		U.S.A.			
272	M	7 Dec 1978	201	202	METROZOO	7 Dec 1978	MIA 03	Captive Born	U.S.A.			
					BUENOSAIR	27 Nov 1979	UNK		ARGENTINA			
						20 Feb 1980	(died)			20 Feb 1980		
273	F	1 Jan 1973	WILD	WILD	WILD	1 Jan 1973	UNK	Wild Born	OFF ISIS			
					FERNDALE	16 Apr 1974	UNK		U.S.A.			
					ASHEBORO	17 Apr 1974	NCL 01		U.S.A.			
					BUFFALO	10 Nov 1978	UNK		U.S.A.			
						20 Sep 1980	(died)			20 Sep 1980		
274	M	1 Jan 1973	WILD	WILD	WILD	1 Jan 1973	UNK	Wild Born	OFF ISIS			
					FERNDALE	16 Apr 1974	UNK		U.S.A.			
					ASHEBORO	17 Apr 1974	NCL 02		U.S.A.			
						30 Apr 1974	(died)			30 Apr 1974		
275	M	1 Jan 1973	WILD	WILD	WILD	1 Jan 1973	UNK	Wild Born	OFF ISIS			
					ASHEBORO	24 Oct 1974	NCL 03		U.S.A.			
						3 Feb 1977	(died)			3 Feb 1977		
276	M	1 Jan 1956	WILD	WILD	UNKNOWN	1 Jan 1956	UNK	Wild Born				
					PEKING	27 Jul 1957	PKG 04		CHINA			
						17 Oct 1971	(died)			17 Oct 1971		
277	M	23 Jan 1979	9	153	MAGDEBURG	23 Jan 1979	MAG 02	Captive Born	E.GERMANY			
278	F	16 Sep 1979	18	19	WHIPSNADE	16 Sep 1979	WHI 05	Captive Born	ENGLAND			
					(MARWELL)	9 Jun 1981	UNK		ENGLAND			
						18 Mar 1986	(died)			18 Mar 1986		
279	F	3 Nov 1979	161	163	DENVER	3 Nov 1979	DEN 07	Captive Born	U.S.A.			
						26 Dec 1979	(died)			26 Dec 1979		
281	M	8 Dec 1979	74	213	SAN FRAN	8 Dec 1979	505	Captive Born	U.S.A.		Stonebreak	SFO 5
						17 Dec 1987	(died)			17 Dec 1987		
282	F	5 Jul 1978	170	217	DVUKRALY	5 Jul 1978	DVU 15	Captive Born	CZECHOSLO			
283	M	18 Mar 1979	172	175	DVUKRALY	18 Mar 1979	DVU 16	Captive Born	CZECHOSLO			
284	F	12 Sep 1979	182	181	HIROSHIMA	12 Sep 1979	HIR 04	Captive Born	JAPAN			
					TAIPEI	13 Apr 1987	UNK		TAIWAN			
285	M	7 Nov 1978	199	126	MEMPHIS	7 Nov 1978	UNK	Captive Born	U.S.A.		BUSTER/BLOMEN	3
					LOSANGELE	27 Aug 1979	09850		U.S.A.			
287	F	7 Jun 1979	238	237	NAGOYA	7 Jun 1979	NGO 06	Captive Born	JAPAN			
					CHENGDU	16 Aug 1982	UNK					
						1 Sep 1982	(died)			1 Sep 1982		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
288	M	13 Feb 1980	238	257	NAGOYA	13 Feb '980	NGO 07	Captive Born	JAPAN			
					CHENGDU	16 Aug '982	UNK					
289	M	3 Feb 1980	203	165	ROMA	3 Feb '980	ROM 02	Captive Born	ITALY			
						5 Aug '984	(died)			5 Aug 1984		
290	F	6 Nov 1970	71	72	COLO SPRG	6 Nov '970	CHH 04	Captive Born	U.S.A.			
						10 Nov 1972	(died)			10 Nov 1972		
291	M	18 Aug 1977	UNK	UNK	KOBE	18 Aug 1977	UNK	Captive Born	JAPAN			
					PEKING	24 Jul 1979	PEQ 05		CHINA			
292	M	11 Dec 1979	79	293	DRANBY	11 Dec 1979	UNK	Captive Born	CANADA		CORNELIUS	GRA 3
					SANDIEGOZ	25 May 1983	181039		U.S.A.			
					SD-WAP	11 Apr 1985	181039		U.S.A.			
293	F	1 Jan 1972	WILD	WILD	WILD	1 Jan 1972	UNK	Wild Born	OFF ISIS		SUZY	GRA 4
					GRANBY	6 Jun 1973	238637		CANADA			
						16 Dec 1986	(died)			16 Dec 1986		
294	F	21 May 1981	169	190	SAN ANTON	21 May 1981	STA 03	Captive Born	U.S.A.		MARSHA	STA 3
					CHICAGOLP	21 Jul 1982	6798		U.S.A.			
295	F	10 Sep 1981	9	153	MAGDEBURG	10 Sep 1981	MAG 03	Captive Born	E.GERMANY			
296	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS		CARLOS	MEX 01
					MEXICOCTY	1 Jan 1971	MEX 01		MEXICO			
297	F	1 Jan '970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS		SUSANA	MEX 02
					MEXICOCIT	1 Jan 1971	MEX 02		MEXICO			
298	F	23 Dec 1981	219	221	BERLIN W	23 Dec 1981	BE 08	Captive Born	W.GERMANY			
299	F	1 Jan 1975	WILD	WILD	UNKNOWN	1 Jan 1975	UNK	Wild Born				
					HAVANA	1 Jan 1976	LHC 01		CUBA			
300	M	29 Mar 1979	169	190	SAN ANTON	29 Mar 1979	STA 04	Captive Born	U.S.A.			
						29 Mar 1979	(died)			29 Mar 1979		
301	M	25 Feb 1980	56	207	CINCINNAT	25 Feb 1980	N14016	Captive Born	U.S.A.		EUGENE	CNG 10
					SEDGWICK	23 Jun 1981	779					
302	M	7 Aug 1980	247	180	CINCINNAT	7 Aug 1980	N14015	Captive Born	U.S.A.		MWANIKI	CNG 11
					(SD-WAP	) 29 Sep 1981	681515		U.S.A.			
303	M	1 Jan 1954	WILD	WILD	UNKNOWN	1 Jan 1954	UNK	Wild Born				
					BANGKOK	21 Nov 1955	BAN 01		THAILAND			
						28 Apr 1985	(died)			28 Apr 1985		
304	M	9 Jul 1981	155	225	DENVER	9 Jul 1981	DEN 08	Captive Born	U.S.A.			
						9 Jul 1981	(died)			9 Jul 1981		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
305	M	31 Mar 1981	182	181	HIROSHIMA	31 Mar 1981	HOR 05	Captive Born	JAPAN		AKI	AJR 5
					COLO SPRG	13 Nov 1983	101541		U.S.A.			
306	F	18 May 1980	142	'95	LYMPNE	18 May 1980	>YT 01	Captive Born	ENGLAND			
						18 May 1980	(died)			18 May 1980		
307	F	1 Jan 1967	WILD	WILD	WILD	1 Jan 1967	UNK	Wild Born	OFF ISIS			
					GRANBY	1 Jan 1968	GRA 05		CANADA			
						5 Dec 1970	(died)			5 Dec 1970		
308	M	18 Oct 198'	74	213	SAN FRAN	18 Oct 1981	SFO 07	Captive Born	U.S.A.		MARSHALL	SFO 7
					(CHICAGOLP)	17 Jun 1982	6780		U.S.A.			
309	F	30 Jun 1981	155	225	BUSCH TAM	30 Jun 1981	TAM 05	Captive Born	U.S.A.			
						19 Aug 1982	(died)			19 Aug 1982		
310	F	5 May 1982	219	243	BERLIN W	5 May 1982	BE 09	Captive Born	W.GERMANY			
						1 Mar 1984	(died)			1 Mar 1984		
311	F	1 Jan 1973	WILD	WILD	WILD	1 Jan 1973	UNK	Wild Born	OFF ISIS		KENYA	HAT 01
					FERNDALE	22 Oct 1974	UNK		U.S.A.			
					RNSCHNITT	24 Oct 1974	UNK		U.S.A.			
					COLUMBUS	6 Oct 1984	542122		U.S.A.			
					BUSCH TAM	24 Oct 1986	UNK		U.S.A.			
					DALLAS	13 Dec 1986	864857		U.S.A.			
312	F	22 May 1982	18	17	LONDON RP	22 May 1982	LON 07	Captive Born	ENGLAND			
					(CHESTER)	9 May 1984	UNK		ENGLAND			
313	F	1 Jan 1973	158	159	TEHERAN	1 Jan 1973	TEH 04	Captive Born	IRAN			
314	M	1 Jan 1975	158	159	TEHERAN	1 Jan 1975	TEH 05	Captive Born	IRAN			
						1 Jan 1984	(died)			1 Jan 1984		
315	F	1 Jan 1977	158	159	TEHERAN	1 Jan 1977	TEH 06	Captive Born	IRAN			
316	F	1 Oct 1980	158	159	TEHERAN	1 Oct 1980	TEH 07	Captive Born	IRAN			
						1 Feb 1981	(died)			1 Feb 1981		
317	F	29 Sep 1982	56	207	CINCINNAT	29 Sep 1982	M14028	Captive Born	U.S.A.		NAIVASHA	CVS 12
					(CHICAGOLP)	12 Jun 1984	7421		U.S.A.			
318	M	4 Oct 1982	22	19	WHIPSNADE	4 Oct 1982	WHI 06	Captive Born	ENGLAND			
					(CHESTER)	1 May 1984	UNK		ENGLAND			
319	M	27 Mar 1982	54	55	OKLAHOMA	27 Mar 1982	OKC 07	Captive Born	U.S.A.			
						14 Apr 1982	(died)			14 Apr 1982		
320	M	1 Jan 1959	WILD	WILD	UNKNOWN	1 Jan 1959	UNK	Wild Born				
					FUKUOKA	1 Jan 1960	KAG 01		JAPAN			
					<IRAKAWA	8 Jul 1976	UNK		JAPAN			
					KAGOYA	13 Jun 1986	UNK		JAPAN			
					YOSHIKAWA	30 May 1988	UNK		JAPAN			
						1 Jan 1990	(died)			1 Jan 1990		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
321	F	1 Jan 1971	WILD	WILD	UNKNOWN	1 Jan 1971	UNK	Wild Born				
					KAGOSHIMA	5 Oct 1972	KAG 02		JAPAN			
						5 Sep 1983	(died)			5 Sep 1983		
322	M	23 Apr 1981	320	321	KAGOSHIMA	23 Apr 1981	KAG 03	Captive Born	JAPAN			
						21 Feb 1983	(died)			21 Feb 1983		
323	M	1 Jan 1972	WILD	WILD	UNKNOWN	1 Jan 1972	UNK	Wild Born				
					HITACHI	29 Oct 1974	HIT 01		JAPAN			
324	M	' Jan 1968	WILD	WILD	UNKNOWN	1 Jan 1968	UNK	Captive Born				
					HITACHI	5 Jun 1969	HIT 02		JAPAN			
						12 Dec 1969	(died)			12 Dec 1969		
325	F	1 Jan 1968	WILD	WILD	UNKNOWN	1 Jan 1968	UNK	Wild Born				
					HITACHI	12 Jun 1969	HIT 03		JAPAN			
						6 Sep 1974	(died)			6 Sep 1974		
326	M	1 Jan 1964	WILD	WILD	UNKNOWN	1 Jan 1964	UNK	Wild Born				
					KUMAMOTO	1 Jan 1965	UNK		JAPAN			
					HITACHI	21 Jul 1971	HIT 04		JAPAN			
						16 Nov 1973	(died)			16 Nov 1973		
327	F	5 Nov 1980	323	185	HITACHI	5 Nov 1980	HIT 05	Captive Born	JAPAN			
						5 Nov 1980	(died)			5 Nov 1980		
328	F	15 Nov 1982	161	163	DENVER	15 Nov 1982	06258	Captive Born	U.S.A.		ONYX	DEN 9
329	M	15 Jun 1979	261	262	DELHI	15 Jun 1979	NDL 03	Captive Born	INDIA			
						15 Jul 1979	(died)			15 Jul 1979		
330	F	28 Dec 1981	261	262	DELHI	28 Dec 1981	NDL 04	Captive Born	INDIA		JERI	DELHI 4
					PERIDALE	- 1989	UNK		U.S.A.			
					OKLAHOMA	2 Feb '989	484717		U.S.A.			
					ST LOUIS	28 Jun '991	UNK		U.S.A.			
331	F	11 Dec 1982	169	190	SAN ANTON	11 Dec 1982	STA 05	Captive Born	U.S.A.		SHY-ANNE	STA 5
					SAN FRAN	- 1984	UNK		U.S.A.			
					(KANSASCITY)	15 Jul 1984	UNK		U.S.A.			
					(COLO SPRS)	14 Jan 1987	870004		U.S.A.			
332	M	11 Jan 1983	247	180	CINCINNAT	11 Jan 1983	UNK	Captive Born	U.S.A.		AKEEM	CVC 13
					(DENVER)	13 Jul 1984	07986		U.S.A.			
337	M	3 Oct 1983	74	213	SAN FRAN	3 Oct 1983	SFO 06	Captive Born	U.S.A.		BLACKSTONESFO 6	
					KANSASCITY	19 Nov 1984	UNK		U.S.A.			
						12 Jul 1985	(died)			12 Jul 1985		
341	M	3 Oct 1983	142	195	LYMPNE	3 Oct 1983	HYT 02	Captive Born	ENGLAND			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
342	F	11 Nov 1983	142	194	LYNPNE	11 Nov 1983	HYT 05	Captive Born	ENGLAND			
343	F	4 Apr 1983	155	225	BUSCH TAM	4 Apr 1983	10237	Captive Born	U.S.A.		JULIET	TAM 6
						10 Sep 1987	(died)			10 Sep 1987		
344	F	11 Aug 1982	79	293	GRANBY	11 Aug 1982	GRA 06	Captive Born	CANADA			
					FERNDALE	9 Aug 1983	UNK		U.S.A.			
					SEOUL	1 Nov 1983	UNK		KOREA S			
						10 Dec 1983	(died)			10 Dec 1983		
345	F	15 Aug 1983	36	37	NAPLES	15 Aug 1983	NAP 07	Captive Born	ITALY			
346	M	30 Oct 1982	182	189	HIROSHIMA	30 Oct 1982	HIR 06	Captive Born	JAPAN			
					OSAKA	18 Sep 1989	HIR 06		JAPAN			
347	M	10 Aug 1984	219	240	BERLIN W	10 Aug 1984	BE 10	Captive Born	W.GERMANY			
348	M	3 May 1982	254	255	BUFFALO	3 May 1982	BOS 04	Captive Born	U.S.A.			
						3 May 1982	(died)			3 May 1982		
349	M	21 Oct 1984	171	150	ZURICH	21 Oct 1984	ZRH 07	Captive Born	SWITZERLND			
					FRANCFURT	27 Jul 1987	ZRH 07		W.GERMANY			
350	M	7 Mar 1984	238	237	NAGOYA	7 Mar 1984	NGO 08	Captive Born	JAPAN			
					TAIPEI	21 Oct 1986	NGO 08		TAIWAN			
351	F	24 Jun 1985	74	213	SAN FRAN	24 Jun 1985	SFO 08	Captive Born	U.S.A.		MOONSTONE	SFO 9
					(METROZOO)	15 Mar 1987	M00744		U.S.A.			
353	F	31 Oct 1985	251	321	ST LOUIS	31 Oct 1985	085437	Captive Born	U.S.A.		MCHAUI	
						27 Apr 1986	(died)			27 Apr 1986		
354	F	9 Aug 1984	182	184	HIROSHIMA	9 Aug 1984	HIR 06	Captive Born	JAPAN			
					TAIPEI	21 Oct 1986	HIR 06		TAIWAN			
355	M	17 Aug 1985	261	262	DELHI	17 Aug 1985	NDL 05	Captive Born	INDIA			
						17 Aug 1985	(died)			17 Aug 1985		
356	M	9 Feb 1986	155	225	BUSCH TAM	9 Feb 1986	10539	Captive Born	U.S.A.		LITTLE JOEYAN	7
357	M	21 Oct 1985	252	270	FRANKFURT	21 Oct 1985	FRA 04	Captive Born	W.GERMANY			
						23 Oct 1985	(died)			23 Oct 1985		
358	M	29 Dec 1985	18	19	WHIPSNADE	29 Dec 1985	WHI 07	Captive Born	ENGLAND			
						29 Dec 1985	(died)			29 Dec 1985		
359	F	1 Feb 1986	169	190	SAN ANTON	1 Feb 1986	SA0200	Captive Born	U.S.A.		CRISTA	STA 6
					CINCINNAT	16 Jul 1987	M14050		U.S.A.			
					(CALDWELL)	17 Jul 1987	001111		U.S.A.			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
363	F	25 Aug 1985	285	267	LOSANGELE	25 Aug 1985	LAX 09	Captive Born	U.S.A.		ASHANTI	LAX 9
					KANSASCTY	17 Jan 1988	002218		U.S.A.			
						27 Jan 1988	(died)			27 Jan 1988		
361	M	3 Oct 1985	54	55	DETROIT	3 Oct 1985	1652	Captive Born	U.S.A.		J.J.	OKC 6
					OKLAHOMA	3 Oct 1985	OKC 08		U.S.A.			
					DETROIT	12 Oct 1985	(died)		U.S.A.	12 Oct 1985		
362	M	11 Mar 1986	259	202	METROZOO	11 Mar 1986	MIA 03	Captive Born	U.S.A.		MAKUU	MIA 5
					CALDWELL	15 Sep 1988	001315		U.S.A.			
363	M	14 Dec 1985	247	180	CINCINNAT	14 Dec 1985	M14046	Captive Born	U.S.A.		KABISA	CVS 14
					(CHICAGOBR)	23 Mar 1987	870051		U.S.A.			
364	F	27 Dec 1985	56	207	CINCINNAT	27 Dec 1985	M14047	Captive Born	U.S.A.		SABABU	CVS 15
					SAN ANTON	17 Jul 1987	870793		U.S.A.			
365	F	18 Jan 1986	271	235	CHICAGOBR	18 Jan 1986	850006	Captive Born	U.S.A.		SHIMA	CHI 06
366	F	6 Dec 1986	219	220	BERLIN W	6 Dec 1986	BE 11	Captive Born	W.GERMANY			
367	F	6 Nov 1986	251	212	ST LOUIS	6 Nov 1986	UNK	Captive Born	U.S.A.			DTT 5
					DETROIT	6 Nov 1986	DTT 05		U.S.A.			
					(CALDWELL)	9 Jul 1987	086435		U.S.A.			
						31 Jan 1990	(died)			31 Jan 1990		
372	M	11 Dec 1986	271	235	CHICAGOBR	11 Dec 1986	Cvl 07	Captive Born	U.S.A.		SORKY	CHI 07
					(CALDWELL)	22 Oct 1988	001425		U.S.A.			
373	M	3 Mar 1986	182	284	HIROSHIMA	3 Mar 1986	HIR 08	Captive Born	JAPAN			
						3 Mar 1986	(died)			3 Mar 1986		
374	F	10 Sep 1986	182	181	HIROSHIMA	10 Sep 1986	HIR 09	Captive Born	JAPAN			
375	F	25 Feb 1987	279	240	BERLIN W	25 Feb 1987	BE 12	Captive Born	W.GERMANY			
						23 Dec 1988	(died)			23 Dec 1988		
376	M	7 May 1987	157	163	DENVER	7 May 1987	10522	Captive Born	U.S.A.		PETE	
					PORTLAND	25 Jun 1986	88036		U.S.A.			
377	M	12 Jul 1987	302	239	SD-WAP	12 Jul 1987	687486	Captive Born	U.S.A.		MASHAKI	SAW 2
					SANDIEGOZ	5 Jan 1990	687485		U.S.A.			
					(LANSING)	30 Jun 1990	1304		U.S.A.			
381	M	10 Jun 1986	285	76	LOSANGELE	10 Jun 1986	LAX 10	Captive Born	U.S.A.		ZAKAR	LAX 10
					(OKLAHOMA)	9 Jun 1988	460416		U.S.A.			
					(MILWAUKEE)	27 Jun 1989	3359		U.S.A.			
					RIVERBANK	23 May 1991	1377		U.S.A.			
382	F	31 Dec 1986	259	255	METROZOO	31 Dec 1986	MD071'	Captive Born	U.S.A.		TAIKA	MIA 5
						3 Feb 1989	(died)			3 Feb 1989		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
383	F	2 Jul 1988	74	213	SAN FRAN	2 Jul 1988	188050	Captive Born	U.S.A.		GEMSTONE	SFO 10
					(MILWAUKEE)	19 Dec 1989	3400		U.S.A.			
					RIVERBANK	6 Jun 1991	1378		U.S.A.			
384	F	25 Nov 1988	18	19	LONDON RP	25 Nov 1988	LON 08	Captive Born	ENGLAND			
385	M	20 Dec 1988	166	240	BERLIN W	20 Dec 1988	BE 15	Captive Born	W.GERMANY			
						20 Dec 1988	(died)			20 Dec 1988		
386	M	15 May 1984	268	244	DVURKRALV	15 May 1984	DVU 17	Captive Born	CZECHOSLO			
387	F	0 Dec 1984	268	175	DVURKRALV	8 Dec 1984	DVU 18	Captive Born	CZECHOSLO			
388	M	26 Aug 1986	268	282	DVURKRALV	26 Aug 1986	DVU 19	Captive Born	CZECHOSLO		BOMA	DVU 19
					ATLANTA	18 Oct 1989	891043		U.S.A.			
389	M	12 Sep 1988	292	233	SD-WAP	12 Sep 1988	688551	Captive Born	U.S.A.		JIONI	SAN 03
					CHICAGOHR	12 Sep 1988	880335		U.S.A.			
					(COLUMBUS)	9 Oct 1989	892117		U.S.A.			
391	M	21 May 1989	268	175	DVURKRALV	21 May 1989	DVU 20	Captive Born	CZECHOSLO			
					LONDON ZP	21 Nov 1990	DVU 20		ENGLAND			
395	M	18 Mar 1988	52	202	METROZOO	18 Mar 1988	M30924	Captive Born	U.S.A.		TAFOO	MIA 6
396	F	4 Nov 1988	271	235	CHICAGOBR	4 Nov 1988	880388	Captive Born	U.S.A.		MIADI	
					(PORTLAND)	15 Mar 1990	90023		U.S.A.			
397	F	19 Oct 1988	247	180	CINCINNAT	19 Oct 1988	M14066	Captive Born	U.S.A.		TULIABA	ALCVU 16
					(COLUMBUS)	10 Apr 1989	892021		U.S.A.			
398	F	28 Jan 1989	259	255	METROZOO	28 Jan 1989	M01055	Captive Born	U.S.A.		WOME ASSIGMIA	7
						8 Feb 1989	(died)			8 Feb 1989		
408	F	30 Oct 1989	18	195	LYMPNE	30 Oct 1989	HYT 04	Captive Born	ENGLAND			
409	M	1 Jan 1953	WILD	WILD	WILD	1 Jan 1953	UNK	Wild Born	OFF ISIS		RUDY	
					PROSPECTP	12 Jul 1954	PRO 01		U.S.A.			
					DETROIT	1 Aug 1988	2492		U.S.A.			
417	F	1 Oct 1989	268	282	DVURKRALV	1 Oct 1989	DVU 21	Captive Born	CZECHOSLO			
418	F	23 Mar 1989	281	55	DETROIT	23 Mar 1989	UNK	Captive Born	U.S.A.			
					OKLAHOMA	24 Mar 1989	OCC 09		U.S.A.			
					(DETROIT)	24 Mar 1989	2797		U.S.A.			
					(BUSCH GAR)	10 Aug 1990	UNK		U.S.A.			
419	M	21 May 1989	306	317	CHICAGOLP	21 May 1989	8910	Captive Born	U.S.A.		AHADI	CMI 01
					CINCINNAT	22 May 1989	UNK		U.S.A.			
					(GARDENCITY)	31 Jul 1990	UNK		U.S.A.			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
420	M	24 Jul 1988	182	181	[illegible]NA	24 Jul 1988	HIR 13	Captive Born	JAPAN			
422	F	7 Mar 1989	252	150	ZURICH	7 Mar 1989	ZRH 08	Captive Born	SWITZRLND			
423	F	5 Jan 1990	251	242	ST LOUIS	5 Jan 1990	090001	Captive Born	U.S.A.			
						12 Jan 1990	(died)			12 Jan 1990		
425	M	9 Jan 1990	18	194	LYMPNE	9 Jan 1990	HYT 05	Captive Born	ENGLAND			
						22 Feb 1990	(died)			22 Feb 1990		
426	F	6 Jan 1990	74	213	SAN FRAN	6 Jan 1990	190005	Captive Born	U.S.A.		ROSETTA ST	
					(ATLANTA)	23 Nov 1990	901030		U.S.A.			
427	M	25 Feb 1990	292	239	SD-WAP	25 Feb 1990	690075	Captive Born	U.S.A.		Makili	SAV 6
428	F	12 Dec 1990	166	298	BERLIN W	12 Dec 1990	BE 14	Captive Born	W.GERMANY			
430	M	21 Sep 1990	252	217	ZURICH	21 Sep 1990	ZRH 09	Captive Born	SWITZRLND			
431	F	24 Aug 1990	268	244	DVUREKR.V	24 Aug 1990	DVU 22	Captive Born	CZECHOSLO			
432	M	30 Oct 1989	161	153	DENVER	30 Oct 1989	11902	Captive Born	U.S.A.		JASPER	DEN 11
434	M	8 Jun 1990	323	185	HITACHI	8 Jun 1990	HIT 07	Captive Born	JAPAN			
435	M	29 Nov 1990	292	255	SD-WAP	29 Nov 1990	690705	Captive Born	U.S.A.		JIMMA	SAV 5
12064	F	4 Oct 1990	332	328	DENVER	4 Oct 1990	UNK	Captive Born	U.S.A.		KWANZA	
						30 Jan 1992	(died)			30 Jan 1992		
*2065	F	7 Mar 1991	271	235	CHICAGOBR	7 Mar 1991	910037	Captive Born	U.S.A.		AKILI	
T2067	M	21 Oct 1991	251	212	ST LOUIS	21 Oct 1991	UNK	Captive Born	U.S.A.			
T2070	M	- 1956	WILD	WILD	WILD	- 1956	UNK	Wild Born	OFF ISIS		SOLO	
					DETROIT	18 May 1957	307		U.S.A.			
						3 Oct 1966	(died)			3 Oct 1966		
T2071	F	- 1955	WILD	WILD	WILD	- 1955	UNK	Wild Born	OFF ISIS		MANDA	
					DETROIT	18 May 1957	308		U.S.A.			
						11 Nov 1964	(died)			11 Nov 1964		
T2072	F	1 Nov 1964	T2070	T2071	DETROIT	1 Nov 1964	UNK	Captive Born	U.S.A.			
						19 Mar 1965	(died)			19 Mar 1965		
T2073	M	- 1927	WILD	WILD	WILD	- 1927	UNK	Wild Born	OFF ISIS		JOHNNY	
					DETROIT	5 Jun 1930	UNK		U.S.A.			
						19 Dec 1956	(died)			19 Dec 1956		
T2074	F	1 Jan 1927	WILD	WILD	WILD	1 Jan 1927	UNK	Wild Born	OFF ISIS		FARO	
					DETROIT	8 Aug 1930	UNK		U.S.A.			
						3 Jun 1955	(died)			3 Jun 1955		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Cate	Name	Breeder #
Y2075	M	26 MAY 1992	332	328	DENVER	26 MAY 1992	UNK	Captive Born	U.S.A.			

TOTALS: 187.193,0 (380)

EASTERN BLACK RHINO Studbook

Restricted to: (Diceros bicornis michaeli)
Dates: During 20/04/1992 <= date .and. date <= 21/04/1992
Status: Living during 20 Apr 1992 -> 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
9	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					GELSNKRKN	25 May 1966	HAJ 03		W.GERMANY			
					HANNOVER	8 Jan 1967	HAJ 03		W.GERMANY			
					MAGDEBURG	29 Aug 1967	HAJ 03		E.GERMANY			
17	F	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					LONDON RP	15 Jul 1966	LDN 02		ENGLAND			
18	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					LONDON RP	15 Jul 1966	WHI 01		ENGLAND			
					WHIPSNADE	24 Jun 1975	WHI 01		ENGLAND			
					LONDON RP	16 Oct 1978	WHI 01		ENGLAND			
					WHIPSNADE	14 May 1985	WHI 01		ENGLAND			
					LYMPNE	7 Jun 1988	WHI 01		ENGLAND			
19	F	1 Jan 1962	WILD	WILD	WILD	1 Jan 1962	UNK	Wild Born	OFF ISIS			
					WHIPSNADE	26 Jul 1963	WHI 02		ENGLAND			
					LONDON RP	19 Jan 1988	WHI 02		ENGLAND			
					LYMPNE	8 Mar 1989	WHI 02		ENGLAND			
32	F	1 Jan 1964	WILD	WILD	WILD	1 Jan 1964	UNK	Wild Born	OFF ISIS			
					ZURICH	30 May 1965	ZRH 02		SWITZERLND			
35	F	1 Jan 1969	WILD	WILD	WILD	1 Jan 1969	UNK	Wild Born	OFF ISIS			
					TURIN	25 Jun 1970	TOR 02		ITALY			
					OFLSNTRKN	1 Sep 1972	TOR 02		W.GERMANY			
					ALMA-ATA	14 Oct 1972	TOR 02		USSR			
					TALLIA	1 Aug 1990	TOR 02		USSR			
36	M	1 Jan 1963	WILD	WILD	WILD	1 Jan 1963	UNK	Wild Born	OFF ISIS			
					NAPLES	6 Jul 1964	NAP 01		ITALY			
37	F	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS			
					NAPLES	6 Dec 1960	UNK		ITALY			
53	F	1 Jan 1962	WILD	WILD	WILD	1 Jan 1962	UNK	Wild Born	OFF ISIS		BESI	DTT 2
					FERNDALE	5 Sep 1965	UNK		U.S.A.			
					DETROIT	30 Sep 1965	DTT 02		U.S.A.			
					(OKLAHOMA)	5 Jun 1985	UNK		U.S.A.			
					(SEDGWICK)	2 Aug 1988	3327					
55	F	27 Jul 1961	56	57	CINCINNAT	27 Jul 1951	UNK	Captive Born	U.S.A.		LOTTIE	OKC 2
					ZEEHANDLR	19 Jun 1952	UNK		U.S.A.			
					CHICAGOLP	- 1953	UNK		U.S.A.			
					OKLAHOMA	28 Jun 1953	UNK		U.S.A.			
					(DETROIT)	5 Jun 1985	1442		U.S.A.			
67	F	1 Jan 1955	WILD	WILD	WILD	1 Jan 1955	UNK	Wild Born	OFF ISIS		MARSHA	DAL 2
					ZEEHANDLR	- 1956	UNK		U.S.A.			
					DALLAS	1 Sep 1956	DD1029		U.S.A.			

Restricted to:
Dates: During 20/04/1992 <= date .and. date <= 21/04/1992
Status: Living during 20 Apr 1992 -> 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
65	M	1 Jan 1950	WILD	WILD	WILD	1 Jan 1950	UNK	Wild Born	OFF ISIS		CLYDE	CHN 1
					BASEL	- 1951	UNK		SWITZERLND			
					COLUMBUS	1 Jan 1954	542001		U.S.A.			
76	F	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS		TWINKLE	TOLAX 1
					FERNDALE	- Mar 1966	UNC		U.S.A.			
					LOSANGELE	3 Oct 1966	02774		U.S.A.			
80	M	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS			
					CAIRO ZOO	20 Dec 1960	CAI 01		EGYPT			
86	M	1 Jan 1955	WILD	WILD	WILD	1 Jan 1955	UNK	Wild Born	OFF ISIS			
					MYSORE	17 Jan 1956	MYS 01		INDIA			
87	F	1 Jan 1955	WILD	WILD	WILD	1 Jan 1955	UNK	Wild Born	OFF ISIS			
					MYSORE	17 Jan 1956	MYS 02		INDIA			
110	M	31 Aug 1967	46	47	WZP-WASH	31 Aug 1967	UNK	Captive Born	U.S.A.		DILLON	WAS 3
					SD-WAP	16 Apr 1970	100285		U.S.A.			
					SANDIEGO2	11 Jan 1985	100785		U.S.A.			
121	F	1 Jan 1961	WILD	WILD	WILD	1 Jan 1961	UNK	Wild Born	OFF ISIS		OLIVE	STL 2
					ST LOUIS	16 Jun 1965	065411		U.S.A.			
					(OKLAHOMA)	25 Jun 1991		UNK	U.S.A.			
125	F	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS		MOMBA	DEN 2
					DENVER	18 Feb 1960	DEN 02		U.S.A.			
					(GARDENCITY)	14 Jul 1984	0002		U.S.A.			
128	M	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					TELAVIV R	27 Aug 1966	TLV 01		ISRAEL			
					RAMAT GAN	1 Jan 1981	UNK		ISRAEL			
					SANDTON	26 Dec 1989	UNK		AFRICAN			
132	M	1 Jan 1959	WILD	WILD	WILD	1 Jan 1959	UNK	Wild Born	OFF ISIS			
					COLOMBO	17 Dec 1960	CEY 01		SRI LANKA			
133	F	1 Jan 1965	WILD	WILD	WILD	1 Jan 1965	UNK	Wild Born	OFF ISIS			
					COLOMBO	1 Jan 1966	CEY 02		SRI LANKA			
134	F	11 Aug 1968	132	133	COLOMBO	11 Aug 1968	CEY 03	Captive Born	SRI LANKA			
142	M	9 Jul 1969	28	29	DUBLIN	9 Jul 1969	DUB 03	Captive Born	IRELAND			
					LYMPNE	3 Apr 1971	DUB 03		ENGLAND			
150	F	27 Aug 1970	51	52	ZURICH	27 Aug 1970	ZRH 04	Captive Born	SWITZRLND			
153	F	1 Jan 1969	WILD	WILD	WILD	1 Jan 1969	UNK	Wild Born	OFF ISIS			
					MAGDEBURG	30 Aug 1970	MAG 01		E.GERMANY			

EASTERN BLACK RHINO Studbook
(Diceros bicornis michaeli)

Restricted to:
Dates: During 20/04/1992 <= date .and. date <- 21/04/1992
Status: Living during 20 Apr 1992 -> 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
158	M	' Jan 1963	WILD	WILD	WILD	1 Jan 1963	UNK	Wild Born	Off ISIS			
					TEHERAN	1 Jan 1964	TEH 01		IRAN			
159	F	1 Jan 1967	WILD	WILD	WILD	1 Jan 1967	UNK	Wild Born	OFF ISIS			
					TEHERAN	1 Jan 1968	TEH 02		IRAN			
160	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					TEHERAN	17 May 1971	TEH 03		IRAN			
161	M	1 Jan 1972	74	75	SAN FRAN	1 Jan 1972	SFO 03	Captive Born	U.S.A.		RHINESTONE	SFO 3
					DENVER	6 Sep 1973	00457		U.S.A.			
163	F	6 Jan 1971	124	125	DENVER	6 Jan 1971	00459	Captive Born	U.S.A.		LIJ	DEN 6
164	M	27 Feb 1971	24	25	CHESTER	22 Feb 1971	CHE 04	Captive Born	ENGLAND			
					PAIGNTON	27 Mar 1973	UNK		ENGLAND			
					CHESTER	30 Jun 1981	CHE 04		ENGLAND			
					LONDON RP	15 Nov 1987	UNK		ENGLAND			
					LYMPNE	17 Jan 1990	UNK		ENGLAND			
165	F	20 Oct 1971	56	57	NAPLES	20 Oct 1971	NAP 04	Captive Born	ITALY			
					ROMA	12 Mar 1974	UNK		ITALY			
166	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					LEIPZIG	27 Nov 1971	LEJ 01		E.GERMANY			
					BERLIN W	5 Apr 1988	UNK		W.GERMANY			
169	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS		LORD	DVU 1
					DVUKRALV	22 Aug 1971	DVU 01		CZECHOSLO			
					JACKSONVL	22 Jun 1972	UNK		U.S.A.			
					SAN ANTON	22 Apr 1978	78:454		U.S.A.			
171	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					DVURKRALV	22 Aug 1971	DVU 03		CZECHOSLO			
					WROCLAW	11 Feb 1976	UNK		POLAND			
					DVURKRALV	2 Oct 1980	DVU 03		CZECHOSLO			
					ZURICH	23 Apr 1985	UNK		SWITZERLND			
					TALLIN	12 Sep 1988	UNK		USSR			
175	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					DVURKRALV	22 Aug 1971	DVU 07		CZECHOSLO			
178	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					DVURKRALV	22 Aug 1971	DVU 10		CZECHOSLO			
180	F	21 Mar 1970	56	57	CINCINNAT	21 Mar 1970	M14005	Captive Born	U.S.A.		PRINCESS	CVG 5
					(COLUMBUS)	10 Apr 1989	UNK		U.S.A.			
					CINCINNAT	10 Jan 1992	M14005		U.S.A.			

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Diceros bicornis michaeli

SPARKS v1.11
24 Apr 1992

EASTERN BLACK RHINO Studbook

(Diceros bicornis michaeli)

Restricted to:
Dates: During 20/04/1992 <= date .and. date <= 21/04/1992
Status: Living during 20 Apr 1992 -> 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
181	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					HIROSHIMA	14 Jul 1971	HIR 02		JAPAN			
182	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					HIROSHIMA	14 Jul 1971	HIR 01		JAPAN			
188	F	1 Jan 1971	WILD	WILD	WILD	1 Jan 1971	UNK	Wild Born	OFF ISIS			SAN 4
					FERNDALE	- 1972	UNK		U.S.A.			
					SD-WAP	30 Sep 1972	100287		U.S.A.			
					SANDIEGO2	19 May 1982	100287		U.S.A.			
					(COLUMBUS)	2 May 1989	892041		U.S.A.			
190	F	26 Nov 1969	16	17	LONDON RP	26 Nov 1969	EDN 03	Captive Born	ENGLAND		JUANA	LON 3
					DUBLIN	19 Apr 1972	UNK		IRELAND			
					TORONTO	7 Jun 1974	UNK		CANADA			
					SAN ANTON	28 Dec 1975	75:258		U.S.A.			
192	F	2 May 1972	54	55	OKLAHOMA	2 May 1972	OKC 06	Captive Born	U.S.A.		EDITH ANN	OKC 4
					SEDGWICK	5 Nov 1973	UNK					
					(SANDIEGO2)	6 Dec 1988	588371		U.S.A.			
194	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					LYMPNE	26 Jul 1971	BEK 01		ENGLAND			
195	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS			
					LYMPNE	20 Oct 1971	BEK 02		ENGLAND			
197	F	23 Aug 1958	99	100	SYDNEY	23 Aug 1958	SLC 07	Captive Born	AUST AUST			
202	F	1 Jan 1972	WILD	WILD	WILD	1 Jan 1972	UNK	Wild Born	OFF ISIS		CORA	MIA 2
					FERNDALE	- 1973	UNK		U.S.A.			
					METROZOO	13 Jun 1973	110		U.S.A.			
212	F	9 Sep 1975	52	53	DETROIT	9 Sep 1975	313	Captive Born	U.S.A.		BETSY	DTT 4
					(ST LOUIS)	30 Oct 1984	084437		U.S.A.			
213	F	1 Jan 1971	WILD	WILD	WILD	1 Jan 1971	UNK	Wild Born	OFF ISIS		ELLY	SFO 4
					FERNDALE	- 1974	UNK		U.S.A.			
					SAN FRAN	16 Apr 1974	17415		U.S.A.			
217	F	1 Jan 1973	WILD	WILD	WILD	1 Jan 1973	UNK	Wild Born	OFF ISIS			
					DVURKRALV	26 Jun 1974	DVU 12		CZECHOSLO			
					ZURICH	23 Apr 1983	UNK		SWITZRLND			
220	F	1 Jan 1974	WILD	WILD	WILD	1 Jan 1974	UNK	Wild Born	OFF ISIS			
					BERLIN W	19 Oct 1975	BZ 04		W.GERMANY			
222	M	1 Jan 1974	WILD	WILD	UNKNOWN	1 Jan 1974	UNK	Wild Born				
					LANGATO	5 May 1975	UNK		EUROPE			
						5 May 1975	UNK					
					(BERLIN W)	6 May 1975	BE 06		W.GERMANY			
						6 May 1975	BE 06					
					JOS ZOO	28 Oct 1976	UNK		NIGERIA			

Restricted to:
Dates: During 20/04/1992 <= date .and. date <= 21/04/1992
Status: Living during 20 Apr 1992 -> 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
223	M	1 Oct 1972	86	87	MYSORE	1 Oct 1972	MYS 04	Captive Born	INDIA			
224	F	29 Oct 1975	86	87	MYSORE	29 Oct 1975	MYS 05	Captive Born	INDIA			
225	F	1 Jan 1968	WILD	WILD	WILD	1 Jan 1968	UNK	Wild Born	OFF ISIS		JULIE	TAM 2
					BUSCH TAM	26 Jul 1971	15318		U.S.A.			
					(CINCINNAT)	16 Aug 1990	190189		U.S.A.			
229	F	1 Jan 1974	WILD	WILD	MAIDUGURI	1 Jan 1974	MDG 02	Wild Born	NIGERIA			
230	F	7 Aug 1976	228	229	MAIDUGURI	7 Aug 1976	MDG 03	Captive Born	NIGERIA			
231	F	23 Apr 1973	118	'19	BUENOSAIR	23 Apr 1973	BUE 04	Captive Born	ARGENTINA			
233	F	1 Jan 1969	WILD	WILD	WILD	1 Jan 1969	UNK	Wild Born	OFF ISIS		JUDY	CHI 3
					CHICAGOBR	25 Nov 1973	CHI 03		U.S.A.			
					(SD-WAP)	13 Nov 1986	037690		U.S.A.			
235	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS		BROOKE	CHI 5
					CHICAGOBR	11 Dec 1973	22624		U.S.A.			
236	F	1 Jan 1967	WILD	WILD	UNKNOWN	1 Jan 1967	UNK	Wild Born				
					NAGOYA	19 May 1968	NGO 03		JAPAN			
237	F	1 Jan 1967	WILD	WILD	UNKNOWN	1 Jan 1967	UNK	Wild Born				
					NAGOYA	18 May 1968	NGO 04		JAPAN			
240	F	1 Jan 1974	WILD	WILD	UNKNOWN	1 Jan 1974	UNK	Wild Born				
					LANGATO	1 Mar 1975	UNK		EUROPE			
					BERLIN W	6 May 1977	RF 07		W.GERMANY			
242	F	14 Dec 1975	36	37	NAPLES	14 Dec 1975	NAP 05	Captive Born	ITALY			
					FASANO	2 Nov 1976	UNK		ITALY			
					SAOLEOPOL	7 Jun 1978	UNK		BRAZIL			
244	F	2 Oct 1977	170	174	DVURKRALV	2 Oct 1977	DVU 14	Captive Born	CZECHOSLO			
245	M	11 Aug 1977	142	194	LYNPWE	11 Aug 1977	BEK 08	Captive Born	ENGLAND			
					(LONDON RP)	17 Jan 1990	UNK		ENGLAND			
247	M	29 Jun 1970	WILD	WILD	W.GERMANY	29 Jun 1970	UNK	Captive Born	W.GERMANY		RALPH	CHI 7
					CINCINNAT	19 Jul 1972	M14006		U.S.A.			
249	F	1 Jan 1975	WILD	WILD	UNKNOWN	1 Jan 1975	UNK	Wild Born				
					PRETORIA	5 Sep 1976	PRY 04		S.AFRICAN			
					ADDO	4 May 1983	UNK		AFRICAN			
250	M	2 Nov 1977	74	213	SAN FRAN	2 Nov 1977	SFO 06	Captive Born	U.S.A.			
					COLOMBO	17 Aug 1978	UNK		SRI LANKA			

EASTERN BLACK RHINO Studbook
(Diceros bicornis michaeli)

Restricted to:
Dates: During 20/04/1992 <= date .and. date <= 21/04/1992
Status: Living during 20 Apr 1992 -> 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
251	M	- 1974	WILD	WILD	WILD	1 Jan 1974	UNK	Wild Born	OFF ISIS		TOTO	STL 8
					FERNDALE	22 May 1976	UNK		U.S.A.			
					ST LOUIS	12 Sep 1976	076444		U.S.A.			
252	M	4 Dec 1976	120	121	ST LOUIS	4 Dec 1976	STL 09	Unk Birth Type	U.S.A.			
					FRANKFURT	26 Jun 1978	UNK		W.GERMANY			
					(ZURICH)	28 Jul 1987	UNK		SWITZERLND			
253	M	1 Jan 1967	WILD	WILD	UNKNOWN	1 Jan 1967	UNK	Wild Born				
					KUALA LUM	6 Jul 1968	KUA 01		MALAYSIA			
255	F	1 Jan 1972	WILD	WILD	WILD	1 Jan 1972	UNK	Wild Born	OFF ISIS		BABY/LULU	BOS 2
					FERNDALE	- 1973	UNK		U.S.A.			
					FRANKLINP	- 1973	BOS 02		U.S.A.			
					BUFFALO	8 Nov 1976	UNK		U.S.A.			
					METROZOO	27 Jan 1983	M00092		U.S.A.			
258	M	16 Oct 1977	54	55	OKLAHOMA	16 Oct 1977	OKC 06	Captive Born	U.S.A.			
					GELSNKRKN	28 Aug 1979	UNK		W.GERMANY			
					HAVANA	5 Oct 1979	UNK		CUBA			
259	M	30 Apr 1977	182	181	HIROSHIMA	10 Apr 1977	HIR 03	Captive Born	JAPAN		TOSHI	KTA 4
					METROZOO	10 Nov 1983	M00208		U.S.A.			
260	M	20 May 1975	99	101	SYDNEY	20 May 1975	SID 08	Captive Born	AUST AUST			
					(BERLIN W)	19 Jul 1988	UNK		W.GERMANY			
261	M	1 Jan 1973	WILD	WILD	UNKNOWN	1 Jan 1973	UNK	Wild Born				
					DELHI	24 Feb 1975	NDL 01		INDIA			
262	F	1 Jan 1973	WILD	WILD	UNKNOWN	1 Jan 1973	UNK	Wild Born				
					DELHI	24 Feb 1975	NDL 02		INDIA			
263	F	1 Jan 1956	WILD	WILD	UNKNOWN	1 Jan 1956	UNK	Wild Born				
					PEKING	27 Jul 1957	PKG 01		CHINA			
265	F	4 Sep 1970	276	263	PEKING	4 Sep 1970	PKG 03	Captive Born	CHINA			
266	M	4 Jan 1978	46	139	WASHINGTO	4 Jan 1978	WAS 05	Captive Born	U.S.A.			
					FERNDALE	17 Apr 1984	UNK		U.S.A.			
					SEOUL	25 Apr 1984	UNK		KOREA S			
267	F	16 Sep 1976	56	237	CINCINNAT	16 Sep 1976	M14008	Captive Born	U.S.A.		SWEET PEA	CVG 8
					LOSANGELE	27 Oct 1979	D9851		U.S.A.			
268	M	3 Nov 1977	247	180	CINCINNAT	3 Nov 1977	CVG 09	Captive Born	U.S.A.			
					DVURKRALV	13 Nov 1978	UNK		CZECHOSLO			

Restricted to: (Diceros bicornis michaeli)
Dates: During 20/04/1992 <= date .and. date <- 21/04/1992
Status: Living during 20 Apr 1992 -> 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
271	M	18 Sep 1978	241	150	ZURICH	18 Sep 1978	UNK	Captive Born	SWITZERLND		EMBU	ZRH 06
					CHICAGOBR	5 Aug 1980	24401		U.S.A.			
277	M	23 Jan 1979	9	153	MAGDEBURG	23 Jan 1979	MAG 02	Captive Born	E.GERMANY			
282	F	5 Jul 1979	170	217	DVUR KRALV	5 Jul 1979	DVU 15	Captive Born	CZECHOSLO			
283	M	18 Mar 1979	172	175	DVUR KRALV	18 Mar 1979	DVU 16	Captive Born	CZECHOSLO			
284	F	12 Sep 1979	182	181	HIROSHIMA	12 Sep 1979	HIR 04	Captive Born	JAPAN			
					TAIPEI	13 Apr 1987	UNK		TAIWAN			
285	M	7 Nov 1978	199	126	MEMPHIS	7 Nov 1978	UNK	Captive Born	U.S.A.		BUSTER/BUCHEM	3
					LOSANGCLC	27 Aug 1979	09850		U.S.A.			
288	M	13 Feb 1980	238	237	NAGOYA	13 Feb 1980	NGO 07	Captive Born	JAPAN			
					CHENGDU	16 Aug 1982	UNK					
291	M	18 Aug 1977	UNK	UNK	KOBE	18 Aug 1977	UNK	Captive Born	JAPAN			
					PEKING	24 Jul 1979	PKG 05		CHINA			
292	M	11 Dec 1979	79	293	CRANBY	11 Dec 1979	UNK	Captive Born	CANADA		CORNELIUS	GRA 3
					SANDIEGOZ	25 May 1983	181C39		U.S.A.			
					SD-WAP	11 Apr 1985	181039		U.S.A.			
294	F	21 May 1981	169	190	SAN ANTON	21 May 1981	STA 05	Captive Born	U.S.A.		MARSHA	STA 3
					CHICAGOLP	21 Jul 1982	6798		U.S.A.			
295	F	10 Sep 1981	9	153	MAGDEBURG	10 Sep 1981	MAG 05	Captive Born	E.GERMANY			
296	M	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS		CARLOS	MEX 01
					MEXICOCTY	1 Jan 1971	MEX 01		MEXICO			
297	F	1 Jan 1970	WILD	WILD	WILD	1 Jan 1970	UNK	Wild Born	OFF ISIS		SUSANA	MEX 02
					MEXICOCTY	1 Jan 1971	MEX 02		MEXICO			
298	F	23 Dec 1981	219	221	BERLIN W	23 Dec 1981	BE 08	Captive Born	W.GERMANY			
299	F	1 Jan 1975	WILD	WILD	UNKNOWN	1 Jan 1975	UNK	Wild Born				
					HAVANA	1 Jan 1976	LHC 01		CUBA			
301	M	25 Feb 1980	56	207	CINCINNAT	25 Feb 1980	N14016	Captive Born	U.S.A.		EUGENE	CVG 10
					SEDGWICK	23 Jun 1981	779					
302	M	7 Aug 1980	247	190	CINCINNAT	7 Aug 1980	N14019	Captive Born	U.S.A.		MWANIKI	CVG 11
					(SD-WAP)	28 Sep 1981	601515		U.S.A.			
305	M	31 Mar 1981	102	184	HIROSHIMA	31 Mar 1981	HIR 05	Captive Born	JAPAN		AKI	HIR 5
					OCLO SPRG	10 Nov 1983	101541		U.S.A.			

Restricted to:
Dates: During 20/04/1992 <= date .and. date <= 21/04/1992
Status: Living during 20 Apr 1992 -> 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
308	M	18 Oct 1981	74	213	SAN FRAN	18 Oct 1981	SFO 07	Captive Born	U.S.A.		MARSHALL	SFO 7
					(CHICAGOLP)	17 Jun 1982	67BB		U.S.A.			
311	F	1 Jan 1973	WILD	WILD	WILD	1 Jan 1973	UNK	Wild Born	OFF Isis		KENYA	HAI 01
					FERNDALE	22 Oct 1974	UNK		U.S.A.			
					RHSCHMITT	24 Oct 1974	UNK		U.S.A.			
					COLUMBUS	6 Oct 1984	842122		U.S.A.			
					BUSCH TAM	24 Oct 1986	UNK		U.S.A.			
					DALLAS	13 Dec 1986	864857		U.S.A.			
312	F	22 May 1982	16	17	LONDON RP	22 May 1982	LON 07	Captive Born	ENGLAND			
					(CHESTER)	9 May 1984	UNK		ENGLAND			
313	F	1 Jan 1973	158	159	TEHERAN	1 Jan 1973	TEH 04	Captive Born	IRAN			
315	F	1 Jan 1977	158	159	TEHERAN	1 Jan 1977	TEH 06	Captive Born	IRAN			
317	F	29 Sep 1982	56	207	CINCINNAT	29 Sep 1982	M14028	Captive Born	U.S.A.		NATASHA	CVG 12
					(CHICAGOLP)	12 Jun 1984	7421		U.S.A.			
318	M	4 Dec 1982	22	19	WHIPSNADE	4 Oct 1982	WHI 06	Captive Born	ENGLAND			
					(CHESTER)	1 May 1984	UNK		ENGLAND			
323	M	1 Jan 1972	WILD	WILD	UNKNOWN	1 Jan 1972	UNK	Wild Born				
					HITACHI	29 Oct 1974	HIT 01		JAPAN			
328	F	15 Nov 1982	161	163	DENVER	15 Nov 1982	36258	Captive Born	U.S.A.		ONYX	DEN 9
330	F	28 Dec 1981	261	262	DELHI	28 Dec 1981	NDL 04	Captive Born	INDIA		JERI	DELHI 4
					FERNDALE	- 1989	UNK		U.S.A.			
					OKLAHOMA	2 Feb 1989	484717		U.S.A.			
					ST LOUIS	28 Jun 1991	UNK		U.S.A.			
331	F	11 Dec 1982	169	190	SAN ANTON	11 Dec 1982	STA 05	Captive Born	U.S.A.		SNY-AHNE	STA 5
					SAN FRAN	- 1984	UNK		U.S.A.			
					(KANSASCTY)	15 Jul 1984	UNK		U.S.A.			
					(COLO SPRG)	14 Jan 1987	87C004		U.S.A.			
332	M	11 Jan 1983	247	180	CINCINNAT	11 Jan 1983	UNK	Captive Born	U.S.A.		AKEEM	CVG 13
					(DENVER)	13 Jul 1984	07986		U.S.A.			
341	M	3 Oct 1983	142	195	LYMPHE	3 Oct 1983	HYT 02	Captive Born	ENGLAND			
342	F	11 Nov 1983	142	194	LYMPHE	11 Nov 1983	HYT 03	Captive Born	ENGLAND			
345	F	15 Aug 1983	36	37	NAPLES	15 Aug 1983	NAP 07	Captive Born	ITALY			
346	M	30 Oct 1982	182	181	HIROSHIMA	30 Oct 1982	HIR 06	Captive Born	JAPAN			
					OSAKA	18 Sep 1989	HIR 06		JAPAN			

Restricted to:
Dates: During 20/04/1992 <= date .and. date <= 21/04/1992
Status: Living during 20 Apr 1992 -> 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
347	M	10 Aug 1984	219	240	BERLIN W	10 Aug 1984	BE 10	Captive Born	W.GERMANY			
349	M	21 Oct 1984	171	150	ZURICH	21 Oct 1984	ZR+ 07	Captive Born	SWITZERLND			
					FRANKFURT	27 Jul 1987	ZR+ 07		W.GERMANY			
350	M	7 Mar 1984	238	237	NAGOYA	7 Mar 1984	NGO 08	Captive Born	JAPAN			
					TAIPEI	26 Oct 1986	NGO 08		TAIWAN			
351	F	24 Jun 1985	74	213	SAN FRAN	24 Jun 1985	SFO 08	Captive Born	U.S.A.		MOONSTONE	SFO 9
					(METROZOO)	15 Mar 1987	M00744		U.S.A.			
354	F	9 Aug 1984	182	181	HIROSHIMA	9 Aug 1984	HIR 06	Captive Born	JAPAN			
					TAIPEI	21 Oct 1986	HIR 06		TAIWAN			
356	M	9 Feb 1986	155	225	BUSCH TAN	9 Feb 1986	18539	Captive Born	U.S.A.		LITTLE JOETAN	7
359	F	1 Feb 1986	169	190	SAN ANTON	1 Feb 1986	86C200	Captive Born	U.S.A.		CRISTA	STA 6
					CINCINNAT	16 Jul 1987	M14058		U.S.A.			
					(CALDWELL)	17 Jul 1987	001111		U.S.A.			
362	M	11 Mar 1986	259	202	METRO200	11 Mar 1986	MIA 03	Captive Born	U.S.A.		MAKINI	MIA 5
					CALDWELL	15 Sep 1988	001315		U.S.A.			
363	M	14 Dec 1985	247	180	CINCINNAT	14 Dec 1985	M14046	Captive Born	U.S.A.		KARISA	CVG 14
					(CHICAGOBR)	25 Mar 1987	B7C051		U.S.A.			
364	F	27 Dec 1985	56	207	CINCINNAT	27 Dec 1985	M14047	Captive Born	U.S.A.		SABABU	CVG 15
					SAN ANTON	17 Jul 1987	870793		U.S.A.			
365	F	10 Jan 1985	27?	235	CHICAGOBR	10 Jan 1985	85C006	Captive Born	U.S.A.		SHEBA	CHI 36
366	F	6 Oct 1986	219	220	BERLIN W	6 Oct 1986	BE 11	Captive Born	W.GERMANY			
372	M	11 Dec 1986	27?	235	CHICAGOBR	11 Dec 1986	CHI 07	Captive Born	U.S.A.		CORKY	CHI 37
					(CALDWELL)	22 Oct 1988	001425		U.S.A.			
374	F	10 Sep 1986	182	181	HIROSHIMA	10 Sep 1986	HIR 09	Captive Born	JAPAN			
376	M	7 May 1987	161	163	DENVER	7 May 1987	10522	Captive Born	U.S.A.		PETE	
					PORTLAND	25 Jun 1988	80036		U.S.A.			
377	M	12 Jul 1987	332	239	SD-WAP	12 Jul 1987	687485	Captive Born	U.S.A.		MASHAKU	SAW 2
					SANDIEGO2	5 Jan 1990	687485		U.S.A.			
					(LANSING)	30 Jun 1990	1304		U.S.A.			
381	M	10 Jun 1986	285	76	LOSANGELE	10 Jun 1986	LAX 10	Captive Born	U.S.A.		ZAKAR	LAX 10
					(OKLAHOMA)	9 Jun 1988	460416		U.S.A.			
					(MILWAUCEE)	27 Jun 1989	3359		U.S.A.			
					RIVERBANK	23 May 1991	1377		U.S.A.			

Restricted to:
Dates: During 20/04/1992 <= date .and. date <= 21/04/1992
Status: Living during 20 Apr 1992 -> 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
383	F	2 Jul 1988	74	233	SAN FRAN	2 Jul 1988	488050	Captive Born	U.S.A.		GEMSTONE	SFO 10
					(MILWAUKEE)	19 Dec 1989	3408		U.S.A.			
					RIVERBANK	6 Jun 1991	1378		U.S.A.			
384	F	25 Nov 1988	18	19	LONDON RP	25 Nov 1988	LDN 08	Captive Born	ENGLAND			
386	F	15 May 1984	268	244	DVURKRALV	15 May 1984	DVU 17	Captive Born	CZECHOSLO			
387	F	8 Dec 1984	268	175	DVURKRALV	8 Dec 1984	DVU 18	Captive Born	CZECHOSLO			
388	M	26 Aug 1986	269	282	DVURKRALV	26 Aug 1986	DVU 19	Captive Born	CZECHOSLO		BOMA	DVU 89
					ATLANTA	18 Oct 1989	B91043		U.S.A.			
389	M	12 Sep 1988	292	233	SD-WAP	12 Sep 1988	485551	Captive Born	U.S.A.		JIONI	SAN 02
					CHICAGOBR	12 Sep 1988	88C335		U.S.A.			
					(COLUMBUS)	9 Oct 1989	892117		U.S.A.			
391	M	21 May 1989	268	175	DVURKRALV	21 May 1989	DVU 20	Captive Born	CZECHOSLO			
					LONDON RF	21 Nov 1990	DVU 20		ENGLAND			
395	M	18 Mar 1988	52	202	METRO200	18 Mar 1988	M00924	Captive Born	U.S.A.		TATOO	MIA 6
396	F	4 Nov 1988	271	235	CHICAGOBR	4 Nov 1988	B88388	Captive Born	U.S.A.		MIADI	
					(PORTLAND)	15 Mar 1990	90023		U.S.A.			
397	F	19 Oct 1988	247	180	CINCINNAT	19 Oct 1988	N14066	Captive Born	U.S.A.		KULINDA	KICVG 16
					(COLUMBUS)	10 Apr 1989	892021		U.S.A.			
408	F	30 Oct 1989	18	195	CYMPNE	30 Oct 1989	MYT 04	Captive Born	ENGLAND			
409	M	1 Jan 1953	WILD	WILD	WILD	1 Jan 1953	UNK	Wild Born	OFF ISIS		JUDY	
					PROSPECTP	12 Jul 1954	PRO 01		U.S.A.			
					DETROIT	1 Aug 1986	2692		U.S.A.			
417	F	1 Oct 1989	268	282	DVURKRALV	1 Oct 1989	DVU 21	Captive Born	CZECHOSLO			
418	F	23 Mar 1989	281	55	DETROIT	23 Mar 1989	UNK	Captive Born	U.S.A.			
					OKLAHOMA	24 Mar 1989	OKC 09		U.S.A.			
					(DETROIT)	24 Mar 1989	2797		U.S.A.			
					(BUSCH TAR)	10 Aug 1990	UNK		U.S.A.			
419	M	21 May 1989	308	317	CHICAGOLP	21 May 1989	8910	Captive Born	U.S.A.		AMADI	CHI 01
					CINCINNAT	22 May 1989	UNK		U.S.A.			
					(GARDNCITY)	31 Jul 1990	UNK		U.S.A.			
420	M	24 Jul 1988	182	181	HIROSHIMA	24 Jul 1988	HIR 10	Captive Born	JAPAN			
422	F	7 Mar 1989	252	150	ZURICH	7 Mar 1989	ZRH 08	Captive Born	SWITZRLND			

Restricted to: (Diceros bicornis michaeli)
Dates: During 20/04/1992 <= date .and. date <= 21/04/1992
Status: Living during 20 Apr 1992 -> 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
426	F	6 Jan 1990	74	213	SAN FRAN (ATLANTA)	6 Jan 1990 23 Nov 1990	190009 901030	Captive Born	U.S.A. U.S.A.		ROSETTA ST	
427	M	25 Feb 1990	292	230	SD-WAP	25 Feb 1990	690073	Captive Born	U.S.A.		Makili	SAW 4
428	F	12 Oct 1990	166	298	BERLIN W	12 Oct 1990	BE 14	Captive Born	W.GERMANY			
430	M	21 Sep 1990	252	217	ZURICH	21 Sep 1990	ZAH 09	Captive Born	SWITZERLND			
431	F	24 Aug 1990	268	244	DVUKRALV	24 Aug 1990	DVU 22	Captive Born	CZECHOSLO			
432	M	30 Oct 1989	161	163	DENVER	30 Oct 1989	11902	Captive Born	U.S.A.		JASPER	DEN 11
434	M	8 Jun 1990	323	185	HITACHI	8 Jun 1990	HIT 07	Captive Born	JAPAN			
435	M	29 Nov 1990	292	253	SD-WAP	29 Nov 1990	690706	Captive Born	U.S.A.		JIANA	SAW 5
T2065	F	7 Mar 1991	27'	235	CHICAGOOR	7 Mar 1991	910357	Captive Born	U.S.A.		AKILL	
T2067	M	21 Oct 1991	25'	212	ST LOUIS	21 Oct 1991	UNK	Captive Born	U.S.A.			
T2075	M	26 Mar 1992	332	328	DENVER	26 Mar 1992	UNK	Captive Born	U.S.A.			

TOTALS: 74.89.0 (163)

Age Pyramid Report

Restricted to: EASTERN BLACK RHINO Studbook
Dates: As of End of 20/04/1992 <= date

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age	Males N = 74	Females N = 89
42	X	
41		
40		
39	X	
38		
37	X	XX
36		X
35		
34		
33	XX	XXX
32		
31		X
30		XXX
29	XX	
28		X
27	XXX	XXX
26		
25	X	XXX
24	X	X
23		XXXX
22	XXXXXXX	XXXXXXXXX
21	XX	XXXXX
20	XX	XXX
19	XX	XXXXXX
18	XX	XXX
17		XX
16	X	XXX
15	XX	XXX
14	XXXXXX	X
13	XXXX	X
12	XXX	X
11	XX	
10	X	XXXX
9	XXX	XXXX
8	XX	XX
7	XXX	XXX
6	XXX	XXX
5	XXX	XX
4	XXX	
3	XX	XXXXXX
2	XXXX	XXX
1	XXX	XXX
0	XX	

32 28 24 20 16 12 8 4 4 8 12 16 20 24 28 32

Number of Animals

X >>> Specimens of known sex...
? >>> Specimens of unknown sex...

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age	Studbook Numbers >>> **Male**						
42	68						
41							
40							
39	409						
38							
37	86						
36							
35							
34							
33	80	132					
32							
31							
30							
29	36	158					
28							
27	9	18	128				
26							
25	253						
24	110						
23							
22	142	160	166	169	171	182	296
21	164	247					
20	161	323					
19	223	261					
18	222	251					
17							
16	260						
15	252	259					
14	245	250	258	266	268	291	
13	271	277	283	285			
12	288	292	301				
11	302	305					
10	308						
9	318	332	346				
8	341	350					
7	347	349	386				
6	356	362	363				
5	372	381	388				
4	376	377	395				
3	389	420					
2	391	419	427	432			
1	430	434	435				
0	T2067	T2075					

Total= 74

Age Pyramid Report
EASTERN BLACK RHINO Studbook

Report Date:
21 Apr 1992

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age	Studbook Numbers >>> Female								
42									
41									
40									
39									
38									
37	67	87							
36	263								
35									
34									
33	37	125	197						
32									
31	121								
30	19	53	55						
29									
28	32								
27	17	76	133						
26									
25	159	236	237						
24	225								
23	35	134	153	233					
22	175	178	180	181	190	194	195	235	297
21	150	163	188	213	265				
20	165	202	255						
19	192	217	231	262	311	313			
18	220	229	240						
17	249	299							
16	212	224	242						
15	230	267	315						
14	244								
13	282								
12	284								
11									
10	294	295	298	330					
9	312	317	328	331					
8	342	345							
7	354	365	387						
6	351	359	364						
5	366	374							
4									
3	383	384	396	397	418	422			
2	408	417	426						
1	428	431	T2065						
0									

Total= 89

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Diceros bicornis michaeli

SPARKS v1.11
21 Apr 1992

Fecundity & Mortality Report
EASTERN BLACK RHINO Studbook

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	175.9	0.00	185.9	0.06	189.7	0.06	195.3
1- 2	0.00	168.8	0.00	176.5	0.05	139.2	0.05	151.0
2- 3	0.00	157.5	0.00	164.4	0.04	153.6	0.06	161.6
3- 4	0.00	151.4	0.01	154.1	0.01	149.3	0.03	150.3
4- 5	0.01	145.4	0.01	147.8	0.03	143.6	0.01	145.8
5- 6	0.03	139.5	0.02	145.9	0.02	138.9	0.01	145.3
6- 7	0.04	131.4	0.05	141.5	0.06	126.9	0.02	139.2
7- 8	0.06	124.3	0.06	134.1	0.03	120.0	0.04	130.5
8- 9	0.08	116.1	0.06	125.8	0.06	111.8	0.04	123.9
9-10	0.07	105.5	0.04	118.0	0.08	100.6	0.04	115.5
10-11	0.08	97.7	0.09	112.0	0.03	95.8	0.01	110.4
11-12	0.05	94.9	0.06	104.9	0.00	94.8	0.06	101.0
12-13	0.09	88.5	0.06	99.5	0.06	85.2	0.04	96.2
13-14	0.05	82.5	0.08	96.7	0.01	82.1	0.01	94.8
14-15	0.06	75.1	0.06	92.0	0.05	74.1	0.09	86.6
15-16	0.06	67.8	0.05	82.4	0.06	65.4	0.05	80.1
16-17	0.07	63.4	0.05	75.9	0.05	61.9	0.04	74.5
17-18	0.08	61.0	0.07	69.9	0.00	59.9	0.04	70.6
18-19	0.04	58.6	0.06	64.2	0.03	57.6	0.05	62.9
19-20	0.04	55.0	0.06	55.8	0.02	54.3	0.04	55.4
20-21	0.07	51.0	0.05	51.6	0.04	50.1	0.02	51.1
21-22	0.02	45.8	0.03	46.2	0.17	41.8	0.04	45.2
22-23	0.06	35.1	0.00	36.6	0.12	32.6	0.00	36.6
23-24	0.05	30.0	0.02	31.6	0.00	30.0	0.03	29.8
24-25	0.04	28.2	0.06	27.7	0.07	27.6	0.08	26.3
25-26	0.02	26.1	0.00	23.9	0.04	24.8	0.00	23.9
26-27	0.04	24.8	0.02	23.0	0.09	23.0	0.00	23.0
27-28	0.00	20.9	0.03	19.7	0.00	20.5	0.11	18.4
28-29	0.03	19.5	0.00	16.5	0.05	19.0	0.13	15.3
29-30	0.06	16.7	0.00	15.0	0.13	15.2	0.00	15.0
30-31	0.03	15.0	0.00	13.3	0.00	15.0	0.00	13.3
31-32	0.00	13.3	0.00	10.9	0.15	13.0	0.10	10.3
32-33	0.00	11.5	0.00	9.5	0.18	11.0	0.11	5.0
33-34	0.06	8.4	0.00	7.3	0.39	7.6	0.00	7.3
34-35	0.00	6.0	0.00	5.1	0.00	6.0	0.50	4.0
35-36	0.10	5.4	0.00	4.0	0.20	5.0	0.00	4.0
36-37	0.00	4.9	0.00	3.3	0.25	4.0	0.00	3.3
37-38	0.00	2.6	0.00	1.6	0.43	2.3	0.00	1.6
38-39	0.00	2.0	0.00	1.0	0.00	2.0	0.00	1.0
39-40	0.00	1.3	0.00	1.0	0.00	1.3	0.00	1.0
40-41	0.00	1.0	0.00	1.0	0.00	1.0	0.00	1.0
41-42	0.00	1.0	0.00	1.0	0.00	1.0	0.00	1.0
42-43	0.00	0.3	0.00	1.0	0.00	0.3	0.00	1.0
43-44	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
44-45	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
45-46	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
46-47	0.00	0.0	0.00	0.2	0.00	0.0	0.00	0.0
47-48	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
48-49	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 14.108 T = 12.942 30 day mortality: 4%

Ro = 0.685	Ro = 0.630	(16 out of 375)
lambda=0.97	lambda=0.96	
r = -0.027	r = -0.036	

188 birth events to known age parents tabulated for Mx...plus...
6 births to UNK or MULT dams...
5 births to UNK or MULT sires...
[372 parents (includes WILD) not found in data set ignored...]

217 death events of known age tabulated for Qx...

WARNING: Values with small sample sizes (N) warrant less confidence...

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Diceros bicornis michaeli

SPARKS v1.11
21 Apr 1992

Fecundity & Mortality Report

Restricted to: EASTERN BLACK RHINO Studbook
Dates: During 01/01/1981 <= date

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	33.7	0.00	40.3	0.22	44.5	0.09	44.3
1- 2	0.00	34.9	0.00	37.1	0.06	34.3	0.14	36.2
2- 3	0.00	33.8	0.00	31.9	0.00	33.8	0.06	32.4
3- 4	0.00	36.3	0.00	26.6	0.00	36.3	0.08	26.3
4- 5	0.00	37.1	0.00	26.5	0.03	36.6	0.04	26.1
5- 6	0.00	34.7	0.00	28.6	0.00	34.7	0.00	28.6
6- 7	0.06	32.7	0.05	28.7	0.00	32.7	0.04	28.2
7- 8	0.07	33.6	0.05	29.6	0.03	33.1	0.00	29.6
8- 9	0.11	31.5	0.07	33.7	0.07	30.4	0.06	34.0
9-10	0.05	28.7	0.01	34.4	0.07	28.4	0.06	34.1
10-11	0.09	28.6	0.08	36.0	0.03	29.2	0.00	36.0
11-12	0.09	34.3	0.06	42.9	0.00	34.3	0.02	41.9
12-13	0.14	32.7	0.08	45.0	0.00	31.9	0.05	44.4
13-14	0.07	30.7	0.07	47.8	0.00	30.7	0.00	47.8
14-15	0.08	26.2	0.09	48.8	0.08	26.1	0.11	45.6
15-16	0.04	22.6	0.03	45.7	0.09	21.9	0.00	45.2
16-17	0.12	28.1	0.07	45.7	0.03	28.9	0.02	45.5
17-18	0.07	27.0	0.07	42.6	0.00	27.0	0.05	43.6
18-19	0.09	26.6	0.08	39.1	0.08	25.9	0.03	39.9
19-20	0.02	25.9	0.06	35.4	0.00	25.3	0.06	36.0
20-21	0.09	22.6	0.04	34.1	0.05	22.1	0.00	34.1
21-22	0.03	19.7	0.05	29.7	0.11	19.0	0.03	29.2
22-23	0.06	16.6	0.00	24.3	0.13	15.6	0.00	24.3
23-24	0.08	13.0	0.03	19.6	0.00	13.0	0.00	19.6
24-25	0.04	11.4	0.09	17.2	0.18	10.9	0.06	16.3
25-26	0.04	12.3	0.00	14.9	0.00	11.8	0.00	14.9
26-27	0.07	13.8	0.03	16.0	0.17	12.0	0.00	16.0
27-28	0.00	10.9	0.04	13.1	0.00	10.5	0.08	12.4
28-29	0.04	12.5	0.00	11.1	0.08	12.0	0.10	10.3
29-30	0.05	10.6	0.00	10.0	0.00	10.2	0.00	10.0
30-31	0.05	10.0	0.00	9.3	0.00	10.0	0.00	9.3
31-32	0.00	9.3	0.00	7.3	0.22	9.0	0.00	7.3
32-33	0.00	9.0	0.00	7.0	0.00	9.0	0.00	7.0
33-34	0.06	7.8	0.00	6.3	0.26	7.6	0.00	6.3
34-35	0.00	6.0	0.00	4.1	0.00	6.0	0.67	3.0
35-36	0.09	5.4	0.00	3.0	0.20	5.0	0.00	3.0
36-37	0.00	4.9	0.00	2.3	0.25	4.0	0.00	2.3
37-38	0.00	2.6	0.00	0.6	0.43	2.3	0.00	0.6
38-39	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
39-40	0.00	1.3	0.00	0.0	0.00	1.3	0.00	0.0
40-41	0.00	1.0	0.00	0.0	0.00	1.0	0.00	0.0
41-42	0.00	1.0	0.00	0.0	0.00	1.0	0.00	0.0
42-43	0.00	0.3	0.00	0.0	0.00	0.3	0.00	0.0
43-44	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
44-45	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 14.530	T = 14.414	30 day mortality: 14%
Ro = 0.788	Ro = 0.536	(12 out of 84)
lambda=0.98	lambda=0.96	
r = -0.016	r = -0.043	

83 birth events to known age parents tabulated for Mx...

82 death events of known age tabulated for Qx...

WARNING: Values with small sample sizes (N) warrant less confidence...

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Dicerus alcemie michaeli

SPARKS v1.11
21 Apr 1992

FOUNDER ANALYSIS - *DICEROS BICORNIS MICHAELI* - WORLD - 21/04/1992

Founder representation in each living animal:
Founders listed across top, descendants down side.
Founder calculations omit UNKNOWNs.

Founders:

99	100	117	31	68	20	21
409	67	74	86	87	T2071	57
263	276	T2070	56	25	8	37
46	60	124	125	132	7	47
121	19	53	79	39	158	32
120	9	16	17	18	76	123
133	155	52	75	150	236	237
253	207	225	95	153	233	160
156	169	170	171	172	174	175
178	181	182	194	195	235	296
297	247	168	213	338	199	202
255	293	323	217	261	262	311
219	220	221	222	228	229	240
241	251	249	299			

Founder contributions:

1.2500	0.7500	0.5000	1.7500	0.0000	0.8751	0.8751
0.0000	0.0000	4.3750	1.0000	1.0000	0.5000	4.0000
0.5000	0.5000	0.5000	6.2500	0.5000	0.2500	1.5000
1.5000	0.0000	1.7500	1.7500	0.5000	0.3500	1.0000
1.0000	1.0000	0.7500	1.2500	1.5000	1.0000	1.7500
1.0000	1.0000	1.2500	1.7500	1.5000	0.5000	0.0000
0.5000	0.5000	1.2500	1.3750	1.0000	0.0000	1.0000
0.0000	2.2500	0.5000	0.0000	1.0000	1.0000	0.0000
0.5000	1.5000	2.0000	0.5000	0.5000	1.0000	1.5000
0.0000	3.7500	3.7500	1.0000	1.0000	2.0000	0.0000
0.0000	4.5000	0.5000	3.0000	1.0000	0.7500	1.0000
0.0000	1.2500	0.5000	1.5000	0.5000	0.5000	0.0000
1.7500	0.5000	0.7500	0.0000	0.5000	0.5000	0.5000
1.5000	0.5000	0.0000	0.0000			

Fractional contributions

0.0125	0.0075	0.0050	0.0175	0.0000	0.0088	0.0088
0.0000	0.0000	0.0439	0.0100	0.0100	0.0050	0.0401
0.0050	0.0050	0.0050	0.0627	0.0050	0.0025	0.0150
0.0150	0.0000	0.0175	0.0175	0.0050	0.0025	0.0100
0.0100	0.0100	0.0075	0.0125	0.0150	0.0100	0.0175
0.0100	0.0100	0.0125	0.0175	0.0150	0.0050	0.0000
0.0050	0.0050	0.0125	0.0125	0.0100	0.0000	0.0100
0.0000	0.0226	0.0050	0.0000	0.0100	0.0100	0.0000
0.0050	0.0150	0.0201	0.0050	0.0050	0.0100	0.0150
0.0000	0.0376	0.0376	0.0100	0.0100	0.0201	0.0000
0.0000	0.0451	0.0050	0.0301	0.0100	0.0075	0.0100
0.0000	0.0125	0.0050	0.0150	0.0050	0.0050	0.0000
0.0175	0.0050	0.0075	0.0000	0.0050	0.0050	0.0050
0.0150	0.0050	0.0000	0.0000			

Number of living descendants

2	2	1	8	3	5	5
0	0	12	2	3	2	18
1	1	2	23	1	1	3
4	3	7	7	1	1	4
3	2	2	4	3	2	8
3	2	4	5	3	1	0
1	1	3	5	2	0	2
0	5	1	0	2	2	0
1	3	6	1	1	3	3
0	8	8	2	2	4	0
0	13	2	7	2	2	2
3	4	1	4	1	1	0
4	1	2	0	1	1	1
5	1	0	0			

GENE DROP - *DICEROS BICORNIS MICHAELI* - WORLD - 21/04/1992

Studbook		Sire	Dam	Status (cap=alive)	Prop. genome unique among living desc.	Prop. genome unique among all living
185	F	UNK	UNK	u		
99	M	WILD	WILD	f		
100	F	WILD	WILD	f		
117	F	WILD	WILD	f		
31	M	WILD	WILD	f		
68	M	WILD	WILD	F		1.0000
20	M	WILD	WILD	f		
21	F	WILD	WILD	f		
109	M	WILD	WILD	F		1.0000
67	F	WILD	WILD	F		1.0000
74	M	WILD	WILD	f		
86	M	WILD	WILD	F		0.2535
87	F	WILD	WILD	F		0.2555
T2071	F	WILD	WILD	f		
57	F	WILD	WILD	f		
263	F	WILD	WILD	F		0.5000
276	M	WILD	WILD	f		
T2070	M	WILD	WILD	f		
56	M	WILD	WILD	f		
35	F	WILD	WILD	f		
P117	M	UNK	UNK	u		
118	M	P117	117	d		
24	M	20	21	d		
197	F	99	100	A	0.5660	0.5650
8	F	WILD	WILD	f		
37	F	WILD	WILD	F		0.1160
46	M	WILD	WILD	f		
80	M	WILD	WILD	F		1.0000
124	M	WILD	WILD	f		
125	F	WILD	WILD	F		0.3775
132	M	WILD	WILD	F		0.5000
7	M	WILD	WILD	f		
47	F	WILD	WILD	f		
25	F	UNK	UNK	u		
121	F	WILD	WILD	F		0.5000
55	F	56	57	A	0.0220	0.0220
28	M	20	21	d		
19	F	WILD	WILD	F		0.2495
53	F	WILD	WILD	F		0.5000
79	M	WILD	WILD	f		
119	F	P117	117	d		
54	M	T2070	T2071	d		
35	M	WILD	WILD	F		0.1275
158	M	WILD	WILD	F		0.2545
32	F	WILD	WILD	F		0.5000
120	M	WILD	WILD	f		
9	M	WILD	WILD	F		0.2460
16	M	WILD	WILD	f		
17	F	WILD	WILD	F		0.2600
18	M	WILD	WILD	F		0.1290
76	F	WILD	WILD	F		0.5000
128	M	WILD	WILD	F		1.0000
133	F	WILD	WILD	F		0.5000
155	M	WILD	WILD	f		
101	F	99	100	d		
22	M	7	8	d		
52	M	WILD	WILD	f		
75	F	WILD	WILD	f		

Studbook		Sire	Dam	Status (captive)	Prop. genome unique among living desc.	all living
153	F	WILD	WILD	F		0.2370
226	F	WILD	WILD	F		1.0000
237	F	WILD	WILD	F		0.2495
253	M	WILD	WILD	F		1.0000
116	M	46	47	A	0.3630	0.3630
267	F	WILD	WILD	f		
225	F	WILD	WILD	F		0.5000
126	F	124	125	d		
134	F	132	133	A	1.0000	0.0000
35	F	WILD	WILD	F		1.0000
153	F	WILD	WILD	F		0.2485
233	F	WILD	WILD	F		0.2590
142	M	28	29	A	0.1100	0.1100
190	F	16	17	A	0.0895	0.2560
160	M	WILD	WILD	F		1.0000
166	M	WILD	WILD	F		0.5000
169	M	WILD	WILD	F		0.1280
170	M	WILD	WILD	f		
171	M	WILD	WILD	F		0.5000
172	M	WILD	WILD	f		
174	F	WILD	WILD	f		
175	F	WILD	WILD	F		0.1330
178	F	WILD	WILD	F		1.0000
181	F	WILD	WILD	F		0.0075
182	M	WILD	WILD	F		0.0070
194	F	WILD	WILD	F		0.2430
195	F	WILD	WILD	F		0.2525
235	F	WILD	WILD	F		0.0665
296	M	WILD	WILD	F		1.0000
297	F	WILD	WILD	F		1.0000
139	F	46	47	d		
190	F	56	57	A	0.0095	0.0095
247	M	WILD	WILD	F		0.0295
150	F	31	32	A	0.1245	0.0660
255	F	276	253	A	1.0000	0.5000
138	F	WILD	WILD	F		0.6355
219	F	WILD	WILD	F		0.0280
238	M	WILD	WILD	f		
163	F	124	125	A	0.0965	0.0535
164	M	24	25	A	0.8730	0.8730
165	F	36	37	A	0.2470	0.0000
181	M	74	75	A	0.0560	0.0560
199	M	WILD	WILD	f		
202	F	WILD	WILD	F		0.2385
255	F	WILD	WILD	F		1.0000
293	F	WILD	WILD	f		
323	M	WILD	WILD	F		0.5000
192	F	54	55	A	0.2495	0.2495
223	M	86	87	A	0.4910	0.0000
313	F	158	159	A	0.5085	0.0000
217	F	WILD	WILD	F		0.2515
261	M	WILD	WILD	F		0.5000
262	F	WILD	WILD	F		0.5000
311	F	WILD	WILD	F		1.0000
331	F	118	119	A	0.7420	0.7420
219	M	WILD	WILD	f		
220	F	WILD	WILD	F		0.5000
221	F	WILD	WILD	f		
222	M	WILD	WILD	F		1.0000
228	M	WILD	WILD	f		
229	F	WILD	WILD	F		0.5000

Studbook	Sire	Dam	Status (cap=alive)	Prop. genome unique among living desc.	all living
240 F	WILD	WILD	P		0.5000
241 M	WILD	WILD	P		
251 M	WILD	WILD	P		0.5000
249 F	WILD	WILD	P		1.0000
295 P	WILD	WILD	P		1.0000
260 M	99	101	A	0.3565	0.2565
212 F	52	52	A	0.3860	0.1270
224 F	86	87	A	0.4910	0.0000
242 F	36	37	A	0.2715	0.0000
230 F	228	225	A	1.0000	0.5000
267 F	56	207	A	0.0845	0.0845
235 F	110	188	d		
252 M	120	121	A	0.2565	0.1315
315 F	158	159	A	0.5025	0.0000
259 M	162	161	A	0.0070	0.0000
245 M	142	194	A	0.2570	0.0000
251 M	UNK	UNK	U		1.0000
244 F	170	174	A	0.2015	0.2015
258 M	54	55	A	0.2495	0.2495
260 M	74	213	A	0.0425	0.0110
268 M	247	180	A	0.0010	0.0000
256 M	48	139	A	0.3715	0.3715
282 F	170	217	A	0.1305	0.0675
271 M	241	150	A	0.0345	0.0345
285 M	199	126	A	0.3755	0.3120
277 M	9	153	A	0.5055	0.0000
283 M	172	175	A	0.6235	0.5000
284 F	183	181	A	0.0170	0.0000
281 M	74	213	d		
292 M	79	293	A	0.1220	0.1220
288 M	238	237	A	0.4895	0.2390
301 M	56	207	A	0.0885	0.0885
302 M	247	180	A	0.0180	0.0000
305 M	182	181	A	0.0105	0.0000
294 F	169	190	A	0.1320	0.0000
295 F	9	153	A	0.5055	0.0000
308 M	74	213	A	0.0210	0.0055
298 F	219	221	A	0.3105	0.3105
330 F	261	262	A	1.0000	0.0000
312 F	18	17	A	0.3550	0.0000
317 F	56	207	A	0.0380	0.0380
318 M	22	19	A	0.7505	0.5000
346 M	182	181	A	0.0150	0.0000
328 F	162	163	A	0.0000	0.0000
331 F	169	190	A	0.1110	0.0000
332 M	247	180	A	0.0165	0.0000
345 F	36	37	A	0.2380	0.0000
341 M	142	195	A	0.2475	0.0000
342 F	142	194	A	0.2570	0.0000
350 M	238	237	A	0.4895	0.2390
386 M	258	244	A	0.0000	0.0000
354 F	182	181	A	0.3105	0.0000
347 M	219	240	A	0.6370	0.1370
349 M	171	150	A	0.5000	0.0000
387 F	268	175	A	0.1150	0.0000
365 F	371	235	A	0.0590	0.0000
351 F	74	213	A	0.0320	0.0115
363 M	247	180	A	0.0360	0.0000
364 F	56	207	A	0.0775	0.0775
359 F	169	193	A	0.1290	0.0000
356 M	155	225	A	1.0000	0.5000

Studbook		Sire	Dam	Status (cap=alive)	Prop. genome living desc.	unique among all living
362	M	259	202	A	0.2615	0.0000
381	M	285	76	A	0.5000	0.0000
393	M	268	282	A	0.0000	0.0000
374	F	182	181	A	0.0195	0.0000
366	F	219	220	A	0.6336	0.1936
372	M	272	235	A	0.0660	0.0010
376	M	161	163	A	0.0000	0.0000
377	M	302	239	A	0.1115	0.0000
395	M	52	202	A	0.5225	0.2610
383	F	74	213	A	0.0370	0.0135
420	M	182	181	A	0.0175	0.0000
389	M	292	231	A	0.2410	0.0000
397	F	247	180	A	0.0280	0.0000
396	F	271	235	A	0.0660	0.0000
384	F	18	19	A	0.3725	0.0000
422	F	252	150	A	0.0000	0.0000
418	F	281	55	A	0.0080	0.0030
391	M	268	175	A	0.1295	0.0000
419	M	308	317	A	0.0005	0.0000
417	F	268	282	A	0.0030	0.0000
408	F	18	195	A	0.3815	0.0005
432	M	161	163	A	0.0000	0.0000
426	F	74	213	A	0.0325	0.0110
427	M	292	233	A	0.1205	0.0000
434	M	329	185	A	1.0000	0.5000
431	F	268	244	A	0.0000	0.0000
430	M	252	217	A	0.2485	0.0000
428	F	166	298	A	0.5000	0.0000
435	M	292	333	A	0.2410	0.0000
T2065	F	271	235	A	0.0560	0.0000
T2067	M	251	212	A	0.5000	0.0000
T2075	M	332	328	A	0.0300	0.0000

99 Founders 102 Living descendants 212 In total pedigree

FOUNDER ALLELE REPRESENTATION

Founder		Retention	%Representation with unk	%Representation w/o	Target with unk	Target w/o	Difference with unk	Difference w/o
185	F U	0.500	0.490	0.000	0.604	0.000	0.114	0.000
99	M	0.805	1.237	1.259	0.973	1.002	-0.258	-0.257
100	F	0.525	0.729	0.745	0.755	0.778	0.026	0.032
117	F	0.440	0.500	0.511	0.531	0.547	0.031	0.036
31	M	0.500	1.692	1.730	0.584	0.622	-1.088	-1.108
68	ML	0.000	0.000	0.000	1.208	1.244	1.208	1.244
20	M	0.429	0.842	0.861	0.518	0.534	-0.324	-0.327
21	F	0.444	0.864	0.884	0.536	0.553	-0.328	-0.331
409	ML	0.000	0.000	0.000	1.208	1.244	1.208	1.244
67	FL	0.000	0.000	0.000	1.208	1.244	1.208	1.244
74	M	0.993	4.262	4.356	1.199	1.236	-3.063	-3.123
86	ML	0.747	0.980	1.003	1.208	1.244	0.227	0.242
87	FL	0.745	0.980	1.003	1.208	1.244	0.227	0.242
T2071	F	0.380	0.500	0.511	0.458	0.472	-0.041	-0.039
57	F	0.741	3.907	3.996	0.894	0.921	-3.013	-3.074
263	FL	0.500	0.490	0.501	1.208	1.244	0.718	0.743
276	M	0.500	0.490	0.501	0.604	0.622	0.114	0.121
T2070	M	0.375	0.481	0.492	0.447	0.460	-0.034	-0.031
50	M	0.983	6.143	6.282	1.187	1.221	-4.956	-5.059
25	F	0.500	0.490	0.501	0.604	0.622	0.114	0.121
P117	M U	0.481	0.481	0.000	0.521	0.000	0.040	0.000
8	F	0.228	0.224	0.229	0.275	0.284	0.052	0.055
37	FL	0.884	1.471	1.504	1.208	1.244	-0.263	-0.259
46	M	0.811	1.474	1.507	0.980	1.010	-0.494	-0.497
80	ML	0.000	0.000	0.000	1.208	1.244	1.208	1.244
124	M	0.641	1.705	1.743	0.775	0.798	-0.930	-0.945
126	FL	0.623	1.725	1.764	1.208	1.244	-0.518	-0.520
132	ML	0.500	0.490	0.501	1.208	1.244	0.718	0.743
7	M	0.272	0.267	0.273	0.329	0.338	0.062	0.066
47	F	0.622	0.980	1.002	0.751	0.774	-0.229	-0.228
29	F U	0.500	1.235	0.000	0.604	0.000	-0.631	0.000
121	FL	0.500	0.985	1.007	1.208	1.244	0.223	0.237
19	FL	0.750	0.980	1.003	1.208	1.244	0.227	0.242
53	FL	0.500	0.725	0.741	1.208	1.244	0.483	0.504
79	M	0.500	1.242	1.270	0.604	0.622	-0.638	0.647
36	ML	0.873	1.471	1.504	1.208	1.244	-0.263	-0.259
156	ML	0.746	0.980	1.003	1.208	1.244	0.227	0.242
32	FL	0.500	1.734	1.773	1.208	1.244	-0.526	-0.529
120	M	0.500	0.976	0.998	0.604	0.622	-0.372	-0.376
9	ML	0.754	0.980	1.003	1.208	1.244	0.227	0.242
16	M	0.500	1.242	1.270	0.604	0.622	-0.638	-0.648
17	FL	0.740	1.699	1.737	1.208	1.244	-0.491	-0.493
18	ML	0.871	1.471	1.504	1.208	1.244	-0.263	-0.259
76	FL	0.500	0.490	0.501	1.208	1.244	0.718	0.743
128	ML	0.000	0.000	0.000	1.208	1.244	1.208	1.244
133	FL	0.500	0.490	0.501	1.208	1.244	0.718	0.743
155	M	0.500	0.490	0.501	0.604	0.622	0.114	0.121
52	M	0.761	1.236	1.264	0.919	0.947	-0.317	-0.317
75	F	0.500	1.365	1.396	0.604	0.622	-0.761	-0.774
159	FL	0.763	0.980	1.003	1.208	1.244	0.227	0.242
236	FL	0.000	0.000	0.000	1.208	1.244	1.208	1.244
237	FL	0.750	0.980	1.003	1.208	1.244	0.227	0.242
253	ML	0.000	0.000	0.000	1.208	1.244	1.208	1.244
207	F	0.932	2.200	2.249	1.126	1.160	-1.073	-1.089
225	FL	0.500	0.490	0.501	1.208	1.244	0.718	0.743
35	FL	0.000	0.000	0.000	1.208	1.244	1.208	1.244
153	FL	0.751	0.980	1.003	1.208	1.244	0.227	0.242
233	FL	0.741	0.980	1.003	1.208	1.244	0.227	0.242

Founder	Retention	%Representation with unk	%Representation w/o	Target with unk	Target w/o	Difference with unk	Difference w/o
160 ML	0.000	0.000	0.000	1.208	1.244	1.208	1.244
166 ML	0.500	0.490	0.501	1.208	1.244	0.718	0.743
169 ML	0.872	1.471	1.504	1.208	1.244	-0.263	-0.259
170 M	0.766	1.958	2.003	0.925	0.953	1.033	1.049
171 ML	0.500	0.490	0.501	1.208	1.244	0.718	0.743
172 M	0.500	0.490	0.501	0.604	0.622	0.114	0.121
174 F	0.500	0.980	1.002	0.604	0.622	-0.376	-0.380
175 FL	0.868	1.471	1.504	1.208	1.244	-0.263	-0.259
178 FL	0.000	0.000	0.000	1.208	1.244	1.208	1.244
181 FL	0.993	3.678	3.761	1.208	1.244	-2.471	-2.517
182 ML	0.993	3.674	3.757	1.208	1.244	-2.466	-2.513
194 FL	0.757	0.980	1.003	1.208	1.244	0.227	0.242
195 FL	0.748	0.980	1.003	1.208	1.244	0.227	0.242
235 FL	0.933	1.961	2.005	1.208	1.244	-0.753	-0.761
256 ML	0.000	0.000	0.000	1.208	1.244	1.208	1.244
257 FL	0.000	0.000	0.000	1.208	1.244	1.208	1.244
247 ML	0.971	4.416	4.516	1.208	1.244	-3.208	-3.271
188 FL	0.364	0.487	0.498	1.208	1.244	0.721	0.746
213 FL	0.972	2.942	3.008	1.208	1.244	-1.734	-1.764
238 M	0.739	0.980	1.003	0.893	0.920	-0.088	-0.083
199 M	0.500	0.746	0.762	0.604	0.622	-0.142	-0.140
202 FL	0.761	0.980	1.003	1.208	1.244	0.227	0.242
255 FL	0.000	0.000	0.000	1.208	1.244	1.208	1.244
293 F	0.500	1.209	1.237	0.604	0.622	-0.605	-0.614
323 ML	0.500	0.490	0.501	1.208	1.244	0.718	0.743
217 FL	0.749	1.474	1.507	1.208	1.244	-0.266	-0.262
261 ML	0.500	0.490	0.501	1.208	1.244	0.718	0.743
262 FL	0.500	0.490	0.501	1.208	1.244	0.718	0.743
311 FL	0.000	0.000	0.000	1.208	1.244	1.208	1.244
219 M	0.876	1.726	1.765	1.059	1.091	-0.667	-0.674
220 FL	0.500	0.490	0.501	1.208	1.244	0.718	0.743
221 F	0.500	0.725	0.741	0.604	0.622	-0.121	-0.119
222 ML	0.000	0.000	0.000	1.208	1.244	1.208	1.244
228 M	0.500	0.490	0.501	0.604	0.622	0.114	0.121
229 FL	0.500	0.490	0.501	1.208	1.244	0.718	0.743
240 FL	0.500	0.490	0.501	1.208	1.244	0.718	0.743
241 M	0.500	1.476	1.509	0.604	0.622	-0.872	-0.887
251 ML	0.500	0.490	0.501	1.208	1.244	0.718	0.743
269 FL	0.000	0.000	0.000	1.208	1.244	1.208	1.244
299 FL	0.000	0.000	0.000	1.208	1.244	1.208	1.244
291 MLU	0.000	0.000	0.000	1.208	0.000	1.208	0.000

GENETIC SUMMARY — LIVING DESCENDANT POPULATION POTENTIAL

	with unknowns	w/o	w/ unkn	w/o
Number of founders:	81	78	99	95
Mean retention:	0.630	0.636	0.836	0.846
Founder genomes surviving:	51.008	49.577	82.790	80.359
Founder Equivalents:	47.423	45.786	91.678	88.365
Founder Genome Equivalents:	31.120	30.182	82.790	80.359
Fraction of wild gene diversity retained:	0.984	0.983	0.994	0.994
Fraction of wild gene diversity lost:	0.016	0.017	0.006	0.006
Mean inbreeding coefficient:	0.008			

DICEROS BICORNIS MICHAELI - WORLD - 21/04/1992

ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	MALES	MK	Known	FEMALES	MK	Known
1	68	0.0000	1.0000	67	0.0000	1.0000
2	409	0.0000	1.0000	236	0.0000	1.0000
3	80	0.0000	1.0000	35	0.0000	1.0000
4	128	0.0000	1.0000	178	0.0000	1.0000
5	253	0.0000	1.0000	297	0.0000	1.0000
6	160	0.0000	1.0000	255	0.0000	1.0000
7	256	0.0000	1.0000	311	0.0000	1.0000
8	222	0.0000	1.0000	249	0.0000	1.0000
9	132	0.0025	1.0000	299	0.0000	1.0000
10	166	0.0025	1.0000	263	0.0025	1.0000
11	171	0.0025	1.0000	76	0.0025	1.0000
12	329	0.0025	1.0000	133	0.0025	1.0000
13	261	0.0025	1.0000	225	0.0025	1.0000
14	251	0.0025	1.0000	188	0.0025	1.0000
15	86	0.0050	1.0000	262	0.0025	1.0000
16	158	0.0050	1.0000	220	0.0025	1.0000
17	9	0.0050	1.0000	229	0.0025	1.0000
18	356	0.0050	1.0000	240	0.0025	1.0000
19	434	0.0050	0.5000	53	0.0038	1.0000
20	318	0.0063	1.0000	231	0.0038	0.5000
21	164	0.0066	1.0000	87	0.0050	1.0000
22	36	0.0075	1.0000	121	0.0050	1.0000
23	18	0.0075	1.0000	19	0.0050	1.0000
24	169	0.0075	1.0000	159	0.0050	1.0000
25	223	0.0075	1.0000	237	0.0050	1.0000
26	277	0.0075	1.0000	134	0.0050	1.0000
27	283	0.0075	1.0000	153	0.0050	1.0000
28	288	0.0075	1.0000	223	0.0050	1.0000
29	350	0.0075	1.0000	265	0.0050	1.0000
30	347	0.0081	1.0000	202	0.0050	1.0000
31	395	0.0081	1.0000	220	0.0050	1.0000
32	T2067	0.0081	1.0000	330	0.0050	1.0000
33	260	0.0088	1.0000	195	0.0050	1.0000
34	381	0.0092	1.0000	194	0.0050	1.0000
35	245	0.0096	0.7500	197	0.0075	1.0000
36	341	0.0096	0.7500	37	0.0075	1.0000
37	110	0.0100	1.0000	175	0.0075	1.0000
38	252	0.0100	1.0000	313	0.0075	1.0000
39	266	0.0100	1.0000	217	0.0075	1.0000
40	285	0.0113	1.0000	224	0.0075	1.0000
41	339	0.0113	1.0000	315	0.0075	1.0000
42	430	0.0113	1.0000	295	0.0075	1.0000
43	435	0.0113	1.0000	366	0.0081	1.0000
44	292	0.0125	1.0000	125	0.0088	1.0000
45	349	0.0125	1.0000	32	0.0088	1.0000
46	427	0.0132	1.0000	17	0.0088	1.0000
47	142	0.0138	0.5000	212	0.0088	1.0000
48	362	0.0163	1.0000	384	0.0088	1.0000
49	372	0.0175	1.0000	428	0.0088	1.0000
50	182	0.0188	1.0000	408	0.0088	1.0000
51	271	0.0201	1.0000	342	0.0096	0.7500
52	258	0.0210	1.0000	235	0.0100	1.0000
53	250	0.0210	1.0000	165	0.0100	1.0000
54	376	0.0210	1.0000	242	0.0100	1.0000
55	432	0.0210	1.0000	298	0.0100	1.0000
56	161	0.0213	1.0000	345	0.0100	1.0000
57	305	0.0213	1.0000	312	0.0107	1.0000

Rank	MALEs	MK	Known	FEMALEs	MK	Known
58	346	0.0213	1.0000	244	0.0125	1.0000
59	420	0.0213	1.0000	294	0.0132	1.0000
60	308	0.0222	1.0000	331	0.0132	1.0000
61	247	0.0226	1.0000	359	0.0132	1.0000
62	259	0.0226	1.0000	190	0.0136	1.0000
63	301	0.0238	1.0000	282	0.0138	1.0000
64	377	0.0243	1.0000	213	0.0150	1.0000
65	419	0.0262	1.0000	163	0.0157	1.0000
66	393	0.0268	1.0000	422	0.0163	1.0000
67	386	0.0293	1.0000	150	0.0175	1.0000
68	398	0.0299	1.0000	365	0.0175	1.0000
69	T2075	0.0310	1.0000	396	0.0175	1.0000
70	363	0.0335	1.0000	T2065	0.0175	1.0000
71	302	0.0348	1.0000	181	0.0188	1.0000
72	332	0.0348	1.0000	192	0.0210	1.0000
73	268	0.0410	1.0000	351	0.0210	1.0000
74	291		0.0000	383	0.0210	1.0000
75				426	0.0210	1.0000
76				284	0.0213	1.0000
77				354	0.0213	1.0000
78				374	0.0213	1.0000
79				328	0.0222	1.0000
80				267	0.0238	1.0000
81				364	0.0238	1.0000
82				317	0.0251	1.0000
83				387	0.0268	1.0000
84				419	0.0284	1.0000
85				431	0.0293	1.0000
86				417	0.0299	1.0000
87				55	0.0320	1.0000
88				397	0.0335	1.0000
89				180	0.0395	1.0000

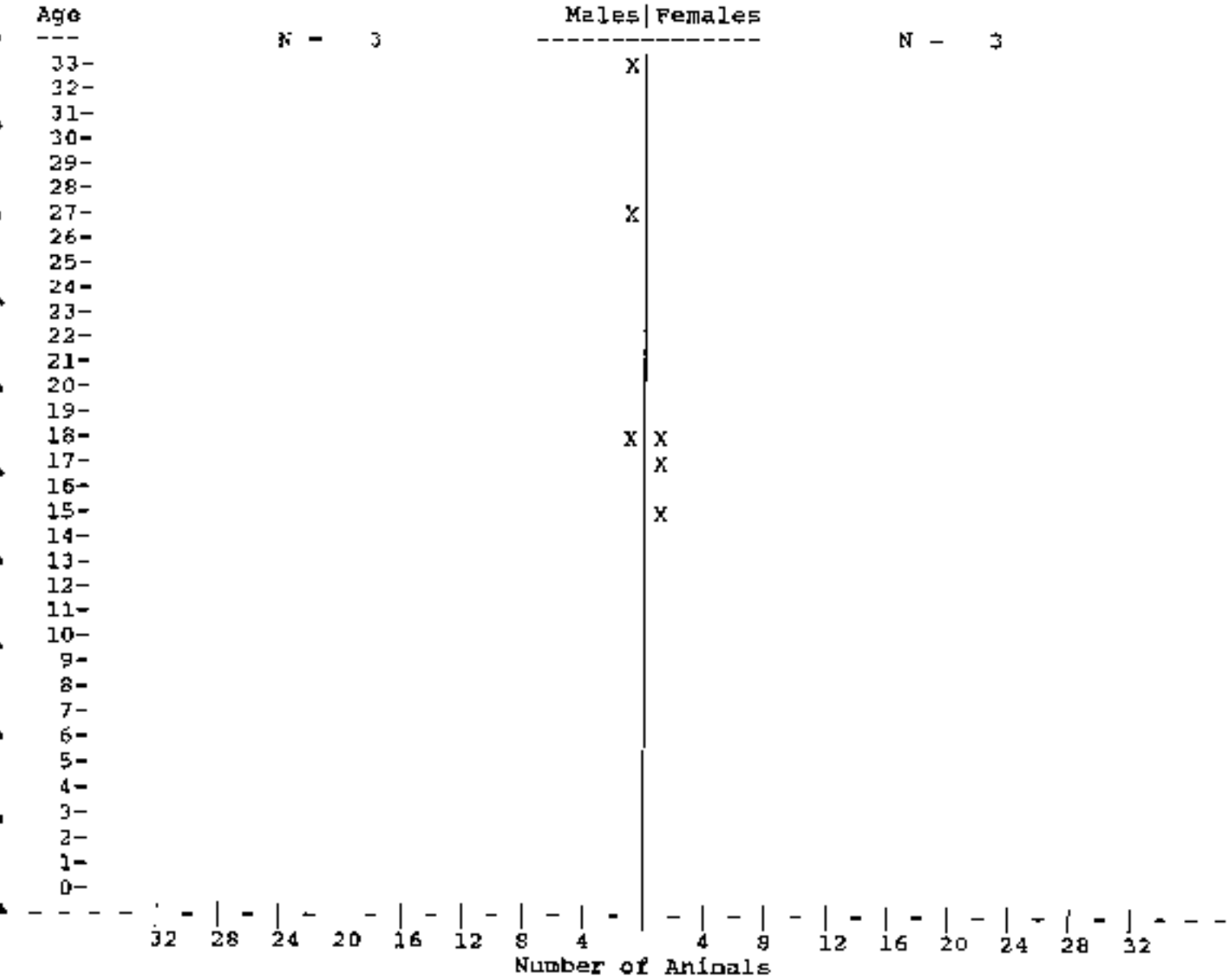
GENETIC SUMMARY OF POPULATION

Descendant population mean kinship:	0.0165
Gene diversity:	0.9835
Founder Genome Equivalents:	30.3645

Age Pyramid Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: AFRICAN /
Dates: As of End of 20/04/1992 <= date

Taxon Name: **DICEROS BICORNIS MICHAELI**



X >>> Specimens of known sex...
? >>> Specimens of unknown sex...

Taxon Name: DICEROS BICORNIS MICHAELI

Age | Studbook Numbers >>> **Male**

Age	Studbook Numbers >>> Male
33	80
32	
31	
30	
29	
28	
27	128
26	
25	
24	
23	
22	
21	
20	
19	
18	222
17	
16	
15	
14	
13	
12	
11	
10	
9	
8	
7	
6	
5	
4	
3	
2	
1	
0	

Total= 3

Age Studbook Numbers >>> Female

Age	Studbook Numbers >>> Female
33	
32	
31	
30	
29	
28	
27	
26	
25	
24	
23	
22	
21	
20	
19	
18	229
17	249
16	
15	230
14	
13	
12	
11	
10	
9	
8	
7	
6	
5	
4	
3	
2	
1	
0	

Total= 3

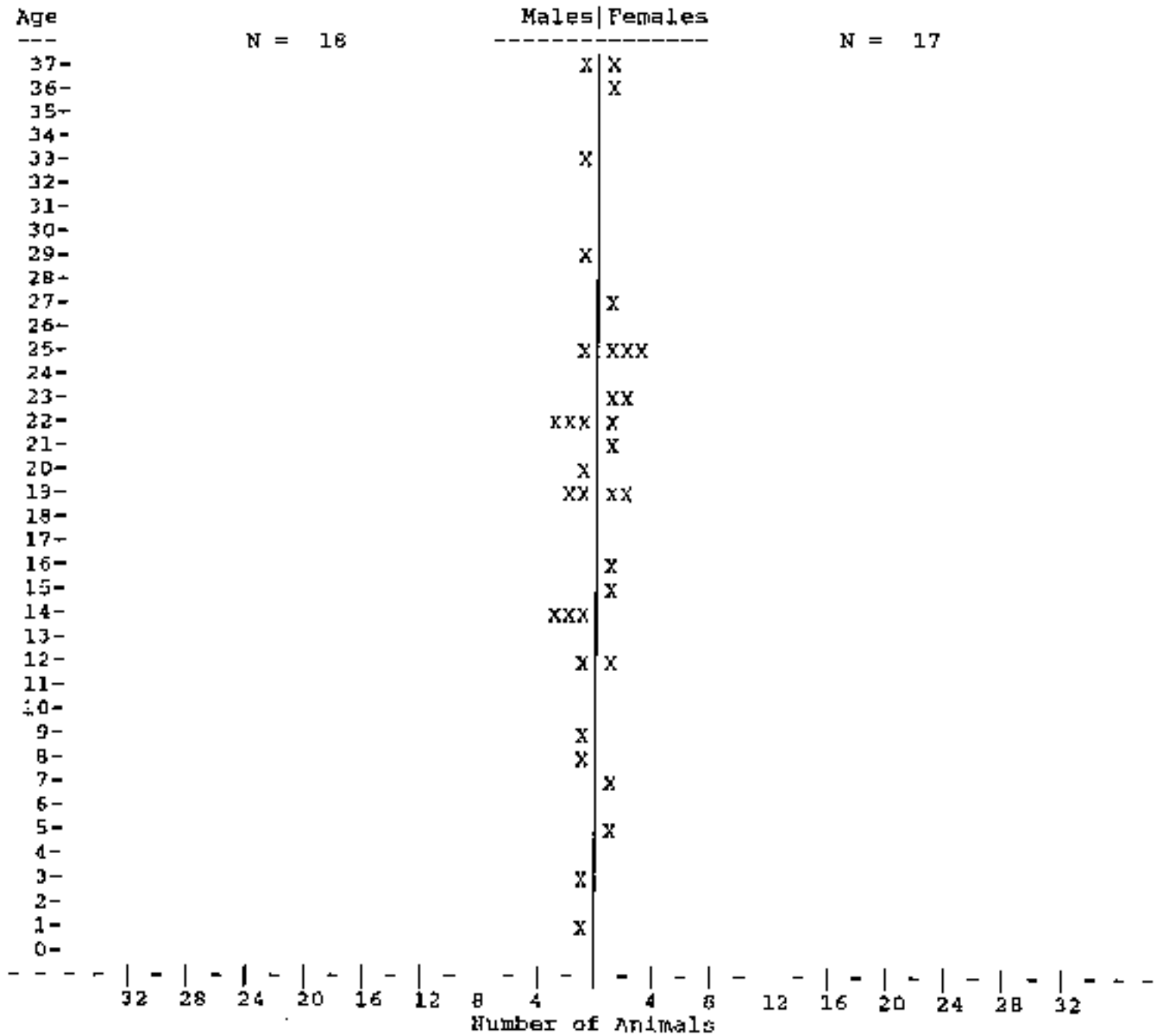
Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Diceros bicornis michaeli

SPARKS v1.11
21 Apr 1992

Age Pyramid Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: ASIA /
Dates: As of End of 20/04/1992 <= date

Taxon Name: **DICEROS BICORNIS MICHAELI**



X >>> Specimens of known sex...
? >>> Specimens of unknown sex...

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Diceros bicornis michaeli

SPARKS v1.11
21 Apr 1992

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age	Studbook Numbers >>> **Male**		
37	86		
36			
35			
34			
33	132		
32			
31			
30			
29	158		
28			
27			
26			
25	253		
24			
23			
22	160	171	182
21			
20	323		
19	223	261	
18			
17			
16			
15			
14	250	266	291
13			
12	288		
11			
10			
9	346		
8	350		
7			
6			
5			
4			
3	420		
2			
1	434		
0			

Total= 18

Age Pyramid Report
EASTERN BLACK RHINO Studbook

Report Date:
21 Apr 1992

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age	Studbook Numbers >>> **Female**		
37	87		
36	263		
35			
34			
33			
32			
31			
30			
29			
28			
27	133		
26			
25	159	236	237
24			
23	35	134	
22	181		
21	265		
20			
19	262	313	
18			
17			
16	224		
15	315		
14			
13			
12	284		
11			
10			
9			
8			
7	354		
6			
5	374		
4			
3			
2			
1			
0			

Total= 17

Fecundity & Mortality Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: ASIA /

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	15.3	0.00	12.3	0.16	16.2	0.14	14.0
1- 2	0.00	26.5	0.00	19.8	0.08	26.2	0.05	21.7
2- 3	0.00	31.4	0.00	23.9	0.06	30.8	0.04	23.9
3- 4	0.00	31.7	0.05	23.5	0.00	31.7	0.04	24.2
4- 5	0.00	31.0	0.00	24.0	0.00	31.0	0.00	24.0
5- 6	0.02	31.0	0.00	24.1	0.00	31.0	0.00	24.1
6- 7	0.02	30.8	0.07	22.7	0.07	29.3	0.09	22.0
7- 8	0.02	28.8	0.03	19.9	0.04	27.5	0.05	19.7
8- 9	0.06	27.1	0.06	19.0	0.04	26.1	0.00	19.0
9-10	0.09	24.4	0.06	19.0	0.09	23.5	0.00	19.0
10-11	0.02	22.4	0.06	19.0	0.05	22.0	0.00	19.0
11-12	0.07	22.0	0.06	18.6	0.00	22.0	0.06	18.0
12-13	0.08	20.3	0.09	17.8	0.05	20.2	0.06	17.1
13-14	0.05	20.0	0.10	16.9	0.00	20.0	0.06	16.0
14-15	0.09	18.4	0.07	16.0	0.00	18.4	0.00	16.0
15-16	0.00	16.2	0.00	15.3	0.13	15.0	0.00	15.3
16-17	0.07	15.0	0.04	14.5	0.00	15.0	0.00	14.5
17-18	0.07	15.0	0.08	14.0	0.00	13.9	0.00	14.0
18-19	0.07	14.6	0.04	13.5	0.07	14.3	0.08	13.0
19-20	0.00	13.9	0.00	11.6	0.00	13.9	0.00	11.6
20-21	0.04	12.3	0.05	11.0	0.00	12.3	0.00	11.0
21-22	0.00	11.4	0.00	10.6	0.09	11.0	0.00	10.6
22-23	0.06	8.9	0.00	9.3	0.00	8.9	0.00	9.3
23-24	0.00	8.0	0.00	8.0	0.00	8.0	0.00	8.0
24-25	0.00	8.0	0.00	6.9	0.00	8.0	0.17	6.0
25-26	0.00	6.3	0.00	3.9	0.00	6.3	0.00	3.9
26-27	0.00	6.0	0.00	3.0	0.20	5.0	0.00	3.0
27-28	0.00	5.0	0.00	2.3	0.00	4.6	0.00	2.3
28-29	0.00	5.0	0.00	2.0	0.00	5.0	0.00	2.0
29-30	0.00	4.3	0.00	2.0	0.00	3.9	0.00	2.0
30-31	0.00	4.0	0.00	2.0	0.00	4.0	0.00	2.0
31-32	0.00	2.3	0.00	2.0	1.00	2.0	0.00	2.0
32-33	0.00	2.0	0.00	2.0	0.00	2.0	0.00	2.0
33-34	0.00	1.3	0.00	2.0	0.00	1.3	0.00	2.0
34-35	0.00	1.0	0.00	2.0	0.00	1.0	0.00	2.0
35-36	0.00	1.0	0.00	2.0	0.00	1.0	0.00	2.0
36-37	0.00	1.0	0.00	1.3	0.00	1.0	0.00	1.3
37-38	0.00	0.3	0.00	0.3	0.00	0.3	0.00	0.3
38-39	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
39-40	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 12.763
Ro = 0.421
lambda=0.93
r = -0.068

T = 11.294
Ro = 0.512
lambda=0.94
r = -0.059

30 day mortality: 13%
(4 out of 32)

28 birth events to known age parents tabulated for Mx...plus...
3 births to UNK or MULT dams...
1 births to UNK or MULT sires...

35 death events of known age tabulated for Qx...

WARNING: Values with small sample sizes (N) warrant less confidence...

SPARKS v1.11
21 Apr 1992

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Oiceros biocrnis michaeli

Fecundity & Mortality Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: ASIA /
Dates: During 01/01/1981 <- date

Taxon Name: DICEROS BICORNIS MICHAELI

Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	6.1	0.00	3.1	0.25	8.1	0.25	4.0
1- 2	0.00	6.7	0.00	4.2	0.17	5.9	0.20	5.1
2- 3	0.00	4.6	0.00	5.0	0.00	4.6	0.00	5.0
3- 4	0.00	5.5	0.00	4.2	0.00	5.5	0.20	5.0
4- 5	0.00	6.0	0.00	5.0	0.00	6.0	0.00	5.0
5- 6	0.00	6.5	0.00	5.4	0.00	6.5	0.00	5.4
6- 7	0.00	8.3	0.10	5.0	0.00	8.3	0.00	5.0
7- 8	0.00	8.0	0.00	3.7	0.00	8.0	0.00	3.7
8- 9	0.06	8.9	0.10	5.0	0.13	7.9	0.00	5.0
9-10	0.00	7.5	0.00	5.0	0.13	7.5	0.00	5.0
10-11	0.00	8.0	0.07	6.7	0.00	8.0	0.00	6.7
11-12	0.05	10.0	0.06	8.0	0.00	10.0	0.00	8.0
12-13	0.11	9.2	0.11	8.9	0.00	9.2	0.12	8.2
13-14	0.05	9.7	0.00	8.0	0.00	9.7	0.00	8.0
14-15	0.05	9.4	0.05	11.0	0.00	9.4	0.00	11.0
15-16	0.00	7.4	0.00	10.4	0.14	7.0	0.00	10.4
16-17	0.11	9.0	0.04	11.5	0.00	10.0	0.00	11.5
17-18	0.00	9.0	0.05	11.0	0.00	9.0	0.00	11.0
18-19	0.10	9.6	0.05	11.0	0.11	9.3	0.00	11.0
19-20	0.00	8.9	0.00	9.6	0.00	8.9	0.00	9.6
20-21	0.00	7.3	0.00	9.0	0.00	7.3	0.00	9.0
21-22	0.00	6.4	0.00	8.6	0.17	6.0	0.00	8.6
22-23	0.08	5.9	0.00	7.2	0.00	5.9	0.00	7.3
23-24	0.00	5.0	0.00	6.0	0.00	5.0	0.00	6.0
24-25	0.00	5.0	0.00	4.9	0.00	5.0	0.25	4.0
25-26	0.00	4.3	0.00	2.9	0.00	4.3	0.00	2.9
26-27	0.00	5.0	0.00	3.0	0.25	4.0	0.00	3.0
27-28	0.00	5.0	0.00	2.3	0.00	4.6	0.00	2.3
28-29	0.00	5.0	0.00	2.0	0.00	5.0	0.00	2.0
29-30	0.00	4.3	0.00	2.0	0.00	3.9	0.00	2.0
30-31	0.00	4.0	0.00	2.0	0.00	4.0	0.00	2.0
31-32	0.00	2.3	0.00	2.0	1.00	2.0	0.00	2.0
32-33	0.00	2.0	0.00	2.0	0.00	2.0	0.00	2.0
33-34	0.00	1.3	0.00	2.0	0.00	1.3	0.00	2.0
34-35	0.00	1.0	0.00	2.0	0.00	1.0	0.00	2.0
35-36	0.00	1.0	0.00	2.0	0.00	1.0	0.00	2.0
36-37	0.00	1.0	0.00	1.3	0.00	1.0	0.00	1.3
37-38	0.00	0.3	0.00	0.3	0.00	0.3	0.00	0.3
38-39	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
39-40	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 14.124
Ro = 0.260
lambda=0.91
r = -0.095

T = 11.180
Ro = 0.285
lambda=0.89
r = -0.112

30 day mortality: 18%
(2 out of 11)

10 birth events to known age parents tabulated for Mx...

16 death events of known age tabulated for Qx...

WARNING: Values with small sample sizes (N) warrant less confidence...

Compiled by: Robert C. Lacy thru Captive Breeding Specialist Group
Diceros bicornis michaeli

SPARKS v1.11
21 Apr 1992

FOUNDER ANALYSIS - *DICEROS BICORNIS MICHAELI* - ASIA - 21/04/1992

Founder representation in each living animal:
Founders listed across top, descendants down side.
Founder calculations omit UNKNOWNs.

Founders:

74	86	87	263	276	46	132
47	158	133	159	236	237	253
35	260	171	181	182	213	238
323	261	262				

Founder contributions:

0.5000	1.0000	1.0000	0.5000	0.5000	0.7500	0.5000
0.2500	1.0000	0.5000	1.0000	0.0000	1.0000	0.0000
0.0000	0.0000	0.5000	2.5000	2.5000	0.5000	1.0000
0.5000	0.0000	0.0000				

Fractional contributions:

0.0323	0.0645	0.0645	0.0323	0.0323	0.0484	0.0323
0.0161	0.0645	0.0323	0.0645	0.0000	0.0645	0.0000
0.0000	0.0000	0.0000	0.1613	0.1613	0.0323	0.0645
0.0323	0.0000	0.0000				

Number of living descendants:

1	2	2	1	1	1	1
1	3	1	2	0	2	0
0	0	0	5	5	1	2
1	0	0				

GENE DROP - *DICEROS BICORNIS MICHAELI* - ASIA - 21/04/1992

Studbook		Sire	Dam	Status (cap=alive)	Prop. genome unique among living desc.	all living
185	F	UNK	UNK	U		
74	M	WILD	WILD	F		
86	M	WILD	WILD	F		0.2420
87	F	WILD	WILD	F		0.2545
263	F	WILD	WILD	F		0.5000
276	M	WILD	WILD	F		
46	M	WILD	WILD	F		
132	M	WILD	WILD	F		0.5000
47	F	WILD	WILD	F		
158	M	WILD	WILD	F		0.2475
133	F	WILD	WILD	F		0.5000
159	F	WILD	WILD	F		0.2355
236	F	WILD	WILD	F		1.0000
237	F	WILD	WILD	F		0.2435
253	M	WILD	WILD	F		1.0000
134	F	132	133	A	1.0000	0.0000
35	F	WILD	WILD	F		1.0000
160	M	WILD	WILD	F		1.0000
171	M	WILD	WILD	F		1.0000
181	F	WILD	WILD	F		0.0290
182	M	WILD	WILD	F		0.0370
139	F	46	47	D		
265	F	276	263	A	1.0000	0.5000
213	F	WILD	WILD	U		
238	M	WILD	WILD	U		
323	M	WILD	WILD	F		0.5000
223	M	86	87	A	0.5035	0.0000
313	F	158	159	A	0.5170	0.0000
261	M	WILD	WILD	F		1.0000
262	F	WILD	WILD	F		1.0000
224	F	86	87	A	0.5035	0.0000
315	F	158	159	A	0.5170	0.0000
291	M	UNK	UNK	U		1.0000
250	M	74	213	A	1.0000	1.0000
266	M	46	139	A	0.7560	0.7560
284	F	182	181	A	0.0620	0.0000
288	M	238	237	A	0.5005	0.2440
346	M	182	181	A	0.0610	0.0000
350	M	238	237	A	0.5005	0.2440
354	F	182	181	A	0.0705	0.0000
374	F	182	181	A	0.0685	0.0000
420	M	182	181	A	0.0635	0.0000
434	M	323	185	A	1.0000	0.5000

---

26 Founders 16 Living descendants 43 In total pedigree

FOUNDER ALLELE REPRESENTATION

Founder	Retention	%Representation with unk	%Representation w/o	Target with unk	Target w/o	Difference with unk	Difference w/o
185 F U	0.500	3.125	0.000	2.210	0.000	0.915	0.000
74 M	0.500	3.125	3.226	2.210	2.367	-0.915	-0.859
66 ML	0.758	6.250	6.452	4.420	4.734	-1.830	-1.717
67 FL	0.746	6.250	6.452	4.420	4.734	-1.830	-1.717
263 FL	0.500	3.125	3.226	4.420	4.734	1.295	1.509
276 M	0.500	3.125	3.226	2.210	2.367	-0.915	-0.859
46 M	0.629	4.697	4.848	2.783	2.980	-1.914	-1.868
132 ML	0.500	3.125	3.226	4.420	4.734	1.295	1.509
47 F	0.248	1.553	1.603	1.098	1.176	-0.455	-0.427
158 ML	0.752	6.250	6.452	4.420	4.734	-1.830	-1.717
133 FL	0.500	3.125	3.226	4.420	4.734	1.295	1.509
159 FL	0.764	6.250	6.452	4.420	4.734	-1.830	-1.717
236 FL	0.000	0.000	0.000	4.420	4.734	4.420	4.734
237 FL	0.756	6.250	6.452	4.420	4.734	-1.830	-1.717
353 ML	0.000	0.000	0.000	4.420	4.734	4.420	4.734
35 FL	0.000	0.000	0.000	4.420	4.734	4.420	4.734
160 ML	0.000	0.000	0.000	4.420	4.734	4.420	4.734
171 ML	0.000	0.000	0.000	4.420	4.734	4.420	4.734
181 FL	0.971	15.625	16.129	4.420	4.734	-11.205	-11.395
182 ML	0.963	15.625	16.129	4.420	4.734	-11.205	-11.395
213 F	0.500	3.125	3.226	2.210	2.367	-0.915	-0.859
298 M	0.744	6.250	6.452	3.289	3.522	-2.961	-2.929
323 ML	0.500	3.125	3.226	4.420	4.734	1.295	1.509
261 ML	0.000	0.000	0.000	4.420	4.734	4.420	4.734
262 FL	0.000	0.000	0.000	4.420	4.734	4.420	4.734
291 MLU	0.000	0.000	0.000	4.420	0.000	4.420	0.000

GENETIC SUMMARY — LIVING DESCENDANT POPULATION POTENTIAL

	with unknowns	w/o	w/ unkn	w/o
Number of founders:	18	17	20	24
Mean retention:	0.630	0.637	0.870	0.880
Founder genomes surviving:	11.333	10.833	22.622	21.122
Founder Equivalents:	12.117	11.508	24.256	22.576
Founder Genome Equivalents:	8.738	8.343	22.622	21.122
Fraction of wild gene diversity retained:	0.943	0.940	0.978	0.976
Fraction of wild gene diversity lost:	0.057	0.060	0.022	0.024
Mean inbreeding coefficient:	0.015			

DICEROS BICORNIS MICHAELI - ASIA - 21/04/1992

ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	MALES	MK	Known	FEMALES	MK	Known
1	253	0.0000	1.0000	236	0.0000	1.0000
2	160	0.0000	1.0000	35	0.0000	1.0000
3	171	0.0000	1.0000	262	0.0000	1.0000
4	261	0.0000	1.0000	263	0.0161	1.0000
5	132	0.0161	1.0000	133	0.0161	1.0000
6	323	0.0161	1.0000	87	0.0323	1.0000
7	86	0.0323	1.0000	159	0.0323	1.0000
8	158	0.0323	1.0000	237	0.0323	1.0000
9	250	0.0323	1.0000	134	0.0323	1.0000
10	434	0.0323	0.5000	265	0.0323	1.0000
11	266	0.0403	1.0000	323	0.0484	1.0000
12	223	0.0484	1.0000	224	0.0484	1.0000
13	288	0.0484	1.0000	315	0.0484	1.0000
14	350	0.0484	1.0000	161	0.0806	1.0000
15	182	0.0806	1.0000	284	0.0968	1.0000
16	346	0.0968	1.0000	354	0.0968	1.0000
17	420	0.0968	1.0000	174	0.0968	1.0000
18	292		0.0000			

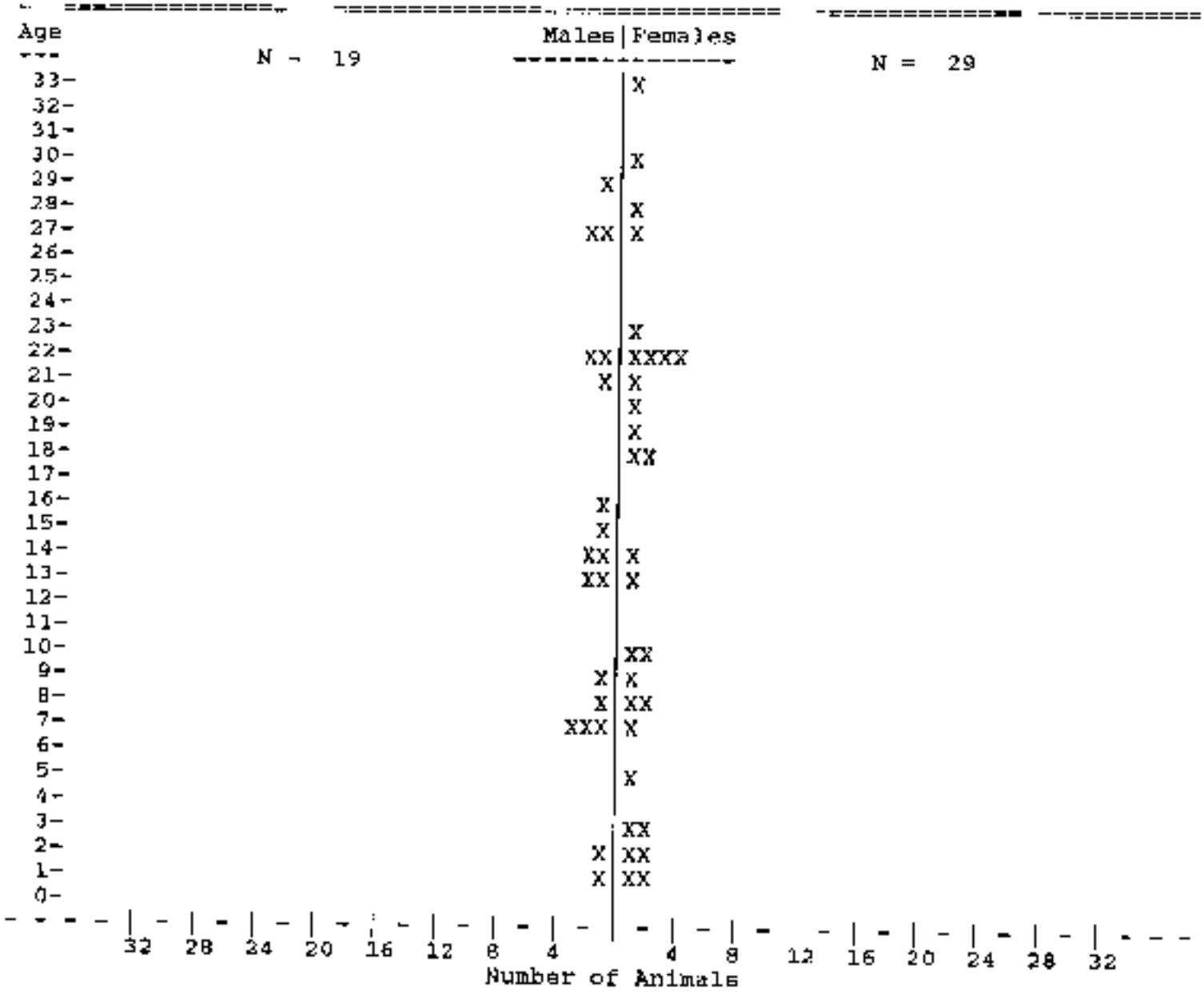
GENETIC SUMMARY OF POPULATION

Descendant population mean kinship:	0.0598
Gene diversity:	0.9402
Founder Genome Equivalents:	8.3565

Age Pyramid Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: EUROPE /
Dates: As of End of 20/04/1992 <- date

Taxon Name: **DICEROS BICORNIS MICHAELI**



X >>> Specimens of known sex...
? >>> Specimens of unknown sex...

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age	Studbook Numbers >>> **Male**		
33			
32			
31			
30			
29	36		
28			
27	9	16	
26			
25			
24			
23			
22	142	166	
21	164		
20			
19			
18			
17			
16	260		
15	252		
14	245	268	
13	277	283	
12			
11			
10			
9	318		
8	341		
7	347	349	386
6			
5			
4			
3			
2	391		
1	430		
0			

Total= 19

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age	Studbook Numbers >>> Female			
33	37			
32				
31				
30	19			
29				
28	32			
27	17			
26				
25				
24				
23	153			
22	175	178	194	195
21	150			
20	165			
19	217			
18	220	240		
17				
16				
15				
14	244			
13	282			
12				
11				
10	295	298		
9	312			
8	342	345		
7	387			
6				
5	366			
4				
3	384	422		
2	408	417		
1	428	431		
0				

Total= 29

Fecundity & Mortality Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: EUROPE /

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	24.9	0.00	32.4	0.14	29.0	0.09	34.0
1- 2	0.00	39.6	0.00	43.9	0.03	38.0	0.10	40.5
2- 3	0.00	52.9	0.00	58.9	0.02	51.4	0.05	58.1
3- 4	0.00	49.2	0.00	55.7	0.00	48.9	0.00	54.5
4- 5	0.03	47.5	0.01	54.8	0.04	47.0	0.00	53.8
5- 6	0.02	46.1	0.01	52.3	0.02	46.0	0.02	52.5
6- 7	0.01	45.8	0.03	50.5	0.02	45.0	0.02	49.5
7- 8	0.08	43.3	0.08	46.0	0.02	42.1	0.02	46.5
8- 9	0.11	37.9	0.09	41.8	0.14	34.7	0.13	39.9
9-10	0.05	32.2	0.04	37.3	0.14	28.9	0.06	36.2
10-11	0.09	28.1	0.09	34.9	0.04	27.2	0.00	34.9
11-12	0.04	28.0	0.05	34.0	0.00	28.0	0.00	34.0
12-13	0.09	27.8	0.06	32.6	0.04	25.5	0.07	30.2
13-14	0.06	25.3	0.08	30.8	0.04	24.9	0.00	29.8
14-15	0.11	23.2	0.05	28.5	0.04	23.2	0.11	26.6
15-16	0.05	20.7	0.02	24.9	0.05	20.4	0.04	24.0
16-17	0.03	18.8	0.02	23.2	0.11	17.9	0.09	22.0
17-18	0.09	17.0	0.10	21.3	0.00	17.0	0.05	21.0
18-19	0.03	16.4	0.03	17.8	0.06	15.7	0.06	17.6
19-20	0.04	14.1	0.13	15.3	0.07	14.0	0.07	15.3
20-21	0.16	12.5	0.08	13.0	0.00	12.0	0.08	12.5
21-22	0.00	10.2	0.00	11.7	0.22	9.2	0.00	11.7
22-23	0.06	8.1	0.00	8.2	0.00	8.1	0.00	8.2
23-24	0.07	7.0	0.08	6.1	0.00	7.0	0.00	5.3
24-25	0.07	7.0	0.10	5.0	0.00	7.0	0.00	5.0
25-26	0.07	7.0	0.00	5.0	0.00	7.0	0.00	5.0
26-27	0.00	7.0	0.10	5.0	0.00	7.0	0.00	5.0
27-28	0.00	5.6	0.00	4.3	0.00	5.6	0.00	4.3
28-29	0.00	5.0	0.00	3.3	0.00	5.0	0.00	3.3
29-30	0.00	3.4	0.00	3.0	0.30	3.3	0.00	3.0
30-31	0.00	3.0	0.00	2.3	0.00	3.0	0.00	2.3
31-32	0.00	3.0	0.00	2.0	0.00	3.0	0.00	2.0
32-33	0.00	2.0	0.00	2.0	0.50	2.0	0.00	2.0
33-34	0.00	2.0	0.00	1.3	0.00	2.0	0.00	1.3
34-35	0.00	2.0	0.00	1.0	0.00	2.0	0.00	0.0
35-36	0.00	1.4	0.00	0.0	1.00	1.0	0.00	0.0
36-37	0.00	1.0	0.00	0.0	0.00	1.0	0.00	0.0
37-38	0.00	0.3	0.00	0.0	0.00	0.0	0.00	0.0
38-39	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
39-40	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 13.205	T = 13.899	30 day mortality: 8%
Ro = 0.617	Ro = 0.601	(5 out of 63)
lambda=0.96	lambda=0.96	
r = -0.037	r = -0.037	

59 birth events to known age parents tabulated for Mx...plus...
2 births to UNK or MULT dams...
1 births to UNK or MULT sires...

68 death events of known age tabulated for Qx...

WARNING: Values with small sample sizes (*N*) warrant less confidence...

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Dicerus bicornis michaeli

SPARKS v1.11
21 Apr 1992

Fecundity & Mortality Report
Restricted to: EASTERN BLACK RHINO Studbook
Locations: EUROPE /
Dates: During 01/01/1981 <= date

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	8.2	0.00	15.0	0.33	12.1	0.00	15.0
1- 2	0.00	8.9	0.00	14.5	0.00	8.9	0.15	13.5
2- 3	0.00	10.6	0.00	12.1	0.00	10.6	0.00	12.1
3- 4	0.00	10.6	0.00	11.3	0.00	10.6	0.00	10.4
4- 5	0.00	11.4	0.00	11.0	0.09	10.9	0.00	11.0
5- 6	0.00	11.0	0.00	10.5	0.00	11.0	0.00	10.5
6- 7	0.05	11.0	0.05	9.5	0.00	11.0	0.11	9.0
7- 8	0.09	10.6	0.09	11.4	0.10	10.1	0.00	11.4
8- 9	0.18	8.6	0.14	10.8	0.00	8.6	0.18	11.1
9-10	0.00	7.7	0.00	8.8	0.00	7.7	0.11	8.7
10-11	0.07	7.6	0.07	7.6	0.12	8.2	0.00	7.6
11-12	0.10	10.5	0.05	11.0	0.00	10.5	0.00	11.0
12-13	0.14	11.0	0.12	13.0	0.00	10.2	0.00	13.2
13-14	0.10	10.2	0.11	13.8	0.00	10.2	0.00	13.8
14-15	0.18	8.2	0.11	13.3	0.12	8.2	0.08	12.6
15-16	0.00	7.2	0.00	12.5	0.15	6.9	0.00	12.0
16-17	0.05	9.1	0.00	13.0	0.11	8.9	0.00	13.0
17-18	0.13	8.0	0.07	13.9	0.00	8.0	0.00	14.0
18-19	0.06	8.4	0.04	11.8	0.13	7.7	0.08	12.6
19-20	0.00	7.0	0.10	10.3	0.00	7.0	0.10	10.3
20-21	0.23	6.5	0.11	9.5	0.00	6.0	0.00	9.5
21-22	0.00	5.2	0.00	8.7	0.00	5.2	0.00	8.7
22-23	0.00	4.1	0.00	6.2	0.00	4.1	0.00	6.2
23-24	0.17	3.0	0.12	4.3	0.00	3.0	0.00	4.3
24-25	0.17	3.0	0.13	4.0	0.00	3.0	0.00	4.0
25-26	0.17	3.0	0.00	4.0	0.00	3.0	0.00	4.0
26-27	0.00	3.0	0.13	4.0	0.00	3.0	0.00	4.0
27-28	0.00	1.6	0.00	3.3	0.00	1.6	0.00	3.3
28-29	0.00	2.0	0.00	2.3	0.00	2.0	0.00	2.3
29-30	0.00	1.3	0.00	2.0	0.00	1.3	0.00	2.0
30-31	0.00	1.0	0.00	1.3	0.00	1.0	0.00	1.3
31-32	0.00	1.0	0.00	1.0	0.00	1.0	0.00	1.0
32-33	0.00	1.0	0.00	1.0	0.00	1.0	0.00	1.0
33-34	0.00	2.0	0.00	1.3	0.00	2.0	0.00	1.3
34-35	0.00	2.0	0.00	1.0	0.00	2.0	0.00	0.0
35-36	0.00	1.4	0.00	0.0	1.00	1.0	0.00	0.0
36-37	0.00	1.0	0.00	0.0	0.00	1.0	0.00	0.0
37-38	0.00	0.3	0.00	0.0	0.00	0.0	0.00	0.0
38-39	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
39-40	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 14.533	T = 14.800	30 day mortality: 15%
Ro = 0.735	Ro = 0.744	(4 out of 27)
lambda=0.98	lambda=0.98	
r = -0.021	r = -0.020	

27 birth events to known age parents tabulated for Mx...

33 death events of known age tabulated for Qx...

WARNING: Values with small sample sizes (N) warrant less confidence...

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Diceros bicornis michaeli

SPARKS v1.11
21 Apr 1992

FOUNDER ANALYSIS - *DICEROS BICORNIS MICHAELI* - EUROPE
21/04/1992

Founder representation in each living animal:
Founders listed across top, descendants down side.
Founder calculations omit **UNKNOWN**s.

Founders:

99	100	31	20	21	57	56
25	8	37	7	121	19	36
32	120	9	17	18	153	166
170	171	172	174	175	178	194
195	247	217	219	223	221	240

Founder contributions:

0.7500	0.2500	1.0000	0.8751	0.8751	0.8750	0.8750
0.5000	0.2500	1.0000	0.2500	1.0000	1.0000	1.0000
1.0000	1.0000	1.0000	0.5000	1.5000	1.0000	0.5000
1.7500	0.5000	0.5000	1.0000	1.5000	1.0000	1.0000
1.0000	1.7500	1.2500	1.7500	0.5000	1.7500	0.5000

Fractional contributions:

0.0244	0.0081	0.0325	0.0285	0.0285	0.0285	0.0285
0.0163	0.0081	0.0325	0.0081	0.0325	0.0325	0.0325
0.0325	0.0325	0.0325	0.0163	0.0488	0.0325	0.0163
0.0569	0.0163	0.0163	0.0325	0.0488	0.0000	0.0325
0.0325	0.0569	0.0407	0.0569	0.0163	0.0244	0.0163

Number of living descendants:

1	1	3	5	5	6	6
1	1	2	1	3	2	2
3	3	2	1	3	2	1
5	1	1	3	3	0	2
2	6	3	4	1	2	1

GENE DROP - *DICEROS BICORNIS MICHAELI* - EUROPE - 21/04/1992

Studbook	Sire	Dam	Status (cap=alive)	Prop. genome unique among living desc.	Prop. genome unique among all living
99 M	WILD	WILD	f		
100 F	WILD	WILD	f		
31 M	WILD	WILD	f		
20 M	WILD	WILD	f		
21 F	WILD	WILD	f		
57 F	WILD	WILD	f		
56 M	WILD	WILD	f		
25 F	WILD	WILD	f		
24 M	20	21	d		
8 F	WILD	WILD	f		
37 F	WILD	WILD	F		0.2520
7 M	WILD	WILD	f		
29 F	UNK	UNK	u		
131 F	WILD	WILD	f		
28 M	20	21	d		
19 F	WILD	WILD	F		0.2420
36 M	WILD	WILD	F		0.2485
32 F	WILD	WILD	F		0.5000
120 M	WILD	WILD	f		
9 M	WILD	WILD	F		0.2575
17 F	WILD	WILD	F		0.5000
18 M	WILD	WILD	F		0.1215
101 F	99	100	d		
22 M	7	8	d		
153 F	WILD	WILD	F		0.2375
142 M	28	29	A	0.1045	0.1045
166 M	WILD	WILD	F		0.5000
170 M	WILD	WILD	f		
171 M	WILD	WILD	f		
172 M	WILD	WILD	f		
174 F	WILD	WILD	f		
175 F	WILD	WILD	F		0.1210
178 F	WILD	WILD	F		1.0000
194 F	WILD	WILD	F		0.2485
195 F	WILD	WILD	F		0.2465
180 F	56	57	d		
247 M	WILD	WILD	f		
150 F	31	32	A	0.2460	0.1295
164 M	24	25	A	0.8660	0.8660
165 F	35	37	A	0.4995	0.5000
217 F	WILD	WILD	F		0.2535
219 M	WILD	WILD	f		
220 F	WILD	WILD	F		0.5000
221 F	WILD	WILD	f		
240 F	WILD	WILD	F		0.5000
260 M	99	101	A	0.7690	0.7690
252 M	120	121	A	0.2560	0.2560
245 M	142	194	A	0.2515	0.0000
244 F	170	174	A	0.1920	0.1920
268 M	247	180	A	0.0265	0.0255
282 F	170	217	A	0.2455	0.1180
277 M	9	153	A	0.5050	0.0000
281 M	172	175	A	0.5370	0.5000
295 F	9	153	A	0.5050	0.0000
298 F	219	221	A	0.3090	0.3090
312 F	18	17	A	0.6305	0.0000
318 M	22	19	A	0.7580	0.5000
345 F	36	37	A	0.4995	0.0000

Studbook		Sire	Dam	Status (cap-alive)	Prop. genome living desc.	unique among all living
341	M	142	195	A	0.2535	0.0000
342	F	142	194	A	0.2515	0.0000
385	M	268	244	A	0.0000	0.0000
347	M	219	240	A	0.6075	0.1075
349	M	171	150	A	0.5000	0.5000
387	F	268	175	A	0.1145	0.0000
366	F	219	220	A	0.6225	0.1285
384	F	18	19	A	0.3820	0.0000
422	F	252	150	A	0.0000	0.0000
391	M	268	175	A	0.1275	0.0000
417	F	268	282	A	0.0000	0.0000
408	F	18	195	A	0.3775	0.0000
431	F	268	244	A	0.0000	0.0000
430	M	252	217	A	0.2465	0.0000
428	F	166	298	A	0.5000	0.0000

36 Founders 32 Living descendants 73 In total pedigree

FOUNDER ALLELE REPRESENTATION

Founder	Retention	%Representation with unk	%Representation w/o	Target with unk	Target w/o	Difference with unk	Difference w/o
99 M	0.635	2.347	2.442	2.505	2.555	0.158	0.114
100 F	0.249	0.778	0.810	0.981	1.001	0.203	0.192
31 M	0.500	3.081	3.206	1.969	2.008	-1.112	-1.197
20 M	0.427	2.608	2.713	1.685	1.719	-0.923	-0.994
21 F	0.499	2.894	3.010	1.728	1.763	1.165	-1.247
57 F	0.242	2.658	2.765	0.956	0.975	-1.702	-1.790
56 M	0.258	2.873	2.989	1.015	1.035	-1.858	-1.954
25 F	0.500	1.563	1.626	1.971	2.010	0.409	0.385
8 F	0.251	0.814	0.847	1.027	1.047	0.213	0.201
37 FL	0.748	3.125	3.251	3.942	4.021	0.817	0.770
7 M	0.239	0.748	0.775	0.944	0.963	0.196	0.184
29 F U	0.500	3.873	0.000	1.971	0.000	-1.903	0.000
121 F	0.500	3.102	3.228	1.971	2.010	-1.132	-1.218
19 FL	0.758	3.125	3.251	3.942	4.021	0.817	0.770
36 ML	0.751	3.125	3.251	3.942	4.021	0.817	0.770
32 FL	0.500	3.166	3.293	3.942	4.021	0.776	0.728
120 M	0.500	3.147	3.274	1.971	2.010	-1.176	-1.263
9 ML	0.743	3.125	3.251	3.942	4.021	0.817	0.770
17 FL	0.500	1.563	1.626	3.942	4.021	2.379	2.395
18 ML	0.878	4.688	4.877	3.942	4.021	-0.746	-0.856
153 FL	0.762	3.125	3.251	3.942	4.021	0.817	0.770
166 ML	0.500	1.563	1.626	3.942	4.021	2.379	2.395
170 M	0.754	5.441	5.660	2.972	3.032	-2.469	-2.628
171 M	0.500	1.563	1.626	1.971	2.010	0.408	0.385
172 M	0.500	1.563	1.626	1.971	2.010	0.408	0.385
174 F	0.500	3.173	3.301	1.971	2.010	-1.203	-1.291
175 FL	0.879	4.688	4.877	3.942	4.021	-0.746	-0.856
178 FL	0.000	0.000	0.000	3.942	4.021	3.942	4.021
194 FL	0.754	3.125	3.251	3.942	4.021	0.817	0.770
195 FL	0.753	3.125	3.251	3.942	4.021	0.817	0.770
247 M	0.500	5.406	5.624	1.971	2.010	-3.435	-3.614
217 FL	0.747	3.886	4.043	3.942	4.021	0.056	-0.022
219 M	0.867	5.467	5.685	3.415	3.484	-2.052	-2.204
220 FL	0.500	1.563	1.626	3.942	4.021	2.379	2.395
221 F	0.500	2.345	2.440	1.971	2.010	-0.375	-0.429
240 FL	0.500	1.563	1.626	3.942	4.021	2.379	2.395

GENETIC SUMMARY — LIVING DESCENDANT POPULATION POTENTIAL

	with unknowns	w/o	w/ unkn	w/o
Number of founders:	35	34	36	35
Mean retention:	0.561	0.563	0.705	0.711
Founder genomes surviving:	19.642	19.142	25.370	24.870
Founder Equivalents:	29.354	28.372	30.782	29.939
Founder Genome Equivalents:	16.158	14.758	25.370	24.970
Fraction of wild gene diversity retained:	0.967	0.966	0.980	0.980
Fraction of wild gene diversity lost:	0.033	0.034	0.020	0.020
Mean inbreeding coefficient:	0.007			

DICEROS BICORNIS MICHAELI - EUROPE - 21/04/1992

ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	MALES	MK	Known	FEMALES	MK	Known
1	166	0.0081	1.0000	178	0.0000	1.0000
2	36	0.0163	1.0000	17	0.0081	1.0000
3	9	0.0163	1.0000	220	0.0081	1.0000
4	318	0.0203	1.0000	240	0.0081	1.0000
5	260	0.0203	1.0000	37	0.0163	1.0000
6	164	0.0213	1.0000	19	0.0163	1.0000
7	18	0.0244	1.0000	32	0.0163	1.0000
8	277	0.0244	1.0000	153	0.0163	1.0000
9	293	0.0244	1.0000	195	0.0163	1.0000
10	347	0.0264	1.0000	194	0.0163	1.0000
11	349	0.0285	1.0000	217	0.0203	1.0000
12	245	0.0312	0.7500	175	0.0244	1.0000
13	341	0.0312	0.7500	165	0.0244	1.0000
14	252	0.0325	1.0000	295	0.0244	1.0000
15	430	0.0346	1.0000	312	0.0244	1.0000
16	142	0.0447	0.5000	345	0.0244	1.0000
17	391	0.0488	1.0000	366	0.0264	1.0000
18	386	0.0559	1.0000	384	0.0285	1.0000
19	268	0.0569	1.0000	428	0.0285	1.0000
20				408	0.0285	1.0000
21				342	0.0312	0.7500
22				150	0.0325	1.0000
23				298	0.0325	1.0000
24				282	0.0366	1.0000
25				244	0.0386	1.0000
26				422	0.0407	1.0000
27				387	0.0488	1.0000
28				417	0.0549	1.0000
29				431	0.0559	1.0000

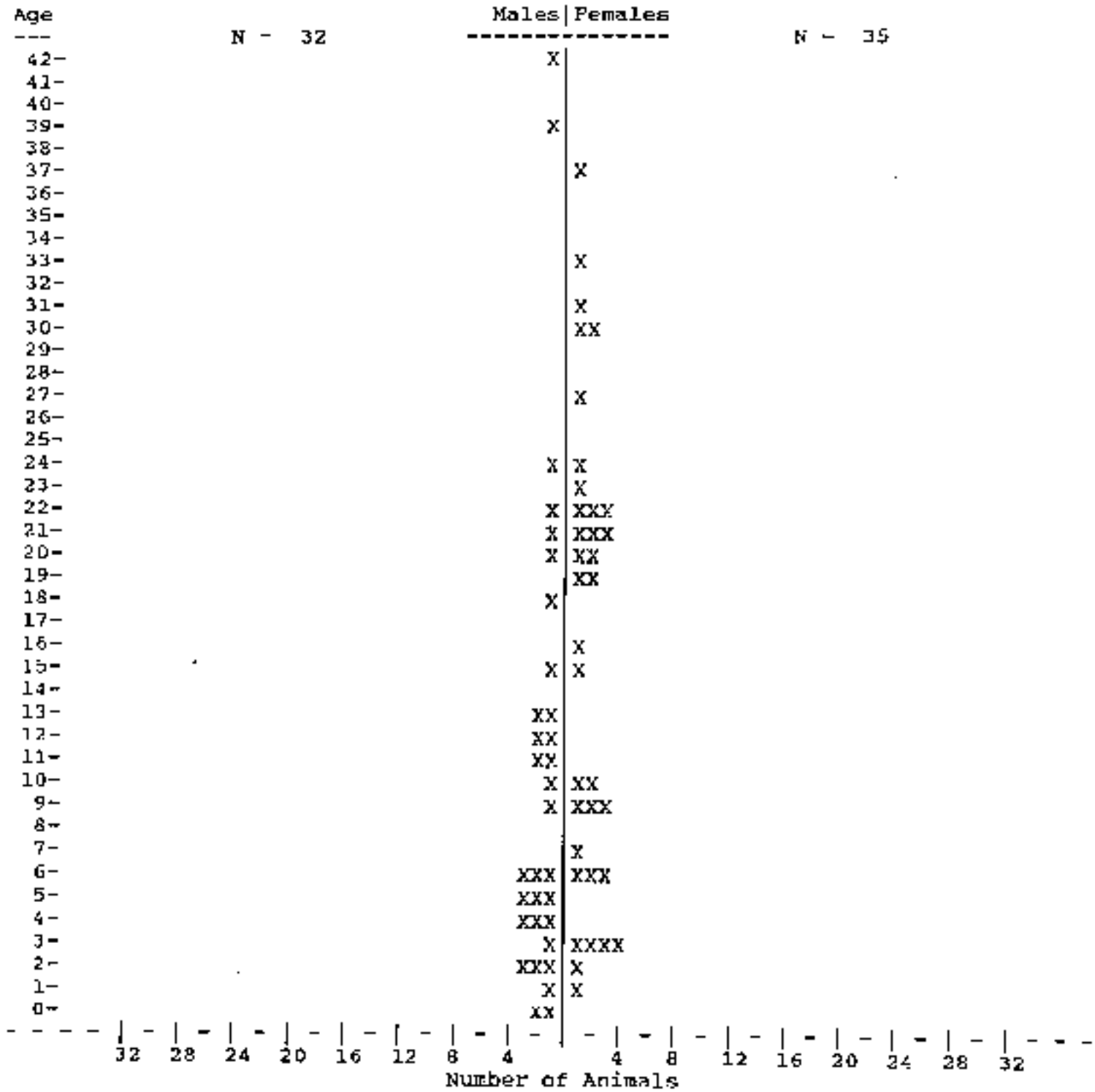
GENETIC SUMMARY OF POPULATION

Descendant population mean kinship:	0.0337
Gene diversity:	0.9663
Founder Genome Equivalents:	14.8326

Age Pyramid Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: N.AMERICA/
Dates: As of End of 20/04/1992 <- date

Taxon Name: **DICEROS BICORNIS MICHAELI**



X >>> Specimens of known sex...
? >>> Specimens of unknown sex...

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group

SPARKS v1.11

Taxon Name: DICEROS BICORNIS MICHAELI

Age	Studbook Numbers >>> Male		
42	68		
41			
40			
39	409		
38			
37			
36			
35			
34			
33			
32			
31			
30			
29			
28			
27			
26			
25			
24	110		
23			
22	169		
21	247		
20	161		
19			
18	251		
17			
16			
15	259		
14			
13	271	285	
12	292	301	
11	302	305	
10	308		
9	332		
8			
7			
6	356	362	363
5	372	381	388
4	376	377	395
3	389		
2	419	427	432
1	435		
0	T2067	T2075	

Total= 32

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Diceros bicornis michaeli

Taxon Name: **DICBROS BICORNIS MICHAELI**

Age	Studbook Numbers >>> Female			
42				
41				
40				
39				
38				
37	67			
36				
35				
34				
33	125			
32				
31	121			
30	53	55		
29				
28				
27	76			
26				
25				
24	225			
23	233			
22	180	190	235	
21	163	188	213	
20	202	255		
19	192	311		
18				
17				
16	212			
15	267			
14				
13				
12				
11				
10	294	330		
9	317	328	331	
8				
7	365			
6	351	359	364	
5				
4				
3	383	396	397	418
2	426			
1	T2065			
0				

Total= 35

Fecundity & Mortality Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: N.AMERICA/
Dates: During date <= 01/04/1992

Taxon Name: **DICEROS BICORNIS MICHAELI**

	Fecundity [Mx]...				Mortality [Qx]...			
Age Class	Male	N	Female	N	Male	N	Female	N
0- 1	0.00	44.3	0.00	41.2	0.10	51.1	0.13	47.3
1- 2	0.00	50.4	0.00	53.7	0.06	51.8	0.06	53.2
2- 3	0.00	57.5	0.00	55.5	0.05	55.6	0.11	53.9
3- 4	0.00	57.0	0.00	51.9	0.00	55.6	0.06	49.2
4- 5	0.00	57.0	0.01	50.7	0.04	56.4	0.04	49.7
5- 6	0.04	54.1	0.05	52.5	0.02	53.7	0.00	51.6
6- 7	0.10	47.0	0.08	51.2	0.09	45.5	0.00	51.2
7- 8	0.08	45.2	0.07	49.2	0.05	43.4	0.06	47.3
8- 9	0.09	44.0	0.07	48.0	0.02	44.0	0.00	48.0
9-10	0.10	41.8	0.06	45.3	0.05	41.2	0.05	44.2
10-11	0.11	39.3	0.13	41.9	0.05	38.5	0.02	40.4
11-12	0.07	36.7	0.05	37.6	0.00	36.7	0.08	36.0
12-13	0.11	33.1	0.07	35.1	0.09	32.3	0.03	35.0
13-14	0.05	30.9	0.10	35.0	0.00	30.9	0.00	35.0
14-15	0.02	27.9	0.09	33.5	0.11	27.0	0.13	31.0
15-16	0.10	26.0	0.10	30.1	0.00	26.0	0.07	29.1
16-17	0.12	25.6	0.11	28.4	0.04	25.0	0.04	28.1
17-18	0.06	25.0	0.06	27.0	0.00	25.0	0.04	27.0
18-19	0.04	24.3	0.08	26.6	0.00	24.3	0.04	26.0
19-20	0.04	24.0	0.04	23.8	0.00	23.5	0.04	23.4
20-21	0.05	21.7	0.02	21.5	0.09	21.3	0.00	21.5
21-22	0.02	20.4	0.08	18.2	0.11	18.5	0.06	17.7
22-23	0.06	15.7	0.00	14.6	0.30	13.3	0.00	14.6
23-24	0.08	13.0	0.00	13.3	0.00	13.0	0.00	13.3
24-25	0.04	11.1	0.08	12.3	0.19	10.6	0.00	12.3
25-26	0.00	9.8	0.00	12.0	0.12	8.5	0.00	12.0
26-27	0.11	8.9	0.00	11.6	0.13	8.0	0.00	11.6
27-28	0.00	8.0	0.05	10.3	0.00	8.0	0.00	9.8
28-29	0.07	7.5	0.00	9.2	0.14	7.0	0.25	8.0
29-30	0.07	7.0	0.00	8.0	0.17	6.0	0.00	8.0
30-31	0.08	6.0	0.00	7.7	0.00	6.0	0.00	7.7
31-32	0.00	6.0	0.00	5.9	0.00	6.0	0.19	5.3
32-33	0.00	6.0	0.00	4.5	0.00	6.0	0.25	4.0
33-34	0.10	4.8	0.00	3.3	0.75	4.0	0.00	3.3
34-35	0.00	3.0	0.00	2.1	0.00	3.0	0.50	2.0
35-36	0.17	3.0	0.00	2.0	0.00	3.0	0.00	2.0
36-37	0.00	2.9	0.00	2.0	0.50	2.0	0.00	2.0
37-38	0.00	2.0	0.00	1.3	0.00	2.0	0.00	1.3
38-39	0.00	2.0	0.00	1.0	0.00	2.0	0.00	1.0
39-40	0.00	1.3	0.00	1.0	0.00	1.3	0.00	1.0
40-41	0.00	1.0	0.00	1.0	0.00	1.0	0.00	1.0
41-42	0.00	1.0	0.00	1.0	0.00	1.0	0.00	1.0
42-43	0.00	0.3	0.00	1.0	0.00	0.3	0.00	1.0
43-44	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
44-45	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
45-46	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
46-47	0.00	0.0	0.00	0.2	0.00	0.0	0.00	0.0
47-48	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
48-49	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 13.154	T = 12.619	30 day mortality: 7%
Ro = 0.754	Ro = 0.671	(7 out of 94)
lambda=0.98	lambda=0.97	
r = -0.021	r = -0.032	

94 birth events to known age parents tabulated for Mx...

97 death events of known age tabulated for Qx...

WARNING: Values with small sample sizes (N) warrant less confidence...

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Diceros bicornis michaeli

SPARKS v1.11
21 Apr 1992

Fecundity & Mortality Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: N.AMERICA/
Dates: During 01/01/1981 <= date

Taxon Name: DICEROS BICORNIS MICHAELI

Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	19.4	0.00	22.2	0.16	24.3	0.12	25.3
1- 2	0.00	19.3	0.00	18.4	0.05	19.5	0.11	17.7
2- 3	0.00	18.5	0.00	14.8	0.00	18.5	0.13	15.3
3- 4	0.00	19.5	0.00	11.1	0.00	19.5	0.09	10.9
4- 5	0.00	18.7	0.00	9.9	0.00	18.7	0.11	9.5
5- 6	0.00	15.9	0.00	10.7	0.00	15.9	0.00	10.7
6- 7	0.13	11.4	0.05	10.2	0.00	11.4	0.00	10.2
7- 8	0.13	12.0	0.05	9.2	0.00	12.0	0.00	9.2
8- 9	0.14	11.0	0.04	11.8	0.09	11.0	0.00	11.8
9-10	0.14	10.4	0.03	14.6	0.10	10.3	0.07	14.4
10-11	0.20	10.0	0.13	15.8	0.00	10.0	0.00	15.8
11-12	0.15	9.8	0.09	16.9	0.00	9.8	0.06	15.9
12-13	0.24	8.5	0.06	16.1	0.00	8.5	0.06	16.0
13-14	0.06	7.7	0.11	19.0	0.00	7.7	0.00	19.0
14-15	0.00	6.1	0.14	17.5	0.17	6.0	0.27	15.0
15-16	0.17	6.0	0.09	16.1	0.00	6.0	0.00	16.1
16-17	0.25	8.0	0.16	15.8	0.00	8.0	0.06	15.6
17-18	0.13	8.0	0.11	14.0	0.00	8.0	0.07	14.0
18-19	0.13	7.6	0.14	14.0	0.00	7.6	0.00	14.0
19-20	0.06	9.0	0.07	14.4	0.00	8.5	0.07	15.1
20-21	0.07	7.3	0.03	14.6	0.14	7.3	0.00	14.6
21-22	0.07	6.8	0.13	11.4	0.00	6.8	0.09	10.9
22-23	0.09	5.3	0.00	8.8	0.47	4.3	0.00	8.8
23-24	0.13	4.0	0.00	7.3	0.00	4.0	0.00	7.3
24-25	0.00	2.4	0.16	6.3	1.00	1.9	0.00	6.3
25-26	0.00	3.0	0.00	6.0	0.00	2.5	0.00	6.0
26-27	0.26	3.8	0.00	7.0	0.33	3.0	0.00	7.0
27-28	0.00	3.0	0.08	6.3	0.00	3.0	0.00	5.8
28-29	0.11	4.5	0.00	5.8	0.25	4.0	0.20	5.0
29-30	0.13	4.0	0.00	5.0	0.00	4.0	0.00	5.0
30-31	0.13	4.0	0.00	5.0	0.00	4.0	0.00	5.0
31-32	0.00	5.0	0.00	3.3	0.00	5.0	0.00	3.3
32-33	0.00	5.0	0.00	3.0	0.00	5.0	0.00	3.0
33-34	0.12	4.2	0.00	2.3	0.50	4.0	0.00	2.3
34-35	0.00	3.0	0.00	1.1	0.00	3.0	1.00	1.0
35-36	0.17	3.0	0.00	1.0	0.00	3.0	0.00	1.0
36-37	0.00	2.9	0.00	1.0	0.50	2.0	0.00	1.0
37-38	0.00	2.0	0.00	0.3	0.00	2.0	0.00	0.3
38-39	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
39-40	0.00	1.3	0.00	0.0	0.00	1.3	0.00	0.0
40-41	0.00	1.0	0.00	0.0	0.00	1.0	0.00	0.0
41-42	0.00	1.0	0.00	0.0	0.00	1.0	0.00	0.0
42-43	0.00	0.3	0.00	0.0	0.00	0.3	0.00	0.0
43-44	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
44-45	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 12.603 T = 14.461 30 day mortality: 13%
Ro = 1.347 Ro = 0.596 (6 out of 46)
lambda=1.02 lambda=0.96

r = 0.024 r = -0.036

46 birth events to known age parents tabulated for Mx...

40 death events of known age tabulated for Qx...

WARNING: Values with small sample sizes (N) warrant less confidence...

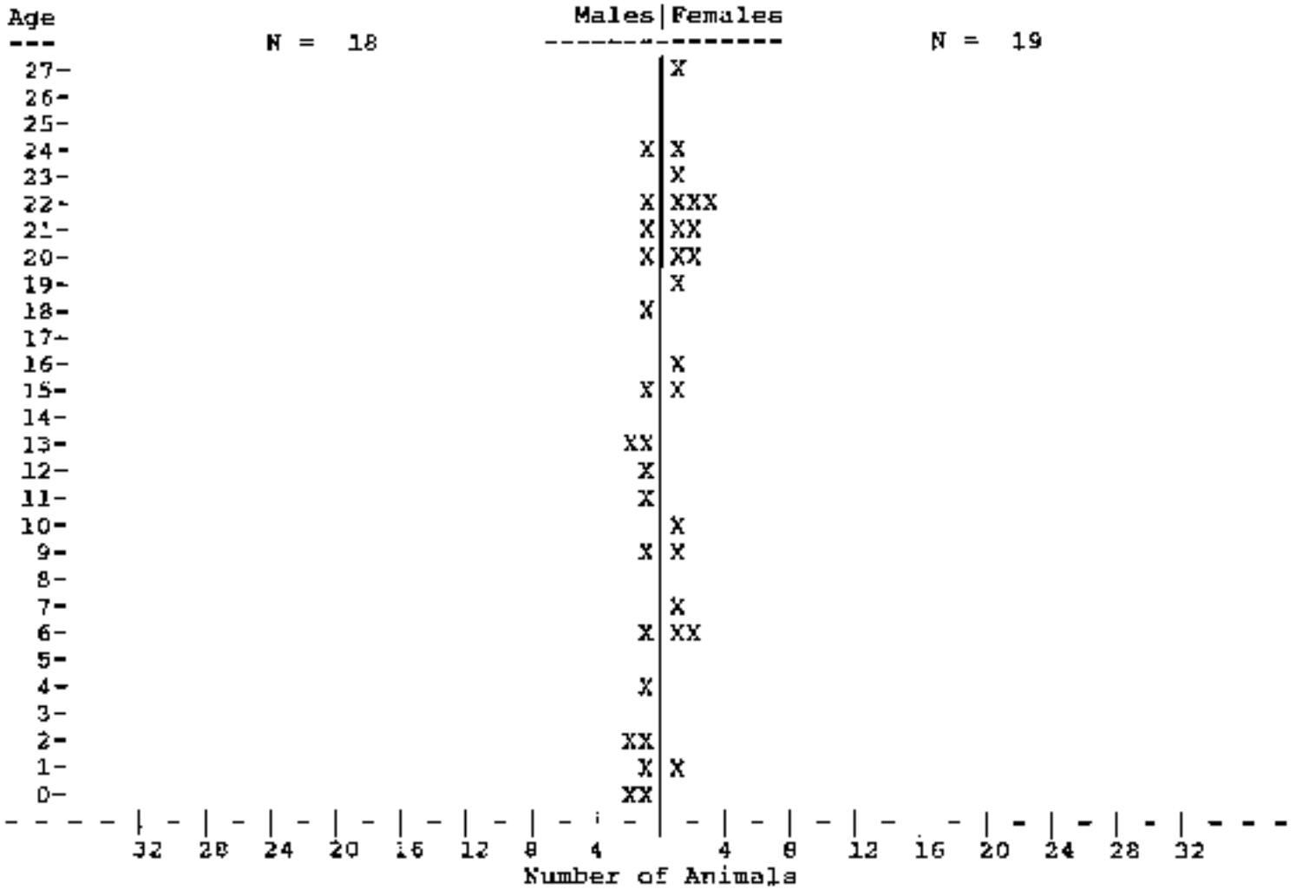
Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Diceros bicornis michaeli

SPARKS v1.11
21 Apr 1992

Age Pyramid Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: CHICAGOBR/CINCINNAT/DENVER /LOSANGELE/METROZOO /SAN ANTON/ST LOUIS
SAN FRAN /SD-WAP /SANDIEGOZ/
Dates: As of End of 20/04/1992 <= date

Taxon Name: **DICEROS BICORNIS MICHAELI**



X >>> Specimens of known sex...
? >>> Specimens of unknown sex...

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age	Studbook Numbers >>> **Male**	
27		
26		
25		
24	110	
23		
22	169	
21	247	
20	161	
19		
18	251	
17		
16		
15	259	
14		
13	271	285
12	292	
11	302	
10		
9	332	
8		
7		
6	363	
5		
4	395	
3		
2	427	432
1	435	
0	T2067	T2075

Total= 18

Age Pyramid Report
EASTERN BLACK RHINO Studbook

Report Date:
21 Apr 1992

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age	Studbook Numbers >>> **Female**		
27	76		
26			
25			
24	225		
23	233		
22	180	190	235
21	163	213	
20	202	255	
19	192		
18			
17			
16	212		
15	267		
14			
13			
12			
11			
10	330		
9	328		
8			
7	365		
6	351	364	
5			
4			
3			
2			
1	T2065		
0			

Total- 19

Fecundity & Mortality Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: CHICAGODR/CINCINNAT/DENVER /LOSANGELE/METROZOO /SAN ANTON/ST LOUIS SAN FRAN /SD-WAP /SANDIEGOZ/

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	27.2	0.00	27.7	0.07	29.2	0.15	32.8
1- 2	0.00	22.5	0.00	22.3	0.00	21.8	0.05	21.5
2- 3	0.00	22.7	0.00	20.9	0.00	22.7	0.10	20.0
3- 4	0.00	22.8	0.00	20.8	0.00	22.8	0.00	20.8
4- 5	0.00	23.1	0.00	22.0	0.00	23.1	0.05	21.7
5- 6	0.09	23.0	0.09	23.5	0.00	23.0	0.00	23.5
6- 7	0.12	21.3	0.09	23.1	0.10	20.8	0.00	23.1
7- 8	0.10	20.5	0.05	21.3	0.05	20.0	0.05	21.2
8- 9	0.13	19.7	0.12	21.0	0.05	19.7	0.00	21.0
9-10	0.13	19.3	0.10	21.0	0.00	19.3	0.05	20.8
10-11	0.18	19.0	0.10	20.3	0.00	19.0	0.00	20.3
11-12	0.08	18.7	0.09	21.1	0.00	18.7	0.00	21.1
12-13	0.19	16.2	0.09	21.1	0.13	15.4	0.05	21.0
13-14	0.04	14.1	0.10	21.0	0.00	14.1	0.00	21.0
14-15	0.00	12.2	0.15	20.7	0.08	12.0	0.05	20.0
15-16	0.14	11.0	0.10	19.3	0.00	11.0	0.05	19.1
16-17	0.19	10.6	0.14	18.4	0.10	10.0	0.05	18.2
17-18	0.10	10.0	0.08	18.0	0.00	10.0	0.00	18.0
18-19	0.05	9.3	0.09	17.3	0.00	9.3	0.00	17.3
19-20	0.00	9.5	0.06	16.2	0.00	9.5	0.00	16.2
20-21	0.05	9.3	0.00	14.6	0.00	9.3	0.00	14.6
21-22	0.00	8.8	0.12	12.1	0.00	8.8	0.09	11.6
22-23	0.15	6.5	0.00	9.2	0.38	5.3	0.00	9.2
23-24	0.10	5.0	0.00	8.3	0.00	5.0	0.00	8.3
24-25	0.11	4.6	0.07	7.3	0.00	4.6	0.00	7.3
25-26	0.00	3.5	0.00	6.5	0.00	3.0	0.00	6.5
26-27	0.33	3.0	0.00	6.0	0.00	3.0	0.00	6.0
27-28	0.00	3.0	0.00	5.8	0.00	3.0	0.00	5.8
28-29	0.17	3.0	0.00	5.8	0.00	3.0	0.20	5.0
29-30	0.17	3.0	0.00	5.0	0.00	3.0	0.00	5.0
30-31	0.17	3.0	0.00	4.5	0.00	3.0	0.00	4.5
31-32	0.00	3.0	0.00	3.6	0.00	3.0	0.33	3.0
32-33	0.00	3.0	0.00	2.5	0.00	3.0	0.50	2.0
33-34	0.30	1.7	0.00	2.0	1.00	1.0	0.00	2.0
34-35	0.00	1.0	0.00	1.1	0.00	1.0	1.00	1.0
35-36	0.50	1.0	0.00	1.0	0.00	1.0	0.00	1.0
36-37	0.00	0.9	0.00	1.0	0.00	0.0	0.00	1.0
37-38	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
38-39	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
39-40	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
40-41	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
41-42	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
42-43	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
43-44	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
44-45	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
45-46	0.00	0.0	0.00	1.0	0.00	0.0	0.00	1.0
46-47	0.00	0.0	0.00	0.2	0.00	0.0	0.00	0.0
47-48	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
48-49	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 15.013	T = 12.632	30 day mortality: 6%
Ro = 1.510	Ro = 0.942	(4 out of 62)
lambda=1.03	lambda 1.00	
r = 0.027	r = -0.005	

62 birth events to known age parents tabulated for Mx...

35 death events of known age tabulated for Qx...

WARNING: Values with small sample sizes (N) warrant less confidence...

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
Diceros bicornis michaeli

SPARKS V1.11
21 Apr 1992

Fecundity & Mortality Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: CHICAGOBR/CINCINNAT/DENVER /LOSANGELE/METROZOO /SAN ANTON/ST LOUIS SAN FRAN /SD-WAP /SANDIEGOZ/
Dates: During 01/01/1981 <= date

Taxon Name: DICEROS BICORNIS MICHAELI

	Fecundity [Mx]...				Mortality [Qx]...			
Age Class	Male	N	Female	N	Male	N	Female	N
0- 1	0.00	17.0	0.00	16.6	0.06	18.0	0.16	19.4
1- 2	0.00	12.1	0.00	9.7	0.00	12.0	0.11	9.4
2- 3	0.00	8.7	0.00	4.5	0.00	8.7	0.25	4.0
3- 4	0.00	7.6	0.00	4.0	0.00	7.6	0.00	4.0
4- 5	0.00	7.1	0.00	5.5	0.00	7.1	0.00	5.5
5- 6	0.00	7.0	0.00	6.0	0.00	7.0	0.00	6.0
6- 7	0.22	6.8	0.00	5.1	0.00	6.8	0.00	5.1
7- 8	0.13	8.0	0.15	3.3	0.00	8.0	0.00	3.3
8- 9	0.21	7.0	0.16	3.2	0.14	7.0	0.00	3.2
9-10	0.14	7.3	0.10	5.0	0.00	7.3	0.21	4.8
10-11	0.27	7.5	0.13	7.5	0.00	7.5	0.00	7.5
11-12	0.17	8.7	0.14	11.0	0.00	8.7	0.00	11.0
12-13	0.27	7.4	0.08	12.1	0.00	7.4	0.08	12.0
13-14	0.00	6.7	0.12	13.0	0.00	6.7	0.00	13.0
14-15	0.00	6.0	0.20	12.7	0.00	6.0	0.08	12.0
15-16	0.20	5.0	0.08	12.1	0.00	5.0	0.00	12.1
16-17	0.30	5.0	0.20	12.4	0.00	5.0	0.08	12.2
17-18	0.20	5.0	0.13	12.0	0.00	5.0	0.00	12.0
18-19	0.12	4.3	0.13	11.3	0.00	4.3	0.00	11.3
19-20	0.00	4.5	0.10	10.2	0.00	4.5	0.00	10.2
20-21	0.00	4.3	0.00	9.6	0.00	4.3	0.00	9.6
21-22	0.00	3.8	0.21	7.1	0.00	3.8	0.15	6.6
22-23	0.17	3.0	0.00	5.2	0.43	2.3	0.00	5.2
23-24	0.00	2.0	0.00	4.3	0.00	2.0	0.00	4.3
24-25	0.00	1.9	0.15	3.3	0.00	1.9	0.00	3.3
25-26	0.00	1.5	0.00	2.5	0.00	1.0	0.00	2.5
26-27	0.50	2.0	0.00	2.0	0.00	2.0	0.00	2.0
27-28	0.00	2.0	0.00	1.8	0.00	2.0	0.00	1.8
28-29	0.25	2.0	0.00	1.8	0.00	2.0	1.00	1.0
29-30	0.25	2.0	0.00	1.0	0.00	2.0	0.00	1.0
30-31	0.25	2.0	0.00	1.5	0.00	2.0	0.00	1.5
31-32	0.00	2.0	0.00	1.0	0.00	2.0	0.00	1.0
32-33	0.00	2.0	0.00	1.0	0.00	2.0	0.00	1.0
33-34	0.48	1.1	0.00	1.0	0.00	1.0	0.00	1.0
34-35	0.00	1.0	0.00	0.1	0.00	1.0	0.00	0.0
35-36	0.50	1.0	0.00	0.0	0.00	1.0	0.00	0.0
36-37	0.00	0.9	0.00	0.0	0.00	0.0	0.00	0.0
37-38	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
38-39	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 18.509	T = 13.570	30 day mortality: 8%
Ro = 2.955	Ro = 0.823	(3 out of 37)
lambda=1.06	lambda=0.99	
r = 0.059	r = -0.014	

37 birth events to known age parents tabulated for Mx...

16 death events of known age tabulated for Qx...

FOUNDER ANALYSIS - *DICEROS BICORNIS MICHAELI* - NORTH AMERICA
21/04/1992

Founder representation in each living animal:
Founders listed across top, descendants down side.
Founder calculations omit UNKNOWNs.

Founders:

31	68	406	67	74	T2071	57
T2070	56	46	124	125	47	121
53	79	32	15	17	76	155
52	75	207	225	233	169	170
181	182	225	247	188	213	199
202	255	283	217	261	202	311
241	251					

Founder contributions:

0.7500	0.0000	0.0000	0.0000	3.8750	0.2500	2.8750
0.2500	5.1250	0.7500	1.7500	1.7500	0.7500	0.0000
0.7500	1.2500	0.7500	1.2500	1.2500	0.5000	0.5000
1.2500	1.3750	2.2500	0.5000	1.0000	1.5000	0.2500
1.2500	1.2500	2.0000	2.7500	0.5000	2.5000	0.7500
1.0000	0.0000	1.2500	0.2500	0.5000	0.5000	0.0000
1.5000	0.5000					

Fractional contributions:

0.0153	0.0000	0.0000	0.0000	0.0791	0.0051	0.0587
0.0051	0.1046	0.0153	0.0357	0.0357	0.0153	0.0000
0.0153	0.0255	0.0153	0.0255	0.0255	0.0102	0.0102
0.0255	0.0281	0.0459	0.0102	0.0204	0.0306	0.0051
0.0255	0.0255	0.0408	0.0561	0.0102	0.0510	0.0153
0.0204	0.0000	0.0255	0.0051	0.0102	0.0102	0.0000
0.0306	0.0102					

Number of living descendants:

5	0	0	0	11	1	11
1	15	3	7	7	3	0
2	4	5	4	4	1	1
3	5	5	1	2	3	1
3	3	4	7	2	5	2
2	0	4	1	1	1	0
5	1					

GENE DROP - *DICEROS BICORNIS MICHAELI* - NORTH AMERICA
21/04/1992

Studbook	Sire	Dam	Status (cap-alive)	Prop. genome living desc.	unique among all living
31 M	WILD	WILD	f		
66 M	WILD	WILD	F		1.0000
409 M	WILD	WILD	F		1.0000
67 F	WILD	WILD	F		1.0000
74 M	WILD	WILD	f		
T2071 F	WILD	WILD	f		
57 F	WILD	WILD	f		
T2070 M	WILD	WILD	f		
56 M	WILD	WILD	f		
45 M	WILD	WILD	f		
124 M	WILD	WILD	f		
125 F	WILD	WILD	F		0.3855
47 F	WILD	WILD	f		
121 F	WILD	WILD	F		1.0000
55 F	56	57	A	0.0605	0.0605
53 F	WILD	WILD	F		1.5000
79 M	WILD	WILD	f		
54 M	T2070	T2071	d		
32 F	WILD	WILD	f		
16 M	WILD	WILD	f		
17 F	WILD	WILD	f		
76 F	WILD	WILD	F		0.5000
155 M	WILD	WILD	f		
52 M	WILD	WILD	f		
75 F	WILD	WILD	f		
110 M	46	47	A	0.6225	0.6225
207 F	WILD	WILD	f		
225 F	WILD	WILD	F		0.5000
126 F	124	125	d		
233 F	WILD	WILD	F		0.2490
190 F	16	17	A	0.1275	0.1275
169 M	WILD	WILD	F		0.1300
170 M	WILD	WILD	f		
181 F	WILD	WILD	f		
182 M	WILD	WILD	f		
235 F	WILD	WILD	F		0.0625
180 F	56	57	A	0.0085	0.0085
247 M	WILD	WILD	F		0.0535
150 F	31	32	d		
188 F	WILD	WILD	F		0.0220
213 F	WILD	WILD	F		0.0540
163 F	124	125	A	0.0910	0.0455
161 M	74	75	A	0.0705	0.0705
199 M	WILD	WILD	f		
202 F	WILD	WILD	F		0.2455
255 F	WILD	WILD	F		1.0000
293 F	WILD	WILD	f		
192 F	54	55	A	0.5000	0.5000
217 F	WILD	WILD	f		
261 M	WILD	WILD	f		
262 F	WILD	WILD	f		
211 F	WILD	WILD	F		1.0000
241 M	WILD	WILD	f		
251 M	WILD	WILD	F		0.5000
212 F	52	53	A	0.3820	0.1385
267 F	56	207	A	0.0670	0.0670
239 F	110	188	d		

Studbook	Sire	Dam	Status (cap=alive)	Prop. genome unique among living desc.	Prop. genome unique among all living
259 M	182	181	A	0.2485	0.2485
268 M	247	180	d		
282 F	170	217	d		
271 M	241	150	A	0.0625	0.0625
285 M	139	136	A	0.2790	0.3250
281 M	74	213	d		
292 M	79	293	A	0.1420	0.1420
301 M	56	207	A	0.0760	0.0760
302 M	247	180	A	0.0180	0.0000
305 M	182	181	A	0.5020	0.5020
294 F	159	190	A	0.1220	0.0000
308 M	74	213	A	0.0320	0.0105
330 F	261	262	A	1.0000	1.0000
317 F	56	207	A	0.0405	0.0405
328 F	161	163	A	0.0000	0.0000
331 F	169	190	A	0.1505	0.0000
332 M	247	180	A	0.0270	0.0000
365 F	271	235	A	0.0690	0.0000
351 F	74	213	A	0.0625	0.0180
363 M	247	180	A	0.0535	0.0000
364 F	56	207	A	0.0750	0.0750
359 F	169	190	A	0.1175	0.0000
356 M	155	225	A	1.0000	0.5000
362 M	259	202	A	0.2520	0.0000
381 M	285	76	A	0.5000	0.0000
368 M	269	282	A	0.5135	0.5000
372 M	271	235	A	0.0675	0.0000
376 M	161	163	A	0.0000	0.0000
377 M	302	239	A	0.1245	0.0000
395 M	52	202	A	0.3160	0.2545
383 F	74	213	A	1.0665	0.0210
389 M	292	293	A	0.2510	0.0000
397 F	247	180	A	0.0555	0.0000
396 F	271	235	A	0.0575	0.0000
418 F	281	55	A	0.0170	0.0055
419 M	318	317	A	0.0000	0.0000
432 M	161	163	A	0.0000	0.0000
426 F	74	213	A	0.0560	0.0210
427 M	292	239	A	0.1315	0.0000
435 M	292	293	A	0.2510	0.0000
T2065 F	271	235	A	0.0590	0.0000
T2067 M	252	212	A	0.5000	0.0000
T2075 M	332	328	A	0.0000	0.0000

44 Founders 49 Living descendants 100 In total pedigree

FOUNDER ALLELE REPRESENTATION

Founder	Retention	%Representation	Target	Difference
31 M	0.237	1.446	0.741	-0.705
68 ML	0.000	0.000	3.120	3.120
109 ML	0.000	0.000	3.120	3.120
67 FL	0.000	0.000	3.120	3.120
74 M	0.972	7.891	3.033	-4.858
T2071 F	0.254	0.516	0.793	0.274
57 F	0.748	5.843	2.334	-3.509
T2070 M	0.246	0.502	0.768	0.266
56 M	0.983	10.477	3.066	-7.411
46 M	0.500	1.529	1.560	0.032
124 M	0.646	3.689	2.017	-1.672
125 FL	0.615	3.446	3.120	-0.326
47 F	0.500	1.531	1.560	0.030
121 FL	0.000	0.000	3.120	3.120
53 FL	0.500	1.544	3.120	1.576
79 M	0.500	2.566	1.560	-1.006
32 F	0.263	1.606	0.819	-0.787
16 M	0.500	2.558	1.560	-0.998
17 F	0.500	2.544	1.560	-0.984
76 FL	0.500	1.020	3.120	2.100
155 M	0.500	1.020	1.560	0.540
52 M	0.704	2.538	2.385	-0.152
75 F	0.500	2.833	1.560	-1.273
207 F	0.933	4.615	2.911	-1.704
225 FL	0.500	1.020	3.120	2.100
233 FL	0.751	2.041	3.120	1.079
169 ML	0.870	3.061	3.120	0.059
170 M	0.263	0.536	0.819	0.283
181 F	0.746	2.545	2.328	-0.217
182 M	0.756	2.557	2.359	-0.198
235 FL	0.938	4.081	3.120	-0.960
247 ML	0.947	5.596	3.120	-2.476
188 FL	0.378	1.020	3.120	2.100
217 FL	0.946	5.107	3.120	-1.987
199 M	0.500	1.522	1.560	0.038
202 FL	0.751	2.040	3.120	1.080
255 FL	0.000	0.000	3.120	3.120
293 F	0.500	2.536	1.560	-0.976
217 F	0.237	0.485	0.741	0.256
261 M	0.500	1.020	1.560	0.540
252 F	0.500	1.020	1.560	0.540
311 FL	0.000	0.000	3.120	3.120
241 M	0.500	3.070	1.560	-1.510
251 ML	0.500	1.020	3.120	2.100

GENETIC SUMMARY	LIVING DESCENDANT POPULATION	POTENTIAL
Number of founders:	38	44
Mean retention:	0.585	0.728
Founder genomes surviving:	22.344	32.048
Founder Equivalents:	23.255	38.259
Founder Genome Equivalents:	15.047	32.048
Fraction of wild gene diversity retained:	0.967	0.984
Fraction of wild gene diversity lost:	0.033	0.016
Mean inbreeding coefficient:	0.000	

DICEROS BICORNIS MICHAELI - NORTH AMERICA - 21/04/1992

ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	MALES	MK	Known	FEMALES	MK	Known
1	68	0.0000	1.0000	67	0.0000	1.0000
2	409	0.0000	1.0000	121	0.0000	1.0000
3	251	0.0051	1.0000	255	0.0000	1.0000
4	356	0.0102	1.0000	311	0.0000	1.0000
5	110	0.0153	1.0000	76	0.0051	1.0000
6	169	0.0153	1.0000	225	0.0051	1.0000
7	395	0.0156	1.0000	188	0.0051	1.0000
8	T2067	0.0156	1.0000	53	0.0077	1.0000
9	305	0.0179	1.0000	233	0.0102	1.0000
10	381	0.0188	1.0000	202	0.0102	1.0000
11	259	0.0204	1.0000	330	0.0102	1.0000
12	362	0.0204	1.0000	125	0.0179	1.0000
13	285	0.0229	1.0000	212	0.0179	1.0000
14	389	0.0230	1.0000	235	0.0204	1.0000
15	435	0.0230	1.0000	190	0.0255	1.0000
16	292	0.0255	1.0000	213	0.0255	1.0000
17	427	0.0255	1.0000	294	0.0255	1.0000
18	247	0.0281	1.0000	331	0.0255	1.0000
19	271	0.0306	1.0000	359	0.0255	1.0000
20	372	0.0306	1.0000	365	0.0306	1.0000
21	388	0.0309	1.0000	396	0.0306	1.0000
22	377	0.0386	1.0000	T2065	0.0306	1.0000
23	308	0.0402	1.0000	163	0.0319	1.0000
24	161	0.0408	1.0000	192	0.0332	1.0000
25	376	0.0415	1.0000	351	0.0376	1.0000
26	432	0.0415	1.0000	383	0.0376	1.0000
27	301	0.0427	1.0000	426	0.0376	1.0000
28	419	0.0478	1.0000	267	0.0427	1.0000
29	363	0.0491	1.0000	364	0.0427	1.0000
30	302	0.0517	1.0000	328	0.0440	1.0000
31	332	0.0517	1.0000	317	0.0453	1.0000
32	T2075	0.0529	1.0000	418	0.0492	1.0000
33				397	0.0491	1.0000
34				55	0.0510	1.0000
35				180	0.0593	1.0000

GENETIC SUMMARY OF POPULATION

Descendant population mean kinship:	0.0332
Gene diversity:	0.9668
Founder Genome Equivalents:	15.0415

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

SECTION 8

SOUTHERN BLACK RHINO

SOUTHERN BLACK RHINO Studbook
(Diceros bicornis minor)

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
11	M	1 Jan 1962	WILD	WILD	AFRICAN	1 Jan 1962	AMS 01	Wild Born	AFRICAN			
					AMSTERDAM	21 Aug 1963	AMS 01		NETHERLND			
						13 Mar 1969	(died)			13 Mar 1969		
83	M	1 Jan 1962	WILD	WILD	AFRICAN	1 Jan 1962	UNK	Wild Born	AFRICAN			
					PRETORIA	15 Mar 1963	PRY 01		S.AFRICAN			
						10 Feb 1979	(died)			10 Feb 1979		
84	F	1 Jan 1966	WILD	WILD	AFRICAN	1 Jan 1966	UNK	Wild Born	AFRICAN			
					PRETORIA	4 Apr 1967	PRY 02		S.AFRICAN			
						12 Oct 1972	(died)			12 Oct 1972		
89	M	1 Jan 1959	WILD	WILD	AFRICAN	1 Jan 1959	UNK	Wild Born	AFRICAN			
					MANILA	1 Jul 1959	MNL 01		PHILEPPIN			
						23 Apr 1975	(died)			23 Apr 1975		
91	F	1 Jan 1960	WILD	WILD	AFRICAN	1 Jan 1960	UNK	Wild Born	AFRICAN			
					OSAKA	4 Jul 1961	OSA 02		JAPAN			
						4 Feb 1974	(died)			4 Feb 1974		
97	M	1 Jan 1946	WILD	WILD	AFRICAN	1 Jan 1946	UNK	Wild Born	AFRICAN			
					TANZANIA	1 Aug 1947	UNK		TANZANIA			
					ADELAIDE	1 Nov 1947	ADL 01		AUST AUST			
					SYDNEY	23 Jun 1981	ADL 01		AUS* AUST			
						30 Aug 1982	(died)			30 Aug 1982		
113	M	1 Jan 1954	WILD	WILD	AFRICAN	1 Jan 1954	UNK	Wild Born	AFRICAN			
					LISBON	10 Jun 1955	LIS 01		PORTUGAL			
114	F	1 Jan 1957	WILD	WILD	AFRICAN	1 Jan 1957	UNK	Wild Born	AFRICAN			
					LISBON	27 Aug 1958	LIS 02		PORTUGAL			
115	M	1 Jan 1964	WILD	WILD	AFRICAN	1 Jan 1964	UNK	Wild Born	AFRICAN			
					LISBON	4 Jun 1965	LIS 03		PORTUGAL			
					SAO PAULO	8 Aug 1967	LIS 03		BRAZIL			
						20 Oct 1971	(died)			20 Oct 1971		
116	M	22 Sep 1965	113	114	LISBON	22 Sep 1965	LIS 04	Captive Born	PORTUGAL			
					GELSNKRCN	14 Apr 1974	LIS 04		W.GERMANY			
						8 Jun 1974	(died)			8 Jun 1974		
136	M	12 Nov 1969	83	84	PRETORIA	12 Nov 1969	PRY 03	Captive Born	S.AFRICAN			
					JOHANSBRG	6 Sep 1977	PRY 03		S.AFRICAN			
						25 Mar 1987	(died)			25 Mar 1987		
168	M	9 Jan 1969	113	114	LISBON	9 Jan 1969	LIS 05	Captive Born	PORTUGAL			
					SAOLEOPOL	3 Apr 1972	LIS 05		BRAZIL			
						10 Apr 1979	(died)			10 Apr 1979		
182	F	1 Feb 1972	184	185	OSAKA	1 Feb 1972	OSA 05	Captive Born	JAPAN			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
184	M	1 Jan 1964	WILD	WILD	AFRICAN	1 Jan 1964	UNK	Wild Born	AFRICAN			
					OSAKA	31 Oct 1965	OSA 05		JAPAN			
						27 Feb 1972	(died)			27 Feb 1972		
185	F	1 Jan 1964	WILD	WILD	AFRICAN	1 Jan 1964	UNK	Wild Born	AFRICAN			
					OSAKA	23 Apr 1965	OSA 04		JAPAN			
					HITACHI	? Apr 1977	UNK		JAPAN			
196	F	1 Jan 1946	WILD	WILD	AFRICAN	1 Jan 1946	UNK	Wild Born	AFRICAN			
					SYDNEY	11 Jan 1947	SID 06		AUST AUST			
						12 Aug 1974	(died)			12 Aug 1974		
211	F	2 May 1974	113	114	LISBON	2 May 1974	LIS 06	Captive Born	PORTUGAL			
266	M	26 May 1977	113	114	LISBON	26 May 1977	LIS 07	Captive Born	PORTUGAL			
333	M	~ 1974	WILD	WILD	ZIMBABWE	~ 1974	UNK	Wild Born	ZIMBABWE		GUS	LAX 6
					LOSANGELE	4 Dec 1982	001078		U.S.A.			
334	F	~ 1977	WILD	WILD	ZIMBABWE	~ 1977	UNK	Wild Born	ZIMBABWE		NAGEL	LAX 7
					LOSANGELE	4 Dec 1982	001079		U.S.A.			
336	F	21 Apr 1983	WILD	334	LOSANGELE	21 Apr 1983	001155	Captive Born	U.S.A.		ZOE	LAX 8
338	M	1 Jan 1982	WILD	WILD	AFRICAN	1 Jan 1982	UNK	Wild Born	AFRICAN			
					PRETORIA	3 May 1983	PRY 05		S.AFRICAN			
						20 Dec 1985	(died)			20 Dec 1985		
339	M	1 Jan 1982	WILD	WILD	AFRICAN	1 Jan 1982	UNK	Wild Born	AFRICAN			
					PRETORIA	3 May 1983	PRY 06		S.AFRICAN			
340	F	1 Jan 1982	WILD	WILD	AFRICAN	1 Jan 1982	UNK	Wild Born	AFRICAN			
					PRETORIA	3 May 1983	PRY 07		S.AFRICAN			
						28 Jul 1983	(died)			28 Jul 1983		
352	M	21 Jul 1983	209	183	OSAKA	21 Jul 1983	OSA 06	Captive Born	JAPAN			
					HIGASHIYA	22 Aug 1989	UNK		JAPAN			
368	F	1 Jan 1984	WILD	WILD	AFRICAN	1 Jan 1984	UNK	Wild Born	AFRICAN			
					PYONGYANG	23 Aug 1985	UNK		KOREA N			
						????	(died)			????		
369	F	1 Jan 1984	WILD	WILD	AFRICAN	1 Jan 1984	UNK	Wild Born	AFRICAN			
					PYONGYANG	23 Aug 1985	PTO 02		KOREA N			
						????	(died)			????		
370	M	1 Jan 1984	WILD	WILD	AFRICAN	1 Jan 1984	UNK	Wild Born	AFRICAN			
					PYONGYANG	23 Aug 1985	PTO 03		KOREA N			
						????	(died)			????		

SOUTHERN BLACK RHINO Studbook
(Diceros bicornis minor)

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
371	M	1 Jan 1984	WILD	WILD	AFRICAN	1 Jan 1984	UNK	Wild Born	AFRICAN			
					PYONGYANG	23 Aug 1985	PYO 04		KOREA N			
						????	(died)			????		
378	M	~ 1984	WILD	WILD	S AFRICA	~ 1984	UNK	Unk Birth Type	AFRICAN		NACHO	LIN 01
					BENTSEN	24 Mar 1984	UNK		U.S.A.			
379	F	~ 1972	WILD	WILD	S AFRICA	~ 1984	UNK	Wild Born	AFRICAN		CHULA	LIN 02
					BENTSEN	24 Mar 1984	UNK		U.S.A.			
380	M	28 Jul 1987	378	379	BENTSEN	28 Jul 1987	UNK	Captive Born	U.S.A.			LIN 03
						28 Jul 1987	(died)			28 Jul 1987		
390	M	~ 1986	WILD	WILD	S AFRICA	~ 1986	UNK	Wild Born	AFRICAN		GUNDWANE	SAN 05
					SANDIEGO2	15 Dec 1987	587408		U.S.A.			
392	F	~ 1986	WILD	WILD	ZIMBABWE	~ 1986	UNK	Wild Born	ZIMBABWE		CHIRUNDU	SAN 06
					(SANDIEGO2)	18 Jul 1989	589278		U.S.A.			
393	F	1 Jan 1988	WILD	WILD	AFRICAN	1 Jan 1988	UNK	Wild Born	AFRICAN			
					FRANKFURT	17 Jul 1989	FRA 05		W.GERMANY			
394	M	1 Jan 1988	WILD	WILD	AFRICAN	1 Jan 1988	UNK	Wild Born	AFRICAN			
					FRANKFURT	17 Jul 1989	FRA 06		W.GERMANY			
399	M	~ 1982	WILD	WILD	ZIMBABWE	~ 1982	UNK	Wild Born	ZIMBABWE		MYAKA-SICA	
					(DALLAS)	16 Jul 1989	896576		U.S.A.			
400	F	~ 1974	WILD	WILD	ZIMBABWE	~ 1974	UNK	Wild Born	ZIMBABWE		MABANZU	
					(DALLAS)	16 Jul 1989	896577		U.S.A.			
401	M	~ 1985	WILD	WILD	ZIMBABWE	~ 1985	UNK	Wild Born	ZIMBABWE		GOTA GOTA	FOW 01
					FORTWORTH	16 Jul 1989	714		U.S.A.			
					BASS RNCH	27 Jul 1991	UNK		U.S.A.			
402	F	~ 1979	WILD	WILD	ZIMBABWE	~ 1979	UNK	Wild Born	ZIMBABWE		NGWETE	FOW 02
					FORTWORTH	16 Jul 1989	715		U.S.A.			
					BENTSEN	6 Jan 1992	UNK		U.S.A.			
403	M	18 Aug 1989	WILD	402	FORTWORTH	18 Aug 1989	716	Captive Born	U.S.A.		HARRY	FOW 03
404	M	~ 1985	WILD	WILD	ZIMBABWE	~ 1985	UNK	Wild Born	ZIMBABWE		MAKUTI/BRENKE	01
					(MILWAUKEE)	18 Jul 1989	3371		U.S.A.			
405	F	~ 1982	WILD	WILD	ZIMBABWE	~ 1982	UNK	Wild Born	ZIMBABWE		RUTASWE/BANKE	02
					(MILWAUKEE)	18 Jul 1989	3372		U.S.A.			
410	F	~ 1983	WILD	WILD	S AFRICA	~ 1989	UNK	Wild Born	AFRICAN		THOMBI	LIN 04
					BENTSEN	17 May 1989	UNK		U.S.A.			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
411	F	28 Feb 1989	378	379	BENTSEN	28 Feb 1989	UNK	Captive Born	U.S.A.		NTOTO	LIN 05
					FORTWORTH	19 Dec 1991	UNK		U.S.A.			
412	F	~ 1985	WILD	WILD	ZIMBABWE	~ 1985	UNK	Wild Born	ZIMBABWE		MARONGORA	LIN 06
					(BENTSEN)	16 Jul 1989	UNK		U.S.A.			
						10 Oct 1989 (died)				10 Oct 1989		
413	M	????	WILD	WILD	ZIMBABWE	1 Jan 1988	UNK	Wild Born	ZIMBABWE		AGRIPA	NHA
					(BASS RNCH)	16 Jul 1989	UNK		U.S.A.			
						10 Oct 1989 (died)				10 Oct 1989		
414	F	1 Jan 1988	WILD	WILD	ZIMBABWE	1 Jan 1988	UNK	Wild Born	ZIMBABWE		CHIMYUKU	BAS 02
					(BASS RNCH)	16 Jul 1989	UNK		U.S.A.			
415	F	~ 1980	WILD	WILD	AFRICAN	~ 1980	UNK	Wild Born	AFRICAN			MAK 01
					FOSSILRIM	25 Mar 1984	UNK		U.S.A.			
						14 Jan 1985 (died)				14 Jan 1985		
416	M	~ 1981	WILD	WILD	AFRICAN	~ 1981	UNK	Wild Born	AFRICAN		MACORA	LIN 08
					FOSSILRIM	25 Mar 1984	UNK		U.S.A.			
						6 Mar 1985 (died)				6 Mar 1985		
421	F	21 Aug 1988	323	185	HITACHI	21 Aug 1988	HIT 06	Captive Born	JAPAN			
424	F	11 Sep 1989	WILD	414	BASS RNCH	11 Sep 1989	UNK	Captive Born	U.S.A.		MARGARITA	BAS 03
429	F	1 Jan 1989	WILD	WILD	AFRICAN	1 Jan 1989	UNK	Wild Born	AFRICAN			
					POTGIETER	9 Aug 1990	PRY 08					
433	F	28 Feb 1990	WILD	400	DALLAS	28 Feb 1990	906719	Captive Born	U.S.A.		ZAMBEZI	
2066	M	20 Jul 1991	378	410	BENTSEN	20 Jul 1991	UNK	Captive Born	U.S.A.			
						20 Jul 1991 (died)				20 Jul 1991		
2068	F	3 Dec 1991	378	379	BENTSEN	3 Dec 1991	UNK	Captive Born	U.S.A.		GLORIA	
2069	F	1 Jan 1969	WILD	WILD	WILD	1 Jan 1969	UNK	Wild Born	OFF ISLS			
					BENTSEN	24 Mar 1984	UNK		U.S.A.			
						23 May 1984 (died)				23 May 1984		
3000	M	~ 1982	WILD	WILD	ZIMBABWE	22 Jun 1991	9109	Wild Born	ZIMBABWE			
					YULEE	22 Apr 1992	UNK		U.S.A.			
3001	F	~ 1982	WILD	WILD	ZIMBABWE	27 Jun 1991	9115	Wild Born	ZIMBABWE			
					YULEE	22 Apr 1992	UNK		U.S.A.			
3002	F	~ 1982	WILD	WILD	ZIMBABWE	23 Jun 1991	9112	Wild Born	ZIMBABWE			
					BASS RNCH	22 Apr 1992	UNK		U.S.A.			
3003	F	1 Dec 1990	WILD	3002	ZIMBABWE	23 Jun 1991	9113	Wild Born	ZIMBABWE			
					BASS RNCH	22 Apr 1992	UNK		U.S.A.			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
3006	M	~ 1982	WILD	WILD	ZIMBABWE	18 Jun 1991	9101	Wild Born	ZIMBABWE			
					FOSSILRIM	22 Apr 1992	UNK		U.S.A.			
3007	F	~ 1982	WILD	WILD	ZIMBABWE	20 Jun 1991	9104	Wild Born	ZIMBABWE			
					FOSSILRIM	22 Apr 1992	UNK		U.S.A.			
3008	M	~ 1982	WILD	WILD	ZIMBABWE	26 Jun 1991	9119	Wild Born	ZIMBABWE			
					FOSSILRIM	22 Apr 1992	UNK		U.S.A.			
3009	F	~ 1982	WILD	WILD	ZIMBABWE	26 Jun 1991	9118	Wild Born	ZIMBABWE			
					FOSSILRIM	22 Apr 1992	UNK		U.S.A.			
3010	M	1 Sep 1990	WILD	3005	ZIMBABWE	27 Jun 1991	9116	Wild Born	ZIMBABWE			
		.			MCALLEN R	22 Apr 1992	UNK		U.S.A.			
3011	F	1 Feb 1990	WILD	3007	ZIMBABWE	27 Jun 1991	9105	Wild Born	ZIMBABWE			
					MCALLEN R	22 Apr 1992	UNK		U.S.A.			
4000	M	~ 1987	WILD	WILD	ZIMBABWE	~ 1987	UNK	Wild Born	ZIMBABWE			
					CHIPANGAL	~ 1988	UNK		AFRICAN			
4001	F	~ 1987	WILD	WILD	ZIMBABWE	~ 1987	UNK	Wild Born	ZIMBABWE			
					CHIPANGAL	~ 1988	UNK		AFRICAN			

TOTALS: 33.36.0 (69)

SOUTHERN BLACK RHINO studbook

Restricted to: (Diceros bicornis minor)
Dates: During 22/04/1992 <= date
Status: Living during 22 Apr 1992 -> 23 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
113	M	1 Jan 1954	WILD	WILD	AFRICAN	1 Jan 1954	UNK	Wild Born	AFRICAN			
					LISBON	10 Jun 1955	LIS 01		PORTUGAL			
114	F	1 Jan 1957	WILD	WILD	AFRICAN	1 Jan 1957	UNK	Wild Born	AFRICAN			
					LISBON	27 Aug 1958	LIS 02		PORTUGAL			
183	F	1 Feb 1972	184	185	OSAKA	1 Feb 1972	OSA 05	Captive Born	JAPAN			
185	F	1 Jan 1964	WILD	WILD	AFRICAN	1 Jan 1964	UNK	Wild Born	AFRICAN			
					OSAKA	23 Apr 1965	OSA 04		JAPAN			
					HITACHI	7 Apr 1977	UNK		JAPAN			
211	F	2 May 1974	113	114	LISBON	2 May 1974	LIS 06	Captive Born	PORTUGAL			
286	F	26 May 1977	113	114	LISBON	26 May 1977	LIS 07	Captive Born	PORTUGAL			
333	M	~ 1974	WILD	WILD	ZIMBABWE	~ 1974	UNK	Wild Born	ZIMBABWE		CUS	LAX 6
					LOSANGELE	4 Dec 1982	001078		U.S.A.			
334	F	~ 1977	WILD	WILD	ZIMBABWE	~ 1977	UNK	Wild Born	ZIMBABWE		MABEL	LAX 7
					LOSANGELE	4 Dec 1982	001079		U.S.A.			
336	F	21 Apr 1983	WILD	334	LOSANGELE	21 Apr 1983	001155	Captive Born	U.S.A.		ZOE	LAX 8
339	M	1 Jan 1982	WILD	WILD	AFRICAN	1 Jan 1982	UNK	Wild Born	AFRICAN			
					PRETORIA	3 May 1983	PRY 06		S.AFRICAR			
362	M	21 Jul 1983	209	183	OSAKA	21 Jul 1983	OSA 06	Captive Born	JAPAN			
					NIGASKIJI	22 Aug 1989	UNK		JAPAN			
378	M	~ 1984	WILD	WILD	S AFRICA	~ 1984	UNK	Unk Birth Type	AFRICAN		NACHO	LIN 01
					BERTSEN	24 Mar 1984	UNK		U.S.A.			
379	F	~ 1972	WILD	WILD	S AFRICA	~ 1984	UNK	Wild Born	AFRICAN		CHULA	LIN 02
					BERTSEN	24 Mar 1984	UNK		U.S.A.			
390	M	~ 1986	WILD	WILD	S AFRICA	~ 1986	UNK	Wild Born	AFRICAN		GUNDWANE	SAN 05
					SANDIEGOZ	15 Dec 1987	587408		U.S.A.			
392	F	~ 1986	WILD	WILD	ZIMBABWE	~ 1986	UNK	Wild Born	ZIMBABWE		CHIRUNDU	SAN 06
					(SANDIEGOZ)	18 Jul 1989	589278		U.S.A.			
393	F	1 Jan 1988	WILD	WILD	AFRICAN	1 Jan 1988	UNK	Wild Born	AFRICAN			
					FRANKFURT	17 Jul 1989	FRA 05		W.GERMANY			
394	M	1 Jan 1988	WILD	WILD	AFRICAN	1 Jan 1988	UNK	Wild Born	AFRICAN			
					FRANKFURT	17 Jul 1989	FRA 06		W.GERMANY			

Restricted to: (Diceros bicornis minor)
Dates: During 22/04/1992 <= date
Status: Living during 22 Apr 1992 -> 23 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death Date	Name	Breeder #
399	M	- 1982	WILD	WILD	ZIMBABWE	- 1982	UNK	Wild Born	ZIMBABWE		NYAKA-SIKA	
					(DALLAS)	16 Jul 1989	896576		U.S.A.			
400	F	- 1974	WILD	WILD	ZIMBABWE	- 1974	UNK	Wild Born	ZIMBABWE		MABANZU	
					(DALLAS)	16 Jul 1989	896577		U.S.A.			
401	M	- 1985	WILD	WILD	ZIMBABWE	- 1985	UNK	Wild Born	ZIMBABWE		GOTA GOTA	FD W 01
					FORTWORTH	16 Jul 1989	714		U.S.A.			
					BASS RNCH	27 Jul 1991	UNK		U.S.A.			
402	F	- 1979	WILD	WILD	ZIMBABWE	- 1979	UNK	Wild Born	ZIMBABWE		NGUETE	FDW 02
					FORTWORTH	16 Jul 1989	715		U.S.A.			
					BENTSEN	6 Jan 1992	UNK		U.S.A.			
403	M	18 Aug 1989	WILD	402	FORTWORTH	18 Aug 1989	716	Captive Born	U.S.A.		HARRY	FDW 03
404	M	- 1985	WILD	WILD	ZIMBABWE	- 1985	UNK	Wild Born	ZIMBABWE		MAKUTI/BRENKE	01
					(MILWAUKEE)	18 Jul 1989	3371		U.S.A.			
405	F	- 1982	WILD	WILD	ZIMBABWE	- 1982	UNK	Wild Born	ZIMBABWE		RUTAGWE/BAMKE	02
					(MILWAUKEE)	18 Jul 1989	3372		U.S.A.			
410	F	- 1985	WILD	WILD	S AFRICA	- 1989	UNK	Wild Born	AFRICAN		THOMBI	LIN 04
					BENTSEN	17 May 1989	UNK		U.S.A.			
411	F	28 Feb 1989	378	379	BENTSEN	28 Feb 1989	UNK	Captive Born	U.S.A.		MTOTO	LIN 05
					FORTWORTH	19 Dec 1991	UNK		U.S.A.			
414	F	1 Jan 1988	WILD	WILD	ZIMBABWE	1 Jan 1988	UNK	Wild Born	ZIMBABWE		CHINJOU	BAS 02
					(BASS RNCH)	16 Jul 1989	UNK		U.S.A.			
421	F	21 Aug 1988	323	185	HITACHI	21 Aug 1988	HIT 04	Captive Born	JAPAN			
424	F	11 Sep 1989	WILD	414	BASS RNCH	11 Sep 1989	UNK	Captive Born	U.S.A.		MARGARITA	BAS 03
429	F	1 Jan 1989	WILD	WILD	AFRICAN	1 Jan 1989	UNK	Wild Born	AFRICAN			
					POTGIETER	9 Aug 1990	PRY 03					
433	F	28 Feb 1990	WILD	400	DALLAS	28 Feb 1990	906719	Captive Born	U.S.A.		ZAMBEZI	
2068	F	3 Dec 1991	378	379	BENTSEN	3 Dec 1991	UNK	Captive Born	U.S.A.		GLORIA	
3000	M	- 1982	WILD	WILD	ZIMBABWE	22 Jun 1991	9109	Wild Born	ZIMBABWE			
					YULEE	22 Apr 1992	UNK		U.S.A.			
3001	F	- 1982	WILD	WILD	ZIMBABWE	27 Jun 1991	9115	Wild Born	ZIMBABWE			
					YULEE	22 Apr 1992	UNK		U.S.A.			

Restricted to: (Diceros bicornis minor)
Dates: During 22/04/1992 <- date
Status: Living during 22 Apr 1992 -> 23 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
3002	F	~ 1982	WILD	WILD	ZIMBABWE	23 Jun 1991	9112	Wild Born	ZIMBABWE			
					BASS RNCH	22 Apr 1992	UNK		U.S.A.			
3003	F	1 Dec 1990	WILD	3002	ZIMBABWE	23 Jun 1991	9113	Wild Born	ZIMBABWE			
					BASS RNCH	22 Apr 1992	UNK		U.S.A.			
3006	M	~ 1982	WILD	WILD	ZIMBABWE	18 Jun 1991	9101	Wild Born	ZIMBABWE			
					FOSSILRIM	22 Apr 1992	UNK		U.S.A.			
3007	F	~ 1982	WILD	WILD	ZIMBABWE	20 Jun 1991	9104	Wild Born	ZIMBABWE			
					FOSSILRIM	22 Apr 1992	UNK		U.S.A.			
3008	M	~ 1982	WILD	WILD	ZIMBABWE	28 Jun 1991	9119	Wild Born	ZIMBABWE			
					FOSSILRIM	22 Apr 1992	UNK		U.S.A.			
3009	F	~ 1982	WILD	WILD	ZIMBABWE	28 Jun 1991	9118	Wild Born	ZIMBABWE			
					FOSSILRIM	22 Apr 1992	UNK		U.S.A.			
3010	M	1 Sep 1990	WILD	3001	ZIMBABWE	27 Jun 1991	9116	Wild Born	ZIMBABWE			
					MCALLEN R	22 Apr 1992	UNK		U.S.A.			
3011	F	1 Feb 1990	WILD	3007	ZIMBABWE	27 Jun 1991	9105	Wild Born	ZIMBABWE			
					MCALLEN R	22 Apr 1992	UNK		U.S.A.			
4000	M	~ 1987	WILD	WILD	ZIMBABWE	~ 1987	UNK	Wild Born	ZIMBABWE			
					CHIPANGAL	~ 1988	UNK		AFRICAN			
4001	F	~ 1987	WILD	WILD	ZIMBABWE	~ 1987	UNK	Wild Born	ZIMBABWE			
					CHIPANGAL	~ 1988	UNK		AFRICAN			

TOTALS: 17.27.0 (44)

FOUNDER ANALYSIS - *DICEROS BICORNIS MINOR* - WORLD - 23/04/1992

Founder representation in each living animal:
Founders listed across top, descendants down side.
Founder calculations omit UNKNOWNs.
Studbook numbers beginning with P indicate wild or unknown founders that mated with studbook # without the P to produce CB offspring.

Founders:

113	114	184	185	379	333	400
334	402	339	399	405	3000	3001
3002	3006	3007	3008	3009	410	P334
378	401	404	390	392	4000	4001
392	394	414	429	P402	P414	P3007
P400	P3001	P3002				

Founder contributions:

1.0000	1.0000	0.7500	1.2500	1.0000	0.0000	0.5000
0.5000	0.5000	0.0000	0.0000	0.0000	0.0000	0.5000
0.5000	0.0000	0.5000	0.0000	0.0000	0.0000	0.5000
1.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.0000
0.0000	0.0000	0.5000	0.0000	0.5000	0.5000	0.5000
0.5000	0.5000	0.5000				

Fractional contributions:

0.0769	0.0769	0.0577	0.0962	0.0769	0.0000	0.0385
0.0385	0.0385	0.0000	0.0000	0.0000	0.0000	0.0385
0.0385	0.0000	0.0385	0.0000	0.0000	0.0000	0.0385
0.0769	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0385	0.0000	0.0385	0.0385	0.0385
0.0385	0.0385	0.0385				

Number of living descendants:

2	2	2	3	2	0	1
1	1	0	0	0	0	1
1	0	1	0	0	0	1
0	0	0	0	0	0	0
0	0	1	0	1	1	1
1	1	1				

GENE DROP - *DICEROS BICORNIS MINOR* - WORLD - 23/04/1992

Studbook	Sire	Dam	Status (cap-alive)	Prop. genome unique among living desc.	Prop. genome unique among all living
209 M	UNK	UNK	u		
323 M	UNK	UNK	u		
113 M	WILD	WILD	F		0.2405
114 F	WILD	WILD	F		0.2460
184 M	WILD	WILD	F		
185 F	WILD	WILD	F		0.2530
379 F	WILD	WILD	F		0.2400
183 F	184	185	A	0.3800	0.2590
333 M	WILD	WILD	F		1.0000
400 F	WILD	WILD	F		0.5000
211 F	113	114	A	0.5140	0.3000
334 F	WILD	WILD	F		0.5000
286 M	113	114	A	0.5135	0.3000
402 F	WILD	WILD	F		0.5000
339 M	WILD	WILD	F		1.0000
399 M	WILD	WILD	F		1.0000
405 F	WILD	WILD	F		1.0000
3000 M	WILD	WILD	F		1.0000
3001 F	WILD	WILD	F		0.5000
3002 F	WILD	WILD	F		0.5000
3006 M	WILD	WILD	F		1.0000
3007 F	WILD	WILD	F		0.5000
3008 M	WILD	WILD	F		1.0000
3009 F	WILD	WILD	F		1.0000
410 F	WILD	WILD	F		1.0000
P334 M	WILD	WILD	f		
336 F	P334	334	A	1.0000	0.5000
352 M	209	183	A	0.5000	0.5000
378 M	WILD	WILD	F		0.2505
401 M	WILD	WILD	F		1.0000
404 M	WILD	WILD	F		1.0000
390 M	WILD	WILD	F		1.0000
392 F	WILD	WILD	F		1.0000
4000 M	WILD	WILD	F		1.0000
4001 F	WILD	WILD	F		1.0000
393 F	WILD	WILD	F		1.0000
394 M	WILD	WILD	F		1.0000
414 F	WILD	WILD	F		0.5000
421 F	323	185	A	0.7470	0.5000
429 F	WILD	WILD	F		1.0000
411 F	378	379	A	0.5095	0.0000
P402 M	WILD	WILD	f		
403 M	P402	402	A	1.0000	0.5000
P414 M	WILD	WILD	f		
424 F	P414	414	A	1.0000	0.5000
P3007 M	WILD	WILD	f		
3011 F	P3007	3007	A	1.0000	0.5000
P400 M	WILD	WILD	f		
433 F	P400	400	A	1.0000	0.5000
P3001 M	WILD	WILD	f		
3010 M	P3001	3001	A	1.0000	0.5000
P3002 M	WILD	WILD	f		
3003 F	P3002	3002	A	1.0000	0.5000
2069 F	378	379	A	0.5095	0.0000

40 Founders 14 Living descendants 54 In total pedigree

FOUNDER ALLELE REPRESENTATION

Founder	Retention	%Representation with unk	%Representation w/o	Target with unk	Target w/o	Difference with unk	Difference w/o
209 M U	0.500	3.571	0.000	1.429	0.000	-2.143	0.000
323 M U	0.500	3.571	0.000	1.429	0.000	-2.143	0.000
113 ML	0.759	7.139	7.659	2.857	2.941	-4.282	-4.718
114 FL	0.754	7.143	7.693	2.857	2.941	-4.286	-4.751
184 M	0.500	5.293	5.700	1.429	1.471	-3.864	-4.230
185 FL	0.767	8.993	9.695	2.857	2.941	-6.136	6.744
379 FL	0.750	7.143	7.693	2.857	2.941	-4.286	-4.751
333 ML	0.000	0.000	0.000	2.857	2.941	2.857	2.941
400 FL	0.500	3.571	3.846	2.857	2.941	-0.714	-0.905
334 FL	0.500	3.571	3.846	2.857	2.941	-0.714	-0.905
402 FL	0.500	3.571	3.846	2.857	2.941	-0.714	-0.905
339 ML	0.000	0.000	0.000	2.857	2.941	2.857	2.941
399 ML	0.000	0.000	0.000	2.857	2.941	2.857	2.941
405 FL	0.000	0.000	0.000	2.857	2.941	2.857	2.941
3000 ML	0.000	0.000	0.000	2.857	2.941	2.857	2.941
3001 FL	0.500	3.571	3.846	2.857	2.941	-0.714	-0.905
3002 FL	0.500	3.571	3.846	2.857	2.941	-0.714	-0.905
3006 ML	0.000	0.000	0.000	2.857	2.941	2.857	2.941
3007 FL	0.500	3.571	3.846	2.857	2.941	0.714	-0.905
3008 ML	0.000	0.000	0.000	2.857	2.941	2.857	2.941
3009 FL	0.000	0.000	0.000	2.857	2.941	2.857	2.941
410 FL	0.000	0.000	0.000	2.857	2.941	2.857	2.941
P354 M	0.500	3.571	3.846	1.429	1.471	-2.143	-2.376
378 ML	0.750	7.143	7.693	2.857	2.941	-4.286	-4.751
401 ML	0.000	0.000	0.000	2.857	2.941	2.857	2.941
404 ML	0.000	0.000	0.000	2.857	2.941	2.857	2.941
390 ML	0.000	0.000	0.000	2.857	2.941	2.857	2.941
392 FL	0.000	0.000	0.000	2.857	2.941	2.857	2.941
4000 ML	0.000	0.000	0.000	2.857	2.941	2.857	2.941
4001 FL	0.000	0.000	0.000	2.857	2.941	2.857	2.941
393 FL	0.000	0.000	0.000	2.857	2.941	2.857	2.941
394 ML	0.000	0.000	0.000	2.857	2.941	2.857	2.941
414 FL	0.500	3.571	3.846	2.857	2.941	-0.714	-0.905
429 FL	0.000	0.000	0.000	2.857	2.941	2.857	2.941
P402 M	0.500	3.571	3.846	1.429	1.471	-2.143	-2.376
P414 M	0.500	3.571	3.846	1.429	1.471	-2.143	-2.376
P3007 M	0.500	3.571	3.846	1.429	1.471	-2.143	-2.376
P400 M	0.500	3.571	3.846	1.429	1.471	-2.143	-2.376
P3001 M	0.500	3.571	3.846	1.429	1.471	-2.143	-2.376
P3002 M	0.500	3.571	3.846	1.429	1.471	-2.143	-2.376

GENETIC SUMMARY — LIVING DESCENDANT POPULATION POTENTIAL

	with unknowns	w/o	w/ unkn	w/o
Number of founders:	22	20	40	38
Mean retention:	0.558	0.564	0.875	0.895
Founder genomes surviving:	12.270	11.270	35.000	34.000
Founder Equivalents:	19.342	17.542	37.692	36.125
Founder Genome Equivalents:	11.058	10.104	35.000	34.000
Fraction of wild gene diversity retained:	0.955	0.951	0.986	0.985
Fraction of wild gene diversity lost:	0.045	0.049	0.014	0.015
Mean inbreeding coefficient:	0.000			

DICEROS BICORNIS MINOR - WORLD - 23/04/1992

ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	MALES	MK	Known	FEMALES	MK	Known
1	333	0.0000	1.0000	405	0.0000	1.0000
2	339	0.0000	1.0000	3009	0.0000	1.0000
3	399	0.0000	1.0000	410	0.0000	1.0000
4	3000	0.0000	1.0000	392	0.0000	1.0000
5	3006	0.0000	1.0000	4001	0.0000	1.0000
6	3008	0.0000	1.0000	393	0.0000	1.0000
7	401	0.0000	1.0000	429	0.0000	1.0000
8	404	0.0000	1.0000	400	0.0192	1.0000
9	390	0.0000	1.0000	334	0.0192	1.0000
10	4000	0.0000	1.0000	402	0.0192	1.0000
11	394	0.0000	1.0000	3001	0.0192	1.0000
12	113	0.0385	1.0000	3002	0.0192	1.0000
13	378	0.0385	1.0000	3007	0.0192	1.0000
14	403	0.0385	1.0000	414	0.0192	1.0000
15	3010	0.0385	1.0000	114	0.0385	1.0000
16	286	0.0577	1.0000	378	0.0385	1.0000
17	352	0.0449	0.5000	336	0.0385	1.0000
18				424	0.0385	1.0000
19				3011	0.0385	1.0000
20				433	0.0385	1.0000
21				3003	0.0385	1.0000
22				185	0.0481	1.0000
23				211	0.0577	1.0000
24				411	0.0577	1.0000
25				2068	0.0577	1.0000
26				181	0.0673	1.0000
27				421	0.0673	0.5000

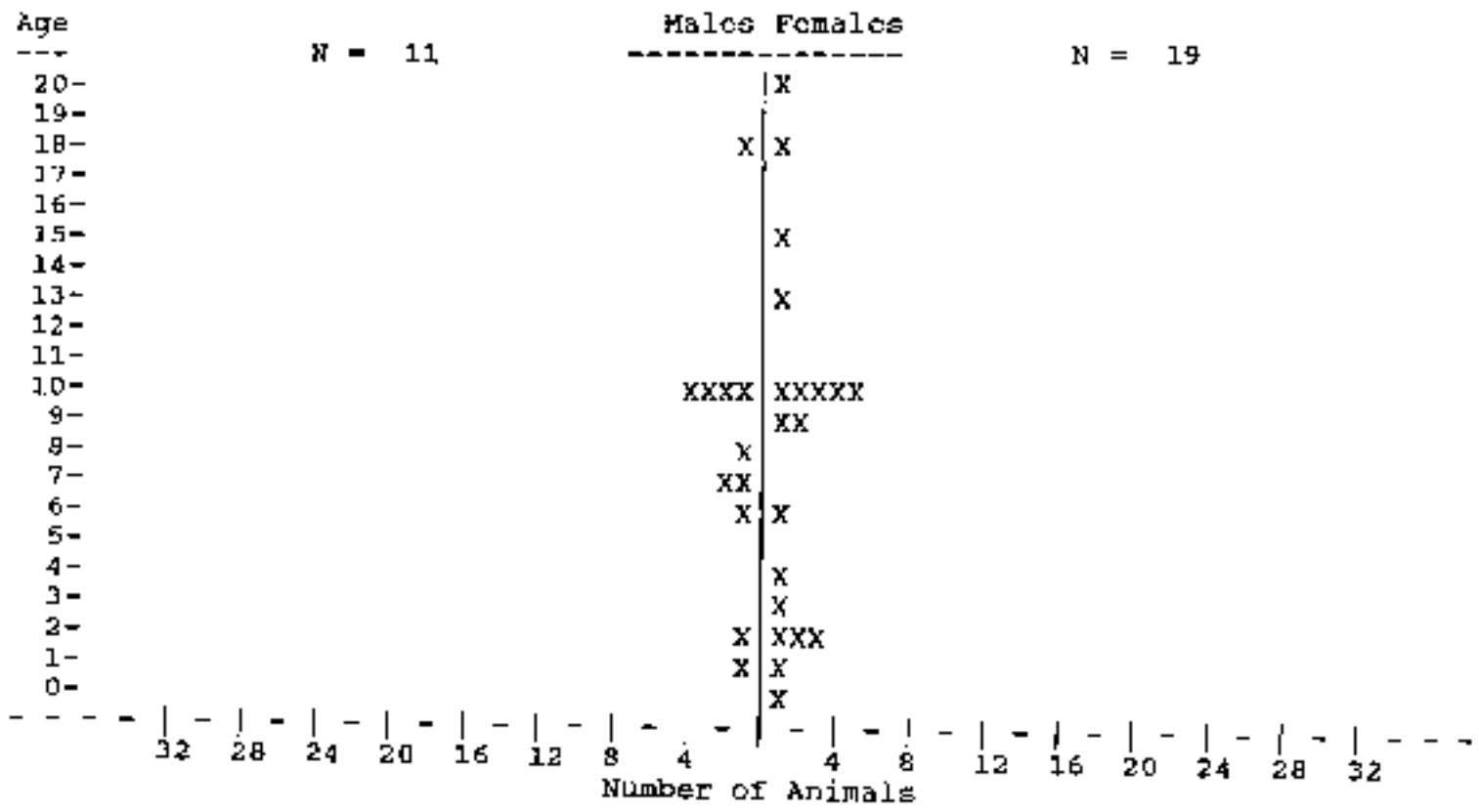
GENETIC SUMMARY OF POPULATION

Descendant population mean kinship:	0.0496
Gene diversity:	0.9504
Founder Genome Equivalents:	10.0896

Age Pyramid Report

Restricted to: SOUTHERN BLACK RHINO Studbook
Locations: N.AMERICA/
Dates: As of End of 22/04/1992 <= date
Status: Living by 2 Mar 1900

Taxon Name: **DICEROS BICORNIS MINOR**



X >>> Specimens of known sex...
? >>> Specimens of unknown sex...

Taxon Name: **DICEROS BICORNIS MINOR**

Age	Studbook Numbers >>> Male			
20				
19				
18	333			
17				
16				
15				
14				
13				
12				
11				
10	399	3000	3006	3008
9				
8	378			
7	401	404		
6	390			
5				
4				
3				
2	403			
1	3010			
0				

Total= 11

Taxon Name: **DICEROS BICORNIS MINOR**

Age	Studbook Numbers >>> **Female**				
20	379				
19					
18	400				
17					
16					
15	334				
14					
13	402				
12					
11					
10	405	3001	3002	3007	3009
9	336	410			
8					
7					
6	392				
5					
4	414				
3	411				
2	424	433	3011		
1	3003				
0	2068				

Total= 19

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

SECTION 9

SOUTHERN WHITE RHINO

SOUTHERN WHITE RHINOCEROS Studbook

(Ceratotherium simum simum)

Restricted to:
Locations: N.AMERICA/
Dates: During 21/04/1992 <= date
Status: Living during 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
25	M	~ 1961	WILD	WILD	NATAL SA	~ 1962	UNK		S.AFRICAR		CHIPPIE	CAT 01
					CATSKILL	9 May 1963	UNK		U.S.A.			
26	F	~ 1961	WILD	WILD	NATAL SA	~ 1962	UNK		S.AFRICAR		BARBARA	CAT 02
					CATSKILL	9 May 1963	UNK		U.S.A.			
29	M	~ 1959	WILD	WILD	NATAL SA	~ 1962	UNK		S.AFRICAR		MASHUARA	CHI 01
					CHICAGOBR	1 Sep 1962	UNK		U.S.A.			
					(WINSTON)	1 Jun 1988	350002		U.S.A.			
30	F	~ 1960	WILD	WILD	NATAL SA	~ 1962	UNK		S.AFRICAR		NEVA	CHI 02
					CHICAGOBR	1 Sep 1962	UNK		U.S.A.			
					(WINSTON)	1 Jun 1988	350003		U.S.A.			
31	M	~ 1958	WILD	WILD	NATAL SA	~ 1962	UNK		S.AFRICAR		NTOMBO	MKE 01
					MILWAUKEE	30 Aug 1962	204		U.S.A.			
					(FOSSILRIM)	15 Dec 1988	12035		U.S.A.			
34	M	~ 1961	WILD	WILD	NATAL SA	~ 1963	UNK		S.AFRICAR		KEMBLA	PHX 01
					PHOENIX	28 Jul 1963	137		U.S.A.			
39	F	~ 1963	WILD	WILD	NATAL SA	~ 1966	UNK		S.AFRICAR		HENRIETTA	OMA 02
					OMAHA	14 Nov 1966	315		U.S.A.			
43	F	~ 1964	WILD	WILD	NATAL SA	~ 1966	UNK		S.AFRICAR		OMGAWA	JAX 02
					JACKSONVL	19 Apr 1967	169		U.S.A.			
					YULEE	22 Aug 1984	8471		U.S.A.			
44	M	~ 1961	WILD	WILD	NATAL SA	~ 1965	UNK		S.AFRICAR		GEORGE	TPA 01
					BUSCH TAM	15 Dec 1966	15315		U.S.A.			
47	F	~ 1963	WILD	WILD	NATAL SA	~ 1966	UNK		S.AFRICAR		JANET	YYC 02
					CALGARY	14 May 1966	100546		CANADA			
50	M	~ 1965	WILD	WILD	NATAL SA	~ 1965	UNK	Wild Born	S.AFRICAR		MAC	LAX 01
					LOSANGELE	17 Aug 1965	UNK		U.S.A.			
					(LLANO)	4 Jun 1983	UNK		U.S.A.			
					(FOSSILRIM)	9 Nov 1989	12050		U.S.A.			
51	F	~ 1965	WILD	WILD	NATAL SA	~ 1965	UNK		S.AFRICAR		TOSHA	LAX 02
					LOSANGELE	17 Aug 1965	UNK		U.S.A.			
					(LLANO)	4 Jun 1983	UNK		U.S.A.			
					(FOSSILRIM)	9 Nov 1989	12051		U.S.A.			
80	M	~ 1964	WILD	WILD	NATAL SA	~ 1969	UNK		S.AFRICAR		LEW II	SDF 01
					LOUISVILL	6 Dec 1969	100131		U.S.A.			
					(KINGS ISL)	11 Feb 1985	821		U.S.A.			

Restricted to: (Ceratotherium simum simum)
Locations: N.AMERICA/
Dates: During 21/04/1992 <= date
Status: Living during 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
81	F	~ 1964	WILD	WILD	NATAL SA	~ 1967	UNK		S.AFRICAR		LUANA	SDF 02
					LOUISVILL	15 Nov 1967	'00150		U.S.A.			
					(KINGS ISL)	31 Feb 1985	822		U.S.A.			
					(COLUMBUS)	15 Jul 1988	882093		U.S.A.			
82	M	~ 1967	WILD	WILD	NATAL SA	~ 1968	UNK		S.AFRICAR		DUDLEY	FOW 01
					FORTWORTH	23 May 1968	'22		U.S.A.			
					(FOSSILRIM)	20 Jan 1989	1282		U.S.A.			
83	F	~ 1967	WILD	WILD	NATAL SA	~ 1968	UNK		S.AFRICAR		POKEY	FOW 02
					FORTWORTH	23 May 1968	123		U.S.A.			
					(FOSSILRIM)	20 Jan 1989	1283		U.S.A.			
143	M	~ 1963	WILD	WILD	NATAL SA	~ 1970	UNK		S.AFRICAR		MTOMDO	SAW 02
					SD-WAP	17 Feb 1971	UNK		U.S.A.			
					TORONTO	8 Aug 1974	4314		CANADA			
146	M	~ 1968	WILD	WILD	NATAL SA	~ 1970	UNK		S.AFRICAR		PENDULA	SAW 05
					SD-WAP	17 Feb 1971	100253		U.S.A.			
					COLUMBUS	21 Jun 1975	752006		U.S.A.			
147	F	~ 1963	WILD	WILD	NATAL SA	~ 1970	UNK		S.AFRICAR		MACETE	SAW 06
					SD WAP	17 Feb 1971	100255		U.S.A.			
					(FOSSILRIM)	14 Dec 1989	1247		U.S.A.			
148	F	~ 1968	WILD	WILD	NATAL SA	~ 1970	UNK		S.AFRICAR		GOBELE	SAW 07
					SD-WAP	17 Feb 1971	100256		U.S.A.			
					COLUMBUS	21 Jun 1975	752007		U.S.A.			
150	F	~ 1968	WILD	WILD	NATAL SA	~ 1970	UNK		S.AFRICAR		SINAMBA	SAW 09
					SD-WAP	17 Feb 1971	100258		U.S.A.			
153	F	~ 1963	WILD	WILD	NATAL SA	~ 1970	UNK		S.AFRICAR		TAMBILE	SAW 12
					SD-WAP	17 Feb 1971	100261		U.S.A.			
					PHOENIX	1 May 1975	1672		U.S.A.			
154	F	~ 1963	WILD	WILD	NATAL SA	~ 1970	UNK		S.AFRICAR		MJUBA	SAW 13
					SD-WAP	17 Feb 1971	100262		U.S.A.			
156	F	~ 1963	WILD	WILD	NATAL SA	~ 1970	UNK		S.AFRICAR		MAMULA	SAW 15
					SD-WAP	17 Feb 1971	100264		U.S.A.			
157	F	~ 1968	WILD	WILD	NATAL SA	~ 1970	UNK		S.AFRICAR		KOMAAS	SAW 16
					SD-WAP	17 Feb 1971	100265		U.S.A.			
159	F	~ 1963	WILD	WILD	NATAL SA	~ 1970	UNK		S.AFRICAR		UMFOLOZI	SAW 18
					SD-WAP	17 Feb 1971	100267		U.S.A.			

Restricted to: (Ceratotherium simum simum)
Locations: N.AMERICA/
Dates: During 21/04/1992 <= date
Status: Living during 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
177	M	- 1968	WILD	WILD	NATAL SA	- 1970	UNK		S.AFRICAR		PHIL	TOL 1
					TOLEDO	22 Sep 1970	UNK		U.S.A.			
					(TULE	) 21 Jun 1984	8451		U.S.A.			
180	M	- 1965	WILD	WILD	NATAL SA	- 1970	UNK		S.AFRICAR		FRED	STA 01
					SAN ANTON	5 Oct 1970	701002		U.S.A.			
181	F	- 1965	WILD	WILD	NATAL SA	- 1970	UNK		S.AFRICAR		GERTRUDE	STA 02
					SAN ANTON	5 Oct 1970	701003		U.S.A.			
182	F	- 1969	WILD	WILD	NATAL SA	- 1970	UNK		S.AFRICAR		PHOEBE	STA 03
					SAN ANTON	13 Feb 1971	710202		U.S.A.			
187	M	- 1968	WILD	WILD	NATAL SA	- 1971	UNK		S.AFRICAR		FODDER	FRE 01
					FRESNO	19 Sep 1971	5156		U.S.A.			
					(SD-WAP	) 30 May 1990	690529		U.S.A.			
188	F	- 1968	WILD	WILD	NATAL SA	- 1971	UNK		S.AFRICAR		MUDDER	FRE 02
					FRESNO	19 Sep 1971	5157		U.S.A.			
189	M	- 1968	WILD	WILD	NATAL SA	- 1970	UNK		S.AFRICAR		M'KABI	BRC 01
					BROWNSVIL	11 Sep 1970	261		U.S.A.			
190	F	- 1968	WILD	WILD	NATAL SA	- 1970	UNK		S.AFRICAR		NOBELA	BRC 02
					BROWNSVIL	11 Sep 1970	262		U.S.A.			
191	M	- 1968	WILD	WILD	NATAL SA	- 1970	UNK		S.AFRICAR			JAH 01
					HOUSTON	8 Jul 1970	441		U.S.A.			
192	F	- 1970	WILD	WILD	NATAL SA	- 1970	UNK		S.AFRICAR			JAH 02
					HOUSTON	8 Jul 1970	440		U.S.A.			
202	M	28 Aug 1972	180	181	SAN ANTON	28 Aug 1972	UNK	Captive Born	U.S.A.		SHAKA	STA 04
					(BROWNSVIL)	8 Jan 1987	3120		U.S.A.			
203	M	11 Oct 1972	52	151	SD-WAP	11 Oct 1972	100270	Captive Born	U.S.A.		ZIBULO	SAN 03
					TUCSON	8 Jun 1976	678		U.S.A.			
213	M	19 Dec 1972	52	152	SANDIEGOZ	19 Dec 1972	UNK	Captive Born	U.S.A.		RENDER	SAN 05
					TORONTO	8 Aug 1974	4313		CANADA			
					CALGARY	22 Sep 1988	102695		CANADA			
218	F	3 Feb 1973	52	157	SD-WAP	3 Feb 1973	UNK	Captive Born	U.S.A.		ISABAMU	SAN 19
					TORONTO	8 Aug 1974	4316		CANADA			
219	F	8 May 1973	52	153	SD-WAP	8 May 1973	UNK	Captive Born	U.S.A.		HENRIETTA	SAN 20
					PHILADELP	4 May 1974	100251		U.S.A.			
					FOSSILRIM	28 Nov 1988	1219		U.S.A.			

Restricted to: (Ceratotherium simum simum)
Locations: N.AMERICA/
Dates: During 21/04/1992 <= date
Status: Living during 21 Apr 1992 -> 22 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
220	M	28 Jun 1973	52	154	SD-WAP	28 Jun 1973	UNK	Captive Born	U.S.A.		SAM	SAW 21
					PHILADELP	4 May 1974	100250		U.S.A.			
					TOLEDO	15 Nov 1988	880033		U.S.A.			
238	F	15 Apr 1973	52	150	SD-WAP	15 Apr 1973	100275	Captive Born	U.S.A.		YEBOMBA	SAW 22
					TUCSON	8 Jun 1976	679		U.S.A.			
277	F	~ 1963	WILD	WILD	NATAL SA	- 1971	UNK		S.AFRICAR		NTHOMBI	SAW 06
					SANDIEGOZ	18 Sep 1971	UNK		U.S.A.			
					SD-WAP	1 Nov 1972	100271		U.S.A.			
280	M	29 May 1974	52	148	SD-WAP	29 May 1974	UNK	Captive Born	U.S.A.		JACK	SAW 23
					WINSTON	26 Jun 1975	106751		U.S.A.			
318	F	- 1971	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR		ANNE	KOM 02
					KANSASCTY	23 Jun 1972	629		U.S.A.			
					JACKSONVL	5 Jan 1983	1943		U.S.A.			
335	M	24 Aug 1976	52	154	SD-WAP	24 Aug 1976	UNK	Captive Born	U.S.A.		GHIMBAYA	SAW 35
					NOGLE	19 May 1977	00927		U.S.A.			
336	M	- 1966	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR		POP	RWC 01
					REDWOOD	1 May 1972	1022		U.S.A.			
					MARINELD	1 Jan 1988	1022		U.S.A.			
337	F	~ 1966	WILD	WILD	NATAL SA	~ 1972	UNK		S.AFRICAR		MOM	RWC 02
					REDWOOD	1 May 1972	1023		U.S.A.			
					MARINELD	1 Jan 1988	1023		U.S.A.			
358	F	- 1966	WILD	WILD	NATAL SA	- 1973	UNK		S.AFRICAR		DINKA	ALG 01
					RIO GRAND	27 Nov 1973	10312		U.S.A.			
359	M	- 1965	WILD	WILD	NATAL SA	- 1973	UNK		S.AFRICAR		CHUKURU	ALG 02
					RIO GRAND	27 Nov 1973	10311		U.S.A.			
363	M	- 1969	WILD	WILD	NATAL SA	- 1973	UNK		S.AFRICAR		LUCIFER	ROK 01
					ROCKTON	3 May 1973	100210		CANADA			
364	M	- 1969	WILD	WILD	NATAL SA	- 1973	UNK		S.AFRICAR		ABNER	ROK 02
					ROCKTON	3 May 1973	100211		CANADA			
365	F	- 1969	WILD	WILD	NATAL SA	- 1973	UNK		S.AFRICAR		KATIE	ROK 03
					ROCKTON	3 May 1973	100212		CANADA			
					(TORONTO	) 25 Jul 1989	24732		CANADA			
366	F	~ 1969	WILD	WILD	NATAL SA	~ 1973	UNK		S.AFRICAR		MAY	ROK 04
					ROCKTON	3 May 1973	100213		CANADA			

Restricted to: (Ceratotherium simum simum)
Locations: N.AMERICA/
Dates: During 21/04/1992 <= date
Status: Living during 21 Apr 1992 -> 22 Apr 1992

Stud #	Sex	BIrth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death Date	Name	Breeder #
379	M	~ 1968	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR		SAMSON	COL 01
					STOCKBRID	15 Apr 1972	UNK		U.S.A.			
					RIVERBANK	18 Apr 1974	SJ0152		U.S.A.			
					YULEE	15 Apr 1989	UNK		U.S.A.			
380	F	~ 1968	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR		DAISEY MAECOL	3
					STOCKBRID	15 Apr 1972	UNK		U.S.A.			
					RIVERBANK	18 Apr 1974	SJ0153		U.S.A.			
					KINGS ISL	23 Nov 1988	1043		U.S.A.			
381	F	- 1968	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR			COL 03
					STOCKBRID	15 Apr 1972	UNK		U.S.A.			
					RIVERBANK	18 Apr 1974	SJ0154		U.S.A.			
					TOLEDO	11 Nov 1988	880031		U.S.A.			
386	M	- 1970	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR			LOU 01
					MONROE	24 Apr 1972	141173		U.S.A.			
387	F	- 1972	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR			LOU 02
					MONROE	24 Apr 1972	142174		U.S.A.			
390	M	~ 1969	WILD	WILD	NATAL SA	- 1974	UNK		S.AFRICAR		ARCHIE	JAX 03
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					JACKSONVL	18 Dec 1975	350		U.S.A.			
391	F	~ 1974	WILD	WILD	NATAL SA	- 1974	UNK		S.AFRICAR		EDITH	JAX 04
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					JACKSONVL	18 Dec 1975	348		U.S.A.			
392	F	~ 1971	WILD	WILD	NATAL SA	~ 1974	UNK		S.AFRICAR		WRINKLES	JAX 05
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					JACKSONVL	18 Dec 1975	349		U.S.A.			
397	F	- 1972	WILD	WILD	NATAL SA	- 1973	UNK		S.AFRICAR		TOMBI	MEM 03
					ROSWELL	2 Oct 1973	UNK		U.S.A.			
					MEMPHIS	16 Apr 1976	0271		U.S.A.			
413	M	~ 1970	WILD	WILD	NATAL SA	~ 1974	UNK		S.AFRICAR		DARYLL	KIN 04
					KINGS ISL	25 Jan 1974	104		U.S.A.			
					HUDSON	21 May 1980	UNK		U.S.A.			
					ASHEBORO	21 Nov 1987	941		U.S.A.			
416	F	~ 1971	WILD	WILD	NATAL SA	~ 1974	UNK		S.AFRICAR		CHARLIE	KIN 07
					KINGS ISL	25 Apr 1974	107		U.S.A.			
417	F	- 1971	WILD	WILD	NATAL SA	- 1974	UNK		S.AFRICAR		PRETTY GIRL	KIN 08
					KINGS ISL	25 Apr 1974	108		U.S.A.			

Restricted to: (Ceratotherium simum simum)
Locations: N.AMERICA/
Dates: During 21/04/1992 <= date
Status: Living during 21 Apr 1992 -> 22 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
418	F	~ 1971	WILD	WILD	NATAL SA	~ 1974	UNK		S.AFRICAN		PETITE	KLM 09
					KINGS ISL	25 Apr 1974	109		U.S.A.			
452	F	~ 1968	WILD	WILD	NATAL SA	~ 1971	UNK		S.AFRICAN		POLLY	LAI 32
					STOCKBRID	15 Apr 1972	UNK		U.S.A.			
					(KNOXVILLE)	2 Nov 1976	142		U.S.A.			
453	F	~ 1968	WILD	WILD	NATAL SA	~ 1971	UNK		S.AFRICAN		DOLLY	LAI 33
					STOCKBRID	15 Apr 1972	UNK		U.S.A.			
					(KNOXVILLE)	2 Nov 1976	141		U.S.A.			
463	M	~ 1970	WILD	WILD	NATAL SA	~ 1972	UNK		S.AFRICAN			LTR 01
					STOCKBRID	15 Apr 1972	UNK		U.S.A.			
					LITTLEROC	12 Jun 1975	184		U.S.A.			
					(FORTWORTH)	15 Dec 1990	UNK		U.S.A.			
464	F	~ 1970	WILD	WILD	NATAL SA	~ 1972	UNK		S.AFRICAN			LTR 02
					STOCKBRID	15 Apr 1972	UNK		U.S.A.			
					LITTLEROC	12 Jun 1975	182		U.S.A.			
465	M	~ 1972	WILD	WILD	NATAL SA	~ 1974	UNK		S.AFRICAN		MONTO	GBR 01
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					BATONROUG	26 Oct 1974	124		U.S.A.			
					(KNOXVILLE)	17 May 1988	1237		U.S.A.			
466	F	~ 1972	WILD	WILD	NATAL SA	~ 1974	UNK		S.AFRICAN		NATAPI	GRP 02
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					BATONROUG	26 Oct 1974	129		U.S.A.			
467	F	~ 1972	WILD	WILD	NATAL SA	~ 1974	UNK		S.AFRICAN		NAGASA	GBR 03
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					BATONROUG	26 Oct 1974	130		U.S.A.			
					KNOXVILLE	17 Jan 1991	1416		U.S.A.			
469	M	~ 1971	WILD	WILD	NATAL SA	~ 1974	UNK		S.AFRICAN		RONNIE	BGH 1
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					BIRMINGHM	24 Feb 1976	315		U.S.A.			
470	F	~ 1971	WILD	WILD	NATAL SA	~ 1974	UNK		S.AFRICAN		GERTRUDE	BGH 02
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					BIRMINGHM	24 Feb 1976	316		U.S.A.			
471	F	~ 1971	WILD	WILD	NATAL SA	~ 1974	UNK		S.AFRICAN		HORTENSE	BGH 03
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					BIRMINGHM	24 Feb 1976	317		U.S.A.			
473	M	~ 1969	WILD	WILD	NATAL SA	~ 1972	UNK		S.AFRICAN		CHUCK	JCK 01
					STOCKBRID	15 Apr 1972	UNK		U.S.A.			
					JACKSON	2 Sep 1974	000219		U.S.A.			
					KNOXVILLE	1 Sep 1988	1249		U.S.A.			

Restricted to: (Ceratotherium simum simum)
Locations: N.AMERICA/
Dates: During 21/04/1992 <= date
Status: Living during 21 Apr 1992 -> 22 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
475	F	- 1969	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR		LONGHORN	.CK 03
					STOCKBRIG	15 Apr 1972	UNK		U.S.A.			
					JACKSON	2 Sep 1974	000221		U.S.A.			
481	M	30 Dec 1975	UNK	UNK	GRT ADVEN	30 Dec 1975	UNK	Captive Born	U.S.A.		OEANO	PIT 01
					PITTSBURG	11 Jul 1977	201		U.S.A.			
482	F	25 Nov 1975	UNK	UNK	GRT ADVEN	25 Nov 1975	UNK	Captive Born	U.S.A.		KIDAGO	PIT 02
					PITTSBURG	11 Jul 1977	202		U.S.A.			
533	F	5 Mar 1979	390	391	JACKSONVL	5 Mar 1979	1298	Captive Born	U.S.A.		GLORIA	JAK 06
					TULEE	12 Apr 1989	UNK		U.S.A.			
542	F	14 Jun 1979	52	157	SD-WAP	14 Jun 1979	UNK	Captive Born	U.S.A.		PRINCESS	SAV 45
					BOGLE	15 Dec 1980	02794		U.S.A.			
565	F	- 1968	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR			WPB 08
					MPALM BCH	1 Jan 1972	UNK					
					HUDSON	13 Jul 1981	UNK		U.S.A.			
					ASHEBORO	21 Nov 1987	942		U.S.A.			
573	M	- 1970	WILD	WILD	NATAL SA	- 1974	UNK		S.AFRICAR		TED	NCL 01
					ST LOUIS	12 Aug 1974	UNK		U.S.A.			
					ASHEBORO	30 Sep 1976	59		U.S.A.			
574	F	- 1970	WILD	WILD	NATAL SA	- 1974	UNK		S.AFRICAR		ALICE	NCL 02
					ST LOUIS	12 Aug 1974	UNK		U.S.A.			
					ASHEBORO	30 Sep 1976	60		U.S.A.			
575	F	19 Aug 1977	573	574	ASHEBORO	19 Aug 1977	5'	Captive Born	U.S.A.		CAROLINE	NCL 03
					(KNOXVILLE)	9 Nov 1988	1259		U.S.A.			
579	F	- 1972	WILD	WILD	NATAL SA	- 1974	UNK		S.AFRICAR		HARRIOTT	NCL 01
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					AUDUBON	13 Dec 1974	052		U.S.A.			
587	F	- 1970	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR		AMY	PHL 01
					STOCKBRID	15 Apr 1972	UNK		U.S.A.			
					PHILADELP	22 Dec 1976	100486		U.S.A.			
					KNOXVILLE	25 Nov 1988	1261		U.S.A.			
					BATONROUG	18 Jan 1991	JUL		U.S.A.			
599	F	4 Sep 1977	52	156	SD-WAP	4 Sep 1977	UNK	Captive Born	U.S.A.		DAISY MAE	SAV 74
					VANCOUVER	26 Jul 1986	UNK		CANADA			
612	F	6 May 1979	562	566	MPALM BCH	6 May 1979	UNK	Captive Born			NOILI	WPB 16
					HOUSTON	21 Nov 1989	11944		U.S.A.			

Restricted to: (Ceratotherium simum simum)
Locations: N.AMERICA/
Dates: During 21/04/1992 <= date
Status: Living during 21 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
618	M	- 1966	WILD	WILD	NATAL SA	- 1974	UNK		S.AFRICAR		MARVIN	KNO 02
					KNOXVILLE	15 Aug 1974	143		U.S.A.			
					BATONROUG	16 May 1988	UNK		U.S.A.			
619	F	- 1966	WILD	WILD	NATAL SA	- 1974	UNK		S.AFRICAR		MILLET	KNO 03
					KNOXVILLE	15 Aug 1974	144		U.S.A.			
620	F	- 1966	WILD	WILD	NATAL SA	- 1974	UNK		S.AFRICAR		TILLEY	KNO 04
					KNOXVILLE	15 Aug 1974	145		U.S.A.			
					BROWNSVIL	18 May 1988	UNK		U.S.A.			
686	F	- 1972	WILD	WILD	NATAL SA	- 1974	UNK		S.AFRICAR		JESSE	NOR 01
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					NORFOLK	5 Jun 1974	172002		U.S.A.			
687	M	- 1972	WILD	WILD	NATAL SA	- 1974	UNK		S.AFRICAR		RUFUS	NOR 02
					KINGS ISL	25 Apr 1974	UNK		U.S.A.			
					NORFOLK	5 Jun 1974	172000		U.S.A.			
691	F	1 Nov 1980	420	429	FERNDALE	1 Nov 1980	UNK	Captive Born	U.S.A.		BONNIE	JAE 38
					TULSA	3 Nov 1982	5592		U.S.A.			
693	F	17 Mar 1980	UNK	UNK	JACKSN MJ	17 Mar 1980	UNK	Captive Born			JEANNIE	GRA 03
					TULSA	3 Nov 1982	5591		U.S.A.			
696	F	- 1968	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR		NADIA	STO 01
					FERNDALE	22 Jul 1975	UNK		U.S.A.			
					MADISON	6 Jul 1976	643		U.S.A.			
697	M	- 1968	WILD	WILD	NATAL SA	- 1972	UNK		S.AFRICAR		SHOKA	STO 02
					FERNDALE	22 Jul 1975	UNK		U.S.A.			
					MADISON	6 Jul 1976	642		U.S.A.			
707	M	- 1975	WILD	WILD	NATAL SA	- 1975	UNK		S.AFRICAR		FRANKLIN	JCK 04
					DARBY CAN	- 1976	UNK		U.S.A.			
					JACKSON	20 Dec 1980	000876		U.S.A.			
750	F	- 1969	WILD	WILD	NATAL SA	- 1973	UNK		S.AFRICAR		LUCY	DOS 01
					DOSWELL	3 Oct 1973	026		U.S.A.			
753	M	- 1969	WILD	WILD	NATAL SA	- 1973	UNK		S.AFRICAR		ALFRED	DOS 04
					DOSWELL	3 Oct 1973	021		U.S.A.			
754	M	- 1969	WILD	WILD	NATAL SA	- 1973	UNK		S.AFRICAR		RUFUS	DOS 05
					DOSWELL	3 Oct 1973	022		U.S.A.			
755	M	10 Jun 1979	754	752	DOSWELL	10 Jun 1979	750	Captive Born	U.S.A.		NELTON	DOS 06

Restricted to: (Ceratotherium simum simum)
Locations: N.AMERICA/
Dates: During 21/04/1992 <= date
Status: Living during 21 Apr 1992 -> 22 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
757	F	~ 1970	WILD	WILD	NATAL SA	~ 1973	UNK		S.AFRICAR		ZUBEJE	DOS 05
					COSWELL	2 Oct 1973	UNK		U.S.A.			
					VANCOUVER	1 May 1979	UNK		CANADA			
758	M	~ 1970	WILD	WILD	NATAL SA	~ 1973	UNK		S.AFRICAR			DOS 09
					DOSWELL	2 Oct 1973	UNK		U.S.A.			
					VANCOUVER	1 May 1979	UNK		CANADA			
772	F	3 Mar 1983	618	453	KNOXVILLE	3 Mar 1983	760	Captive Born	U.S.A.		DAFFODIL	IAÉ 44
					(LOUISVILL	23 May 1985	100906		U.S.A.			
788	F	22 Dec 1983	52	157	SD-WAP	22 Dec 1983	026204	Captive Born	U.S.A.		KARIBU	SAV 63
790	M	3 Jan 1984	618	452	KNOXVILLE	3 Jan 1984	843	Captive Born	U.S.A.		KYLE	KNO 10
					(CLEVELAND)	23 May 1985	850505		U.S.A.			
791	F	11 Jan 1984	618	620	KNOXVILLE	11 Jan 1984	844	Captive Born	U.S.A.		PLAJEDO	KNO 11
					(LOUISVILL	23 May 1985	100905		U.S.A.			
819	F	24 Jun 1984	52	155	SD-WAP	24 Jun 1984	026210	Captive Born	U.S.A.		DUKIEHA	SAV 67
822	F	28 Aug 1984	52	150	SD-WAP	28 Aug 1984	026342	Captive Born	U.S.A.		SINYAA	SAV 70
841	M	27 Ju. 1985	420	599	SD-WAP	27 Jul 1985	UNK	Captive Born	U.S.A.		SITEMI	SAV 75
					HONOLULU	29 Oct 1986	860275		U.S.A.			
842	F	19 Aug 1985	40	397	MEMPHIS	19 Aug 1985	7593	Captive Born	U.S.A.		KARLA	MEM 07
					CLEVELAND	6 Jun 1986	860603		U.S.A.			
861	M	11 May 1986	420	155	SD-WAP	11 May 1986	005486	Captive Born	U.S.A.		DUMA	SAV 78
					OMAHA	18 Dec 1989	5585		U.S.A.			
876	M	25 Nov 1986	50	51	LLANO	25 Nov 1986	UNK	Captive Born	U.S.A.			LLA 01
					(LOUISVELL)	2 Dec 1988	101'30		U.S.A.			
898	M	14 Jul 1987	34	153	PHOENIX	14 Jul 1987	5077	Captive Born	U.S.A.		OLLIE	PHX 07
					(FOSSILRIN)	9 Jul 1989	12898		U.S.A.			
925	F	26 Jan 1988	420	277	SD-WAP	26 Jan 1988	688C27	Captive Born	U.S.A.		HUTKA	
926	M	15 Feb 1988	420	147	SD-WAP	15 Feb 1988	688C5D	Captive Born	U.S.A.		MAREJEO	
947	F	22 Jun 1987	420	599	VANCOUVER	22 Jun 1987	UNK	Captive Born	CANADA			
950	M	13 Jan 1990	143	218	TORONTO	13 Jan 1990	25243	Captive Born	CANADA		ATU	
963	M	28 Aug 1990	34	153	PHOENIX	28 Aug 1990	UNK	Captive Born	U.S.A.			

Restricted to: (Ceratotherium simum simum)
Locations: N.AMERICA/
Dates: During 21/04/1992 <= date
Status: Living during 21 Apr 1992 -> 22 Apr 1992

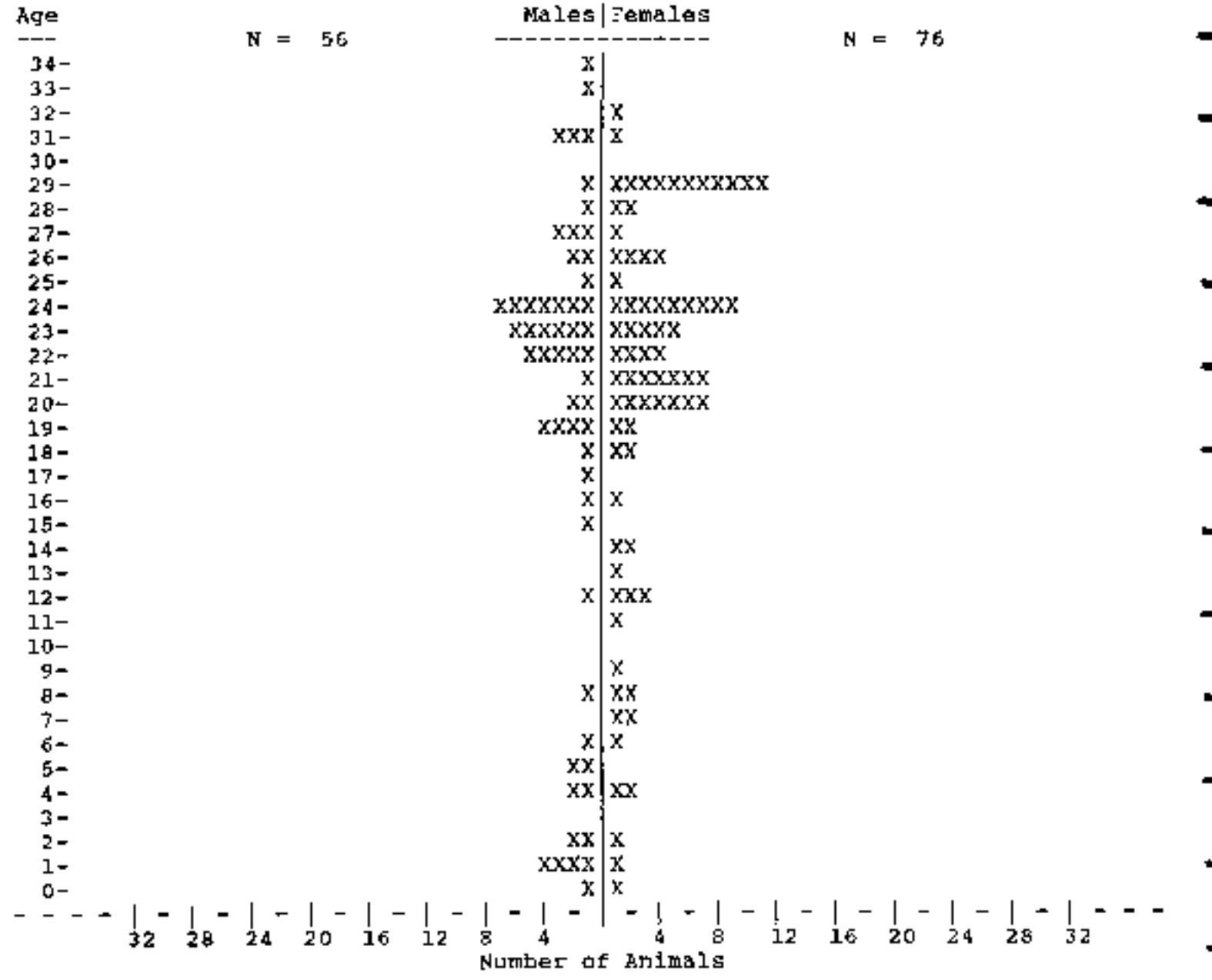
Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
968	M	4 Aug 1989	180	182	SAN ANTON	4 Aug 1989	890804	Captive Born	U.S.A.		NOTD KIFOR	
TC02	F	2 Feb 1990	465	453	KNOXVILLE	2 Feb 1990	0347	Captive Born	U.S.A.			
TC04	F	8 Jan 1991	465	452	KNOXVILLE	8 Jan 1991	1413	Captive Born	U.S.A.			
T005	M	26 Jan 1991	390	391	JACKSONVL	26 Jan 1991	UNK	Captive Born	U.S.A.			
T006	M	9 Mar 1991	40	367	MEMPHIS	9 Mar 1991	19835	Captive Born	U.S.A.			
T008	F	3 Sep 1991	379	533	YULEE	3 Sep 1991	9147	Captive Born	U.S.A.			
T009	M	14 Dec 1990	189	620	BROWNSVIL	14 Dec 1990	4648	Captive Born	U.S.A.			
T010	M	20 Nov 1991	187	159	SD-WAP	20 Nov 1991	691716	Captive Born	U.S.A.			

TOTALS: 56.76.0 (132)

Age Pyramid Report

Restricted to: SOUTHERN WHITE RHINOCEROS Studbook
Locations: N.AMERICA/
Dates: As of End of 21/04/1992 <= date

Taxon Name: **CERATOTHERIUM SIMUM SIMUM**



X >>> Specimens of known sex...
? >>> Specimens of unknown sex...

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
White Rhino Species Survival Plan

SPARKS v1.11
22 Apr 1992

Taxon Name: **CERATOTHERIUM SIMUM SIMUM**

Age	Studbook Numbers >>> **Male**						
34	31						
33	29						
32							
31	25	34	44				
30							
29	143						
28	80						
27	50	180	359				
26	336	618					
25	82						
24	146	177	187	189	191	379	697
23	363	364	390	473	753	754	
22	386	413	463	573	758		
21	469						
20	465	687					
19	202	203	213	707			
18	220						
17	280						
16	481						
15	335						
14							
13							
12	755						
11							
10							
9							
8	790						
7							
6	841						
5	861	876					
4	898	926					
3							
2	950	968					
1	963	T005	T006	T009			
0	T010						

Total= 56

Taxon Name: **CERATOTHERIUM SIMUM SIMUM** Page 3

Age	Studbook Numbers >>> Female									
34										
33										
32	30									
31	26									
30										
29	39	47	51	147	150	153	154	156	157	159
	277									
28	43	81								
27	181									
26	337	358	619	620						
25	83									
24	148	188	190	380	381	452	453	565	696	
23	182	365	366	475	750					
22	464	574	587	757						
21	192	318	416	417	418	470	471			
20	387	392	397	466	467	579	686			
19	218	230								
18	219	391								
17										
16	482									
15										
14	575	599								
13	533									
12	542	612	693							
11	691									
10										
9	772									
8	788	791								
7	819	822								
6	842									
5										
4	925	947								
3										
2	T002									
1	T004									
0	T008									

Total= 76

Fecundity & Mortality Report

Restricted to: SOUTHERN WHITE RHINOCEROS Studbook
Locations: N.AMERICA/

Taxon Name: **CERATOTHERIUM SIMUM SIMUM**

Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	69.3	0.00	61.6	0.15	81.2	0.18	73.7
1- 2	0.00	46.2	0.00	45.8	0.08	48.6	0.07	43.6
2- 3	0.00	44.1	0.00	61.8	0.07	43.3	0.03	60.8
3- 4	0.00	60.4	0.00	89.3	0.00	59.9	0.02	87.7
4- 5	0.00	70.4	0.01	105.0	0.01	71.4	0.00	105.0
5- 6	0.00	74.0	0.00	109.1	0.01	73.1	0.01	108.2
6- 7	0.00	73.2	0.02	108.4	0.01	73.8	0.01	108.4
7- 8	0.02	71.7	0.04	107.8	0.01	70.8	0.01	108.5
8- 9	0.00	72.3	0.01	113.1	0.00	71.5	0.03	110.8
9-10	0.02	72.1	0.05	111.7	0.00	71.8	0.00	111.4
10-11	0.05	71.9	0.04	104.4	0.01	71.1	0.00	104.4
11-12	0.02	64.4	0.06	97.9	0.00	64.4	0.03	94.5
12-13	0.07	61.2	0.07	87.7	0.02	60.9	0.04	85.4
13-14	0.09	58.0	0.09	80.7	0.00	58.0	0.01	80.0
14-15	0.14	57.5	0.08	78.4	0.04	55.1	0.01	77.5
15-16	0.06	54.8	0.04	75.9	0.04	53.7	0.00	75.9
16-17	0.12	52.2	0.07	73.0	0.00	52.2	0.03	71.5
17-18	0.10	50.5	0.02	70.7	0.00	50.9	0.01	69.9
18-19	0.14	48.8	0.08	66.9	0.02	48.8	0.03	67.0
19-20	0.11	45.5	0.05	63.2	0.02	44.8	0.00	63.2
20-21	0.20	41.1	0.04	58.4	0.00	41.1	0.00	57.4
21-22	0.12	39.3	0.07	50.8	0.00	39.3	0.02	50.6
22-23	0.16	35.5	0.05	44.8	0.00	35.5	0.02	44.2
23-24	0.10	29.2	0.12	38.6	0.00	28.4	0.03	37.9
24-25	0.19	21.3	0.06	29.8	0.10	20.2	0.00	29.8
25-26	0.07	16.6	0.16	25.2	0.00	16.6	0.08	24.3
26-27	0.08	14.1	0.00	21.2	0.07	13.6	0.05	22.2
27-28	0.06	10.0	0.03	17.1	0.10	9.9	0.12	16.3
28-29	0.07	8.3	0.04	14.5	0.00	8.3	0.00	14.6
29-30	0.08	7.3	0.00	6.4	0.00	7.3	0.00	6.4
30-31	0.00	6.3	0.00	3.0	0.00	6.3	0.00	3.0
31-32	0.00	3.4	0.00	2.3	0.34	2.9	0.00	2.3
32-33	0.00	2.0	0.00	1.2	0.00	2.0	1.00	0.3
33-34	0.00	1.3	0.00	0.0	0.00	1.3	0.00	0.0
34-35	0.00	0.3	0.00	0.0	0.00	0.3	0.00	0.0
35-36	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
36-37	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 19.170
Ro = 1.226
lambda=1.01
r = 0.011

T = 17.062
Ro = 0.760
lambda=0.98
r = -0.016

30 day mortality: 13%
(20 out of 157)

139 birth events to known age parents tabulated for Mx...plus...
22 births to UNK or MULT dams...
21 births to UNK or MULT sires...

84 death events of known age tabulated for Qx...

WARNING: Values with small sample sizes (N) warrant less confidence...

Fecundity & Mortality Report

Restricted to: SOUTHERN WHITE RHINOCEROS Studbook
Locations: N.AMERICA/
Dates: During 01/01/1981 <= date

Taxon Name: **CERATOTHERIUM SIMUM SIMUM**

	Fecundity [Mx]...				Mortality [Qx]...			
Age Class	Male	N	Female	N	Male	N	Female	N
0- 1	0.00	35.9	0.00	33.5	0.18	43.8	0.13	38.5
1- 2	0.00	25.2	0.00	24.4	0.04	25.6	0.08	24.2
2- 3	0.00	18.6	0.00	17.7	0.17	17.5	0.12	16.7
3- 4	0.00	14.2	0.00	18.3	0.00	14.2	0.12	17.1
4- 5	0.00	10.9	0.00	17.0	0.00	10.9	0.00	17.0
5- 6	0.00	7.8	0.00	15.9	0.00	7.8	0.00	15.9
6- 7	0.00	7.1	0.03	16.5	0.13	7.7	0.00	16.5
7- 8	0.00	7.5	0.07	16.0	0.00	7.5	0.06	16.7
8- 9	0.00	10.6	0.00	14.6	0.00	10.6	0.00	14.6
9-10	0.00	12.2	0.10	20.8	0.00	12.2	0.00	20.8
10-11	0.04	13.0	0.02	26.0	0.00	13.0	0.00	26.0
11-12	0.00	19.5	0.02	31.5	0.00	19.5	0.00	31.5
12-13	0.00	26.9	0.05	40.3	0.00	26.9	0.05	39.9
13-14	0.03	34.0	0.06	44.9	0.00	34.0	0.00	44.9
14-15	0.07	35.5	0.06	44.4	0.06	35.0	0.02	43.5
15-16	0.03	34.8	0.03	46.9	0.06	33.7	0.00	46.9
16-17	0.05	35.3	0.05	46.4	0.00	35.3	0.00	45.9
17-18	0.04	36.9	0.00	47.8	0.00	36.9	0.02	47.0
18-19	0.15	39.8	0.08	58.4	0.00	39.8	0.02	57.9
19-20	0.06	36.5	0.06	56.2	0.03	35.8	0.00	56.2
20-21	0.17	35.1	0.04	53.4	0.00	35.1	0.00	52.4
21-22	0.11	37.3	0.07	47.8	0.00	37.3	0.02	47.6
22-23	0.15	34.5	0.05	41.8	0.00	34.5	0.02	41.2
23-24	0.09	29.2	0.11	38.6	0.00	28.4	0.03	37.9
24-25	0.17	21.3	0.05	29.8	0.10	20.2	0.00	29.8
25-26	0.06	16.6	0.15	25.2	0.00	16.6	0.08	24.3
26-27	0.08	14.1	0.00	21.1	0.07	13.6	0.05	22.2
27-28	0.05	10.0	0.03	17.1	0.10	9.9	0.12	16.3
28-29	0.06	8.3	0.04	14.6	0.00	8.3	0.00	14.6
29-30	0.07	7.3	0.00	6.4	0.00	7.3	0.00	6.4
30-31	0.00	6.3	0.00	3.0	0.00	6.3	0.00	3.0
31-32	0.00	3.4	0.00	2.3	0.34	2.9	0.00	2.3
32-33	0.00	2.0	0.00	1.2	0.00	2.0	1.00	0.3
33-34	0.00	1.3	0.00	0.0	0.00	1.3	0.00	0.0
34-35	0.00	0.3	0.00	0.0	0.00	0.3	0.00	0.0
35-36	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
36-37	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 20.728	T = 17.130	30 day mortality: 15%
Ro = 0.695	Ro = 0.603	(12 out of 82)
lambda=0.98	lambda=0.97	
r = -0.018	r = -0.030	

79 birth events to known age parents tabulated for Mx...plus...
5 births to UNK or MULT dams...
5 births to UNK or MULT sires...

49 death events of known age tabulated for Qx...

WARNING: Values with small sample sizes (N) warrant less confidence...

Compiled by: Robert W. Reece thru Captive Breeding Specialist Group
White Rhino Species Survival Plan

SPARKS v1.11
22 Apr 1992

FOUNDER ANALYSIS - *CERATOTHERIUM SIMUM SIMUM* - NORTH AMERICA
22/04/1992

Founder representation in each living animal:
Founders listed across top, descendants down side.
Founder calculations omit UNKNOWNs.

Founders:

31	29	30	52	25	26	34
44	39	40	47	51	143	147
150	151	152	153	154	155	156
157	159	277	43	80	81	50
180	181	359	336	337	358	618
619	620	82	83	562	146	148
177	187	188	189	190	191	379
380	381	420	429	452	453	565
566	696	697	182	363	364	365
366	390	473	475	750	752	753
754	386	413	463	464	573	574
587	757	758	192	312	416	417
418	469	470	471	392	387	397
465	466	467	579	686	687	707
391						

Founder contributions:

0.0000	0.0000	0.0000	7.2500	0.0000	0.0000	1.0000
0.0000	0.0000	1.0000	0.0000	0.5000	0.5000	0.5000
1.0000	0.5000	0.5000	1.5000	1.0000	1.0000	1.0000
1.7500	0.5000	0.5000	0.0000	0.0000	0.0000	0.5000
1.0000	0.5000	0.0000	0.0000	0.0000	0.0000	1.5000
0.0000	1.0000	0.0000	0.0000	0.5000	0.0000	0.5000
0.0000	0.5000	0.0000	0.5000	0.0000	0.0000	0.5000
0.0000	0.0000	1.0000	0.5000	1.0000	1.0000	0.0000
0.5000	0.0000	0.0000	0.5000	0.0000	0.0000	0.0000
0.0000	1.2500	0.0000	0.0000	0.0000	0.5000	0.0000
0.5000	0.0000	0.0000	0.0000	0.0000	0.5000	0.5000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.2500						

Fractional contributions:

0.0000	0.0000	0.0000	0.1813	0.0000	0.0000	0.0250
0.0000	0.0000	0.0250	0.0000	0.0125	0.0125	0.0125
0.0250	0.0125	0.0125	0.0375	0.0250	0.0250	0.0250
0.0438	0.0125	0.0125	0.0000	0.0000	0.0000	0.0125
0.0250	0.0125	0.0000	0.0000	0.0000	0.0000	0.0375
0.0000	0.0250	0.0000	0.0000	0.0125	0.0000	0.0125
0.0000	0.0125	0.0000	0.0125	0.0000	0.0000	0.0125
0.0000	0.0000	0.0750	0.0125	0.0250	0.0250	0.0000
0.0125	0.0000	0.0000	0.0125	0.0000	0.0000	0.0000
0.0000	0.0313	0.0000	0.0000	0.0000	0.0125	0.0000
0.0125	0.0000	0.0000	0.0000	0.0000	0.0125	0.0125
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0250
0.0250	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0313						

Number of living descendants:

0	0	0	16	0	0	2
0	0	2	0	1	1	1
2	1	1	3	2	2	3
4	1	1	6	0	0	1
2	2	0	0	1	0	1
0	1	0	1	0	2	0
0	1	0	1	2	0	0
1	0	5	3	0	1	0
0	3	0	0	0	1	0
1	0	0	0	0	0	1
0	0	0	0	0	0	0
0	0	0	0	0	0	2
2	0	0	0	0	0	0
3						

GENE DROP - *CERATOTHERIUM SIMUM SIMUM* - NORTH AMERICA
22/04/1992

Studbook	Sire	Dam	Status (cap=alive)	Prop. genome unique among living desc.	all living
31 M	WILD	WILD	F		1.0000
29 M	WILD	WILD	F		1.0000
30 F	WILD	WILD	F		1.0000
52 M	WILD	WILD	f		
25 M	WILD	WILD	F		1.0000
26 F	WILD	WILD	F		1.0000
34 M	WILD	WILD	F		0.2430
44 M	WILD	WILD	F		1.0000
39 F	WILD	WILD	F		1.0000
48 M	WILD	WILD	f		
47 F	WILD	WILD	F		1.0000
51 F	WILD	WILD	F		0.5000
143 M	WILD	WILD	F		0.5000
147 F	WILD	WILD	F		0.5000
150 F	WILD	WILD	F		0.2580
151 F	WILD	WILD	f		
152 F	WILD	WILD	f		
153 F	WILD	WILD	F		0.1270
154 F	WILD	WILD	F		0.2485
155 F	WILD	WILD	f		
156 F	WILD	WILD	F		0.5000
157 F	WILD	WILD	F		0.1255
159 F	WILD	WILD	F		0.5000
277 F	WILD	WILD	F		0.5000
43 F	WILD	WILD	F		1.0000
80 M	WILD	WILD	F		1.0000
81 F	WILD	WILD	F		1.0000
50 M	WILD	WILD	F		0.5000
180 M	WILD	WILD	F		0.2360
181 F	WILD	WILD	F		0.5000
359 M	WILD	WILD	F		1.0000
336 M	WILD	WILD	F		1.0000
337 F	WILD	WILD	F		1.0000
358 F	WILD	WILD	F		1.0000
618 M	WILD	WILD	F		0.1270
619 F	WILD	WILD	F		1.0000
620 F	WILD	WILD	F		0.2510
82 M	WILD	WILD	F		1.0000
83 F	WILD	WILD	F		1.0000
562 M	WILD	WILD	f		
146 M	WILD	WILD	F		1.0000
148 F	WILD	WILD	F		0.5000
177 M	WILD	WILD	F		1.0000
187 M	WILD	WILD	F		0.5000
188 F	WILD	WILD	F		1.0000
189 M	WILD	WILD	F		0.5000
190 F	WILD	WILD	F		1.0000
191 M	WILD	WILD	F		1.0000
379 M	WILD	WILD	F		0.5000
380 F	WILD	WILD	F		1.0000
381 F	WILD	WILD	F		1.0000
420 M	WILD	WILD	f		
429 F	WILD	WILD	f		
452 F	WILD	WILD	F		0.2495
453 F	WILD	WILD	F		0.2600
565 F	WILD	WILD	F		1.0000
566 F	WILD	WILD	f		

Studbook		Sire	Dam	Status (cap=alive)	Prop. genome living desc.	unique among all living
696	F	WILD	WILD	F		1.0000
697	M	WILD	WILD	F		1.0000
182	F	WILD	WILD	F		0.5000
363	M	WILD	WILD	F		1.0000
364	M	WILD	WILD	F		1.0000
365	F	WILD	WILD	F		1.0000
366	F	WILD	WILD	F		1.0000
390	M	WILD	WILD	F		0.3485
473	M	WILD	WILD	F		1.0000
475	F	WILD	WILD	F		1.0000
750	F	WILD	WILD	F		1.0000
752	F	WILD	WILD	F		
753	M	WILD	WILD	F		1.0000
754	M	WILD	WILD	F		0.5000
386	M	WILD	WILD	F		1.0000
413	M	WILD	WILD	F		1.0000
463	M	WILD	WILD	F		1.0000
464	F	WILD	WILD	F		1.0000
573	M	WILD	WILD	F		0.5000
574	F	WILD	WILD	F		0.5000
587	F	WILD	WILD	F		1.0000
757	F	WILD	WILD	F		1.0000
758	M	WILD	WILD	F		1.0000
192	F	WILD	WILD	F		1.0000
318	F	WILD	WILD	F		1.0000
416	F	WILD	WILD	F		1.0000
417	F	WILD	WILD	F		1.0000
418	F	WILD	WILD	F		1.0000
469	M	WILD	WILD	F		1.0000
470	F	WILD	WILD	F		1.0000
471	F	WILD	WILD	F		1.0000
392	F	WILD	WILD	F		1.0000
387	F	WILD	WILD	F		1.0000
397	F	WILD	WILD	F		0.2625
465	M	WILD	WILD	F		0.2395
466	F	WILD	WILD	F		1.0000
467	F	WILD	WILD	F		1.0000
579	F	WILD	WILD	F		1.0000
686	F	WILD	WILD	F		1.0000
687	M	WILD	WILD	F		1.0000
202	M	180	181	A	0.7640	0.0000
203	M	52	151	A	0.5005	0.5005
213	M	52	152	A	0.5005	0.5005
707	M	WILD	WILD	F		1.0000
218	F	52	157	A	0.0695	0.0000
238	F	52	150	A	0.2420	0.0000
219	F	52	153	A	0.1120	0.0000
220	M	52	154	A	0.2515	0.0000
391	F	WILD	WILD	F		0.2490
280	M	52	148	A	0.5000	0.0000
482	F	UNK	UNK	U		1.0000
481	M	UNK	UNK	U		1.0000
335	M	52	154	A	0.2515	0.0000
575	F	573	574	A	1.0000	0.0000
599	F	52	156	A	0.1280	0.0000
533	F	390	391	A	0.2500	0.0000
612	F	562	566	A	1.0000	1.0000
755	M	754	752	A	1.0000	0.5000
542	F	52	157	A	0.1210	0.0005
693	F	UNK	UNK	U		1.0000
691	F	420	429	A	0.5190	0.5190

studbook		Sire	Dam	Status (cap=alive)	Prop. genome unique among living desc.	Prop. genome unique among all living
772	F	618	453	A	0.3625	0.0000
788	F	52	157	A	0.1175	0.0000
790	M	618	452	A	0.3915	0.0000
791	F	618	620	A	0.3585	0.0000
819	F	52	155	A	0.2375	0.2375
822	F	52	151	A	0.2420	0.0000
841	M	420	599	A	0.0170	0.0170
842	F	40	397	A	0.4800	0.2425
861	M	420	155	A	0.2470	0.2470
876	M	50	51	A	1.0000	0.0000
947	F	420	599	A	0.0120	0.0120
898	M	34	153	A	0.3895	0.0000
925	F	420	277	A	0.5115	0.0115
926	M	420	147	A	0.5150	0.0150
968	M	180	182	A	0.7640	0.0000
959	M	143	318	A	0.5000	0.0000
T002	F	465	453	A	0.5005	0.0000
963	M	34	153	A	0.3855	0.0000
T003	M	189	620	A	0.7490	0.0000
T004	F	465	452	A	0.5110	0.0000
T005	M	393	391	A	0.5025	0.0000
T006	M	43	397	A	0.4800	0.2425
T008	F	379	533	A	0.5000	0.0000
T010	M	167	159	A	1.0000	0.0000

102 Founders 40 Living descendants 142 In total pedigree

FOUNDER ALLELE REPRESENTATION

Founder	Retention	%Representation with unk	%Representation w/o	Target with unk	Target w/o	Difference with unk	Difference w/o
31 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
29 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
30 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
52 M	1.000	18.150	18.150	1.016	1.048	-17.134	-17.102
25 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
26 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
34 ML	0.757	2.500	2.500	1.016	1.048	-1.484	-1.452
44 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
39 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
40 M	0.743	2.500	2.500	0.754	0.778	-1.746	-1.722
47 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
51 FL	0.500	1.250	1.250	1.016	1.048	-0.234	-0.202
143 ML	0.500	1.250	1.250	1.016	1.048	-0.234	-0.202
147 FL	0.500	1.250	1.250	1.016	1.048	-0.234	0.202
150 FL	0.742	2.500	2.500	1.016	1.048	-1.484	-1.452
151 F	0.500	1.250	1.250	0.508	0.524	-0.742	-0.726
152 F	0.500	1.250	1.250	0.508	0.524	-0.742	-0.726
153 FL	0.873	3.750	3.750	1.016	1.048	-2.734	-2.702
154 FL	0.751	2.500	2.500	1.016	1.048	-1.484	-1.452
155 F	0.738	2.500	2.500	0.749	0.773	-1.751	-1.727
156 FL	0.500	2.506	2.506	1.016	1.048	-1.491	-1.459
157 FL	0.875	4.344	4.344	1.016	1.048	3.329	-3.296
159 FL	0.500	1.250	1.250	1.016	1.048	-0.234	-0.202
277 FL	0.500	1.250	1.250	1.016	1.048	-0.234	-0.202
43 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
80 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
81 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
50 ML	0.500	1.250	1.250	1.016	1.048	0.234	-0.202
180 ML	0.764	2.500	2.500	1.016	1.048	-1.484	-1.452
181 FL	0.500	1.250	1.250	1.016	1.048	-0.234	0.202
359 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
336 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
337 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
358 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
618 ML	0.873	3.750	3.750	1.016	1.048	-2.734	-2.702
619 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
620 FL	0.749	2.500	2.500	1.016	1.048	-1.484	-1.452
82 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
83 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
562 M	0.500	1.250	1.250	0.508	0.524	-0.742	-0.726
146 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
148 FL	0.500	1.250	1.250	1.016	1.048	-0.234	-0.202
177 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
187 ML	0.500	1.250	1.250	1.016	1.048	0.234	0.202
188 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
189 ML	0.500	1.250	1.250	1.016	1.048	-0.234	-0.202
190 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
191 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
379 ML	0.500	1.250	1.250	1.016	1.048	-0.234	-0.202
380 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
381 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
420 M	0.983	7.501	7.500	0.998	1.030	6.502	-6.470
429 F	0.500	1.250	1.250	0.508	0.524	0.742	-0.726
452 FL	0.750	2.501	2.500	1.016	1.048	-1.484	-1.452
453 FL	0.740	2.500	2.500	1.016	1.048	-1.484	-1.452
565 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
566 F	0.500	1.250	1.250	0.508	0.524	-0.742	-0.726
696 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048

Founder	Retention	%Representation		Target		Difference	
		with unk	w/o	with unk	w/o	with unk	w/o
697 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
182 FL	0.500	1.250	1.250	1.016	1.048	-0.234	-0.202
363 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
364 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
365 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
366 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
390 ML	0.751	3.116	3.116	1.016	1.048	-2.101	-2.069
475 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
475 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
750 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
752 F	0.500	1.250	1.250	0.508	0.524	-0.742	-0.726
755 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
754 ML	0.500	1.250	1.250	1.016	1.048	-0.234	-0.202
386 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
413 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
463 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
464 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
573 ML	0.500	1.250	1.250	1.016	1.048	-0.234	-0.202
574 FL	0.500	1.250	1.250	1.016	1.048	-0.234	-0.202
587 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
757 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
758 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
192 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
318 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
416 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
417 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
418 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
469 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
470 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
471 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
392 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
307 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
397 FL	0.738	2.500	2.500	1.016	1.048	-1.484	-1.452
465 ML	0.760	2.500	2.500	1.016	1.048	-1.484	-1.452
466 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
467 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
579 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
686 FL	0.000	0.000	0.000	1.016	1.048	1.016	1.048
687 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
707 ML	0.000	0.000	0.000	1.016	1.048	1.016	1.048
191 FL	0.751	3.134	3.134	1.016	1.048	-2.118	-2.086
482 FLU	0.000	0.000	0.000	1.016	0.000	1.016	0.000
481 MLU	0.000	0.000	0.000	1.016	0.000	1.016	0.000
693 FLU	0.000	0.000	0.000	1.016	0.000	1.016	0.000

GENETIC SUMMARY

	LIVING DESCENDANT POPULATION		POTENTIAL	
	with unknowns	w/o	w/ unkn	w/o
Number of founders:	40	40	102	99
Mean retention:	0.633	0.633	0.965	0.964
Founder genomes surviving:	25.338	25.330	98.462	95.463
Founder Equivalents:	17.856	17.856	100.402	97.403
Founder Genome Equivalents:	14.220	14.220	98.463	95.463
Fraction of wild gene diversity retained:	0.965	0.965	0.995	0.995
Fraction of wild gene diversity lost:	0.035	0.035	0.005	0.005
Mean inbreeding coefficient:	0.000			

CERATOTHERIUM SIMUM SIMUM - NORTH AMERICA - 22/04/1992

ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	MALES	MK	Known	FEMALES	MK	Known
1	31	0.0000	1.0000	30	0.0000	1.0000
2	29	0.0000	1.0000	26	0.0000	1.0000
3	25	0.0000	1.0000	39	0.0000	1.0000
4	44	0.0000	1.0000	47	0.0000	1.0000
5	80	0.0000	1.0000	43	0.0000	1.0000
6	359	0.0000	1.0000	81	0.0000	1.0000
7	336	0.0000	1.0000	337	0.0000	1.0000
8	82	0.0000	1.0000	358	0.0000	1.0000
9	146	0.0000	1.0000	619	0.0000	1.0000
10	177	0.0000	1.0000	83	0.0000	1.0000
11	191	0.0000	1.0000	186	0.0000	1.0000
12	697	0.0000	1.0000	190	0.0000	1.0000
13	363	0.0000	1.0000	390	0.0000	1.0000
14	364	0.0000	1.0000	381	0.0000	1.0000
15	473	0.0000	1.0000	565	0.0000	1.0000
16	753	0.0000	1.0000	696	0.0000	1.0000
17	366	0.0000	1.0000	365	0.0000	1.0000
18	413	0.0000	1.0000	366	0.0000	1.0000
19	463	0.0000	1.0000	475	0.0000	1.0000
20	758	0.0000	1.0000	750	0.0000	1.0000
21	459	0.0000	1.0000	464	0.0000	1.0000
22	687	0.0000	1.0000	587	0.0000	1.0000
23	707	0.0000	1.0000	757	0.0000	1.0000
24	143	0.0063	1.0000	192	0.0000	1.0000
25	50	0.0063	1.0000	318	0.0000	1.0000
26	187	0.0063	1.0000	416	0.0000	1.0000
27	189	0.0063	1.0000	417	0.0000	1.0000
28	379	0.0063	1.0000	418	0.0000	1.0000
29	754	0.0063	1.0000	470	0.0000	1.0000
30	573	0.0063	1.0000	471	0.0000	1.0000
31	34	0.0125	1.0000	392	0.0000	1.0000
32	180	0.0125	1.0000	387	0.0000	1.0000
33	465	0.0125	1.0000	466	0.0000	1.0000
34	755	0.0125	1.0000	467	0.0000	1.0000
35	876	0.0125	1.0000	679	0.0000	1.0000
36	T010	0.0125	1.0000	686	0.0000	1.0000
37	390	0.0156	1.0000	51	0.0063	1.0000
38	202	0.0156	1.0000	147	0.0063	1.0000
39	968	0.0156	1.0000	159	0.0063	1.0000
40	T009	0.0156	1.0000	277	0.0063	1.0000
41	618	0.0188	1.0000	181	0.0063	1.0000
42	T006	0.0188	1.0000	148	0.0063	1.0000
43	790	0.0219	1.0000	182	0.0063	1.0000
44	898	0.0219	1.0000	574	0.0063	1.0000
45	963	0.0219	1.0000	150	0.0125	1.0000
46	T005	0.0219	1.0000	154	0.0125	1.0000
47	926	0.0281	1.0000	156	0.0125	1.0000
48	861	0.0313	1.0000	620	0.0125	1.0000
49	950	0.0422	1.0000	452	0.0125	1.0000
50	203	0.0547	1.0000	453	0.0125	1.0000
51	213	0.0547	1.0000	397	0.0125	1.0000
52	280	0.0547	1.0000	575	0.0125	1.0000
53	941	0.0570	1.0000	612	0.0125	1.0000
54	220	0.0578	1.0000	391	0.0156	1.0000
55	335	0.0578	1.0000	153	0.0188	1.0000
56	481		0.0000	842	0.0188	1.0000
57				T002	0.0188	1.0000

Rank	MALES	MK	Known	FEMALES	MK	Known
58				T004	0.0188	1.0000
59				157	0.0219	1.0000
60				772	0.0219	1.0000
61				791	0.0219	1.0000
62				T008	0.0219	1.0000
63				533	0.0250	1.0000
64				591	0.0281	1.0000
65				925	0.0291	1.0000
66				947	0.0573	1.0000
67				239	0.0578	1.0000
68				819	0.0578	1.0000
69				822	0.0578	1.0000
70				219	0.0609	1.0000
71				542	0.0625	1.0000
72				788	0.0625	1.0000
73				599	0.0641	1.0000
74				218	0.0656	1.0000
75				482		0.0000
76				693		0.0000

GENETIC SUMMARY OF POPULATION

Descendant population mean kinship:	0.0351
Gene diversity:	0.9649
Founder Genome Equivalents:	14.2539

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

SECTION 10

NORTHERN WHITE RHINO

NORTHERN WHITE RHINO Studbook
(Ceratotherium simum simum)

Restricted to:
Status: Living by 29 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Breeder #
348	M	1 Jan 1972	WILD	WILD	SUDAN	1 Apr 1975	UNK	Wild Born	SUDAN	KHM 04
					SD-WAP	12 Aug 1990	UNK		U.S.A.	
351	F	1 Jan 1970	WILD	WILD	SUDAN	1 Mar 1971	UNK	Wild Born	SUDAN	FRC 01
					PRESCOT	1 Jun 1971	UNK		OFF ISIS	
					DVURKRALV	27 Aug 1977	UNK		CZECHOSLO	
372	M	1 Jan 1974	WILD	WILD	SUDAN	19 Jun 1975	UNK	Wild Born	SUDAN	DVU 12
					DVURKRALV	19 Sep 1975	UNK		CZECHOSLO	
373	M	1 Jan 1974	WILD	WILD	SUDAN	19 Jun 1975	UNK	Wild Born	SUDAN	DVU 13
					DVURKRALV	19 Sep 1975	UNK		CZECHOSLO	
					SD-WAP	14 Oct 1989	UNK		U.S.A.	
374	F	1 Jan 1974	WILD	WILD	SUDAN	19 Jun 1975	UNK	Wild Born	SUDAN	DVU 14
					DVURKRALV	19 Sep 1975	UNK		CZECHOSLO	
					SD-WAP	14 Oct 1989	UNK		U.S.A.	
376	F	1 Jan 1974	WILD	WILD	SUDAN	19 Jun 1975	UNK	Wild Born	SUDAN	DVU 16
					DVURKRALV	19 Sep 1975	UNK		CZECHOSLO	
					SD-WAP	14 Dec 1989	UNK		U.S.A.	
377	F	1 Jan 1974	WILD	WILD	SUDAN	19 Jun 1975	UNK	Wild Born	SUDAN	DVU 17
					DVURKRALV	19 Sep 1975	UNK		CZECHOSLO	
630	M	8 Jun 1980	373	351	DVURKRALV	8 Jun 1980	UNK	Captive Born	CZECHOSLO	DVU 22
789	F	15 Nov 1983	372	351	DVURKRALV	15 Nov 1983	UNK	Captive Born	CZECHOSLO	DVU 23
943	F	11 Jul 1989	372	351	DVURKRALV	11 Jul 1989	UNK	Captive Born	CZECHOSLO	DVU 24

TOTALS: 4.6.0 (10)

Compiled by: T.J. Foose thru Captive Breeding Specialist Group
Data current thru: 29 Apr 1992

SPARKS v1.11
29 Apr 1992

BREITMAULNASHORN-ZUCHTBUCH

PER 31.12.1990

PEDIGREE OF WHITE RHINOCEROSES

PER 31.12.1990

ACCOUNT OF WHITE RHINOCEROS per 31.12.1990
[Legend: STATUS explains the type of transfer]
[B = Born, P = Purchase, L = Loan ...]

NAME	STB-CODE	BREEDER	SEX	BIRTHDATE	DEATHDATE	SIRE	DAM	PEDIGR	GENERATION		STATUS	LOCATION	REMARK
mixed breed	0479	[illegible]	F	11.01.1977		[illegible]	0051		0	1	B	11.11.1977	[illegible]
extinct	0014	ANT 01	M	07.06.1958	13.06.1968	0010	0013		0	0	P	07.06.1958	[illegible]
	0016	ANT 02	F	07.06.1958	09.08.1985	0010	0015		0	0	P	07.06.1958	[illegible]
	0019	LON 01	M	23.03.1959	23.08.1990	0010	0013		0	0	P	31.01.1960	LONDON
											P	23.08.1990	[illegible]
	0020	MAS 01	M	04.09.1960	03.05.1975	0010	0018		0	0	P	04.09.1960	MASCHEN
											L	15.06.1970	SAN DIEGO ZOO
	0025	SAN 02	F	04.09.1964	15.05.1979	0010	0020		0	0	P	04.09.1964	[illegible]
											L	16.04.1970	SAN DIEGO ZOO
	0034	CHP 01	M	01.04.1964	01.01.1985	0010	0060		0	0	P	01.01.1964	CHAPLIN
											P	01.01.1964	[illegible]
	0035	SAN 02	F	04.04.1964	11.03.1985	0010	0020		0	0	P	04.04.1964	[illegible]
											P	04.01.1968	[illegible]
	0036	TPL 02	F	28.07.1957		0010	0013		0	0	P	28.07.1957	[illegible]
											P	30.04.1972	SAN DIEGO ZOO
											P	31.01.1980	SAN DIEGO ZOO
											P	28.12.1981	SAN DIEGO ZOO
	0037	BTL 01	F	28.07.1957	15.04.1979	0010	0013		0	0	P	28.07.1957	[illegible]
											P	07.08.1973	SAN DIEGO ZOO
	0043	WAA 01	F	01.01.1972	18.09.1979	0010	0020		0	0	P	01.01.1972	WAARSEN
											P	01.01.1972	[illegible]
	0047	DVR 01	M	01.04.1970	16.01.1971	0010	0020		0	0	P	01.04.1970	DVORAK
	0048	DVR 02	F	31.05.1970		0010	0020		0	0	P	01.04.1970	DVORAK
											L	12.04.1990	SAN DIEGO ZOO
	0051	PRC 01	F	01.04.1971		0010	0013		0	0	P	04.04.1971	PRETORIA
											P	21.08.1972	[illegible]
	0070	DVJ 12	M	08.05.1975		0010	0013		0	0	P	19.05.1975	[illegible]
	0071	DVJ 13	M	19.05.1975		0010	0013		0	0	P	19.05.1975	[illegible]
	0074	DVJ 16	F	29.09.1975		0010	0013		0	0	P	19.05.1975	[illegible]
	0075	DVJ 17	F	19.09.1975	24.01.1990	0010	0013		0	0	P	29.09.1975	[illegible]
	0076	DVJ 18	F	19.09.1975		0010	0020		0	0	P	29.09.1975	[illegible]
	0077	DVJ 19	F	19.09.1975		0010	0020		0	0	P	29.09.1975	[illegible]
	0082	DVR 03	M	08.06.1982		0053	0051		0	1	B	08.06.1982	[illegible]
	0084	DVR 04	F	18.11.1984		0053	0051		0	1	B	18.11.1984	[illegible]
	0085	DVR 05	F	17.07.1984		0053	0051		0	1	B	17.07.1984	[illegible]
[illegible]	0051	PRC 02	F	01.01.1974		0010	0013		0	0	P	01.01.1974	[illegible]
											P	30.05.1978	[illegible]
	0055	DES 01	F	08.10.1973		0010	0013		0	0	P	03.12.1973	[illegible]
	0001	MB 01	M	10.04.1961		0000	0000		0	0	P	26.04.1961	[illegible]
	0002	MB 02	F	26.04.1961		0000	0000		0	0	P	26.04.1961	[illegible]
											L	04.10.1962	[illegible]
											P	31.05.1964	[illegible]
	0004	TJ 01	F	31.05.1964		0010	0013		0	0	P	01.01.1964	[illegible]
											P	26.09.1964	[illegible]

AROUND THE HORN

The Rhino Conservation Newsletter

APRIL 1992

DVUR KRALOVE UPDATE

A 26-year-old female northern white rhino (Nasima) at Dvur Kralove Zoo has in all probability been lost for future breeding efforts. Last summer she suffered a prolapsed vagina in her tenth month of pregnancy and aborted a well-developed female fetus. Although she responded well to treatment, there is a high risk of a recurrence of the condition with a future pregnancy.

Two younger females at Dvur Kralove have started to come into estrus. One of them, a 9-year-old born at Dvur Kralove, has been mated and is believed to be pregnant. Zoo officials are hopeful that breeding of northern whites will continue at Dvur Kralove despite the unfortunate loss of Nasima as a potential breeder.

DEC . 1991

PROJET PARC NATIONAL DE LA GARAMBA, ZAIRE
GARAMBA NATIONAL PARK PROJECT, ZAIRE

c/o AIM/MAF (via Aba)
P.O. Box 21285
Nairobi
Kenya

2.12.91

Dr Thomas J.Foose
C.B.S.G.
12101 Johnny Cake rd
Apple Valley
MN 55124

Dear Tom,

I am enclosing a couple of the Garamba brochures in English as promised.

Fraser has just returned from Garamba. It seems that the President Delegue General of IZCN (Institut Zairois pour la Conservation de la Nature) has said that he does not at this stage want any outside support towards salaries. He needs to prove that IZCN can continue to manage, and feels it could be construed as a political move at the moment. He has managed to secure a rise in salary for the parks staff up to 1.5 million basic, the same as the military. This is a great boost to morale, though at the time Fraser had to leave the park the salaries had not actually succeeded in arriving.

It is a moot point how long such salaries can continue to be paid by Zaire and we forsee the project having to partially or fully support the guards, possibly in kind, in the future. We really appreciate the offer of some help from the zoo communities and will let you know if there are some specific requirements. We should also be very interested in pursuing the "adopt a park" idea anyway.

The rhino workshop was a very interesting and useful exercise. Many thanks to you all.

Kind regards and best wishes for Christmas;

Sincerely,

Kes Smith, PhD

Parc National de la Garamba

NORTHERN WHITE RHINOCEROS (Ceratotherium simum cottoni)

POPULATION STRUCTURE AND DYNAMICS, MARCH 1991 updated Nov. 91.

ADULT MALES		STATUS
M2	'Eleti'	dominant, territory changed in 09.88.
M3	'Kondo akatani'	prior to 09.88 classed as old sub-adult, took over territory of M2
M4	'Bac'	probably dominant.
M5	'Bawesi'	dominant
M6	'Longuecorne'	dominant
M7	'Koitior'	young male
M9	'Notch'	dominant
ADULT FEMALES		
F1	'Mama Moke'	with JF
F3	'Kunalina'	with JM
F4	'Boletina'	with JF and SF
F5	'Mama Giningamba'	with JM
F6	'Pacque'	with JM and SF
3aF	'Kuni'	born c.9-10/83, with IM
SUB-ADULTS		
1aM	'Moke'	S2, male, born mid 1983
4aM	'Bolete moke'	S2, male, born c. 08-09.1983
5aM	'Giningamba'	S1, male, born 02.85
4bF	'Mai'	S1, female, born 05.85
3bF	'Juillet'	S1, female, born 07.85.
6aF	'Oeuf de Pacque'	S1, female, born 03.86
4cF	'Noel'	S1, female, born 10-11.87
5bF	'Grizmok'	S1, female, born 10.87
JUVENILES		
6bM	'Elikya'	J3, male, born 06.88
1bM	'Mpiko'	J3, male, born 03-04.89
4dF	'Minzoto'	J2, female, born 08-09.89
5cM	'Molende'	J2, male, born 08.89
3cM	'Solo'	J1, male, born 12.89,
3aaM	'Bonne Annee'	I2, male, born 12.90
1cF	'Nawango'	I1, female, born 02.91
6d ?	'Tengatu'	I', ? born 05/06.91
5d		I', ? " 07.91 (M3 father?)

TOTAL KNOWN INDIVIDUALS	
Male adults (MA)	7
Female adults (FA)	6
Males sub-adults (SM)	3
Female sub-adults(SF)	5
Male juveniles (JM)	4
Female juveniles (JF)	1
Male infant (IM)	1
Female infant (IF)	1
Unsexed infants	2+1?
TOTAL	28 (30 or 31)
SEX RATIO	15M : 13F
ADULT:SUBAD.& JUV.RATIO	1 : 1.2

5d I, born 09.91.

Immense concentrations of large mammals

With its five thousand elephants and thirty thousand buffalos, Garamba must be the envy of most of the well-known national parks. At certain times of year you can witness the spectacle of herds of several hundred elephants, while the sight of a huge group of buffalos, galloping beneath a cloud of cattle egrets, is truly unforgettable.

Garamba National Park is the only place where the Northern giraffe (sub-species *angolensis*) can be seen and is home to Lelwel's hartebeest, Uganda kob, Defassa waterbuck, reedbuck, bushbuck, roan antelope and warthog. Hippos can be observed at close range wallowing in rivers and pools. Of the large carnivores, lions, hyenas and leopards are regularly sighted.

Practical details

Climate: dry season from mid-December to mid-March, wet season from mid-March to mid-December. Average annual rainfall of 1,300 mm. Mean maximum temperatures between 29 and 37° C, mean minima between 13 and 19° C.

Accommodation and food: Guest houses at Nagero and Gangala-na-Bodio offer all basic comforts. Camping is allowed. Visitors arriving without prior arrangement are asked to bring their own food. Cooking facilities are available.

How to get there ? By road: via Goma, Kisangani, or from Uganda or the Central African Republic. By air: from Goma, Isiro or Nairobi (charter flights). The relative isolation of Garamba is the key to its attraction. A visit to Garamba can easily be included in a circuit of Eastern Zaire.

For further information on the park and current prices, contact: Institut Zaïrois pour la Conservation de la Nature, B.P. 868, Kinshasa, Zaïre, tel. (243.12)31401, 31252, 302352, or WWF Representative, c/o Tabazaire B.P. 42, Kinshasa, Zaire. Telephone and Fax: 243 12 27547.

Garamba National Park, Zaire

ON THE TRACK OF AN ELEPHANT, DISCOVER ONE OF THE LAST SANCTUARIES OF WILD AFRICA.

The African elephant (*Loxodonta africana*), unlike its Asian cousin, has the reputation of being indomitable. Nevertheless, at the beginning of this century, the story of their domestication began in the very heart of Africa. The idea, first put forward by the Belgian king, Leopold II, was developed in Zaire and it was very successful until the advent of the motor car. For nearly fifty years, several hundred elephants were trained to pull ploughs and waggons, to carry loads and to use their trunks for work in the tropical forest.

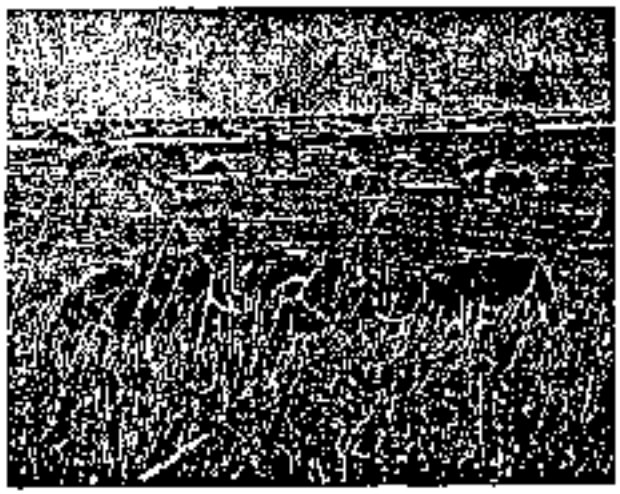
Today the elephants have found a new role in tourism. Perched on the back of an elephant you can contemplate a multitude of wild animals and approach without disturbing them. A real safari adventure !

Experienced guides must be present at all times.

Institut Zaïrois
pour la Conservation de la Nature

Savour the peace of a vast unspoilt wilderness

By car, on foot, or on elephant back, Garamba National Park offers the visitor a grand spectacle of savanna grassland stretching as far as the eye can see, cut by numerous sandy river courses and punctuated by rocky hills. Far from hectic towns and over-used reserves the visitor can appreciate the perfect calm offered by Garamba. Here one experiences the true mystery and solitude of wild Africa.



A paradise for camping and walking

For visitors seeking the joys of camping in the bush, Garamba offers its bountiful natural resources: numerous rivers full of fish (sport fishing is allowed), pure perennial springs, cool and shady places, superb panoramas

In the company of experienced guides you can take walks in the park with the thrill of intimate contact with nature, learn to read the tracks of animals, and observe the wide variety of birds, like the Abyssinian ground hornbill, the secretary bird, Denham's bustard, or the colourful colonies of carmine bee-eaters.

Northern white rhinos: the last refuge

When a count in 1983 revealed that no more than 15 northern white rhinos (*Ceratotherium simum cottoni*) remained in Garamba and that poaching threatened them with complete extinction, the major conservation organisations mobilised themselves to remedy this dramatic situation. Since 1984, the World Wide Fund for Nature (WWF), the Frankfurt Zoological Society (FZS), UNESCO and the World Conservation Union (IUCN) have been working in collaboration with the Zaire Institute for the Conservation of Nature (IZCN), to ensure the protection of this population and the park in which it lives. By 1991 the rhinos had increased to 27 individuals.

These conservation measures are all the more important because Garamba shelters the last wild, viable nucleus of this sub-species of rhino, one of the rarest animals on the planet.

Today, thanks to several years of successful efforts, you can once again contemplate these splendid creatures in their natural environment and experience the excitement of approaching within a few metres of them.

Published by:

WWF - Belgium

Photos: M. et C. Denis-Huot (1,2),
J. Kalpers (3,6),
J. Kalpers/Wildlife Pictures (5),
K. Tillman-Smith (4)

Printed in Belgium

THE USE OF RADIO TELEMETRY TO ASSIST WITH THE IN SITU CONSERVATION OF NORTHERN WHITE RHINO (Ceratotherium simum cottoni) IN ZAIRE

PROJECT LEADER:

FRASER AND KES SMITH, PARC NATIONAL DE LA GARAMBA, c/o AIM/MAF (via ABA, ZAIRE), BOX 21285, NAIROBI, KENYA.

OBJECTIVES:

To use radio telemetry to monitor 4 northern white rhino over a 2 year period. The aim of this monitoring is to facilitate anti-poaching activities and obtain information on the movements and interactions of the rhino.

BACKGROUND AND JUSTIFICATION:

The two sub-species of the white rhino are quite distinct and been separated for about 2 million years. The southern white rhino was brought back from the brink of extinction by conservationists in Natal and is now the most numerous of all the rhino. The northern sub species has not fared so well. In the last century the sub-species was found in Chad, Sudan Uganda, Central African Republic and Zaire and probably numbered in the thousands. In 1961 there were an estimated 1300 white rhino in Garamba National Park in north eastern Zaire. In 1984 there were only 15 left in the park. Two waves of poaching (1963 - 64 & 1978 - 1983) decimated the Garamba population. Since 1984, through the efforts of the government of Zaire and the Garamba Rehabilitation Project, the population has grown to 34. As this population grows it disperses over a larger area and has become difficult to protect. Adding to this is the greater threat of rhino poaching in Garamba due to the political upheavals in Zaire and political instability, civil war and banditry in neighbouring countries. As part of a program to provide adequate protection of these valuable animals it has been decided to use radio telemetry to rapidly locate the rhino and obtain information on their movements and interactions. Collars have been selected because they have a good range, a long life, are easily recovered for re-use, are very quick and easy to attach and remove, are animal friendly, and can serve as a visual deterrent (the collars have an industrial elastic insert which keeps the collars snug on the neck but allows for expansion and contraction - they are presently being used with success on black rhino in Etosha National Park).

4. EQUIPMENT AND FUNDING:

Radio telemetry: 2 x (TR-2 Receiver of Frequency 172.000 - 174.000 MHz + RC-1 Case + RP-2-220 AC Charger + RP-3-12 Charger), 2 x RA-3AK Antenna, 1 x TAC-2-SLB Antenna Control Unit & 6 x MOD-500 transmitters (Frequency: 172.000 - 174.000 MHz, Antenna: TA-

Attention Dave Jessup

SRT/Int, Attachment: CLM, U/H, 1/8\1/8, 1" wide, 75 - 150 cm, HCC 44, REMARKS: CAST-1, OPERATIONAL LIFE: 30 mo @ 1000 mSec.

25% of the telemetry equipment has been donated by Telonics (9.2 East Impala Avenue, Mesa, Arizona 85204, USA). This donation was motivated by Dave Jessup of International Wildlife Veterinary services (IWVS). If the equipment is ready in time it will be brought back from the USA by Mike Kock. If this is not possible it will be shipped to Namibia by Mike Foley of Sales and Imports (Costs to be carried by REF). 75% of radio telemetry equipment costs to be charged by Donations *

Veterinary supplies: To be supplied by IWVS and donations from veterinary supply companies in California. Again organized by Dave Jessup of IWVS. Some drugs and equipment will be supplied by Pete Morkel from Namibia.

Two return air tickets from Windhoek (Namibia) to Nairobi (Kenya) for Pete Morkel and Louis Geldenhuys to be paid for by Rhino and Elephant Foundation (RSA). Other travel costs - accommodation, transport etc - also to be paid for by REF (REF has budgeted R 7 000 for the operation).

No daily rate has been asked by PM and LG because of the shortage of funds and the nature of the operation. If possible it will be greatly appreciated.

As far as I am aware, at this stage no other agency is involved in the funding of the operation although Holly Dublin of WWF Kenya may try and obtain funding for the travel costs.

5. DURATION OF PROJECT:

Initially from 5/92 to 11/94. If project considered a success and funding is available it may be continued after 11/94.

6. ACTIVITIES AND TIMETABLE:

The collars will be attached in mid May. Pete Morkel and Louis Geldenhuys will assist Fraser and Ken Smith with this. Monitoring (ground and air) will be carried out continuously thereafter for the life of the collars

RHINO GLOBAL CAPTIVE ACTION PLAN WORKSHOP

BRIEFING BOOK

LONDON ZOOLOGICAL GARDENS
9-10 MAY 1992

SECTION 11

INDIAN/NEPALI RHINO

INDIAN RHINOCEROS Studbook
(Rhinoceros unicornis)

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
1	M	~ 1961	WILD	WILD	ASSAM P	31 Jan 1961	UNK	Wild Born	INDIA		KASI	
					MYSORE	29 Apr 1965	UNK		INDIA			
						30 Apr 1979 (died)				30 Apr 1979		
2	F	????	WILD	WILD	ASSAM P	24 Jun 1948	UNK	Wild Born	INDIA		KAMALA-RAN	
					CHICAGOBR	24 Jun 1948	UNK		U.S.A.			
						6 May 1968 (died)				6 May 1968		
3	M	????	WILD	WILD	ASSAM P	24 Jun 1948	UNK	Wild Born	INDIA		KASHI-RAM	
					CHICAGORR	24 Jun 1948	UNK		U.S.A.			
						13 Nov 1970 (died)				13 Nov 1970		
4	F	16 May 1948	WILD	2	DEAD IN T	16 May 1948	UNK	Captive Born	INDIA			
					WILD	16 May 1948	UNK		OFF ISLS			
						16 May 1948 (died)				16 May 1948		
5	M	- 1948	WILD	WILD	ASSAM P	30 May 1951	UNK	Wild Born	INDIA		GADADHAR	
					BASEL	25 Nov 1964 (died)			SWITZRLND	25 Nov 1964		
6	M	- 1944	WILD	WILD	ASSAM P	31 Jan 1944	UNK	Wild Born	INDIA		IDMY	
					ROMA	5 Sep 1951	UNK		ITALY			
						28 Feb 1983 (died)				28 Feb 1983		
7	F	- 1947	WILD	WILD	ASSAM P	31 Jan 1947	UNK	Wild Born	INDIA		JOYMOTHI	
					BASEL	8 Jul 1957	UNK		SWITZRLND			
						10 Nov 1983 (died)				10 Nov 1983		
8	F	~ 1950	WILD	WILD	ASSAM P	16 Jul 1952	UNK	Wild Born	INDIA		MOHINI	
					WHIPSNADE	16 Jul 1952	UNK		ENGLAND			
					(AMSTERDAM)	26 Apr 1976	UNK		NETHERLND			
						25 Apr 1985 (died)				25 Apr 1985		
9	F	????	WILD	WILD	ASSAM P	????	UNK	Wild Born	INDIA		KAMAKLOTA PHIL 2	
					PHILADELP	17 Jun 1953	UNK		U.S.A.			
					(SD-WAP 3	7 Dec 1976	UNK		U.S.A.			
						12 May 1977 (died)				12 May 1977		
10	M	1 Jan 1955	WILD	WILD	ASSAM P	14 Sep 1955	UNK	Wild Born	INDIA		KAMAKBALA PHILA 1	
					PHILADELP	14 Sep 1955	UNK		U.S.A.			
11	F	~ 1948	WILD	WILD	ASSAM P	- 1948	UNK	Wild Born	INDIA		RANNI	
					MYSORE	- 1956	UNK		INDIA			
12	M	????	WILD	WILD	ASSAM P	????	UNK	Wild Born	INDIA		RANI	
					TRIVANDRU	25 May 1956	UNK		INDIA			
						16 Feb 1987 (died)				16 Feb 1987		
13	M	- 1943	WILD	WILD	INDIA	31 Jan 1943	UNK	Wild Born	INDIA		MOHAN	
					WHIPSNADE	7 Aug 1947	UNK		ENGLAND			
						7 Mar 1951 (died)				7 Mar 1951		

Compiled by: MICHAEL DEE thru Captive Breeding Specialist Group
Date current thru: 31 Dec 1990 INTERNATIONAL

SPARKS v1.11
20 Apr 1992

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
14	M	14 Sep 1956	5	7	BASEL	14 Sep 1956	UNK	Captive Born	SWITZERLND		RUDRA	
					MILWAUKEE	20 Jul 1959	UNK		U.S.A.			
						6 Feb 1987 (died)				6 Feb 1987		
15	F	29 Oct 1957	13	8	WHIPSNADE	29 Oct 1957	UNK	Captive Born	ENGLAND		MOHINIJA	
					MILWAUKEE	20 Jul 1959	UNK		U.S.A.			
						24 Jun 1975 (died)				24 Jun 1975		
16	F	~ 1956	WILD	WILD	ASSAM P	11 Aug 1957	UNK	Wild Born	INDIA		NEPALI II	
					HAMBURG	11 Aug 1957	UNK		W.GERMANY			
					LOSANGELE	25 May 1968	UNK		U.S.A.			
						22 Jan 1971 (died)				22 Jan 1971		
17	F	17 Aug 1958	5	7	BASEL	17 Aug 1958	UNK	Captive Born	SWITZRLND		MOOLA	
						17 Aug 1958	UNK					
						4 Jan 1973 (died)				4 Jan 1973		
18	M	~ 1958	WILD	WILD	ASSAM P	22 Sep 1959	UNK	Wild Born	INDIA		ARJUN	
					BERLIN W	22 Sep 1959	UNK		W.GERMANY			
					BASEL	8 Jul 1965	UNK		SWITZRLND			
						15 Apr 1983 (died)				15 Apr 1983		
19	M	1 Jan 1959	WILD	WILD	INDIA	26 May 1960	UNK	Wild Born	INDIA		TARUN	MASK 1
					NEW-WASH	26 May 1960	UNK		U.S.A.			
					OKLAHOMA	16 Dec 1983	UNK		U.S.A.			
						25 Sep 1989 (died)				25 Sep 1989		
20	M	18 Aug 1960	13	8	WHIPSNADE	18 Aug 1960	UNK	Captive Born	ENGLAND		RAMIK	
						18 Aug 1960	UNK					
						25 Apr 1975 (died)				25 Apr 1975		
21	F	????	WILD	WILD	INDIA	????	UNK	Wild Born	INDIA		LAUIE/RANI	
					TOKYOUENO	~ 1961	UNK		JAPAN			
					YOKYOTAMA	1 Jan 1989	UNK		JAPAN			
22	M	????	WILD	WILD	INDIA	????	UNK	Wild Born	INDIA		TANAO/LUPS	
					TOKYOUENO	~ 1961	UNK		JAPAN			
					TOKYOTAMA	1 Jan 1989	UNK		JAPAN			
23	F	12 Mar 1961	WILD	21	CALCUTTA	12 Mar 1961	UNK	Captive Born	INDIA		SHEMA	
						12 Mar 1961	UNK					
						14 Aug 1982 (died)				14 Aug 1982		
24	M	????	WILD	WILD	ASSAM P	????	UNK	Wild Born	INDIA		SHIRAJI	
					ASSAM	24 Sep 1960	UNK		INDIA			
						~ 1988 (died)				~ 1988		
25	F	????	WILD	WILD	ASSAM P	????	UNK	Wild Born	INDIA		PADMINI	
					ASSAM	25 Sep 1965	UNK		INDIA			
						~ 1988 (died)				~ 1988		

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
26	M	31 Aug 1962	5	7	BASEL	31 Aug 1962	UNK	Captive Born	SWITZERLND		LASAI	
					SD-WAP	26 Apr 1972	UNK		U.S.A.			
27	M	9 Mar 1963	5	17	BASEL	9 Mar 1963	UNK	Captive Born	SWITZERLND		KHUNLAI	
					PARIS ZOO	29 Sep 1964	UNK		FRANCE			
						26 Feb 1976	(died)			26 Feb 1976		
28	F	10 Apr 1963	WILD	30	ASSAM	10 Apr 1963	UNK	Captive Born	INDIA		RAJKUMARI	
					MZP-WASH	16 Dec 1963	UNK		U.S.A.			
						9 Sep 1980	(died)			9 Sep 1980		
29	F	10 Jul 1963	24	82	ASSAM	10 Jul 1963	UNK	Captive Born	INDIA		JAYPUR	
					SD-WAP	26 Apr 1972	UNK		U.S.A.			
33	F	~ 1958	WILD	WILD	INDIA	29 Oct 1962	UNK	Wild Born	INDIA		DEEPALI	
					ASSAM	29 Oct 1962	UNK		INDIA			
					MZP-WASH	16 Dec 1963	UNK		U.S.A.			
						28 Dec 1963	(died)			28 Dec 1963		
31	F	12 Jun 1964	5	7	BASEL	12 Jun 1964	UNK	Captive Born	SWITZRLND		MIRIS	
					BERLIN W	6 May 1975	UNK		W.GERMANY			
32	M	11 Aug 1964	5	16	HAMBURG	11 Aug 1964	UNK	Captive Born	W.GERMANY		GAUHATI	
					BERLIN W	5 Aug 1965	UNK		W.GERMANY			
35	M	~ 1962	WILD	WILD	ASSAM P	~ 1967	UNK	Wild Born	INDIA		MEHAN/MOHA	
					DELHI	1 Dec 1965	UNK		INDIA			
						6 Jul 1988	(died)			6 Jul 1988		
34	F	25 Aug 1965	5	17	BASEL	25 Aug 1965	UNK	Captive Born	SWITZRLND		NANDA	
					STUTTGART	24 Oct 1973	UNK		W.GERMANY			
35	M	~ 1966	WILD	WILD	ASSAM P	8 Mar 1966	UNK	Wild Born	INDIA		HERMAN	LA 1
					LOSANGELE	8 Mar 1966	UNK		U.S.A.			
36	?	20 Jun 1966	22	21	TOKYOLAND	20 Jun 1966	UNK	Captive Born	JAPAN			
						20 Jun 1966	UNK					
						20 Jun 1966	(died)			20 Jun 1966		
37	F	~ May 1966	WILD	WILD	NEPAL	~ May 1966	UNK	Wild Born	NEPAL		KANCHI	
					BERLIN TP	6 Aug 1966	UNK		E.GERMANY			
						9 Jan 1967	(died)			9 Jan 1967		
38	F	9 Apr 1967	18	16	HAMBURG	9 Apr 1967	UNK	Captive Born	W.GERMANY		SHITA	
						9 Apr 1967	UNK					
39	M	7 Jul 1967	18	7	BASEL	7 Jul 1967	UNK	Captive Born	SWITZRLND		PANDUR	
					HAMBURG	5 Sep 1968	UNK		W.GERMANY			
40	F	~ May 1967	WILD	WILD	NEPAL	~ May 1967	UNK	Wild Born	NEPAL		KUMARI	
					BERLIN TP	1 Aug 1967	UNK		E.GERMANY			

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name	Breeder #
41	M	22 Dec 1967	18	17	BASEL	22 Dec 1967	UNK	Captive Born	SWITZRLND		PURI	
					STUTTGART	3 Jun 1969	UNK		W.GERMANY			
42	M	13 Feb 1968	1	11	MYSORE	13 Feb 1968	UNK	Captive Born	INDIA		MYSORE	
					BERLIN TP	24 Apr 1971	UNK		E.GERMANY			
43	F	- 1962	WILD	WILD	ASSAM P	- 1962	UNK	Wild Born	INDIA		RENGI/RONG	
					DELHI	28 Mar 1968	UNK		INDIA			
						2 Jun 1986	(died)			2 Jun 1986		
44	F	27 Apr 1969	16	7	BASEL	27 Apr 1969	UNK	Captive Born	SWITZRLND		RUEDI	
					HOUSTON	6 Oct 1970	UNK		U.S.A.			
						9 Feb 197'	(died)			9 Feb 1971		
45	F	5 Oct 1969	18	17	BASEL	5 Oct 1969	UNK	Captive Born	SWITZRLND		RANDA	BASEL 10
					LOSANGELE	22 Nov 1974	UNK		U.S.A.			
46	F	- 1969	WILD	WILD	ASSAM P	29 Nov 1969	UNK	Wild Born	INDIA		RHADHA	LA 2
					LOSANGELE	29 Nov 1969	UNK		U.S.A.			
						- 1988	(died)			- 1988		
47	F	- Apr 1967	WILD	WILD	ASSAM P	- Apr 1967	UNK	Wild Born	INDIA			
					LOSANGELE	30 Nov 1969	UNK		U.S.A.			
						23 Jan 1971	(died)			23 Jan 1971		
48	F	~ Jun 1968	WILD	WILD	ASSAM P	- Jun 1968	UNK	Wild Born	INDIA			
					OMAHA	- Jan 1970	UNK		U.S.A.			
						31 Jan 1970	(died)			31 Jan 1970		
49	M	1 Jun 1969	WILD	WILD	NEPAL	25 Apr 1970	UNK	Wild Born	NEPAL		MOHAN	MIAMI 1
					METROZOO	23 Apr 1970	UNK		U.S.A.			
50	F	????	WILD	WILD	NEPAL	12 Jun 1970	UNK	Wild Born	NEPAL		SHANTI	MIAMI 2
					METROZOO	12 Jun 1970	UNK		U.S.A.			
					PHILADELP	10 Apr 1987	UNK		U.S.A.			
					NY BRONX	22 Nov 1988	UNK		U.S.A.			
					METROZOO	29 Mar 1990	UNK		U.S.A.			
51	F	27 Jan 1971	33	43	DELHI	27 Jan 1971	UNK	Captive Born	INDIA		ROOPA	
					WHIPSNADE	6 Feb 1973	UNK		ENGLAND			
52	F	30 Jan 1967	14	15	MILWAUKEE	30 Jan 1967	UNK	Captive Born	U.S.A.			
						30 Jan 1967	UNK					
						30 Jan 1967	(died)			30 Jan 1967		
53	M	16 Apr 1971	1	11	MYSORE	16 Apr 1971	UNK	Captive Born	INDIA		VINJ	
					TORONTO	12 Jun 1976	UNK		CANADA			
					NY BRONX	30 May 1990	UNK		U.S.A.			
54	F	16 Jul 1971	18	34	STUTTGART	16 Jul 1971	UNK	Captive Born	W.GERMANY			
						16 Jul 1971	UNK					
						16 Jul 1971	(died)			16 Jul 1971		