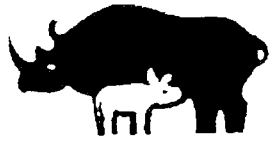
AZA SSP
RHINOCEROS MASTERPLAN

1998



Regional Captive
Propagation Programs

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AZA Rhino Advisory Group

1998 AZA SSP RHINO MASTERPLAN
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Studbook of Living Individuals by Institution, Births, Deaths, Transfers & Population Analyses

- Eastern Black Rhino (GREEN paper)
- Southern Black Rhino (LAVENDER paper)
- Southern White Rhino (YELLOW paper)
- Northern White Rhino (PINK paper)
- Indian Rhino (TAN paper)
- Sumatran Rhino (SALMON paper)

AZA SSP RHINOCEROS MASTERPLAN

BACKGROUND AND OVERVIEW

The conservation crisis for most rhino species in the wild continues worldwide but there is some remission:

(1) The **Southern White Rhino** population continues to explode although over 95% of this taxon still occurs in one political unit, the Republic of South Africa.

However, the situation in the wild for the **Northern White Rhino** population in Garamba National Park has deteriorated drastically as a result of the civil war and subsequent instability in the Democratic Republic of Congo (formerly Zaire) and there is a very imminent danger that this taxon will become extinct in the wild.

(2) There has been some stabilization and recovery for the **Black Rhino** over the last 2 years.

(3) **Indian Rhino** in both India and Nepal are still increasing slightly, but the population is concentrated in two areas that are in unstable regions.

(4) The rhino protection unit (RPU) program for **Sumatran Rhino** seems to be having some positive effect although poaching pressure is still high and rhino are still being lost.

(5) Rhino protection units and other conservation measures are being implemented for **Javan Rhino** in both Indonesia and Vietnam.

Figures 1 (Black Rhino), 2 (White Rhino), and 3 (Asian Rhinos) present the historical and recent distribution and numbers of rhino taxa.

Table 1 presents the latest data on numbers and distribution in the wild and in captivity for each taxa (species and subspecies) of rhino recognized as distinct.

SSP PROGRAMS & POPULATIONS

Captive programs for rhino remain a vital part of the conservation strategy for all rhino taxa but performance of the populations in captivity is still problematic.

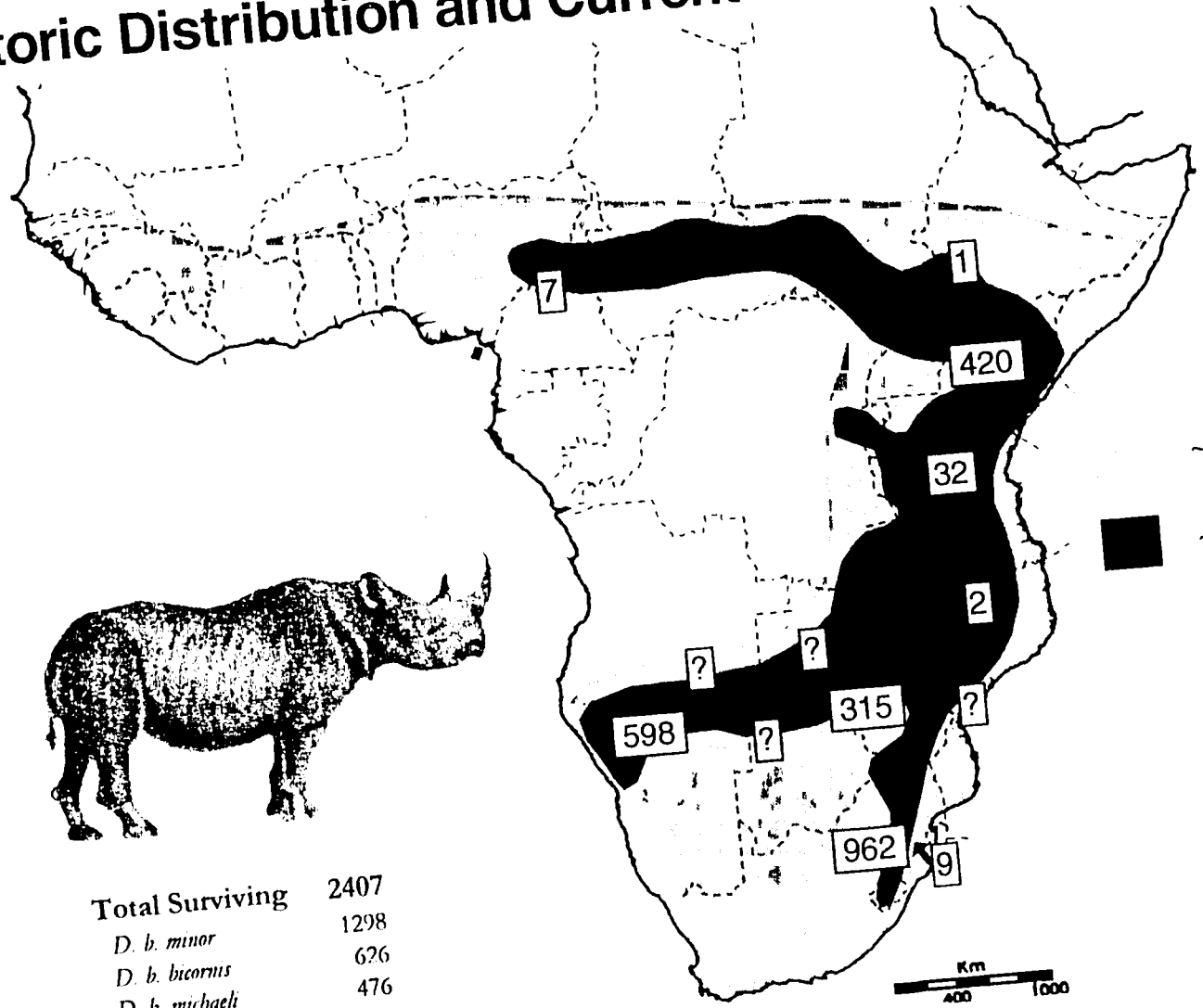
Table 2 presents an summary of program performance and status of the AZA Rhino SSP Programs for 1 November 1995 to 1 December 1997.

Table 3 presents a demographic and genetic profile of each rhino taxon in the SSP.

Table 4A summarizes the pattern of sex ratio in calves born to various rhino taxa in the SSP and Table 4B compares them to other regions.

BLACK RHINO

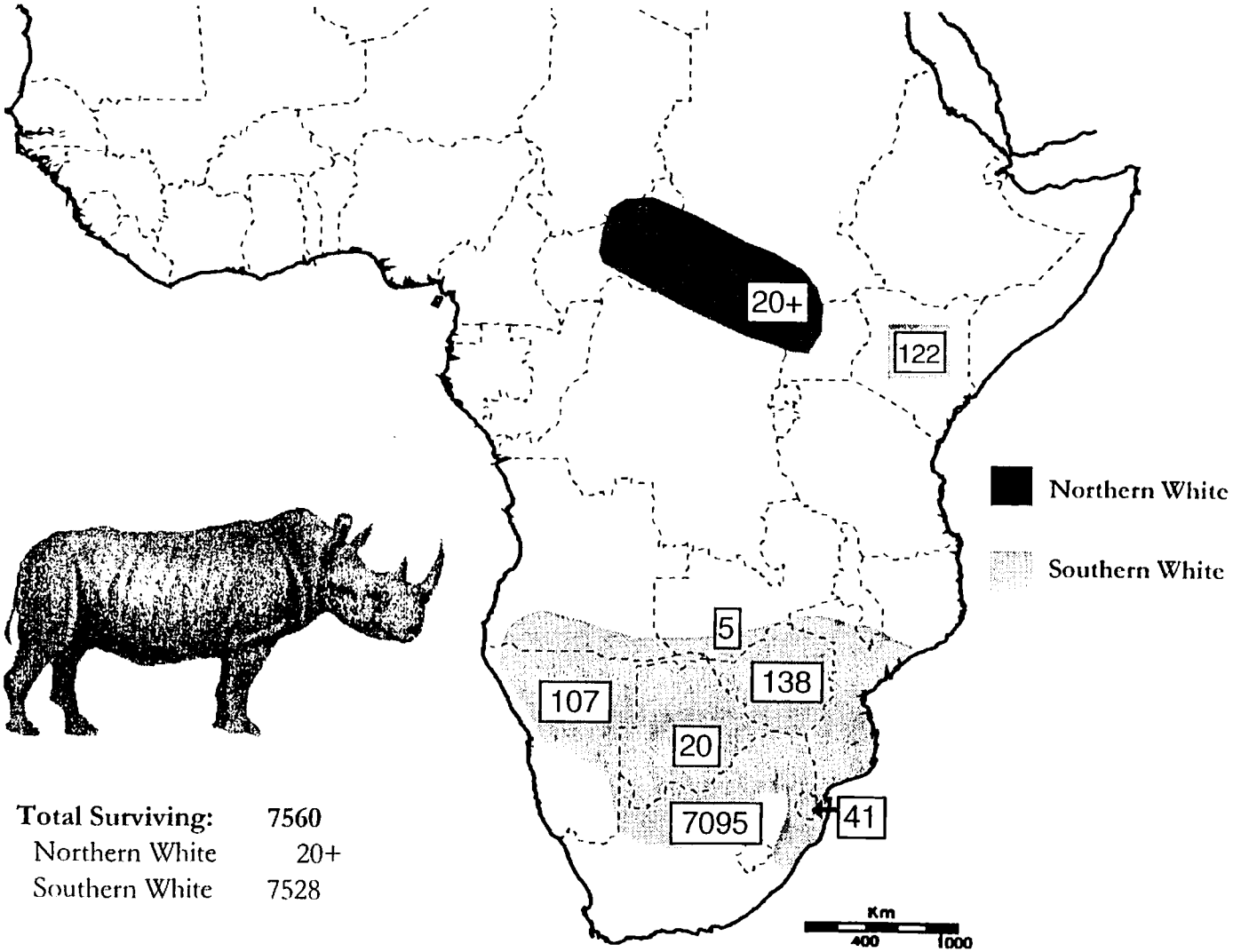
Historic Distribution and Current Country Totals – 1996



Total Surviving	2407
D. b. minor	1298
D. b. bicornis	626
D. b. michaeli	476
D. b. longipes	7

WHITE RHINO

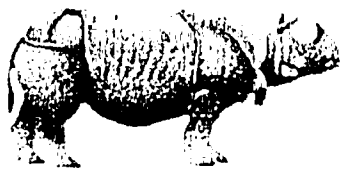
Historic Distribution and Current Country Totals – 1996/1997



Total Surviving:	**7560**
Northern White	20+
Southern White	7528

ASIAN RHINO

Historic Distribution
Current Numbers – 1996



INDIAN RHINO

~ 2000 surviving

JAVAN RHINO

< 70 surviving

SUMATRAN RHINO

< 400 surviving

35339 IRF- 9

TABLE 1
WILD AND CAPTIVE POPULATIONS OF RHINO

Species or Subspecies	Wild Population *1996 Estimate**	North American SSP Captive Population *7 November 1997*	Global Captive Population *1997 Estimate*
Southwestern Black Rhino	630	0	0
Northwestern Black Rhino	15	0	0
Eastern Black Rhino	480	74	175
Southern Black Rhino	1,300	35	60
TOTAL BLACK RHINO	~2,400	109	235
Northern White Rhino	20+?	4	9
Southern White Rhino	~ 7,600	117	646
TOTAL WHITE RHINO	~ 7,600	121	655
AFRICAN RHINO SPECIES	*~10,000*	*230*	*890*
INDIAN/NEPALESE RHINO	2,100	45	136
JAVAN RHINO	< 100	0	0
Borneo Sumatran Rhino	< 100	0	3
Malaya/Sumatra Sumatran Rhino	< 300	3	14
TOTAL SUMATRAN RHINO	< 400	*3*	*17*
ASIAN RHINO SPECIES	*~ 2,500*	*48*	*153*
ALL SPECIES	***12,500***	***278***	***~ 1,000***

* Source IUCN/SSC African & Asian Rhino Specialist Groups & T. J. Foose International Rhino Foundation

TABLE 2
SSP RHINO POPULATION PERFORMANCE AND STATUS NOVEMBER 1995 TO DECEMBER 1997

	EASTERN BLACK	SOUTHERN BLACK	SOUTHERN WHITE	NORTHERN WHITE	INDIAN	SUMATRAN
Desired Births 95-97	14	9	16-20	2	6	2
Actual Births 95-97	5.2 = 7	8.5 = 13	5.2 = 7	0.0 = 0	4.5 = 9	0.0 = 0
Deaths 95-97	2.5 = 7	1.5 = 6	4.6 = 10	0.0 = 0	3.2 = 5	0.0 = 0
Imports 95-97	0.4 = 4	0.0 = 0	0.0 = 0	0.0 = 0	0.0 = 0	0.0 = 0
Exports 95-97	0.0 = 0	0.0 = 0	1.3 = 4 *	0.0 = 0	3.0 = 3	0.0 = 0
# Transfers in SSP 95-97	6.6 = 12	3.3 = 6	11.9 = 20	0.0 = 0	2.1 = 3	0.0 = 0
Breeders 1 November 1997	16.19 = 35	8.11 = 19	16.22 = 38	0.0 = 0	7.12 = 19	1.1 = 2 ?
New Breeders Since 1 November 1995	2.2 = 4	3.4 = 7	1.0 = 1	0.0 = 0	0.3 = 3	1.1 = 2 ?
Breeders Lost Since 1 November 1995	0.3 = 3	0.2 = 2	1.1 = 2	0.0 = 0	1.0 = 1	0.0 = 0
Total Alive 1 November 1995	39.30 = 69	11.18 = 29	54.71 = 125	2.2 = 4	24.21 = 45	1.2 = 3
Total Alive 1 November 1997	42.30 = 72	18.17 = 35	53.64 = 117	2.2 = 4	22.23 = 45	1.2 = 3
Change in Numbers from 95 to 97	+3/0 = +3	+7/-1 = +6	-1.-7 = -8	0.0 = 0	-2/+2 = 0	0.0 = 0
Target Population Goal **10 YR / 50 YR / 100 YR** **2005 / 2045 / 2095**	90 / 90 /90	50 / 80 / 80	120 / 120 / 120	?	50 / 90 / 90	10 / 20 / 50
Additional Founders Desired: **Demographic Reasons** **Genetic Reasons**	0.3 = 3 0.0 = 0	0.0 = 0 0.0 = 0	6.12 = 18	?	2.0 = 2 (1998) 5.5 = 10 (2000)	?
Number of Participating Institutions	31	9	38	1	17	3
New Institutions Expected 1998-1999	0	1	1	?	4	0

Thomas J. Foose, Ph.D.
Program Director
Interntional Rhino Foundation (IRF)
15 December 1997

TABLE 3
DEMOGRAPHIC AND GENETIC OVERVIEW OF AZA SSP RHINO POPULATIONS
15 December 1997

RHINO TAXON	TOTAL NUMBER		BREEDERS		CHANGE IN POPULATION NUMBERS		% OLDER THAN 25 YEARS M/F		GENE DIVERSITY Actual Potential		FOUNDERS ACTUAL + POTENTIAL		F.G.E. Actual Potential		MEAN M_k		EFFECTIVE POPULATION SIZE N_{eG}/N N_{eD}/N *	
	1995	1997	1995	1997	% ** Change 95-97	Life Table Lambda	1995	1997	1995	1997	1995	1997	1995	1997	1995	1997	1995	1997
Eastern Black	39.30 = 69	42.30 = 72	16.20 = 36	16.19 = 35	0%	+ 1%	10%/28%	9%/26%	.969 .982	.968 .983	41	43	16.0 27.3	15.7 28.3	.0314	.0320	.36 .52	.35 .48
Southern Black	11.18 = 29	18.17 =35	5.9 = 14	8.11 = 19	+ 21.6%	+ 1.5%	0%/0%	6%/6%	.948 .976	.957 .975	25	24	9.6 20.7	11.8 19.9	.0518	.0426	.38 .46	.43 .53
Southern White	54.71 = 125	53.64 = 117	17.23 = 40	16.22 = 38	- 3.4%	- 3.5%	52%/58%	56%/66%	.971 .994	.971 .994	77	75	17.0 83.7	17.7 79.3	.0294	.0282	.20 .33	.21 .33
Northern White	2.2 = 4	2.2 = 4	0.0	0.0	0%	0	0%/0%	100/50%	0 .875	0 .875	4	4	0 4	0 4	0	0	0 0	0 0
Indian	24.21 = 45	22.23 = 45	8.9 = 17	7.12 = 19	0%	+ 4%	8%/14%	14%/13%	.917 .975	.919 .972	26	24	6.0 19.8	6.2 17.9	.0832	.0807	.18 .36	.18 .39
Sumatran	1.2 = 3	1.2 = 3	0	1.1 ? = 2	0%	- 20%	?		0 .833	0 .833	3	3	0 3	0 3	0	0	0 0	0 0

* Definitions/Calculation of Effective Population Size:

N_{eG} = Genetic N_e calculated from genetic data: Gene Diversity Retained = [1 - 1/(2) (# Founders)] [1 - 1/ (2) (N_{eG})]

N_{eD} = Genetic N_e calculated from demographic data: $N_e = (4) (M_k) (F_k)/ M_k + F_k$ Where M_k = Number of Male Breeders and F_k = Number of Female Breeders

N = Total Current Population Size

** Excluding Imports & Exports

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15 December 1997

TABLE 4 A
SEX RATIO OF RHINO BIRTHS - AZA SSP

	Eastern Black	Southern Black	Southern White	Indian
01/01/1990 - 10/11/1997				
Total Births	25/11 = 36	12/9 = 21	16/14 = 30	18/11 = 29
Births Not Surviving	4/6 = 10	2/2 = 4	3/5 = 8	4/2 = 6
Surviving Births	21/5 = 26	10/7 = 17	13/9 = 22	14/9 = 23
01/01/1994 - 10/11/1997				
Total Births	10/4 = 14	9/5 = 14	6/5 = 11	10/6 = 16
Births Not Surviving	2/1 = 3	1/1 = 2	0/1 = 1	3/1 = 4
Surviving Births	8/3 = 11	8/4 = 12	6/4 = 10	7/5 = 12

TABLE 4 B
SEX RATIO OF EASTERN BLACK RHINO BIRTHS
BY CONTINENT
01/01/1990 - 10/11/1997

	North America	Japan	Europe
Total Births	25/11 = 36	1/9 = 10	14/18 = 32
Births Not Surviving	4/6 = 10	0/2 = 2	5/3 = 8
Surviving Births	21/5 = 26	1/7 = 8	9/15 = 26

Thomas J. Foose, Ph.D.
Program Director
International Rhino Foundation (IRF)
15 December 1997

Notable Points of These Summaries Are:

(1) **Black Rhino - *Diceros bicornis***

The major problems with this species are mainly demographic. Reproduction has been healthy in the Southern and moderate in the Eastern taxon. However, mortality continues to be higher than desirable due mostly to various manifestations of the "syndrome" afflicting this species. A second problem of equal significance is the skew in sex ratio, especially in the Eastern Taxon but increasing in the Southern Taxon as well.

(2) **White Rhino - *Ceratotherium simum***

The major problems with this species are demographic but because of them also genetic. Neither taxa of white rhino are reproducing well: the Northern still not at all and the Southern not enough to sustain the population. Only 5 institutions (San Diego Wild Animal Park, White Oak Conservation Center, Knoxville Zoo, Memphis Zoo, and San Antonio Zoo) are currently breeding the southern white rhino, although 4 others may commence or resume soon (Disney Animal Kingdom, Jacksonville, the Wilds, and Gladys Porter Zoo - Brownsville). More founders are needed for primarily demographic but secondarily genetic reasons.

(3) **Indian Rhino - *Rhinoceros unicornis***

The problems with this species are mainly genetic. This population continues to reproduce well but the genetic base is limited with too much representation from Basel lineages to the extent that it is now difficult to provide breeder males without Basel blood. More founders are needed for genetic reasons.

(4) **Sumatran Rhino - *Dicerorhinus sumatrensis***

There are only 3 animals, 1 male and 2 females of this species in the SSP. One female may be reproductively senescent. However, there has been a most encouraging development in the mating and pregnancy that was induced in the other pair. Unfortunately, the pregnancy did not implant properly but there is optimism that this pair will reproduce. AZA SSP institutions in partnership with the IRF are assisting efforts to induce reproduction in the other 15 (5.10) Sumatran rhinos in captivity outside North America at the rhino breeding centers at the Sumatran Rhino Sanctuary (SRS) in Way Kambas National Park, Sumatra; Indonesia; the Sumatran Rhino Conservation Center - Sungai Dusun in Peninsula Malaysia; and the Sepilok Rhino Center in Sabah.

THE 1998 SSP MASTERPLAN FOR RHINOCEROS

This 1998 AZA SSP Rhinoceros Masterplan represents an update of the 1996 Plan which was the first merger of the AZA SSP Masterplans for African Rhino and for Indian/Nepalese Rhino. As in 1996, the 1998 recommendations have been formulated at a workshop involving the AZA Rhinoceros Advisory Group, including all the AZA SSP Rhino Species Coordinators, 16-17 November 1997 at the White Oak Conservation Center. It is intended to produce major updates of the AZA SSP Rhino Masterplan every 2 years with adaptive modifications as needed during the interim.

The 1998 Masterplan continues the process of more coordinated management of all rhino taxa in the AZA SSP through the AZA Rhinoceros Advisory Group (Rhino TAG). An AZA Regional Collection Plan has been developed to facilitate strategic and coordinated management of the SSP rhino populations. Table 5 summarizes this Regional Collection Plan for Rhinos.

Another trend that continues is to apply more husbandry, behavioral, reproductive, and veterinary considerations in the formulation of recommendations for specific animals. Before recommendations were formulated at the workshop, there were presentations by the groups working on:

- Husbandry and Back-Casting (i.e., studbook analysis): Mike Fouraker & Tarren Wagener, Fort Worth Zoo; Don Lindburg and Susan Millard, San Diego Zoo & Wild Animal Park;
- Reproductive Biology: Terri Roth, Cincinnati Zoo; Nancy Czekala, San Diego Zoo; Nan Schaffer, Rhinoceros Reproduction Program, Milwaukee Zoological Society & SOS Rhino.

In addition to the captive propagation and management programs conducted through the SSPs, the AZA Rhinoceros Advisory Group has also adopted a 5-Year Plan presented in Table 6. The Plan entails efforts to assist *in situ* conservation as well as management-oriented research.

There has been significant progress on several components of the 5-Year Plan's *in situ* programs, through partnership with the International Rhino Foundation (IRF), i.e.:

- Development of sanctuary programs for Sumatran rhino in Indonesia and Malaysia has advanced, especially in Way Kambas National Park (Sumatra) which should be ready to receive rhino in January 1998.
- Deployment of rhino protection units (RPUs) for Sumatran rhino in Indonesia and Malaysia
- Finalization of plans to form RPUs for Javan Rhino in Ujung Kulon National Park, Indonesia, and prepare for them in Cat Loc Nature Reserve, Vietnam.

There has also been progress in a number of priority areas for management research. Table 7 presents a list of the research projects the Rhino TAG is supporting, in partnership with the IRF.

Finally, this 1998 AZA SSP Rhino Masterplan has adopted a more concise format that omits the ISIS Masterplan Sheets for the Institution-By-Institution Recommendations which instead are presented as continuous text. The Rhino TAG believes the new format contains all the information of previous versions although it may require a bit more cross-reference as not all the information about an individual is on the same sheet. However, by reference to the Studbook of Living Animals By Institution and the Demographic and Genetic Analyses, all the information from the old ISIS Masterplan pages are available. Omitting the Masterplan sheets has reduced the size of the Masterplan by about 200 pages. The ISIS Masterplan sheets are available from Tom Foose, Rhino TAG Program Officer, to any institution upon request.

TABLE 5
AZA RHINO REGIONAL COLLECTION PLAN - 1998
CURRENT AND TARGET NUMBERS OF RHINO IN AZA RHINO SSP INSTITUTIONS

INSTITUTIONS	CURRENT NUMBER				RECOMMENDED NUMBER 98-99				ULTIMATE CAPACITY (Within 7 Years)			
	Black	White	Indian	Sumatran	Black	White	Indian	Sumatran	Black	White	Indian	Sumatran
Atlanta	1.1				1.1				1.1			
Albuquerque		1.1				1.4				2.3		
Asheboro		2.2				2.2				2.2		
Baltimore		1.1			1.1	1.2			1.1	1.2		
Baton Rogue			1.0				1.1				1.1	
Birmingham		1.2					1.1				1.1	
Brownsville		3.2				2.2				2.2	1.1	
Buffalo			1.0				1.1				1.1	
Calgary ?											1.1	
Chicago Brookfield	3.2				2.2				2.2			
Chicago Lincln Prk	1.2				1.2				1.2			
Cincinnati	2.1		1.1	1.2	2.2		1.1	1.2	2.2		1.1	1.2
Cleveland	1.1				1.1				1.1			
Colorado Springs	0.1				1.1				2.2			
Columbia Rivrbnks	1.1				1.1				1.1			
Columbus	1.0				2.2				2.2		1.1	
Cumberland Wilds	1.1	2.6	1.0			4.6	1.2			5.15	3.7	
Dallas	3.0				2.2				2.2			
Denver	2.0				2.2				2.2			

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	Black	White	Indian	Sumatran	Black	White	Indian	Sumatran	Black	White	Indian	Sumatran
Detroit	1.0								1.2			
El Coyote - Bass	3.4				1.3				1.3			
Fort Worth	1.2	1.1	1.1		1.2	2.4	1.1		1.2	2.4	1.1	
Garden City	1.0				1.1				1.1			
Gln Rose Fosl Rm	1.3	3.4			2.2	3.6			2.4	2.6		
Granby		1.0			1.1				1.1			
Gulf Breeze			1.1				1.1				1.1	
Honolulu	2.0	1.0			1.1	1.2			1.1	1.2	1.1	
Houston		1.1					1.1				1.1	
Jackson		1.1				1.2				1.2		
Jacksonville	1.0	1.2			1.1	2.3			1.1	2.3		
Kansas City	2.2				2.2				2.2			
Knoxville		3.3				2.4				2.4		
Lansing - Potr Prk	1.1				1.1				1.1			
Little Rock	1.0	1.0			1.0	1.1			1.1	1.2		
Los Angeles	1.3		1.1		1.2		2.2		1.2		2.2	1.2 (?)
Louisville		1.2				1.2				1.2		
Madison		1.1				1.2				1.2		
McComb Ranch		1.0				1.2				2.4		

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INSTITUTIONS	CURRENT NUMBER				RECOMMENDED NUMBER 98-99				ULTIMATE CAPACITY (Within 7 Years)			
	Black	White	Indian	Sumatran	Black	White	Indian	Sumatran	Black	White	Indian	Sumatran
Memphis		1.2					1.1				1.1	
Miami	2.3		2.1		2.4		1.1		2.4		2.2	
Milwaukee	1.2				2.2				2.2			
Monroe		1.1										
New Orleans		1.1				1.2	1.1			1.2	3.3	3.3 (?)
New York - Bronx	1.0		2.3		1.0		2.4		1.0		2.4	
Norfolk		2.1				1.2				2.3		
Oklahoma City	1.0		1.2		1.1		1.1		1.1		1.1	
Omaha		1.1			1.2				1.2			
Orlando - Disney	2.1	1.1			2.2	2.4			2.2	2.6	2.2	
Philadelphia			1.1				1.2				1.2	
Phoenix		1.1			1.1				1.1			
Pittsburgh	1.1				1.1				1.1			
Portland	1.2				1.1				1.1			
Racine		1.0				1.2				1.2		
Rockton AfLionSfr		2.1				2.2				2.3		
Rolling Hills		2.2	1.0			2.2	1.0			2.3	1.1	
St. Louis	1.1				1.1				2.2			
Salt Lake		1.1			1.1				1.1			

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AZA RHINO REGIONAL COLLECTION PLAN - 1998
CURRENT AND TARGET NUMBERS OF RHINO IN AZA RHINO SSP INSTITUTIONS

INSTITUTIONS	CURRENT NUMBER				RECOMMENDED NUMBER 98-99				ULTIMATE CAPACITY (Within 7 Years)			
	Black	White	Indian	Sumatran	Black	White	Indian	Sumatran	Black	White	Indian	Sumatran
San Antonio	1.2	2.2			1.2	1.2			1.2	1.2		
San Diego WAP	3.2	4.11	2.8		4.4	4.13	4.4		4.4	4.14	4.4	2.2 (?)
San Diego Zoo	2.1				2.2				2.2		1.1	
San Francisco	2.1		1.0		1.1		1.1		1.1		1.1	
Sioux Falls	1.0				1.1				1.1			
Tampa Busch	2.2				2.2				2.2			
Tampa Lowry			1.0				1.1 ?				1.1 ?	
Toledo		1.1			1.1				1.1			
Toronto		2.2	2.1			2.2	1.2			2.4	1.2	
Tulsa		1.1				1.2				1.2		
Tuscon		1.1			1.1				1.1			
Tyler Caldwell	2.1				2.2				2.2			
Waco		1.2			1.2				1.2			
Wash DC			1.3				1.1				1.1	
Wichita	1.1				1.1				1.1			
Winston Wldlf Sfr		1.2				2.5				2.5		
Yulee - Wht Oak	5.3	3.3			2.4	2.5			2.4	2.8		3.5

TABLE 5
AZA RHINO REGIONAL COLLECTION PLAN - 1998
CURRENT AND TARGET NUMBERS OF RHINO IN AZA RHINO SSP INSTITUTIONS

INSTITUTIONS	CURRENT NUMBER				RECOMMENDED NUMBER 98-99				ULTIMATE CAPACITY (Within 7 Years)			
	Black	**White**	**Indian**	**Sumatran**	**Black**	**White**	**Indian**	**Sumatran**	**Black**	**White**	**Indian**	**Sumatran**
Total Current Participants	61.48 **109**	56.66 **122**	21.24 **45**	1.2 **3**	62.72 **134**	46.87 **133**	26.30 **56**	1.2 **3**	65.79 **144**	49.109 **158**	38.46 **84**	10.14 **24 (?)**
Potential Participants												
Battle Creek						2.4				2.4		
Fresno											1.1	
Lufkin					2.0				1.1			
Minnesota											1.1	
Minot									1.1			
Montgomery							2.0				1.1	
Richmond										1.2		
Sacramento									1.1			
Seattle									1.1			
TOTAL									69.83 **152**	51.115 **166**	41.49 **90**	11.16 **24 (?)**
									TOTAL = 435			
RCP/GCAP-GASP 100 YR TARGET									**170**	**120 SWR 40 NWR**	**90**	**50 (?)**
									TOTAL = 470			

TABLE 6
AZA RHINOCEROS ADVISORY GROUP
5-YEAR PLAN

1. Sanctuary Program for Sumatran and Javan Rhino in Indonesia:

   A. Sumatran Rhino in Way Kambas

   B. Javan Rhino in Ujung Kulon

   C. Groundwork for Possible Second Sanctuary for Javan Rhino

2. Sanctuary Program for Northern White Rhino:

   A. Support for existing sanctuary in Garamba National Park

   B. Establishment of a second sanctuary using a few rhino translocated from Garamba and perhaps some of the captive rhino.

3. Health and Husbandry Research on Black and Sumatran Rhino:

   A. Proposals in part to be prepared in accordance with Masterplan from Black Rhino Disease Workshop. Major areas of investigation will include: nutrition; stress; comparative cell metabolism; and specific studies on mucocutaneous ulcerative disease, cholestatic hepatopathy, encephalomalacia, basic immunological function, and epidemiology. Also included will be improved systems for sample and data acquisition and storage.

4. Reproductive Research on all Rhino Species:

   A. Completely characterize reproductive cycles in all 4 species in captivity and develop reliable feces/urine/saliva tests for estrus and pregnancy.

   B. Develop a more concerted and coordinated effort toward development of methodologies, instrumentation, etc. for assisted reproduction (AI and ET) and gene banking.

5. Support of IPZs for Black Rhino:

   A. Actual sites to be determined.

6. Development of a Sanctuary(ies) for Indian/Nepalese Rhino.

TABLE 7
RESEARCH PROJECTS ENDORSED AND/OR SUPPORTED BY THE AZA RHINO TAG

ENDORSED BY RHINO TAG & FUNDED BY IRF

Pathophysiologic Basis of Disease Affecting Captive Black Rhinoceros
D.E. Paglia & E.H. Harley

Baseline Physiological Data for Assessment of Rhino Nutrient Status
Ellen Dierenfeld

Rhinoceros and Data Acquisition and Storage
D.A. Jessup et al.

Understanding Basic Reproductive Biology to Conserve Rhinoceros
T.L. Roth et al.

Serial Ultrasonic Monitoring of Reproductive Events in Female White & Black Rhino
R.W. Radcliff et al.

Determinants of Natal Sex Ratio in Rhinoceros
S. Atkinson et al.

ENDORSED & ENCOURAGED BY TAG BUT NOT CURRENTLY FUNDED BY IRF

Evaluations of Rhinoceros Diets in U.S. SSP Institutions
Ellen Dierenfeld

Intercontinental Comparison of Rhino Diets in North America, Europe, and Japan.
Ellen Dierenfeld

Back-Casting Work on White & Indian Rhinoceros
D. Lindburg et al.

Reproductive Assessment and Manipulation of Northern White Rhino to Induce Breeding
B. Durrant, N. Czekala, et al.

Behavioral Assessment of Black Rhino
Kathy Carlstead et al.

Rhinoceros Fertility Hormones: Development of Hormone Sources for Use as Diagnostic & Pharmaceutical Reagents
G. Sherman

Reproductive Assessments of Specific Individual Rhino
N. Schaffer

Investigation of a Potentially Immunosuppressive Retrovirus in Black Rhino
M. Worley et al.

GOALS & OBJECTIVES OF THE SSP RHINO MASTERPLAN

GOALS

The goals of the AZA SSP Programs for Rhinoceros are:

(1) Development of viable *ex situ* populations as:

(A) reservoirs of genetic and demographic material for potential reinforcement of populations in the wild as the need and opportunity occur;

(B) subjects for research to improve conservation management *in situ* as well as *ex situ*;

(C) ambassadors to stimulate public awareness and support, especially financial, for rhino conservation.

(2) Improvement of captive husbandry and management through research in health, nutrition, behavior and reproduction to facilitate development of viable populations *ex situ* and to transfer results as appropriate to intensively managed populations *in situ*.

(3) Strategic coordination of space and resources for rhinos in AZA SSP institutions to provide maximum assistance to as many rhino taxa as possible (The Regional Collection Plan).

(4) Financial, technical, and administrative assistance (particularly in partnership with the International Rhino Foundation (IRF)) for selected *in situ* efforts for rhino with emphasis on those projects that are significant, feasible, and provide appropriate opportunities for application of the particular expertise that the captive conservation community can provide in terms of intensive management technology.

GENERAL OBJECTIVES

(1) Development of SSP Programs for 6 taxa of rhino:

(A) Develop self-sustaining populations for 4 taxa of rhino:

(a) Eastern Black Rhino - *Diceros bicornis michaeli*

(b) Southern Black Rhino - *Diceros bicornis minor*

(c) Southern White Rhino - *Ceratotherium simum simum*

(d) Indian or Asian Greater One-Horned Rhino - *Rhinoceros unicornis*

(B) Continue attempts to reproduce 2 taxa of rhino as a contribution to the global populations of these species:

(a) Northern White Rhinoceros - *Ceratotherium simum cottoni*

(b) Sumatran Rhinoceros - *Dicerorhinus sumatrensis*

(2) Demographic Management to optimize the probability the captive populations of these 6 taxa can be sustained and expanded:

(A) Toward this end, consider 5 of the 6 SSP rhino taxa to be under a demographic imperative; the exception is the Indian Rhino.

(B) Under this imperative, recognize demographic considerations, especially to maximize reproduction, to be paramount.

(C) More specifically.:

(a) Consider genetics in the formation of new pairs, but accord greater importance to utilization of proven breeders.

(b) No separation of producing pairs based on their relative mean kinship values.

(D) Relax the demographic imperative for any rhino taxon once its population shows positive growth in the annual census and the age pyramid appears more stable, e.g. the Indian Rhino.

(3) Genetic Management, within the demographic constraints, of the captive populations of each taxon to maintain 90% of the gene diversity for a period of 100 years to 150 years (the latter ~ 8-10 rhino generations).

(A) Hence, genetically manage of the existing population to maximize gene diversity by preferentially breeding individuals with low and comparable mean kinships (M_ks).

(B) Recognize that reproducing individuals with mean kinships lower than the population average mean kinship will increase gene diversity in the population; reproducing individuals with mean kinships higher than the population average mean kinship will decrease gene diversity.

(4) Attainment of Target Population Sizes adequate to achieve the genetic objectives as well as to provide demographic security:

Eastern Black Rhino	90
Southern Black Rhino	80
Southern White Rhino	100 (+ 20 research individuals)
Indian/Nepalese Rhino	90
Sumatran Rhino	Target population objectives are considered very idealistic at this time; the immediate objective is to achieve successful reproduction in captivity with this species; in collaboration with managed breeding efforts for this species worldwide, a 100 year target population objective of 50 individuals for the SSP may be plausible.
Northern White Rhino	Target population objectives are considered premature or inappropriate at this time; the immediate objective is to induce existing animals to reproduce before they die with an ambitious objective of 8 offspring from the current 2.2 = 4 individuals in the SSP population.

(5) Creation of approximately 150 additional rhino spaces and reallocation of some existing spaces to different rhino taxa as delineated in the Regional Collection Plan.

(6) Continued efforts to acquire additional founders to enable achievement of genetic and demographic objectives.

(7) Cooperation and coordination with other regional captive breeding programs for rhino taxa, especially with those with compatible objectives. Such cooperation could preserve even higher levels of gene diversity for longer periods of time (e.g. maintaining 90% of gene diversity for 10-15 rhino generations 150-200 years).

(8) Interaction between SSP and wild populations for mutual benefit.

(9) Conduct of research useful to management of self-sustaining populations in captivity and viable populations in the wild in a number of major areas or problems including:

(A) Health, especially of Black and Sumatran Rhino

(B) Nutrition of Rhinos, especially the browsing species (Black and Sumatran).

(C) Reproduction in all Rhinos, with hopeful timely application to the 2 taxa on the verge of extinction within the SSP (Northern White Rhino and Sumatran Rhino).

(10) Employ the captive populations as flagship species for conservation of rhino and the ecosystems they occupy.

SPECIFIC OBJECTIVES
BLACK RHINO

(1) Continuing efforts to reduce captive mortality in this species.

The major problems are the captive-disease syndromes prevalent in the population: the "hemolytic anemia/hepatopathy/ulcerative/respiratory/cerebral" and the newly emerging or recognized "hemorrhagic diathesis" disorder. Other diseases that have been problems include: Salmonella. Tuberculosis, Johnes, and a new hepadenovirus (causing immune deficiency disorder) isolated from black rhino.

(2) Breeding by all prime age females.

(3) Toward this end, preferentially placement of young females with older, proven breeder males.

(4) Reduction of inter-birth intervals.

(5) Elucidation of causes and correction of the skew in natal sex ratio toward males.

(6) More intensive and systematic attempts at pregnancy diagnosis.

SPECIFIC OBJECTIVES
WHITE RHINO

Southern

(1) Revitalization and rejuvenation of the senescing population of Southern White Rhino by:

(A) Designating a number of individuals of advanced age as "surplus" while attempting some hormonal therapies on a few selected individuals considered likely candidates for success and located in or readily accessible to facilities with an existing program for reproductive research.

(B) Importing 12 (4.8) additional founders from South Africa to compensate for the genetic and demographic losses caused by declaring so many rhinos surplus, by the several institutions that have indicated an interest in doing so:

Disney Wild Animal Kingdom - Orlando	1/3
Rio Grande Zoo - Albuquerque	1/2
Binder Park Zoo - Battle Creek	1/2
Wilds	1/1

(2) Elucidation of the factors that contribute to successful reproduction of white rhino and in particular to elucidate the F1 phenomenon wherein there appears to be much non-reproduction by first generation captive born females.

Northern

(1) Achievement of successful reproduction in this species.

SPECIFIC OBJECTIVES
INDIAN RHINO

(1) Higher priority on increasing the gene diversity and genetic foundation of this species since this population does not seem to be under a demographic imperative

Demographically, this taxon is in the best condition. However, the number of breeders is limited, although their production has been high. Because of the limited number of breeders, this population is in the worst condition genetically of all the rhino species in the SSP. Further breeding of the lineages that have been reproducing will only exacerbate the genetic problems. There needs to be more effort to recruit non-breeders to reproduce which should not be too difficult since there are a number of young potential founders in the population. Some of the older wild-caught non-breeders need intensified efforts.

(2) Recruitment of additional founders (as measured by Founder Genome Equivalents)

(A) by adjusting the relative representation of the founder lineages in the current captive born (living descendant) population

(B) by inducing the 5 wild-caught individuals in the population that have not yet reproduced to breed with the objective of ultimately producing at least 4 offspring from each

(C) by reducing or refraining from reproducing rhinos with high mean kinships representing the over-represented lineages or bloodlines.

(3) Acquisition of Additional Founders from Indian and/or Nepal by:

(A) Exchange of Rhinos with Indian Zoos to Both Acquire and Provide New Founders for the Respective Regional Programs.

(B) Possible obtainment of rhino which need to be culled from wild populations (e.g. Kaziranga National Park and/or Chitawan National Park in Nepal); the acquisition could either be direct or via Indian/Nepalese Zoos which would receive the rhino from the wild and then provide offspring to SSP institutions over a 5-10 year period.

(C) A summary of the Funder Acquisition Objectives are:

Number	Date	Reason	Source/Circumstances
2.0	1998	Genetic	From Indian zoos through exchange for 0.2 provided by the SSP.
4.6	2000-2005	Genetic	From Indian/Nepalese zoos and/or the wild via Indian/Nepalese zoos through a cooperative program that would also provide US$ 1-1.5 million as an endowment whose interest would be used to support *in situ* guards.

SPECIFIC OBJECTIVES
SUMATRAN RHINO

(1) Achievement of successful reproduction in this species.

(2) Provision of more space to simulate a more natural environment.

(3) Elucidation of the "wasting" disorder in Sumatran rhino

GENERAL RECOMMENDATIONS

(1) Develop capacity in all institutions involved in the Rhino SSPs to hold offspring for 2-3 years before moving them to another institution. Institutions not able to comply with this recommendation will need to modify their facility to comply unless otherwise specified by the TAG/SSP.

(2) Breed females back as soon as possible, i.e. within 1 year, after a birth for those taxa where a demographic imperative is recognized and for pairs approved for reproduction.

(3) Do not relocate calves until they are 1 year of age, due to behavioral and husbandry concerns; special circumstances such as hand raised calves could be an exception.

(4) Do not return females moved to another institution for impregnation until the calf is born and ready to move to avoid any jeopardy to the pregnancy.

(5) Conduct reproductive assessments on all non-reproducing females, and more selectively males; consider hormonal stimulation for important individuals as identified by the SSP.

(6) Apply the recommendations in the *AZA RHINO HUSBANDRY MANUAL* available from Mike Fouraker and Tarren Wagener at the Fort Worth Zoo. (The cover page of this Manual is presented in Figure 4).

(7) Participate as appropriate and invited in the various research projects that the TAG has approved.

(8) Provide biological samples according to *VETERINARY/NUTRITION BLOOD AND TISSUE COLLECTION PROTOCOL FOR RHINOCEROS 1997* available from Dr. Eric Miller, St. Louis Zoo. (The cover page of this Protocol is illustrated in Figure 5).

(9) Implement the nutritional husbandry guidelines provided by the TAG (Table 8).

(10) Promptly report any changes in rhino collection (births, deaths, transfers) to the North American Regional Studbook maintained by Tom Foose (Fax: 1/717/765-9373; e-mail: irftom@aol.com; Tel. 1/717/765-9373; Postal Address: 20 Pen Mar Street, Waynesboro, PA, 17268).

(11) Use the Internet listserves, established in conjunction with the IRF website (address http://www.rhinos-irf.org) to facilitate communication among participants in the SSPs and between them and the Rhino TAG.

(12) Resume publication of *Around the Horn, The Rhino Conservation Newsletter* (the joint newsletter of the AZA Rhino Advisory Group, the IRF, and the Rhino Global Action Plan (GCAP).

(13) Form technical support teams for management/manipulation of rhino.

(14) Conduct additional exchanges of rhino between SSP and other Regional Rhino Breeding Programs

(15) Continue and increase support of programs for *in situ* conservation of rhinos, again in conjunction with IRF and the AAZK Bowling for Rhinos.

RHINOCEROS HUSBANDRY

RESOURCE MANUAL

AMERICAN ZOO AND AQUARIUM ASSOCIATION
RHINO TAXONOMIC ADVISORY GROUP

INTERNATIONAL RHINO FOUNDATION

VETERINARY/NUTRITION BLOOD AND TISSUE COLLECTION PROTOCOL FOR RHINOCEROSES 1997

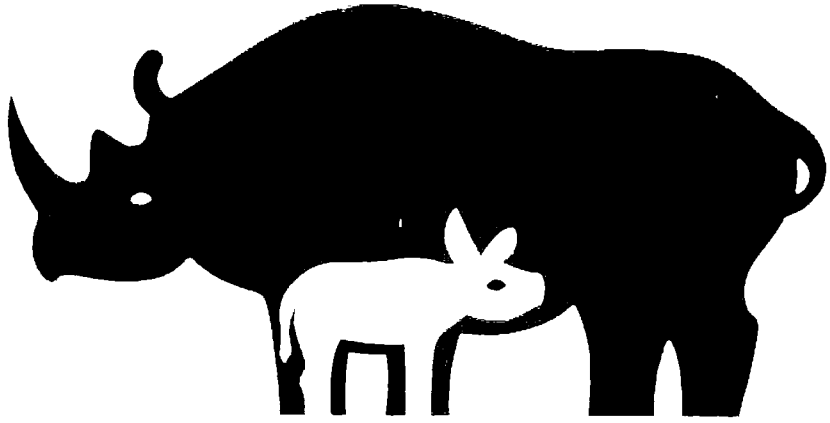

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TABLE 8
1998 NUTRITIONAL RECOMMENDATIONS FOR HUSBANDRY OF RHINOS IN THE SSP

Ellen S. Dierenfeld, PhD, CNS
Nutrition Advisor, Rhinoceros Taxon Advisory Group

- **Use horse feeds and/or high fiber herbivore pellets** as the concentrate portion of rhinoceros diets, using the domestic equid as a physiological model for nutrient requirements.

- **Feed mixed grass/legume hay** as a primary forage source to browsing rhino species; high-quality grass hay is suitable for grazing rhino species. High-quality alfalfa should not be the exclusive forage for rhinos, as it may lead to nutrient imbalances, colic, and diarrhea.

- **Include at least some browse** (fresh or frozen) in the diets for the browsing rhino species. Recent data on browse composition suggests that palatable browses may be adding essential nutrients not found in other diet components. A minimum goal would be 5% of dietary dry matter, or approximately 10% of the total weight of the diet, as browse.

- **Choose browse based on availability, palatability**, and known **lack of toxic compounds**. Browses from the Moraceae family (mulberry, figs) are reported to be particularly palatable for browsing rhinoceros in North American facilities.

- **Perform routine nutrient analyses** (minimum protein, fiber, macro- and trace minerals) on all browses and forages utilized in the feeding program.

- **Continue to supplement diets with Vitamin E**, if necessary, to contain 150 to 200 IU vitamin E per kg dietary dry matter. Several commercially manufactured products are available for this purpose.

- **Do not use a mixed Se/Vitamin E supplement** unless Se deficiency has been confirmed by tissue analysis.

- **Do not use mineral supplements** unless dietary and/or clinical evaluations suggest a specific need.

- **Provide salt blocks and water** at all times.

- **Perform fat-soluble vitamin, mineral, and fatty acid determinations** on all rhinoceros blood samples, following protocols developed and available from the Nutrition Advisor: Dr. Ellen Dierenfeld, Wildlife Conservation Society, Bronx, NY 10460. (718) 220-7102; fax (178) 220-7126; edierenfeld@wcs.org

SPECIFIC RECOMMENDATIONS
EASTERN BLACK RHINO

(1) Exchange animals with the Species Survival Committee of Japan (SSCJ) Program: males from SSP to SSCJ; female from SSCJ to SSP.

(2) Provide surplus males for re-introduction to the wild at Mkomazi Rhino Sanctuary in Tanzania.

(3) Separate females in situations where there are 2 adult females together which have not reproduced to test the hypothesis (suggested by the circumstantial evidence) that such association may suppress estrus cycles and hence reproduction.

(4) Implement the Institution-By-Institution and Animal-By-Animal recommendations as summarized on the ensuing pages.

INSTITUTION BY INSTITUTION RECOMMENDATIONS FOR EASTERN BLACK RHINO
(Arranged Alphabetically By State or Province)

UNITED STATES

Little Rock Zoo	Maintain Male 542 (Johari).
Los Angeles Zoo	Move Females 76 (Twinkle Toes) and 267 (Sweet Pea) to San Diego Wild Animal Park and Breed with Male 292 (Cornelius). Move Male 285 (Buster) to Cheyenne Mountain Zoo to Breed with Female 331 (Shy-Anne). Receive Black Rhino again in the future if and when masterplan is completed and includes this species.
San Diego Wld Anml Prk	Breed Male 292 (Cornelius) with Females 233 (Judy) and 330 (Jeri). Receive Females 76 (Twinke Toes) and 267 (Sweet Pea) and Breed with Male 292 (Cornelius). Move Male 636 (Jubba) to the Bronx Zoo. Maintain Male 665 (Jambia) until a bachelor group is available at a site to be determined, perhaps White Oak Conservation Center.
San Francisco Zoo	Breed Male 377 (Mashaki) with Female 213 (Elly) again. Move Male 664 to bachelor group when available at a site to be identified, perhaps White Oak Conservation Center. This animal may also be a candidate for translocation to Mkomazi Rhino Sanctuary in Tanzania.
Cheyenne Mountain Zoo	Receive Male 285 (Buster) from Los Angeles Zoo and Breed with Female 331 (Shy-Anne).
Denver	Maintain Males 332 (Akeem) and 516 (no name reported) for further medical evaluation of them and the environment at Denver, which has had a Salmonella problem among others.

Jacksonville Zoo	Receive Female 677 (Imara) from Washington Park Zoo, Portland or Female 591 (Keesha) from Miami Metrozoo and Breed with Male 552 (Zeus).
Busch Gardens - Tampa	Receive Male 488 (Kijito) from Brookfield and Breed with Female 418 (Judy). Breed Male 432 (Jasper) with Female 517 (Jumatano).
Miami Metrozoo	Breed Male 259 (Toshi) with Female 202 (Cora) and Male 395 (Tatu) with Female 351 (Moonstone) again. Move Female 591 (Keesha) to Jacksonville to Breed with Male 552 (Zeus) or to Honolulu to Breed with Male 458 (Akoni).
Zoo Atlanta	Breed Male 388 (Boma) with Female 426 (Rosetta Stone).
Honolulu Zoo	Move Males 443 (Hailstone) and 458 (Akoni) to Japan (Hiroshima and Nagoya). Receive and Breed Male 372 (Corky) from Caldwell Zoo, Tyler and Female 560 from Hiroshima, Japan.
Brookfield Zoo	Move Male 488 (Kijito) to Busch Gardens - Tampa to Breed with Female 418 (Judy).
Chicago Lincoln Park	Move Female 294 (Marsha) to Oklahoma City to Breed with Male 459 (Werikhe); this move is intended to separate the pair of adult females on hypothesis that their association may be inhibiting reproduction. Breed Male 308 (Marshall) to Female 317 (Naivasha).
Lee Richardson Zoo	Maintain Male 419 (Ahadi); consider as a candidate for translocation to Japan if Male 458 (Akoni) from Honolulu is not available and Male 419 is in good health.
Sedgwick Cnty Zoo	Continue attempts to Breed Male 301 (Eugene) with Female 53 (Bibi).
Potter Park Zoo	Breed Male 435 (Jimma) with Female 489 (Rafiki).

Detroit Zoo	Maintain Male 409 (Rudy) and try for longevity record for species in captivity.
Kansas City Zoo	Breed Males 475 (Tucker) and 490 (Rudisha) with Females 660 (Ginny/Lucy) and 684 (Luyisa) in manner most convenient as any combinations are beneficial genetically to the population. Receive Male 169 (Lord) from San Antonio and maintain until another location can be identified.
St Louis Zoo	Breed Male 251 (Toto) with Female 212 (Betsy) as soon as possible as these individuals are important genetically to the population.
Bronx Zoo - W.C.P.	Move Male 473 (Werikhe) to San Antonio to Breed with Females 190 (Luana) and 364 (Sababu). Receive Male 636 (Jubba) from San Diego Wild Animal Park.
Cincinnati Zoo	Breed Male 247 (Ralph) with Female 225 (Julie) again. Maintain Male 518 (Bwana Chai) for future Breeding as he is an important animal genetically to the population.
Cleveland Metroparks Zoo	Breed Male 457 (Spike) to Female 683 (Inge).
Columbus Zoo	Maintain Male 68 (Clyde) in competition with 409 (Rudy) at Detroit for longevity record for species in captivity. Receive Male 389 (Jioni) and Female 397 (Kulinda Kifaru) back from Wilds when new facilities are completed and reproductive situation of this pair permits.
The Wilds	Breed Male 389 (Jioni) and 397 (Kulinda Kifaru)
Oklahoma City Zoo	Receive Female 294 (Marsha) from Chicago Lincoln Park and Breed with Male 459 (Werikhe).

Washington Prk Zoo - Prtld	Breed Male 376 (Pete) with Female (Miadi) again. Move Female 677 to Great Plains Zoo, Sioux Falls to Breed with Male 480 (Boo) or to Jacksonville to Breed with Male 552 (Zeus) .
Pittsburgh Zoo	Maintain Male 569 until another Female can be identified.
Riverbanks Zoo	Breed Male 381 (Zakar) with Female 383 (Gemstone).
Great Plains Zoo	Receive Female 677 (Imara) from Washington Park Zoo, Portland to Breed with Male 480 (Boo) if Female 677 does not move to Jacksonville.
San Antonio Zoo	Move Male 169 (Lord) to Kansas City for holding. Receive Male 473 (Werikhe) from the Bronx Zoo and Breed with Females 190 (Luana/Lisa) and 364 (Sababu). Maybe consider separating these 2 adult females if they still fail to reproduce with the new male.
Caldwell Zoo	Breed Male 362 (Makuu) with Female 359 (Crista) again. Move Male 372 (Corky) to Honolulu to Breed with Female 560 from Hiroshima, Japan or Receive Female 560 from Hiroshima Japan and Breed with Male 372 (Corky) at Caldwell. Maintain Male 682 (Tatu) until he can be Moved to bachelor group when available at a site to be identified, perhaps White Oak Conservation Center. This animal may also be a candidate for translocation to Mkomazi Rhino Sanctuary in Tanzania.

SPECIFIC RECOMMENDATIONS
SOUTHERN BLACK RHINO

(1) Provide surplus males to National Parks Board of South Africa for re-introduction into the wild.

(2) Assist the Australasian SSP program to determine why their group of rhino are not reproducing better.

(3) Implement the Institution-By-Institution and Animal-By-Animal recommendations as summarized on the ensuing pages.

INSTITUTION BY INSTITUTION RECOMMENDATIONS FOR SOUTHERN BLACK RHINO
(Arranged Alphabetically By Province or State)

UNITED STATES

Los Angeles Zoo	Move Female 336 (Zoe) to Milwaukee to breed with Male 404 (Brewster)
San Diego Zoo	Breed Male 390 (Gundwane) with Female 392 (Chirundu). Retain Male 681 (Limpopo) for bachelor group to be formed (at White Oak Conservation Center or a future site to be identified) in 1998 or 1999.
Disney's Animal Kingdom	Receive Female 574 (Pombe) from Milwaukee and Breed with Male 403 (Harry). Receive Male 670 (Travis) from El Coyote and Breed with Female 486 (Kit). Move Male 521 (Lee) to White Oak Conservation Center for bachelor group.
White Oak Cnsrvtn Cntr	Breed Males 522 (Tortoise) and 523 (Clem) to Females 402 (Ngwete), 410 (Thombi), and 468 (Mwenda) as most convenient. Male 523 (Tortoise) is the more valuable genetically and would be a more useful mate for 410 (Thombi) and 468 (Mwenda) but it is acknowledged that his medical condition may impede such matings. Receive Male 521 (Lee) from Disney for bachelor group. Retain Males 666 (Tom) and 667 (no name reported) for bachelor group. Move Male 626 (Tim) to Marakele National Park, South Africa for re-introduction to the wild.
Dallas Zoo	Maintain Males 399 (Nyakasikan), 520 (Independence), and 668 (no name reported) for medical evaluation until Spring 1998. Move Male 399 (Nyakasikan) to Fort Worth as Breeder for Females 379 (Chula) and 411 (Mtoto) if Male 465 (Binga) is lost or not able to breed. If Male 465 remains viable, Receive an adult Female (379 or 411) from Ft. Worth.

Fort Worth Zoo	Receive Female 671 (Salsa) from El Coyote when she is old enough to move. If Male 465 (Binga) survives and is capable of breeding, move 1 adult Female 379 (Chula) or 411 (Mtoto) to Dallas to Breed with Male 399 (Nyakasikan); then Breed Male 465 (Binga) with 671 (Salsa) and the adult Female that remains, i.e. either Female 379 (Chula) or 411 (Mtoto) If Male 465 (Binga) does not survive or is not capable of breeding, Receive Male 399 (Nyakasikan) from Dallas as Breeder for all Females, i.e. 379 (Chula), 411 (Mtoto), and 67 (Salsa).
Fossil Rim Wldlf Ctr	Move Female 669 (no name reported) to Louisville in 1998. Breed Male 401 (Gota Gota) with Females 462 (Charere) and 466 (Sinampande) again.
Bass El Coyote	Move Male 670 (Travis) to Disney Animal Kingdom Move Female 671 (Salsa) to Fort Worth when she is ready. Move Male 672 (Elvis) to Louisville to Breed with Female 669 (no name reported). Breed Male 378 (Macho) with Females 414 (Victoria), 424 (Margarita), 461 (Chanel).
Milwaukee Zoo	Receive Female 336 (Zoe) from Los Angeles to Breed with Male 404 (Brewster). Move Male 574 (Pombe) to Disney Animal Kingdom to Breed with Male 403 (Harry). Breed Male 404 (Brewster) and 405 (Barley) again.

SPECIFIC RECOMMENDATIONS
SOUTHERN WHITE RHINO

(1) Improve conditions to stimulate reproduction in those institutions with the species which are not breeding.

Conditions recognized as conducive to reproduction in southern white rhino are:
- Large enclosures
- Multiple animal groups: more than 2 females seems most important; the value of more than one male is not clear but maintaining 2.0 until 1 male initiates breeding may be a good precaution.
- Herd situations where rhino are outside in the social group most of the time.
- Minimal management.

(2) Designate surplus most, with a very few exceptions, females older than 25 years of age in recognition that many of these individuals may be lost causes and that efforts/funds may be better expended on acquiring new founders from South Africa for demographic as well as genetic reasons.

The effects of moving non-breeder southern white rhino, especially females, to stimulate breeding is equivocal. There may be value in moving non-breeder females to proven males but the situation is confused because the effect may be due to conducive conditions at the institution rather than exposure to proven males.

(3) Do not move females older than 21 years of age in an attempt to induce breeding. Rather, there should be attempts at inducing reproduction by hormonal treatment. It is noted that to date the oldest first time breeder female in the SSP was 23 years old at time of conception.

(4) Attempt to avoid the "sibling relationship" syndrome that seems to occur when young white rhino, especially pairs, are placed together from an early age.

(5) Import 6.12 to 9.18 rhino from South Africa over the next 2 years (1998-1999) through the several institutions that indicated an interest in this endeavor.

Number	Time	Reason	Institutions Involved	Circumstances
0.2	1998	Demographic	White Oak C.C.	Exchange for 1.0 *D. b. minor*
2.4 to 3.6	1998	Demographic	Rio Grande - Albq African Lion Safari	Financial support to *in situ* work in S. Africa
6.10 to 7.14	1999	Demographic	Disney Anml Kngdm Binder Park Omaha Metro Toronto	Financial support to *in situ* work in S. Africa

(6) Assist Australasian ASMP program to acquire new founder stock from South Africa by providing quarantine facility for up to 6 months at the Wilds in Summer of 1998.

(7) Implement the Institution-By-Institution and Animal-By-Animal recommendations as summarized on the ensuing pages.

INSTITUTION BY INSTITUTION RECOMMENDATIONS FOR SOUTHERN WHITE RHINO
(Arranged Alphabetically By Province or State)

CANADA

African Lion Safari	Consider current collection post-reproductive. Encourage efforts to import new founder stock from South Africa.
Metro Toronto Zoo	Encourage to consider importation of new founder stock from South Africa. Perhaps Move Female 582 (Shaboola) to Taman Safari Indonesia if Female 542 (Princess) not available for export to Indonesia.
Granby Zoo	Maintain Male 748 (Yekisamga). Consider converting to Black Rhino in the future.

UNITED STATES

Birmingham Zoo	Consider collection Male 469 (Ronnie) and Female 470 (Gertrude) post-reproductive. Did not respond to Species Coordinator survey. No recommendations.
Phoenix Zoo	Consider collection Male 34 (Kehtla) and Female 153 (Tambile) post-reproductive. No recommendations other than maintain.
Reid Park Zoo - Tuscon	Consider collection Male 203 (Zibulo) and Female 238 (Yebonga) probably post-reproductive. Maintain animals.
Little Rock Zoo	Maintain Male 82 (Dudley) post-reproductive. If want to continue with white rhino, prepare facilities for 1.2 in future.

San Diego Wld Anml Prk	Move Female 188 (Mudder) to Hogle Park Zoo.
	Consider importation of new founder stock from South Africa.
	Breed Male 473 (Chuck) to Females 154 (Mjuba), 157 (Komaas), 159 (Umfolozi), 277 (Nthombi), 819 (Dumisha), 822 (Sinyaa), and 1051 (Ujima).
	Continue study of failure of F1 Females 819 and 822 to breed.
Jacksonville Zoo	Accommodate a second adult male. Receive Male 177 (Phil) from White Oak for one year and Breed him with Females 318.
	Conduct reproductive evaluation of Female 318 (Anne) using Dr. Terri Roth.
	In 1999, Return Male 177 to White Oak and Receive Male 379 (Samson) as future breeder.
	Breed Male 390 (Archie) with Female 1036 (Gabriella).
	Receive Female 1148 (no name reported) from Memphis Zoo.
Disney Animal Kingdom	Maintain Male 1045 (Tex) and Female 1079 (Maggie).
	Receive Female 569 (Grunt) from Lion Country West Palm Beach for exhibit purposes.
	Import 2.4 new founder stock from South Africa in 1999.
Lion Cntry - W. Palm Beach	If verify pedigrees through DNA analysis, invite or admit to participate in SSP.
	Specifically, conduct DNA analysis on Males 685 (Pop), 916 (Spike), and 992 (Axel) for possible relocation to SSP institutions.

White Oak Cnsrvtn Ctr	Move Male 177 (Phil) to Jacksonville for a year to Breed with Female 318 (Anne). Then in 1999, Receive Male 177 (Phil) back from Jacksonville and move Male 379 (Samson) to Jacksonville as their future breeder. Breed Male 379 (Samson) and to available Females 391 (Edith), 533 (Gloria), and 1020 (Julie). Import 0.2 southern white rhino from South Africa in exchange for 1.0 *Diceros bicornis minor* Male 626 (Tim). Move entire herd to Fort Worth Zoo if opportunity and need develops to receive northern white rhino from Democratic republic of Congo.
Honolulu Zoo	Participate if possible in importation of rhinos, preferably 1.2 since current Male 841 (Sitini) has a mean kinship above the population average.
Rolling Hills Ranch	Try to Breed Males 755 (Milton) with Females 467 (Wasaga) and 619 (Milley). Maintain Male 980 (Uzazi).
Louisville Zoo	Move entire collection Male 754 (Rufus) and Females 772 (Lulu) and 791 (Sindi) to Tulsa Zoo. Convert to Southern Black Rhino.
LA Purchase Zoo - Monroe	Remove collection Male 386 (no name reported) and Female 387 (no name reported) from SSP. No response to survey by Species Coordinator. This is last time this institution and these animals will appear in the SSP Masterplan and regional Studbook.
Audubon Zoo - N Orlns	Maintain Male 1034 (Saba) and Female 1038 (Yvonne) as is for exhibition.
Baltimore Zoo	Maintain Male 1040 (Akin) and Female 380 (Daisey Mae) as is for exhibition.
Jackson Zoo	Maintain Male 707 (Franklin) and Female 475 (Longhorn) as is for exhibition.

Omaha Zoo	Maintain current collection: Female 39 is clearly post-reproductive and Male 861 can be used for reproductive stimulation in future. Import 1.2 from South Africa in future.
Rio Grande Zoo - Albq	Import 2.4 from South Africa. Invite Racine to participate in and contribute to the importation; in exchange Move Female 358 (Dinka) to Racine.
North Carolina Zoo	Try to Breed Males 413 (Stan) and/or 573 (Ted) with Females 565 (Olivia) and 574 (Alice); both Male 413 (Stan) and Female 565 (Olivia) have reproduced elsewhere in the past; Re-evaluate husbandry and work with Dr. Terri Roth to assess situation and induce breeding.
Toledo Zoo	Maintain Male 220 (Sam) and Female 381 (Lulu). Convert to Black Rhino in future when white rhino are depart by attrition.
The Wilds	Facilitate importation of 4.8 white rhino from South Africa for Australasia by providing quarantine during 1998; perhaps Receive 1.0 or 2.0 of the males in exchange for help. Breed 187 (Fodder) with Females 148 (Delilah), 416 (Charlie), 417 (Pretty Girl), 418 (Petite), 750 (Lucy), and 842 (Karla).
Tulsa Zoo	Receive Male 754 (Rufus) and Females 772 (Lulu) and 791 (Sindi) from Louisville Zoo. Move Male 718 (Buzbie) and Female 693 (Jeannie) to Thailand via International Animal Exchange.
Wildlife Safari - Winston	Continue attempts to Breed Male 29 (Mashuara) with Females 30 (Neva) and 1039 (Taryn).
Erie Zoo	Receive Males 1080 (Dugan) and 1081 (Gregory) from Knoxville Zoo.
Knoxville Zoo	Move Males 1080 (Dugan) and 1081 (Gregory) to Erie Zoo.

Memphis Zoo	Breed Male 146 (Pendullah) with Female 397 (Tombi) again as soon as possible. Move Female 1148 (no name reported) to Jacksonville Zoo.
Gladys Porter Zoo - Brwnsvl	Receive Male 180 (Fred) and female 181 (Gertrude) from San Antonio and Breed together. Also Breed Male 180 (Fred) with Female 620 (Tilley). Move Males 1041 (Stormy) and 1042 (Bwana) to Lufkin.
Fort Worth Zoo	Maintain Male 463 (Ben) and Female 464 (Sue) for exhibition until their death. Receive herd from White Oak Conservation Center if that facility needs to provide space for northern white rhino from Democratic Republic of Congo as part of rescue operation for Garamba population.
Houston Zoo	Maintain collection of Male 191 (Samburu) and Female 192 (Marcibut) for exhibition. Consider converting to Indian Rhino in future.
Lufkin Zoo	Receive Males 1041 (Stormy) and 1042 (Bwana) to Lufkin.
San Antonio Zoo	Move Male 180 (Fred) and female 181 (Gertrude) to Gladys Porter Zoo - Brownsville because San Antonio has indicated reluctance to continue breeding due to limited space. Receive Female 190 (Nobela) from Gladys Porter Zoo - Brownsville. Move Male 1150 (no name reported) to McComb's Ranch.
Waco Zoo	Attempt to Breed Male 898 (Ollie) with Females 392 (Wrinkles) and 466 (Hatari); these wild caught females are very valuable genetically to population. Reproductively evaluate male with assistance from Dr. Terri Roth.

Fossil Rim Wldlf Ctr	Move Female 83 (Pokey) to McComb's Ranch. Retire Male 31 (Mac). Try to Breed Male 50 (Mac) or Male 618 (Marvin) with Females 147 (Macite), and 612 (M'Billi); try to Breed only Male 618 with Female 1027 (Laptop) since Male 50 (Mac) is her father.
McComb's Ranch	Receive Male 1150 (no name reported) from San Antonio and Female 83 (Pokey) from Fossil Rim. Maintain Male 202 (Shaka).
Hogle Park - Salt Lake City	Maintain Male 335 (Shimbaya). Move Female 542 (Princess) to Taman Safari Indonesia via International Animal Exchange. Receive Female 188 (Mudder) from San Diego Wild Animal Park.
Virginia Zoo - Norfolk	Maintain current collection of Males 687 (Rufus) and 753 (Alfred) and Female 686 (Jesse).
Henry Vilas - Madison	Consider collection of Male 697 (Shaka) and female 696 (Nadia) post-reproductive. Maintain.
Racine Zoo	Invite to participate and contribute to importation of 2.4 from South Africa by Rio Grande Zoo - Albuquerque. In exchange, Receive Female 358 (Dinka). Maintain Male 213 (Bender).

SPECIFIC RECOMMENDATIONS
NORTHERN WHITE RHINO

(1) Continue the intensive reproductive assessment and management, including the hormonal manipulation, of the 4 individuals, including both females, in the SSP at the San Diego Wild Animal Park in an endeavor to induce successful reproduction.

(2) Continue and increase cooperation with Dvur Kralove to maximize possibilities that this taxon can be induced to reproduce in captivity.

(3) To this end, encourage and endorse the proposed project by Renee Hogden to extend and integrate the research work occurring at San Diego Wild Animal Park and Dvur Kralove.

(4) Remain receptive to possible rescue of rhinos from Garamba National Park for managed breeding under safe and conducive conditions at White Oak Conservation Center.

INSTITUTION BY INSTITUTION RECOMMENDATIONS FOR NORTHERN WHITE RHINO
(Arranged Alphabetically By Province or State)

UNITED STATES

San Diego Wld Anml Prk	Continue the intensive efforts to Breed Females 374 (Nola) and 376 (Nadi) with Male 373 (Saut) using Male 348 (Angalifu) as a stimulus.

SPECIFIC RECOMMENDATIONS
INDIAN RHINO

(1) Refrain from reproducing individuals identified with high mean kinships and hence over-representation in the population, specifically with Basel bloodlines.

(2) Conduct aggressive evaluation and intervention for 2 important potential founders that have failed to reproduce successfully, including Females 50 (Miami) and Male 49 (Miami).

(3) Recruit 1-2 additional founders by providing females from the SSP population in exchange for males from Indian zoos which currently have an excess of males.

(4) Initiate exploration of a more extensive cooperative program with zoos and wildlife departments in India and Nepal which would:

(A) Acquire up to 10 more founders from these countries either directly from wild populations that need to be culled for ecological health or from zoos in India/Nepal already possessing or acquiring as part of this program additional individuals which could represent founders for the SSP population.

(B) Assist zoos in India and Nepal to improve their management and propagation of this species.

(C) Establish an endowment of US$ 1-2 million, the interest on which would be used to provide a regular and significant source of support for *in situ* guards in rhino areas in India and Nepal.

(D) Encourage SSP Institutions which have expressed interest to participate in this endeavor, i.e.:

Institution	**Possible Number**
Columbus Zoo	1.1
Disney Animal Kingdom	1.1 to 2.2
Los Angeles Zoo	1.1
Audubon Zoo - New Orleans	1.1

(5) It is highly recommended that San Diego Wild Animal Park consider obtaining a male and females representing new lineages unrelated to Basel bloodline to permit the extremely conducive breeding environment at this facility to be used more effectively to increase the gene diversity of the SSP population.

(6) Recruit additional qualified facilities to maintain this species in order to accommodate the proposed doubling of the current population to its target size.

(7) Improve the husbandry of this species to enhance the well-being and the breeding of this species.

(A) Develop minimum enclosure standards and vigorously encourage those institutions maintaining the species to comply. A particular problem is enclosures that are too small or unsafe to accommodate breeding.

(B) Ameliorate problems with introduction of males and females for breeding. Prepare inexperienced facilities for the aggressive interactions that can typically occur during courtship. Toward this end, develop a video of such interactions and introductions starting with footage that is already available (e.g. San Diego)

(8) Implement the Institution-By-Institution and Animal-By-Animal recommendations as summarized on the ensuing pages.

INSTITUTION BY INSTITUTION RECOMMENDATIONS FOR INDIAN RHINO
(Arranged Alphabetically By Province or State)

CANADA

Metro Toronto Zoo	Breed Male 69 (Patrick) with Female 79 (Indira) again as soon as possible.
	Move Male 222 (Sanjay) to Philadelphia to Breed with Female 223 (Penny).

UNITED STATES

Montgomery Zoo	Receive Male 101 (Pandu) from Philadelphia Zoo.
Los Angeles Zoo	Try to Breed Male 35 (Herman) with Female 45 (Randa).
	Receive Female 230 (Daily) from Bronx Zoo and Breed with Male 35 (Herman).
San Diego Wld Anml Prk	Provide Females 209 (Godvari) and T2091 (Jakichu) to Indian Zoos in exchange for 2 Males (one of which would be Male 174 or Male 177 from Trivandrum); 1 of the males would be placed at the Wilds and the other at San Diego Wild Animal Park. The Wilds will pay for transport of 1 of the males and India will pay for transport of the 2 females.
	In any case do not breed Females 209 or 143 again because of high mean kinships.
	Breed Male 106 (Rabha) with Females 99 (Gainda), 89 (Terai), 137 (Shanti), and perhaps 130 (Jumia) although her mean kinship is high.
	Move Male 236 to Columbus Zoo or Fresno Zoo.
San Francisco Zoo	Move Male 227 (Gauhati) to Buffalo (if Buffalo cannot modify yard) and Receive Male 236 (Jasai) from San Diego Wild Animal Park.
	Otherwise Retain Male 227 (Gauhati).

National Zoo - DC	Move Female 139 (Kali) to Bronx Zoo for Breeding with Male 53 (Vinu). Later, when Wilds has an appropriate breeder male from India or from Miami Metro Zoo, Move 139 (Kali) to the Wilds. Move Female 238 (Chitwan) to the Wilds for future breeding. If possible, Receive Male 49 (Mohan) from Miami Metro Zoo if he passes his reproductive assessment and Breed with Female 138 (Mechi). In this scenario, Move Male 239 (Himal) to Columbus. If not possible to Receive and Manage Male 49 (Mohan) from Miami Metrozoo, then Retain Male 239 (Himal) and Move 138 (Mechi) to Wilds for Breeding with Male 49 (Mohan) or Male from India.
Disney Animal Kingdom	Acquire a pair of new founder rhino from India or Nepal in the future.
Lowry Park - Tampa	Maintain 116 (Jorhat).
Miami Metrozoo	Move Female 50 (Shanti) to Bronx Zoo to Breed with Male 83 (Heiner) who has impregnated her before; Permit Female 50 to Remain at Bronx Zoo until calf is born in order not to jeopardize pregnancy. Evaluate Male 49 (Mohan) behaviorally (Mike Dee) and physiologically (Dr. Nan Schaffer) to assess his ability to breed; if considered a potential breeder, Move to National Zoo to Breed with Female 138 (Mechi) as first option or to Wilds if National determines it cannot manage Male 49 (Mohan). Maintain Male 126 (Akbar).
The Zoo - Gulf Breeze	Maintain Female 29 (Jaypuri) and Male 224 (Jafar).
Rolling Hills Ranch	Maintain Male 146 (Joya); could be surplus genetically since mean kinship is so high.

Baton Rouge Zoo	Maintain Male 180 (Jaunpur).
Bronx Zoo - W.C.P.	Receive Female 50 (Shanti) from Miami Metro Zoo to Breed with Male 83 (Heiner) who has impregnated her before; Retain Female 50 at Bronx Zoo until calf is born in order not to jeopardize pregnancy. Receive Female 139 (Kali) from National Zoo - DC and Breed with Male 53 (Vinu) for one calf only. Later, when the Wilds has an appropriate breeder male from India or from Miami Metrozoo and when Female 139 (Kali) is not pregnant or with calf, Move Female 139 (Kali) to the Wilds. Breed Male 53 (Vinu) with Females 66 (Mayan Kum), 131 (Ella), and 139 (Kali). Move Female 230 (Daily), when sexually mature, to Los Angeles to try to Breed with Male 35 (Herman).
Buffalo Zoo	If divide yard to accommodate breeding per recommendations from Species Coordinator, Receive Female 241 (Tashi) from Oklahoma City and Breed with Male 187 (Dhalaguri). Otherwise, Move Male 187 (Dhalaguri) to San Francisco to Breed with Female 241 (Tashi) and then Receive Male 227 from San Francisco.
Cincinnati Zoo	Breed Male 147 (Jimmy) with Female 189 (Nikki).
Columbus Zoo	Possibly Receive Male 236 (Jasai) from San Diego Wild Animal Park. Receive Male 239 (Himal) from National Zoo if Female 138 (Mechi) Remains at national and Male 49 (Mohan) Moves to national from Miami Metrozoo. Acquire pair of new founder rhino from India or Nepal in the future.

The Wilds	Receive Female 238 (Chitwan) from National Zoo to Breed in Future with an appropriate male from India or 49 from Miami. Possibly Receive Female 138 (Mechi) from National Zoo and Male 49 from Miami Metrozoo to be bred together if it is determined that the Miami male is too difficult to manage in the facilities at National Zoo. If do not Receive Female 138 (Mechi) from National Zoo, Receive Female 139 (Kali) from Bronx in future.
Oklahoma City Zoo	Breed Male 125 (Chandra) with Female 161 (Mary). Move Female 241 (Tashi) to Buffalo or to San Francisco to Breed with Male 187 (Dhalaguri).
Philadelphia Zoo	Move Male 101 (Pandu) to Montgomery Zoo. Receive Male 222 (Sanjay) from Toronto and Breed with Female 223 (Penny). Do not Breed Female 80 (Xavira).
Fort Worth Zoo	Breed Male 190 (Arun) with Female 191 (Arati).

SPECIFIC RECOMMENDATIONS
SUMATRAN RHINO

(1) Continue the program of intensive reproductive assessment and management to induce the 1.2 rhino, including both females, in the SSP at the Cincinnati Zoo to reproduce.

(2) Provide technical and financial assistance to the captive/managed breeding efforts for this species at the Sumatran Rhino Conservation Center - Sungai Dusun in Peninsula Malaysia; the Sumatran Rhino Sanctuary in Way Kambas National Park, Sumatra, Indonesia; and the Sepilok Sumatran Rhino Center, Sabah, Malaysia.

INSTITUTION BY INSTITUTION RECOMMENDATIONS FOR SUMATRAN RHINO
(Arranged Alphabetically By Province or State)

UNITED STATES

Cincinnati Zoo	Continue intensive efforts to Breed Male 28 (Ipuh) with Female 29 (Emi). Also attempt to Breed Female 27 (Rapunzel).

AZA SSP POPULATIONS OF RHINOCEROS

REGIONAL STUDBOOK UPDATE

LIVING BY INSTITUTION

BRITHS, DEATHS, TRANSFERS 1995-1997

DEMOGRAPHIC & GENETIC ANALYSES

15 December 1997

Compiled By

Dr. Tom Foose

EASTERN BLACK RHINO

Diceros bicornis michaeli

EASTERN BLACK RHINO Studbook
(Diceros bicornis michaeli)

Restricted to:
Locations: N.AMERICA/
Dates: During 12/12/1997 <= date
Status: Living during 12 Dec 1997 -> 15 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
Little Rock Zoological Gardens, Little Rock, AR, USA										
542	M	10 Mar 1995	363	365	CHICAGOBR	10 Mar 1995	950021	Captive Born	U.S.A.	JOHARI
					LITTLEROC	25 Nov 1996	UNK		U.S.A.	
Totals: 1.0.0 (1)										
Los Angeles Zoo, Los Angeles, CA, USA										
76	F	~ 1963	WILD	WILD	UNKNOWN	1 Jan 1966	UNK	Wild Born		TWINKLE TO
					FERNDALE	1 Jan 1966	UNK		U.S.A.	
					LOSANGELE	3 Oct 1966	UNK		U.S.A.	
267	F	16 Sep 1976	56	207	CINCINNAT	16 Sep 1976	UNK	Captive Born	U.S.A.	SWEET PEA
					FERNDALE	18 Dec 1978	UNK		U.S.A.	
					COLUMBUS	20 Dec 1978	UNK		U.S.A.	
					FERNDALE	1 May 1979	UNK		U.S.A.	
					LOSANGELE	27 Oct 1979	UNK		U.S.A.	
						15 Jun 1981	UNK			
285	M	7 Nov 1978	199	126	MEMPHIS	7 Nov 1978	UNK	Captive Born	U.S.A.	BUSTER/BUC
					FERNDALE	26 Aug 1979	UNK		U.S.A.	
					LOSANGELE	27 Aug 1979	UNK		U.S.A.	
						15 Jun 1981	UNK			
Totals: 1.2.0 (3)										
San Diego Wild Animal Park, Escondido, CA, USA										
233	F	~ 1970	WILD	WILD	UNKNOWN	23 Nov 1973	UNK	Wild Born		JUDY
					CHICAGOBR	23 Nov 1973	UNK		U.S.A.	
					SD-WAP	10 Nov 1986	037690		U.S.A.	
292	M	11 Dec 1979	79	293	GRANBY	11 Dec 1979	UNK	Captive Born	CANADA	CORNELIUS
					SANDIEGOZ	11 Mar 1981	UNK		U.S.A.	
					SD-WAP	25 May 1983	UNK		U.S.A.	
					SANDIEGOZ	11 Apr 1985	UNK		U.S.A.	
					SD-WAP	22 Oct 1986	181039		U.S.A.	
330	F	28 Dec 1981	261	262	DELHI	28 Dec 1981	UNK	Captive Born	INDIA	JERI
					OKLAHOMA	2 Feb 1989	UNK		U.S.A.	
					ST LOUIS	28 Jun 1991	UNK		U.S.A.	
					SD-WAP	11 Dec 1994	694690		U.S.A.	

Restricted to: (Diceros bicornis michaeli)
Locations: N.AMERICA/
Dates: During 12/12/1997 <= date
Status: Living during 12 Dec 1997 -> 15 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
636	M	6 Oct 1996	292	330	SD-WAP	6 Oct 1996	696516	Captive Born	U.S.A.	JUBBA
665	M	25 Feb 1997	292	233	SD-WAP	25 Feb 1997	697072	Captive Born	U.S.A.	JAMBIA

Totals: 3.2.0 (5)

San Francisco Zoological Gardens, San Francisco, CA, USA

213	F	1 Jan 1971	WILD	WILD	KENYA	1 Jan 1971	UNK	Wild Born	KENYA	ELLY
					FERNDALE	10 Apr 1974	UNK		U.S.A.	
					SAN FRAN	16 Apr 1974	UNK		U.S.A.	
377	M	12 Jul 1987	302	239	SD-WAP	12 Jul 1987	UNK	Unk Birth Type	U.S.A.	MASHAKI
						12 Jul 1987	UNK			
					SANDIEGOZ	5 Jan 1990	UNK		U.S.A.	
					LANSING	30 Jun 1990	UNK		U.S.A.	
					SAN FRAN	13 Apr 1994	UNK		U.S.A.	
664	M	9 Jan 1997	377	213	SAN FRAN	9 Jan 1997	UNK	Captive Born	U.S.A.	

Totals: 2.1.0 (3)

Cheyenne Mtn Zoological Park, Colorado Springs, CO, USA

331	F	11 Dec 1982	169	190	SAN ANTON	11 Dec 1982	UNK	Captive Born	U.S.A.	SHY-ANNE/H
					SAN FRAN	1 Jan 1983	UNK		U.S.A.	
					KANSASCTY	15 Jul 1984	UNK		U.S.A.	
					JACKSONVL	31 Dec 1985	UNK		U.S.A.	
					COLO SPRG	14 Jan 1987	UNK		U.S.A.	

Totals: 0.1.0 (1)

Denver Zoological Gardens, Denver, CO, USA

332	M	11 Jan 1983	247	180	CINCINNAT	11 Jan 1983	UNK	Captive Born	U.S.A.	AKEEM
					DENVER	13 Jul 1984	UNK		U.S.A.	
516	M	13 Nov 1993	161	163	DENVER	13 Nov 1993	UNK	Captive Born	U.S.A.	

Totals: 2.0.0 (2)

Jacksonville Zoological Gardens, Jacksonville, FL, USA

552	M	22 Aug 1995	381	383	COLUMBIA	22 Aug 1995	SJ1712	Captive Born	U.S.A.	ZEUS
					(JACKSONVL)	14 Oct 1996	896088		U.S.A.	

Totals: 1.0.0 (1)

Restricted to: (Diceros bicornis michaeli)
Locations: N.AMERICA/
Dates: During 12/12/1997 <= date
Status: Living during 12 Dec 1997 -> 15 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
Busch Gardens, Tampa, FL, USA										
418	F	23 Mar 1989	281	55	DETROIT	23 Mar 1989	UNK	Captive Born	U.S.A.	JUDY
						23 Mar 1989	UNK			
					BUSCH TAM	10 Aug 1990	UNK		U.S.A.	
432	M	30 Oct 1989	161	163	DENVER	30 Oct 1989	UNK	Captive Born	U.S.A.	JASPER
					BUSCH TAM	21 Aug 1991	UNK		U.S.A.	
517	F	21 Dec 1994	356	418	BUSCH TAM	21 Dec 1994	58126	Captive Born	U.S.A.	JUMATANO
Totals: 1.2.0 (3)										
Miami Metrozoo, Miami, FL, USA										
202	F	~ 1972	WILD	WILD	UNKNOWN	13 Jun 1973	UNK	Wild Born		CORA
					METROZOO	13 Jun 1973	110		U.S.A.	
259	M	10 Apr 1977	182	181	HIROSHIMA	10 Apr 1977	UNK	Captive Born	JAPAN	TOSHI
					METROZOO	10 Nov 1983	M00208		U.S.A.	
351	F	24 Jun 1985	74	213	SAN FRAN	24 Jun 1985	UNK	Captive Born	U.S.A.	MOONSTONE
					KANSASCTY	1 Jan 1986	UNK		U.S.A.	
					LOSANGELE	13 Jan 1987	UNK		U.S.A.	
					METROZOO	15 Mar 1987	M00744		U.S.A.	
395	M	18 Mar 1988	52	202	METROZOO	18 Mar 1988	M00924	Captive Born	U.S.A.	TATU
591	F	13 May 1996	395	351	METROZOO	13 May 1996	M01943	Captive Born	U.S.A.	KEESHA
Totals: 2.3.0 (5)										
Zoo Atlanta, Atlanta, GA, USA										
388	M	26 Aug 1986	268	282	DVURKRALV	26 Aug 1986	UNK	Captive Born	CZECH REP	BOMA/SADO
					ATLANTA	18 Oct 1989	UNK		U.S.A.	
426	F	6 Jan 1990	74	213	SAN FRAN	6 Jan 1990	UNK	Captive Born	U.S.A.	ROSETTA ST
					ATLANTA	23 Nov 1990	UNK		U.S.A.	
Totals: 1.1.0 (2)										
Honolulu Zoo, Honolulu, HI, USA										
443	M	30 Jul 1991	74	213	SAN FRAN	30 Jul 1991	UNK	Captive Born	U.S.A.	HAILSTONE
					HONOLULU	1 Mar 1994	UNK		U.S.A.	

Restricted to: (Diceros bicornis michaeli)
Locations: N.AMERICA/
Dates: During 12/12/1997 <= date
Status: Living during 12 Dec 1997 -> 15 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
458	M	26 Mar 1992	332	328	DENVER	26 Mar 1992	UNK	Captive Born	U.S.A.	AKONI
					HONOLULU	31 Jan 1994	UNK		U.S.A.	
Totals: 2.0.0 (2)										
Chicago Zoological Park, Brookfield, IL, USA										
235	F	- 1970	WILD	WILD	UNKNOWN	11 Dec 1973	UNK	Wild Born		BROOKE
					CHICAGOBR	11 Dec 1973	UNK		U.S.A.	
363	M	14 Dec 1985	247	180	CINCINNAT	14 Dec 1985	UNK	Captive Born	U.S.A.	KABISA
					CHICAGOBR	23 Mar 1987	UNK		U.S.A.	
365	F	18 Jan 1985	271	235	CHICAGOBR	18 Jan 1985	UNK	Captive Born	U.S.A.	SHIMA
427	M	25 Feb 1990	292	239	SD-WAP	25 Feb 1990	UNK	Unk Birth Type	U.S.A.	NAKILI
					CHICAGOBR	17 May 1994	UNK		U.S.A.	
488	M	6 Oct 1993	271	235	CHICAGOBR	6 Oct 1993	UNK	Captive Born	U.S.A.	KIJITO
Totals: 3.2.0 (5)										
Lincoln Park Zoo, Chicago, IL, USA										
294	F	21 May 1981	169	190	SAN ANTON	21 May 1981	UNK	Captive Born	U.S.A.	MARSHA
					CHICAGOLP	21 Jul 1982	UNK		U.S.A.	
308	M	18 Oct 1981	74	213	SAN FRAN	18 Oct 1981	UNK	Captive Born	U.S.A.	MARSHALL
					CHICAGOLP	17 Jun 1982	UNK		U.S.A.	
317	F	29 Sep 1982	56	207	CINCINNAT	29 Sep 1982	UNK	Captive Born	U.S.A.	NAIVASHA
					CHICAGOLP	12 Jun 1984	UNK		U.S.A.	
Totals: 1.2.0 (3)										
Lee Richardson Zoo, Garden City, KS, USA										
419	M	21 May 1989	308	317	CHICAGOLP	21 May 1989	UNK	Captive Born	U.S.A.	AHADI/BARL
					GARDENCTY	31 Jul 1990	UNK		U.S.A.	
Totals: 1.0.0 (1)										

Restricted to:
Locations: N.AMERICA/
Dates: During 12/12/1997 <= date
Status: Living during 12 Dec 1997 -> 15 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
Sedgwick County Zoo, Wichita, KS, USA										
53	F	~ 1963	WILD	WILD	UNKNOWN	5 Sep 1965	UNK	Wild Born		BIBI
					FERNDALE	5 Sep 1965	UNK		U.S.A.	
					DETROIT	30 Sep 1965	UNK		U.S.A.	
					OKLAHOMA	5 Jun 1985	UNK		U.S.A.	
					SEDGWICK	2 Aug 1988	UNK		U.S.A.	
301	M	25 Feb 1980	56	207	CINCINNAT	25 Feb 1980	UNK	Captive Born	U.S.A.	EUGENE
					SEDGWICK	23 Jun 1981	UNK		U.S.A.	
Totals: 1.1.0 (2)										
Potter Park Zoological Gardens, Lansing, MI, USA										
435	M	29 Nov 1990	292	233	SD-WAP	29 Nov 1990	UNK	Unk Birth Type	U.S.A.	JIMMA
					LANSING	18 May 1994	UNK		U.S.A.	
489	F	30 May 1993	362	359	CALDWELL	30 May 1993	UNK	Captive Born	U.S.A.	RAFIKI
					LANSING	28 Jun 1994	UNK		U.S.A.	
Totals: 1.1.0 (2)										
Detroit Zoological Institute, Royal Oak, MI, USA										
409	M	~ 1952	WILD	WILD	UNKNOWN	12 Jul 1954	UNK	Wild Born		RUDY
					PROSPECTP	12 Jul 1954	UNK		U.S.A.	
					DETROIT	1 Aug 1988	UNK		U.S.A.	
Totals: 1.0.0 (1)										
Kansas City Zoological Gardens, Kansas City, MO, USA										
475	M	11 Feb 1993	259	202	METROZOO	11 Feb 1993	UNK	Captive Born	U.S.A.	TUCKER
					KANSASCTY	5 Apr 1995	UNK		U.S.A.	
490	M	16 Aug 1993	301	53	SEDGWICK	16 Aug 1993	UNK	Captive Born	U.S.A.	RUDISHA
					KANSASCTY	1 Nov 1995	102752		U.S.A.	
660	F	~ 1992	WILD	WILD	S.AFRICA	15 Jun 1996	UNK	Wild Born	S.AFRICA	GINNY/LUCY
					KANSASCTY	17 Oct 1996	102863		U.S.A.	
684	F	1 Jan 1993	WILD	WILD	ADDO N.P.	~ Mar 1997	UNK	Wild Born	S.AFRICA	LUYISA
					KANSASCTY	3 Jul 1997	97M052		U.S.A.	
Totals: 2.2.0 (4)										

Restricted to:
Locations: N.AMERICA/
Dates: During 12/12/1997 <= date
Status: Living during 12 Dec 1997 -> 15 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
St Louis Zoological Park, St Louis, MO, USA										
212	F	9 Sep 1975	52	53	DETROIT	9 Sep 1975	UNK	Captive Born	U.S.A.	BETSY
					ST LOUIS	30 Oct 1984	UNK		U.S.A.	
251	M	~ 1974	WILD	WILD	UNKNOWN	22 May 1976	UNK	Wild Born		TOTO
					FERNDALE	22 May 1976	UNK		U.S.A.	
					ST LOUIS	12 Sep 1976	UNK		U.S.A.	
Totals: 1.1.0 (2)										
International Wildlife Conservation Pk, Bronx, NY, USA										
473	M	15 Nov 1992	110	192	SANDIEGOZ	15 Nov 1992	UNK	Captive Born	U.S.A.	WERIKHE
					NY BRONX	8 Jun 1994	UNK		U.S.A.	
Totals: 1.0.0 (1)										
Cincinnati Zoo & Botanical Garden, Cincinnati, OH, USA										
225	F	~ 1968	WILD	WILD	UNKNOWN	1 Jan 1970	UNK	Wild Born		JULIE
					OKAHANDJA	1 Jan 1970	UNK		NAMIBIA	
					BUSCH TAM	24 Jul 1971	UNK		U.S.A.	
					CINCINNAT	16 Aug 1990	UNK		U.S.A.	
247	M	~ 1968	WILD	WILD	UNKNOWN	1 Jul 1970	UNK	Wild Born		RALPH
					DEMMER	1 Jan 1971	UNK		AUSTRIA	
					CINCINNAT	19 Jul 1972	UNK		U.S.A.	
518	M	9 Dec 1994	247	225	CINCINNAT	9 Dec 1994	UNK	Captive Born	U.S.A.	BWANA CHAI
Totals: 2.1.0 (3)										
Cleveland Metroparks Zoological Park, Cleveland, OH, USA										
457	M	5 Aug 1992	247	225	CINCINNAT	5 Aug 1992	UNK	Captive Born	U.S.A.	SPIKE
					CLEVELAND	19 Aug 1994	940846		U.S.A.	
683	F	1 Jan 1993	WILD	WILD	ADDO N.P.	~ Mar 1997	UNK	Wild Born	S.AFRICA	INGE
					CLEVELAND	3 Jul 1997	970703		U.S.A.	
Totals: 1.1.0 (2)										

Restricted to: (Diceros bicornis michaeli)
Locations: N.AMERICA/
Dates: During 12/12/1997 <= date
Status: Living during 12 Dec 1997 -> 15 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
Columbus Zoological Gardens, Powell, OH, USA										
68	M	~ 1951	WILD	WILD	AFRICAN	1 Jan 1954	UNK	Wild Born	AFRICAN	CLYDE
					COLUMBUS	1 Jan 1954	UNK		U.S.A.	
Totals: 1.0.0 (1)										
The Wilds / Irf, Cumberland, OH, USA										
389	M	12 Sep 1988	292	233	SD-WAP	12 Sep 1988	UNK	Captive Born	U.S.A.	JIONI
					COLUMBUS	9 Oct 1989	UNK		U.S.A.	
					WILDS	30 Oct 1996	UNK		U.S.A.	
397	F	19 Oct 1988	247	180	CINCINNAT	19 Oct 1988	UNK	Captive Born	U.S.A.	KULINDA KI
					COLUMBUS	10 Apr 1989	UNK		U.S.A.	
					WILDS	30 Oct 1996	UNK		U.S.A.	
Totals: 1.1.0 (2)										
Oklahoma City Zoological Park, Oklahoma City, OK, USA										
459	M	21 Oct 1991	251	212	ST LOUIS	21 Oct 1991	UNK	Captive Born	U.S.A.	WERIKHE
					OKLAHOMA	9 Nov 1993	UNK		U.S.A.	
Totals: 1.0.0 (1)										
Washington Park Zoo, Portland, OR, USA										
376	M	7 May 1987	161	163	DENVER	7 May 1987	UNK	Captive Born	U.S.A.	PETE
					PORTLAND	25 Jun 1988	UNK		U.S.A.	
396	F	4 Nov 1988	271	235	CHICAGOBR	4 Nov 1988	UNK	Captive Born	U.S.A.	MIADI
						4 Nov 1988	UNK			
					PORTLAND	15 Mar 1990	UNK		U.S.A.	
677	F	29 Sep 1997	376	396	PORTLAND	29 Sep 1997	UNK	Captive Born	U.S.A.	IMARA
Totals: 1.2.0 (3)										
Pittsburgh Zoo, Pittsburgh, PA, USA										
569	M	22 Jul 1995	292	233	SD-WAP	22 Jul 1995	695401	Captive Born	U.S.A.	JOMO
					PITTSBURG	13 Aug 1996	UNK		U.S.A.	
Totals: 1.0.0 (1)										

Restricted to: (Diceros bicornis michaeli)
Locations: N.AMERICA/
Dates: During 12/12/1997 <= date
Status: Living during 12 Dec 1997 -> 15 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
Riverbanks Zoo and Garden, Columbia, SC, USA										
381	M	10 Jun 1986	285	76	LOSANGELE	10 Jun 1986	002425	Captive Born	U.S.A.	ZAKAR
					OKLAHOMA	9 Jun 1988	UNK		U.S.A.	
					MILWAUKEE	27 Jun 1989	UNK		U.S.A.	
					COLUMBIA	23 May 1991	SJ1377		U.S.A.	
383	F	2 Jul 1988	74	213	SAN FRAN	2 Jul 1988	188050	Captive Born	U.S.A.	GEMSTONE
					MILWAUKEE	19 Dec 1989	UNK		U.S.A.	
					COLUMBIA	6 Jun 1991	SJ1378		U.S.A.	
Totals: 1.1.0 (2)										
Great Plains Zoo, Sioux Falls, SD, USA										
480	M	20 Oct 1993	305	331	COLO SPRG	20 Oct 1993	UNK	Captive Born	U.S.A.	BOO
					SIOUX FAL	19 Nov 1995	UNK		U.S.A.	
Totals: 1.0.0 (1)										
San Antonio Zool Garden & Aquarium, San Antonio, TX, USA										
169	M	~ 1969	WILD	WILD	UNKNOWN	22 Aug 1971	UNK	Wild Born		LORD
					DVURKRALV	22 Aug 1971	UNK		CZECH REP	
					JACKSONVL	3 Aug 1972	UNK		U.S.A.	
					SAN ANTON	22 Apr 1978	UNK		U.S.A.	
190	F	26 Nov 1969	16	17	LONDON RP	26 Nov 1969	UNK	Captive Born	ENGLAND	LUANA/LISA
					DUBLIN	19 Apr 1972	UNK		IRELAND	
					TORONTO	7 Jun 1974	UNK		CANADA	
					SAN ANTON	28 Dec 1976	UNK		U.S.A.	
364	F	27 Dec 1985	56	207	CINCINNAT	27 Dec 1985	UNK	Captive Born	U.S.A.	SABABU
					SAN ANTON	17 Jul 1987	UNK		U.S.A.	
Totals: 1.2.0 (3)										
Caldwell Zoo, Tyler, TX, USA										
359	F	1 Feb 1986	169	190	SAN ANTON	1 Feb 1986	UNK	Captive Born	U.S.A.	CRISTA
					CALDWELL	19 Jul 1987	001111		U.S.A.	
362	M	11 Mar 1986	259	202	METROZOO	11 Mar 1986	UNK	Captive Born	U.S.A.	MAKUU
					CALDWELL	15 Sep 1988	001315		U.S.A.	

Restricted to: (Diceros bicornis michaeli)
Locations: N.AMERICA/
Dates: During 12/12/1997 <= date
Status: Living during 12 Dec 1997 -> 15 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
372	M	11 Dec 1986	271	235	CHICAGOBR	11 Dec 1986	UNK	Captive Born	U.S.A.	CORKY
					CALDWELL	23 Oct 1988	001425		U.S.A.	
682	M	26 Jul 1997	362	359	CALDWELL	26 Jul 1997	104130	Captive Born	U.S.A.	TATU

Totals: 3.1.0 (4)

TOTALS: 42.30.0 (72)
31 Institutions

Restricted to: (Diceros bicornis michaeli)
Locations: N.AMERICA/
Dates: During 01/11/1995 <= date
Event: Births
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name
San Diego Wild Animal Park, Escondido, CA, USA											
636	M	6 Oct 1996	292	330	SD-WAP	6 Oct 1996	696516	Captive Born	U.S.A.		JUBBA
665	M	25 Feb 1997	292	233	SD-WAP	25 Feb 1997	697072	Captive Born	U.S.A.		JAMBIA
Totals: 2.0.0 (2)											
San Francisco Zoological Gardens, San Francisco, CA, USA											
664	M	9 Jan 1997	377	213	SAN FRAN	9 Jan 1997	UNK	Captive Born	U.S.A.		
Totals: 1.0.0 (1)											
Miami Metrozoo, Miami, FL, USA											
591	F	13 May 1996	395	351	METROZOO	13 May 1996	M01943	Captive Born	U.S.A.		KEESHA
Totals: 0.1.0 (1)											
Washington Park Zoo, Portland, OR, USA											
677	F	29 Sep 1997	376	396	PORTLAND	29 Sep 1997	UNK	Captive Born	U.S.A.		IMARA
Totals: 0.1.0 (1)											
Caldwell Zoo, Tyler, TX, USA											
572	M	18 Dec 1995	362	359	CALDWELL	18 Dec 1995 24 Dec 1995 (died)	3704	Captive Born	U.S.A.	24 Dec 1995	
[Death by: Unknown means]											
682	M	26 Jul 1997	362	359	CALDWELL	26 Jul 1997	104130	Captive Born	U.S.A.		TATU
Totals: 2.0.0 (2)											

TOTALS: 5.2.0 (7)
5 Institutions

Restricted to: (Diceros bicornis michaeli)
Locations: N.AMERICA/
Dates: During 01/11/1995 <= date
Event: Deaths
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name
San Diego Wild Animal Park, Escondido, CA, USA											
192	F	2 May 1972	54	55	OKLAHOMA	2 May 1972	UNK	Captive Born	U.S.A.		EDITH ANN
					SEDGWICK	5 Nov 1973	UNK		U.S.A.		
					SANDIEGOZ	6 Oct 1988	UNK		U.S.A.		
					SD-WAP	14 Mar 1995	UNK		U.S.A.		
						24 Apr 1997 (died)				24 Apr 1997	
					[Death by: Unknown means]						
Totals: 0.1.0 (1)											
Denver Zoological Gardens, Denver, CO, USA											
328	F	15 Nov 1982	161	163	DENVER	15 Nov 1982	UNK	Captive Born	U.S.A.		ONYX
						11 Sep 1996 (died)				11 Sep 1996	
					[Death by: Euthanasia Unknown Generalized Metabolism]						
Totals: 0.1.0 (1)											
Busch Gardens, Tampa, FL, USA											
356	M	9 Feb 1986	155	225	BUSCH TAM	9 Feb 1986	UNK	Captive Born	U.S.A.		LITTLE JOE
						5 Dec 1997 (died)				5 Dec 1997	
					[Death by: Infection Associated Unknown Respiratory Unknown (after autopsy)]						
Totals: 1.0.0 (1)											
Miami Metrozoo, Miami, FL, USA											
255	F	~ 1969	WILD	WILD	UNKNOWN	1 Jan 1970	UNK	Wild Born			LULU/BABY
					OKAHANDJA	1 Jan 1970	UNK		NAMIBIA		
					FRANKLINP	9 Jul 1973	UNK		U.S.A.		
					BUFFALO	9 Nov 1976	UNK		U.S.A.		
					METROZOO	21 Jan 1983	M00092		U.S.A.		
						14 Aug 1997 (died)				14 Aug 1997	
					[Death by: Infection Associated Unknown Respiratory Unknown (after autopsy)]						
Totals: 0.1.0 (1)											

Restricted to: (Diceros bicornis michaeli)
Locations: N.AMERICA/
Dates: During 01/11/1995 <= date
Event: Deaths
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name
Pittsburgh Zoo, Pittsburgh, PA, USA											
571	F	13 Aug 1995	377	213	SAN FRAN	13 Aug 1995	UNK	Captive Born	U.S.A.		GENELLY
					SD-WAP	22 Mar 1996	UNK		U.S.A.		
					PITTSBURG	13 Aug 1996	UNK		U.S.A.		
						28 Nov 1997 (died)				28 Nov 1997	
					[Death by: Env. or Beh. Conditions Unknown Digestive Metabolism]						
Totals: 0.1.0 (1)											
Caldwell Zoo, Tyler, TX, USA											
538	F	20 Apr 1996	346	183	OSAKA	20 Apr 1996	UNK	Captive Born	JAPAN		SATOMI
					CALDWELL	7 Oct 1996	UNK		U.S.A.		
						21 Oct 1996 (died)				21 Oct 1996	
					[Death by: Self Inflicted Injuries Unknown No Autopsy Planned]						
572	M	18 Dec 1995	362	359	CALDWELL	18 Dec 1995	3704	Captive Born	U.S.A.		
						24 Dec 1995 (died)				24 Dec 1995	
					[Death by: Unknown means]						
Totals: 1.1.0 (2)											

TOTALS: 2.5.0 (7)
6 Institutions

EASTERN BLACK RHINO Studbook
(Diceros bicornis michaeli)

Restricted to:
Locations: N.AMERICA/
Dates: During 01/11/1995 <= date
Event: Transfers
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name
Little Rock Zoological Gardens, Little Rock, AR, USA											
542	M	10 Mar 1995	363	365	CHICAGOBR	10 Mar 1995	950021	Captive Born	U.S.A.		JOHARI
					LITTLEROC	25 Nov 1996	UNK		U.S.A.		
Totals: 1.0.0 (1)											
Jacksonville Zoological Gardens, Jacksonville, FL, USA											
552	M	22 Aug 1995	381	383	COLUMBIA	22 Aug 1995	SJ1712	Captive Born	U.S.A.		ZEUS
					(JACKSONVL)	14 Oct 1996	896088		U.S.A.		
Totals: 1.0.0 (1)											
Kansas City Zoological Gardens, Kansas City, MO, USA											
490	M	16 Aug 1993	301	53	SEDGWICK	16 Aug 1993	UNK	Captive Born	U.S.A.		RUDISHA
					KANSASCTY	1 Nov 1995	102752		U.S.A.		
660	F	~ 1992	WILD	WILD	S.AFRICA	15 Jun 1996	UNK	Wild Born	S.AFRICA		GINNY/LUCY
					KANSASCTY	17 Oct 1996	102863		U.S.A.		
684	F	1 Jan 1993	WILD	WILD	ADDO N.P.	~ Mar 1997	UNK	Wild Born	S.AFRICA		LUYISA
					KANSASCTY	3 Jul 1997	97M052		U.S.A.		
Totals: 1.2.0 (3)											
Cleveland Metroparks Zoological Park, Cleveland, OH, USA											
683	F	1 Jan 1993	WILD	WILD	ADDO N.P.	~ Mar 1997	UNK	Wild Born	S.AFRICA		INGE
					CLEVELAND	3 Jul 1997	970703		U.S.A.		
Totals: 0.1.0 (1)											
The Wilds / Irf, Cumberland, OH, USA											
389	M	12 Sep 1988	292	233	SD-WAP	12 Sep 1988	UNK	Captive Born	U.S.A.		JIONI
					COLUMBUS	9 Oct 1989	UNK		U.S.A.		
					WILDS	30 Oct 1996	UNK		U.S.A.		
397	F	19 Oct 1988	247	180	CINCINNAT	19 Oct 1988	UNK	Captive Born	U.S.A.		KULINDA KI
					COLUMBUS	10 Apr 1989	UNK		U.S.A.		
					WILDS	30 Oct 1996	UNK		U.S.A.		
Totals: 1.1.0 (2)											

Restricted to: (Diceros bicornis michaeli)
Locations: N.AMERICA/
Dates: During 01/11/1995 <= date
Event: Transfers
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name
Pittsburgh Zoo, Pittsburgh, PA, USA											
569	M	22 Jul 1995	292	233	SD-WAP	22 Jul 1995	695401	Captive Born	U.S.A.		JOMO
					PITTSBURG	13 Aug 1996	UNK		U.S.A.		
571	F	13 Aug 1995	377	213	SAN FRAN	13 Aug 1995	UNK	Captive Born	U.S.A.		GENELLY
					SD-WAP	22 Mar 1996	UNK		U.S.A.		
					PITTSBURG	13 Aug 1996	UNK		U.S.A.		
						28 Nov 1997 (died)				28 Nov 1997	
					[Death by: Env. or Beh. Conditions Unknown Digestive Metabolism]						
Totals: 1.1.0 (2)											
Great Plains Zoo, Sioux Falls, SD, USA											
480	M	20 Oct 1993	305	331	COLO SPRG	20 Oct 1993	UNK	Captive Born	U.S.A.		BOO
					SIOUX FAL	19 Nov 1995	UNK		U.S.A.		
Totals: 1.0.0 (1)											
Caldwell Zoo, Tyler, TX, USA											
538	F	20 Apr 1996	346	183	OSAKA	20 Apr 1996	UNK	Captive Born	JAPAN		SATOMI
					CALDWELL	7 Oct 1996	UNK		U.S.A.		
						21 Oct 1996 (died)				21 Oct 1996	
					[Death by: Self Inflicted Injuries Unknown No Autopsy Planned]						
Totals: 0.1.0 (1)											
TOTALS: 6.6.0 (12)											
8 Institutions											

Locations: N.AMERICA/
Dates: As of End of 11/12/1997 <= date
Status: Living by

Taxon Name: DICEROS BICORNIS MICHAELI

Age	Males N =42.0	Females N =30.0
46-	X	
45-	X	
44-		
43-		
42-		
41-		
40-		
39-		
38-		
37-		
36-		
35-		
34-		XX
33-		
32-		
31-		
30-		
29-	X	X
28-	X	X
27-		XX
26-		X
25-		X
24-		
23-	X	
22-		X
21-		X
20-	X	
19-	X	
18-	X	
17-	X	
16-	X	X
15-		XXX
14-	X	
13-		
12-	X	XX
11-	XXXX	XX
10-	XX	
9-	XX	XXX
8-	XX	X
7-	XX	X
6-	XX	
5-	XXX	X
4-	XXXXX	XXX
3-	X	
2-	XXX	X
1-	X	X
0-	XXX	X

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

Number of Animals

Locations: N.AMERICA/
Dates: As of End of 11/12/1997 <= date
Status: Living by

Taxon Name: DICEROS BICORNIS MICHAELI

Age	Studbook Numbers >>> Male				
46	68				
45	409				
44					
43					
42					
41					
40					
39					
38					
37					
36					
35					
34					
33					
32					
31					
30					
29	247				
28	169				
27					
26					
25					
24					
23	251				
22					
21					
20	259				
19	285				
18	292				
17	301				
16	308				
15					
14	332				
13					
12	363				
11	362	372	381	388	
10	376	377			
9	389	395			
8	419	432			
7	427	435			
6	443	459			
5	457	458	473		
4	475	480	488	490	516
3	518				
	542	552	569		
2	636	665	682		

Locations: N.AMERICA/
Dates: As of End of 11/12/1997 <= date
Status: Living by

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age	Studbook Numbers >>> **Female**		
46			
45			
44			
43			
42			
41			
40			
39			
38			
37			
36			
35			
34	53	76	
33			
32			
31			
30			
29	225		
28	190		
27	233	235	
26	213		
25	202		
24			
23			
22	212		
21	267		
20			
19			
18			
17			
16	294		
15	317	330	331
14			
13			
12	351	365	
11	359	364	
10			
9	383	396	397
8	418		
7	426		
6			
5	660		
4	489	683	684
3			
2	517		
1	591		
0	677		

Total= 30

Fecundity and Mortality Report

Restricted to: EASTERN BLACK RHINO Studbook
Locations: N.AMERICA/
Dates: During 01/01/1988 <= date

Taxon Name: **DICEROS BICORNIS MICHAELI**

Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	25.0	0.00	11.3	0.17	30.0	0.31	16.2
1- 2	0.00	24.9	0.00	11.8	0.00	24.9	0.08	12.5
2- 3	0.00	26.2	0.00	11.7	0.00	26.2	0.28	14.5
3- 4	0.00	23.9	0.00	10.2	0.00	23.9	0.09	11.0
4- 5	0.00	20.6	0.00	10.7	0.00	20.6	0.00	10.7
5- 6	0.00	18.2	0.04	12.5	0.00	18.2	0.00	12.5
6- 7	0.03	16.6	0.04	12.4	0.00	16.6	0.00	12.4
7- 8	0.09	16.6	0.11	13.8	0.00	16.6	0.00	13.8
8- 9	0.12	16.6	0.04	12.7	0.00	16.6	0.00	12.7
9-10	0.21	16.6	0.15	9.7	0.00	16.6	0.00	9.7
10-11	0.13	15.3	0.17	9.0	0.00	15.3	0.00	9.0
11-12	0.12	12.4	0.05	10.3	0.08	12.6	0.00	10.3
12-13	0.17	9.0	0.00	9.1	0.00	9.0	0.00	9.1
13-14	0.12	8.5	0.06	7.8	0.11	9.0	0.13	8.0
14-15	0.13	7.9	0.15	6.7	0.12	8.2	0.14	7.0
15-16	0.25	6.0	0.00	5.5	0.00	6.0	0.00	5.5
16-17	0.16	6.2	0.18	5.6	0.00	6.2	0.00	5.6
17-18	0.26	5.8	0.06	8.2	0.00	5.8	0.00	8.2
18-19	0.00	4.0	0.22	11.4	0.00	4.0	0.08	11.9
19-20	0.00	4.1	0.04	13.0	0.00	4.1	0.00	13.0
20-21	0.09	5.3	0.14	14.0	0.00	5.3	0.00	14.0
21-22	0.10	5.0	0.08	13.2	0.00	5.0	0.08	13.2
22-23	0.00	5.0	0.18	11.3	0.00	5.0	0.00	11.3
23-24	0.00	4.0	0.05	9.9	0.20	5.0	0.18	11.0
24-25	0.27	3.7	0.12	8.1	0.25	4.0	0.22	9.0
25-26	0.17	3.0	0.06	9.0	0.00	3.0	0.00	9.0
26-27	0.17	3.0	0.18	8.5	0.00	3.0	0.00	8.5
27-28	0.00	2.1	0.10	9.9	0.33	3.0	0.00	9.9
28-29	0.00	2.0	0.08	6.5	0.00	2.0	0.28	7.1
29-30	0.00	1.0	0.00	6.0	0.00	1.0	0.00	6.0
30-31	0.00	0.0	0.10	5.0	0.00	0.0	0.00	5.0
31-32	0.00	0.3	0.00	4.6	0.00	0.3	0.20	5.0
32-33	0.00	1.0	0.00	3.2	0.00	1.0	0.50	4.0
33-34	0.00	0.4	0.00	3.0	0.95	1.1	0.00	3.0
34-35	0.50	1.0	0.00	2.9	0.00	1.0	0.00	2.9
35-36	0.00	1.0	0.00	1.0	0.00	1.0	0.00	1.0
36-37	0.25	2.0	0.00	1.0	0.00	2.0	0.00	1.0
37-38	0.18	2.9	0.00	1.0	0.33	3.0	0.00	1.0
38-39	0.00	2.0	0.00	0.2	0.00	2.0	1.00	1.0
39-40	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
40-41	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0

Taxon Name: **DICEROS BICORNIS MICHAELI**

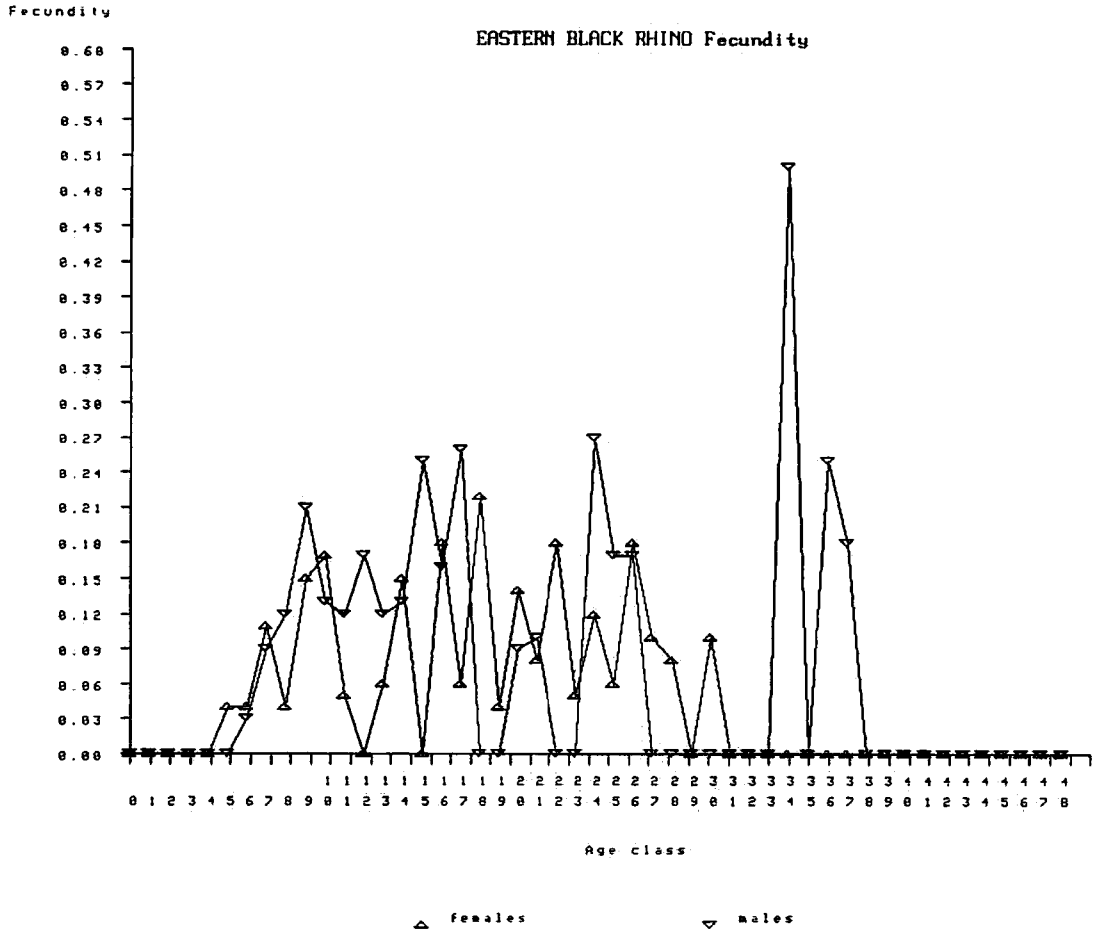
42-43	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
43-44	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
44-45	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
45-46	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
46-47	0.00	1.0	0.00	0.0	0.00	1.0	0.00	0.0
47-48	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
48-49	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

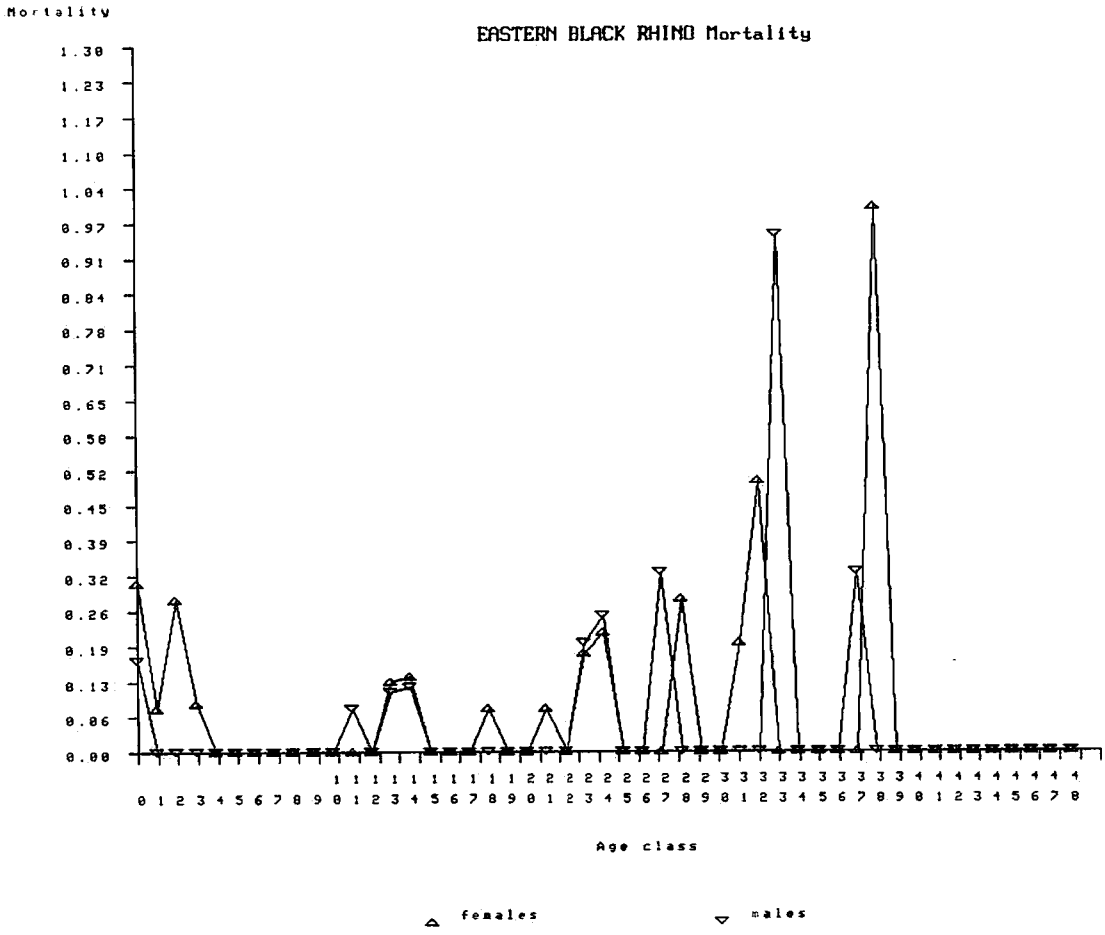
T = 14.562 T = 15.730 30 day mortality: 20%
Ro = 1.606 Ro = 0.686 (9 deaths out of 46 arriving
lambda=1.03 lambda=0.98 within 30 days of birth date)
r = 0.033 r = -0.024

46 birth events to known age parents tabulated for Mx...
(Average of 46 births to female parents and 46 births to male parents.)

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

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


EASTERN BLACK RHINO Fecundity
Fecundity
0.60
0.57
0.54
0.51
0.48
0.45
0.42
0.39
0.36
0.33
0.30
0.27
0.24
0.21
0.18
0.15
0.12
0.09
0.06
0.03
0.00
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8
Age class
females
males


EASTERN BLACK RHINO Mortality
Mortality
1.30
1.23
1.17
1.10
1.04
0.97
0.91
0.84
0.78
0.71
0.65
0.58
0.52
0.45
0.39
0.32
0.26
0.19
0.13
0.06
0.00
Age class
females
males

Age Class	Fecundity [Mx] ... Male	N	Female	N	Mortality [Qx] ... Male	N	Female	N
0- 1	0.00	25.0	0.00	11.3	0.17	30.0	0.31	16.2
1- 2	0.00	24.9	0.00	11.8	0.00	24.9	0.18	12.5
2- 3	0.00	26.2	0.00	11.7	0.00	26.2	0.15	14.5
3- 4	0.00	23.9	0.00	10.2	0.00	23.9	0.12	11.0
4- 5	0.00	20.6	0.01	10.7	0.00	20.6	0.03	10.7
5- 6	0.01	18.2	0.03	12.5	0.00	18.2	0.00	12.5
6- 7	0.04	16.6	0.06	12.4	0.00	16.6	0.00	12.4
7- 8	0.08	16.6	0.06	13.8	0.00	16.6	0.00	13.8
8- 9	0.14	16.6	0.10	12.7	0.00	16.6	0.00	12.7
9-10	0.15	16.6	0.12	9.7	0.00	16.6	0.00	9.7
10-11	0.15	15.3	0.12	9.0	0.03	15.3	0.00	9.0
11-12	0.14	12.4	0.07	10.3	0.03	12.6	0.00	10.3
12-13	0.14	9.0	0.04	9.1	0.06	9.0	0.04	9.1
13-14	0.14	8.5	0.07	7.8	0.08	9.0	0.09	8.0
14-15	0.17	7.9	0.07	6.7	0.08	8.2	0.09	7.0
15-16	0.18	6.0	0.11	5.5	0.04	6.0	0.05	5.5
16-17	0.22	6.2	0.08	5.6	0.00	6.2	0.00	5.6
17-18	0.14	5.8	0.15	8.2	0.00	5.8	0.03	8.2
18-19	0.09	4.0	0.11	11.4	0.00	4.0	0.03	11.9
19-20	0.03	4.1	0.13	13.0	0.00	4.1	0.03	13.0
20-21	0.06	5.3	0.09	14.0	0.00	5.3	0.03	14.0
21-22	0.06	5.0	0.13	13.2	0.00	5.0	0.03	13.2
22-23	0.03	5.0	0.10	11.3	0.07	5.0	0.09	11.3
23-24	0.09	4.0	0.12	9.9	0.15	5.0	0.13	11.0
24-25	0.15	3.7	0.08	8.1	0.15	4.0	0.13	9.0
25-26	0.20	3.0	0.12	9.0	0.08	3.0	0.07	9.0
26-27	0.11	3.0	0.11	8.5	0.11	3.0	0.00	8.5
27-28	0.06	2.1	0.12	9.9	0.11	3.0	0.09	9.9
28-29	0.00	2.0	0.06	6.5	0.11	2.0	0.09	7.1
29-30	0.00	1.0	0.06	6.0	0.00	1.0	0.09	6.0
30-31	0.00	0.0	0.03	5.0	0.00	0.0	0.07	5.0
31-32	0.00	0.3	0.03	4.6	0.00	0.3	0.23	5.0
32-33	0.00	1.0	0.00	3.2	0.32	1.0	0.23	4.0
33-34	0.17	0.4	0.00	3.0	0.32	1.1	0.17	3.0
34-35	0.17	1.0	0.00	2.9	0.32	1.0	0.00	2.9
35-36	0.25	1.0	0.00	1.0	0.00	1.0	0.00	1.0
36-37	0.14	2.0	0.00	1.0	0.11	2.0	0.00	1.0
37-38	0.14	2.9	0.00	1.0	0.11	3.0	0.33	1.0
38-39	0.06	2.0	0.00	0.2	0.11	2.0	0.33	1.0
39-40	0.00	2.0	0.00	0.0	0.00	2.0	0.33	0.0
40-41	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
41-42	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
42-43	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
43-44	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
44-45	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
45-46	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
46-47	0.00	1.0	0.00	0.0	0.00	1.0	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
49-50	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 15.445
Ro = 1.689
lambda=1.03
r = 0.034

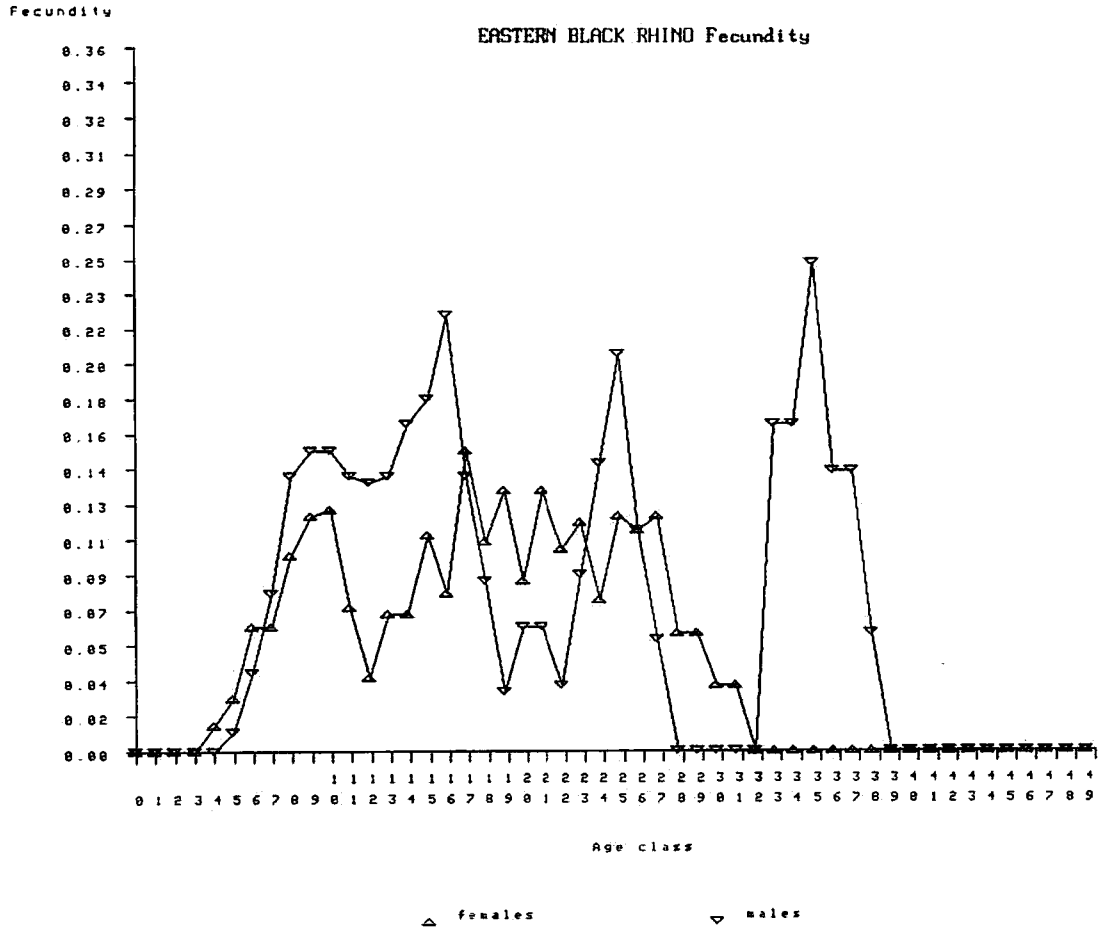
T = 15.728
Ro = 0.680
lambda=0.98
r = -0.024

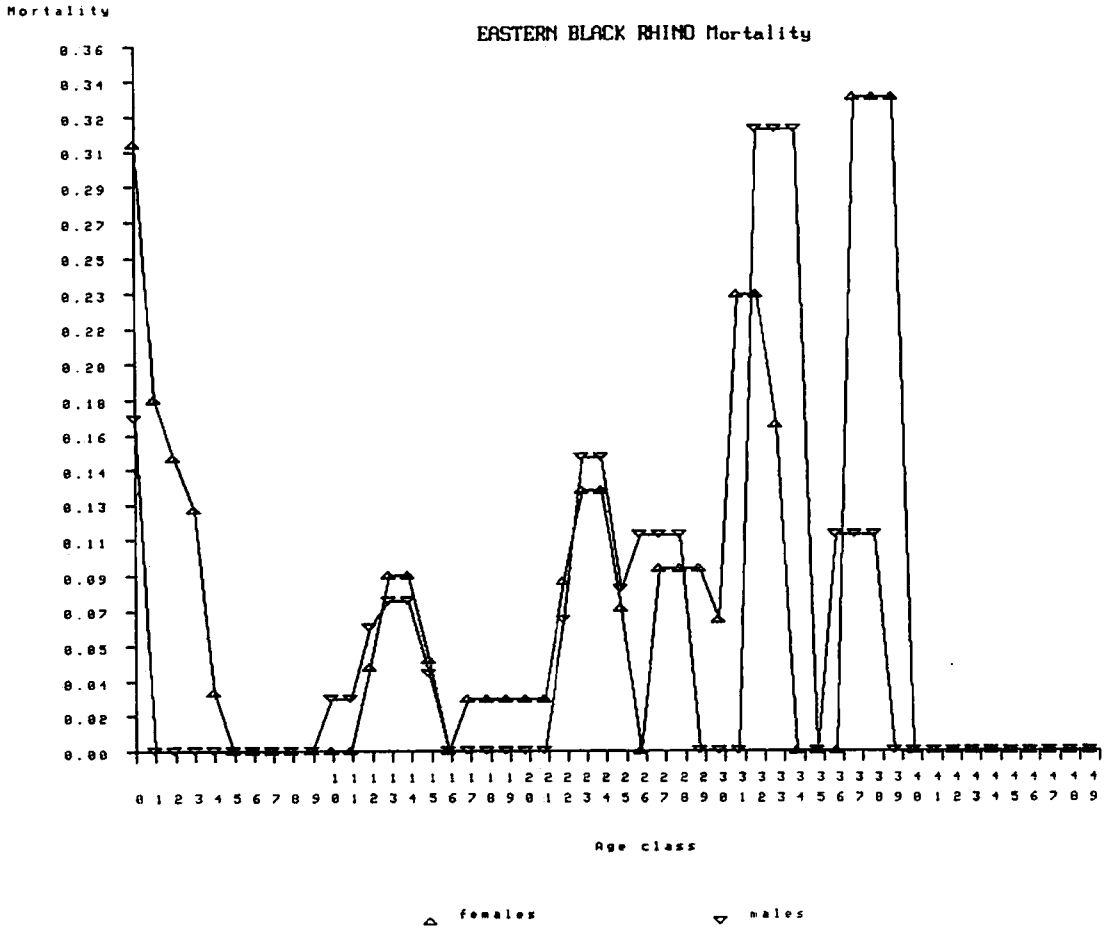
30 day mortality: 20%
(9 deaths out of 46 arriving within 30 days of birth date)

46 birth events to known age parents tabulated for Mx...
(Average of 46 births to female parents and 46 births to male parents.)
plus...

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

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


EASTERN BLACK RHINO Fecundity
Fecundity
0.36
0.34
0.32
0.31
0.29
0.27
0.25
0.23
0.22
0.20
0.18
0.16
0.14
0.13
0.11
0.09
0.07
0.05
0.04
0.02
0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
Age class
females
males


EASTERN BLACK RHINO Mortality
Mortality
0.36
0.34
0.32
0.31
0.29
0.27
0.25
0.23
0.22
0.20
0.18
0.16
0.14
0.13
0.11
0.09
0.07
0.05
0.04
0.02
0.00
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9
Age class
females
males

FOUNDER ANALYSIS - EASTERN BLACK RHINO *Diceros bicornis michaeli*

Analysis date: 14/12/97
Locations: N.AMERICA/
Dates: During 11/12/1997 <= date
Status: Living during 11 Dec 1997 -> 14 Dec 1997

Founder calculations omit UNKNOWNs.

Founders

Founders	16	17	31	32	46	47	52
Founders	53	56	57	68	74	75	76
Founders	79	124	125	155	169	170	181
Founders	182	188	199	202	207	213	217
Founders	225	233	235	241	247	251	261
Founders	262	293	409	660	683	684	T2070
Founders	T2071						

Founder contributions

1.6250	1.6250	0.6250	0.6250	0.5625	0.5625	1.5000
1.2500	4.3125	1.8125	0.0000	4.6250	1.0000	0.7500
2.0000	1.4375	1.4375	0.2500	2.2500	0.2500	1.5000
1.5000	0.6250	0.8750	2.2500	2.5000	4.1250	0.2500
1.2500	2.0000	2.5000	1.2500	3.6250	0.5000	0.7500
0.7500	2.0000	0.0000	0.0000	0.0000	0.0000	0.1250
0.1250						

Fractional contributions

0.0285	0.0285	0.0110	0.0110	0.0099	0.0099	0.0263
0.0219	0.0757	0.0318	0.0000	0.0811	0.0175	0.0132
0.0351	0.0252	0.0252	0.0044	0.0395	0.0044	0.0263
0.0263	0.0110	0.0154	0.0395	0.0439	0.0724	0.0044
0.0219	0.0351	0.0439	0.0219	0.0636	0.0088	0.0132
0.0132	0.0351	0.0000	0.0000	0.0000	0.0000	0.0022
0.0022						

Number of living descendants

7	7	6	6	4	4	4
3	17	11	0	15	5	2
7	8	8	1	6	1	6
6	3	3	6	6	11	1
3	4	6	6	10	1	2
2	7	0	0	0	0	1
1						

GENE DROP ANALYSIS - EASTERN BLACK RHINO *Diceros bicornis michaeli*

Analysis date: 14/12/97
Locations: N.AMERICA/
Dates: During 11/12/1997 <= date
Status: Living during 11 Dec 1997 -> 14 Dec 1997
(Allele loss calculations assume animals breed according to Repro. Values.)

Studbook	Sire	Dam	Location	Prop. genome unique among living desc.	unique among all living	Prob. allele will be lost
53 F	WILD	WILD	SEDGWICK		0.2465	0.3533
68 M	WILD	WILD	COLUMBUS		1.0000	1.0000
76 F	WILD	WILD	LOSANGELE		0.5000	0.5638
169 M	WILD	WILD	SAN ANTON		0.1330	0.0960
190 F	16	17	SAN ANTON	0.1170	0.1170	0.1296
202 F	WILD	WILD	METROZOO		0.1230	0.0990
212 F	52	53	ST LOUIS	0.2495	0.1270	0.1345
213 F	WILD	WILD	SAN FRAN		0.0120	0.0142
225 F	WILD	WILD	CINCINNAT		0.1835	0.2422
233 F	WILD	WILD	SD-WAP		0.0590	0.0873
235 F	WILD	WILD	CHICAGOBR		0.0525	0.0708
247 M	WILD	WILD	CINCINNAT		0.0170	0.0185
251 M	WILD	WILD	ST LOUIS		0.5000	0.2036
259 M	182	181	METROZOO	0.1790	0.1790	0.0977
267 F	56	207	LOSANGELE	0.0850	0.0850	0.0492
285 M	199	126	LOSANGELE	0.3915	0.3915	0.1738
292 M	79	293	SD-WAP	0.0135	0.0135	0.0137
294 F	169	190	CHICAGOLP	0.1225	0.0000	0.0361
301 M	56	207	SEDGWICK	0.0400	0.0400	0.0319
308 M	74	213	CHICAGOLP	0.0110	0.0075	0.0052
317 F	56	207	CHICAGOLP	0.0410	0.0410	0.0142
330 F	261	262	SD-WAP	0.5000	0.5000	0.0946
331 F	169	190	COLO SPRG	0.0585	0.0000	0.0182
332 M	247	180	DENVER	0.0185	0.0095	0.0064
351 F	74	213	METROZOO	0.0095	0.0065	0.0026
359 F	169	190	CALDWELL	0.0345	0.0000	0.0117
362 M	259	202	CALDWELL	0.0330	0.0000	0.0137
363 M	247	180	CHICAGOBR	0.0250	0.0160	0.0077
364 F	56	207	SAN ANTON	0.0845	0.0845	0.0249
365 F	271	235	CHICAGOBR	0.0655	0.0340	0.0154
372 M	271	235	CALDWELL	0.1055	0.0510	0.0264
376 M	161	163	PORTLAND	0.0530	0.0530	0.0194
377 M	302	239	SAN FRAN	0.1035	0.1005	0.0263
381 M	285	76	COLUMBIA	0.2510	0.0000	0.0827
383 F	74	213	COLUMBIA	0.0105	0.0070	0.0018
388 M	268	282	ATLANTA	0.5165	0.5120	0.1061
389 M	292	233	WILDS	0.0685	0.0000	0.0151
395 M	52	202	METROZOO	0.1820	0.1235	0.0376
396 F	271	235	PORTLAND	0.0715	0.0340	0.0098
397 F	247	180	WILDS	0.0375	0.0240	0.0046
409 M	WILD	WILD	DETROIT		1.0000	1.0000
418 F	281	55	BUSCH TAM	0.0620	0.0590	0.0066
419 M	308	317	GARDENCTY	0.0000	0.0000	0.0031
426 F	74	213	ATLANTA	0.0210	0.0095	0.0024
427 M	292	239	CHICAGOBR	0.1830	0.1830	0.0321
432 M	161	163	BUSCH TAM	0.1105	0.1105	0.0228
435 M	292	233	LANSING	0.0580	0.0000	0.0120
443 M	74	213	HONOLULU	0.0205	0.0110	0.0040
457 M	247	225	CLEVELAND	0.2035	0.0000	0.0332
458 M	332	328	HONOLULU	0.0395	0.0395	0.0092

Studbook	Sire	Dam	Location	Prop. genome unique among living desc.	Prop. genome unique among all living	Prob. allele will be lost
459 M	251	212	OKLAHOMA	0.5000	0.0000	0.0404
473 M	110	192	NY BRONX	0.6000	0.6000	0.0893
475 M	259	202	KANSASCTY	0.1250	0.0000	0.0255
480 M	305	331	SIOUX FAL	0.2420	0.2420	0.0439
488 M	271	235	CHICAGOBR	0.1275	0.0600	0.0239
489 F	362	359	LANSING	0.0000	0.0000	0.0011
490 M	301	53	KANSASCTY	0.2535	0.0000	0.0518
516 M	161	163	DENVER	0.1285	0.1285	0.0269
517 F	356	418	BUSCH TAM	0.3130	0.2455	0.0173
518 M	247	225	CINCINNAT	0.2020	0.0000	0.0364
542 M	363	365	LITTLEROC	0.0000	0.0000	0.0032
552 M	381	383	JACKSONVL	0.0000	0.0000	0.0123
569 M	292	233	PITTSBURG	0.0600	0.0000	0.0151
591 F	395	351	METROZOO	0.0000	0.0000	0.0025
636 M	292	330	SD-WAP	0.0000	0.0000	0.0165
660 F	WILD	WILD	KANSASCTY		1.0000	0.0559
664 M	377	213	SAN FRAN	0.0075	0.0000	0.0056
665 M	292	233	SD-WAP	0.0660	0.0000	0.0164
677 F	376	396	PORTLAND	0.0000	0.0000	0.0051
682 M	362	359	CALDWELL	0.0000	0.0000	0.0045
683 F	WILD	WILD	CLEVELAND		1.0000	0.0508
684 F	WILD	WILD	KANSASCTY		1.0000	0.0508

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43 Founders 57 Living descendants 118 In analysis

FOUNDER ALLELE REPRESENTATION

Founder	Retention	%Representation	Target	Difference
16 M	0.500	2.842	1.746	-1.096
17 F	0.500	2.882	1.746	-1.135
31 M	0.228	1.114	0.798	-0.316
32 F	0.237	1.100	0.828	-0.272
46 M	0.347	0.982	1.210	0.228
47 F	0.339	0.981	1.184	0.203
52 M	0.744	2.619	2.599	-0.021
53 FL	0.754	2.202	3.493	1.291
56 M	0.978	7.605	3.414	-4.191
57 F	0.631	3.154	2.204	-0.950
68 ML	0.000	0.000	3.493	3.493
74 M	0.986	8.078	3.446	-4.633
75 F	0.452	1.752	1.579	-0.173
76 FL	0.500	1.314	3.493	2.179
79 M	0.500	3.542	1.746	-1.796
124 M	0.584	2.507	2.040	-0.467
125 F	0.594	2.549	2.076	-0.473
155 M	0.246	0.431	0.857	0.427
169 ML	0.867	3.925	3.493	-0.433
170 M	0.238	0.417	0.830	0.413
181 F	0.620	2.611	2.164	-0.448
182 M	0.622	2.635	2.174	-0.461
188 F	0.376	1.093	1.313	0.220
199 M	0.500	1.538	1.746	0.209
202 FL	0.877	3.968	3.493	-0.475
207 F	0.936	4.378	3.267	-1.111
213 FL	0.988	7.241	3.493	-3.749
217 F	0.262	0.461	0.917	0.456
225 FL	0.816	2.201	3.493	1.292
233 FL	0.941	3.509	3.493	-0.016
235 FL	0.948	4.375	3.493	-0.882
241 M	0.467	2.183	1.631	-0.552
247 ML	0.983	6.399	3.493	-2.906
251 ML	0.500	0.877	3.493	2.616
261 M	0.500	1.304	1.746	0.442
262 F	0.500	1.327	1.746	0.419
293 F	0.500	3.475	1.746	-1.729
409 ML	0.000	0.000	3.493	3.493
660 FL	0.000	0.000	3.493	3.493
683 FL	0.000	0.000	3.493	3.493
684 FL	0.000	0.000	3.493	3.493
T2070 M	0.132	0.232	0.461	0.229
T2071 F	0.112	0.197	0.393	0.196

GENETIC SUMMARY	LIVING DESCENDANT POPULATION	POTENTIAL
Number of founders:	38	43
Mean retention:	0.574	0.666
Founder genomes surviving:	21.804	28.631
Founder Genome Equivalents:	15.663	28.631
Fraction source gene diversity retained:	0.968	0.983
Fraction wild source gene diversity lost:	0.032	0.017
Mean inbreeding coefficient:	0.000	

INBREEDING COEFFICIENTS AND MEAN KINSHIPS FOR EASTERN BLACK RHINO *Diceros bicornis michaeli*

Analysis date: 14/12/97
Locations: N.AMERICA/
Dates: During 11/12/1997 <= date
Status: Living during 11 Dec 1997 -> 14 Dec 1997
Inbreeding and kinship calculations omit genes from UNKNOWN ancestors.

MEAN KINSHIP OF LIVING ANIMALS TO LIVING NON-FOUNDERS

Studbook	Sire	Dam	Inbreeding	Mean kinship	Kinship value	Known	Location
53 F	WILD	WILD	F = 0.0000	mk = 0.0110	kv = 0.0092	1.0000	SEDGWICK
68 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000	COLUMBUS
76 F	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0059	1.0000	LOSANGELE
169 M	WILD	WILD	F = 0.0000	mk = 0.0197	kv = 0.0212	1.0000	SAN ANTON
190 F	16	17	F = 0.0000	mk = 0.0285	kv = 0.0224	1.0000	SAN ANTON
202 F	WILD	WILD	F = 0.0000	mk = 0.0197	kv = 0.0216	1.0000	METROZOO
212 F	52	53	F = 0.0000	mk = 0.0186	kv = 0.0153	1.0000	ST LOUIS
213 F	WILD	WILD	F = 0.0000	mk = 0.0362	kv = 0.0419	1.0000	SAN FRAN
225 F	WILD	WILD	F = 0.0000	mk = 0.0110	kv = 0.0129	1.0000	CINCINNAT
233 F	WILD	WILD	F = 0.0000	mk = 0.0175	kv = 0.0181	1.0000	SD-WAP
235 F	WILD	WILD	F = 0.0000	mk = 0.0219	kv = 0.0234	1.0000	CHICAGOBR
247 M	WILD	WILD	F = 0.0000	mk = 0.0318	kv = 0.0325	1.0000	CINCINNAT
251 M	WILD	WILD	F = 0.0000	mk = 0.0044	kv = 0.0049	1.0000	ST LOUIS
259 M	182	181	F = 0.0000	mk = 0.0241	kv = 0.0207	1.0000	METROZOO
267 F	56	207	F = 0.0000	mk = 0.0343	kv = 0.0298	1.0000	LOSANGELE
285 M	199	126	F = 0.0000	mk = 0.0197	kv = 0.0150	1.0000	LOSANGELE
292 M	79	293	F = 0.0000	mk = 0.0351	kv = 0.0319	1.0000	SD-WAP
294 F	169	190	F = 0.0000	mk = 0.0285	kv = 0.0259	1.0000	CHICAGOLP
301 M	56	207	F = 0.0000	mk = 0.0365	kv = 0.0321	1.0000	SEDGWICK
308 M	74	213	F = 0.0000	mk = 0.0450	kv = 0.0498	1.0000	CHICAGOLP
317 F	56	207	F = 0.0000	mk = 0.0365	kv = 0.0344	1.0000	CHICAGOLP
330 F	261	262	F = 0.0000	mk = 0.0132	kv = 0.0132	1.0000	SD-WAP
331 F	169	190	F = 0.0000	mk = 0.0307	kv = 0.0289	1.0000	COLO SPRG
332 M	247	180	F = 0.0000	mk = 0.0417	kv = 0.0415	1.0000	DENVER
351 F	74	213	F = 0.0000	mk = 0.0450	kv = 0.0522	1.0000	METROZOO
359 F	169	190	F = 0.0000	mk = 0.0329	kv = 0.0319	1.0000	CALDWELL
362 M	259	202	F = 0.0000	mk = 0.0307	kv = 0.0305	1.0000	CALDWELL
363 M	247	180	F = 0.0000	mk = 0.0417	kv = 0.0415	1.0000	CHICAGOBR
364 F	56	207	F = 0.0000	mk = 0.0343	kv = 0.0320	1.0000	SAN ANTON
365 F	271	235	F = 0.0000	mk = 0.0285	kv = 0.0301	1.0000	CHICAGOBR
372 M	271	235	F = 0.0000	mk = 0.0263	kv = 0.0273	1.0000	CALDWELL
376 M	161	163	F = 0.0000	mk = 0.0340	kv = 0.0345	1.0000	PORTLAND
377 M	302	239	F = 0.0000	mk = 0.0323	kv = 0.0324	1.0000	SAN FRAN
381 M	285	76	F = 0.0000	mk = 0.0197	kv = 0.0164	1.0000	COLUMBIA
383 F	74	213	F = 0.0000	mk = 0.0450	kv = 0.0524	1.0000	COLUMBIA
388 M	268	282	F = 0.0000	mk = 0.0252	kv = 0.0246	1.0000	ATLANTA
389 M	292	233	F = 0.0000	mk = 0.0307	kv = 0.0295	1.0000	WILDS
395 M	52	202	F = 0.0000	mk = 0.0230	kv = 0.0245	1.0000	METROZOO
396 F	271	235	F = 0.0000	mk = 0.0285	kv = 0.0313	1.0000	PORTLAND
397 F	247	180	F = 0.0000	mk = 0.0395	kv = 0.0414	1.0000	WILDS
409 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000	DETROIT
418 F	281	55	F = 0.0000	mk = 0.0430	kv = 0.0506	1.0000	BUSCH TAM
419 M	308	317	F = 0.0000	mk = 0.0451	kv = 0.0466	1.0000	GARDENCTY
426 F	74	213	F = 0.0000	mk = 0.0428	kv = 0.0507	1.0000	ATLANTA
427 M	292	239	F = 0.0000	mk = 0.0285	kv = 0.0275	1.0000	CHICAGOBR

Studbook	Sire	Dam	Inbreeding	Mean kinship	Kinship value	Known	Location
432 M	161	163	F = 0.0000	mk = 0.0318	kv = 0.0334	1.0000	BUSCH TAM
435 M	292	233	F = 0.0000	mk = 0.0307	kv = 0.0299	1.0000	LANSING
443 M	74	213	F = 0.0000	mk = 0.0428	kv = 0.0492	1.0000	HONOLULU
457 M	247	225	F = 0.0000	mk = 0.0258	kv = 0.0275	1.0000	CLEVELAND
458 M	332	328	F = 0.0000	mk = 0.0400	kv = 0.0412	1.0000	HONOLULU
459 M	251	212	F = 0.0000	mk = 0.0159	kv = 0.0150	1.0000	OKLAHOMA
473 M	110	192	F = 0.0000	mk = 0.0188	kv = 0.0200	1.0000	NY BRONX
475 M	259	202	F = 0.0000	mk = 0.0263	kv = 0.0259	1.0000	KANSASCTY
480 M	305	331	F = 0.0000	mk = 0.0274	kv = 0.0260	1.0000	SIOUX FAL
488 M	271	235	F = 0.0000	mk = 0.0263	kv = 0.0280	1.0000	CHICAGOBR
489 F	362	359	F = 0.0000	mk = 0.0362	kv = 0.0385	1.0000	LANSING
490 M	301	53	F = 0.0000	mk = 0.0281	kv = 0.0253	1.0000	KANSASCTY
516 M	161	163	F = 0.0000	mk = 0.0318	kv = 0.0332	1.0000	DENVER
517 F	356	418	F = 0.0000	mk = 0.0303	kv = 0.0386	1.0000	BUSCH TAM
518 M	247	225	F = 0.0000	mk = 0.0258	kv = 0.0272	1.0000	CINCINNAT
542 M	363	365	F = 0.0000	mk = 0.0395	kv = 0.0403	1.0000	LITTLEROC
552 M	381	383	F = 0.0000	mk = 0.0367	kv = 0.0388	1.0000	JACKSONVL
569 M	292	233	F = 0.0000	mk = 0.0307	kv = 0.0293	1.0000	PITTSBURG
591 F	395	351	F = 0.0000	mk = 0.0384	kv = 0.0450	1.0000	METROZOO
636 M	292	330	F = 0.0000	mk = 0.0285	kv = 0.0268	1.0000	SD-WAP
660 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000	KANSASCTY
664 M	377	213	F = 0.0000	mk = 0.0387	kv = 0.0414	1.0000	SAN FRAN
665 M	292	233	F = 0.0000	mk = 0.0307	kv = 0.0292	1.0000	SD-WAP
677 F	376	396	F = 0.0000	mk = 0.0356	kv = 0.0370	1.0000	PORTLAND
682 M	362	359	F = 0.0000	mk = 0.0362	kv = 0.0349	1.0000	CALDWELL
683 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000	CLEVELAND
684 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000	KANSASCTY

ORDERED LISTS OF MEAN KINSHIP BY SEX - EASTERN BLACK RHINO

Rank	MALES	MK	Age	Known		FEMALES	MK	Age	Known	
1	68	.0000	47	1.00	COLUM	660	.0000	6	1.00	KANSA
2	409	.0000	46	1.00	DETRO	683	.0000	5	1.00	CLEVE
3	251	.0043	24	1.00	ST LO	684	.0000	5	1.00	KANSA
4	459	.0158	6	1.00	OKLAH	76	.0065	35	1.00	LOSAN
5	473	.0187	5	1.00	NY BR	53	.0109	35	1.00	SEDGW
6	169	.0197	29	1.00	SAN A	225	.0109	30	1.00	CINCI
7	285	.0197	19	1.00	LOSAN	330	.0131	16	1.00	SD-WA
8	381	.0197	12	1.00	RVRBK	233	.0175	28	1.00	SD-WA
9	395	.0230	10	1.00	METRO	212	.0186	22	1.00	ST LO
10	259	.0241	21	1.00	METRO	202	.0197	26	1.00	METRO
11	388	.0252	11	1.00	ATLAN	235	.0219	28	1.00	CHICA
12	457	.0257	5	1.00	CLEVE	190	.0285	28	1.00	SAN A
13	518	.0257	3	1.00	CINCI	294	.0285	17	1.00	CHICA
14	372	.0263	11	1.00	CALDW	365	.0285	13	1.00	CHICA
15	475	.0263	5	1.00	KANSA	396	.0285	9	1.00	PORTL
16	488	.0263	4	1.00	CHICA	517	.0302	3	1.00	BUSCH
17	480	.0274	4	1.00	SIOUX	331	.0307	15	1.00	COLO
18	490	.0281	4	1.00	KANSA	→ 359	.0328	12	1.00	CALDW
19	427	.0285	8	1.00	CHICA	267	.0342	21	1.00	LOSAN
20	636	.0285	1	1.00	SD-WA	364	.0342	12	1.00	SAN A
21	362	.0307	12	1.00	CALDW	677	.0356	0	1.00	PORTL
22	389	.0307	9	1.00	WILDS	213	.0361	27	1.00	SAN F
23	435	.0307	7	1.00	LANSI	489	.0361	5	1.00	LANSI
24	569	.0307	2	1.00	PITTS	317	.0364	15	1.00	CHICA
25	665	.0307	1	1.00	SD-WA	591	.0383	2	1.00	METRO
26	247	.0317	30	1.00	CINCI	397	.0394	9	1.00	WILDS
27	432	.0317	8	1.00	BUSCH	426	.0427	8	1.00	ATLAN
28	516	.0317	4	1.00	DENVE	418	.0430	9	1.00	BUSCH
→ 29	377	.0323	10	1.00	SAN F	351	.0449	12	1.00	METRO
30	376	.0339	11	1.00	PORTL	383	.0449	9	1.00	RVRBK
31	292	.0350	18	1.00	SD-WA					
32	682	.0361	0	1.00	CALDW					
33	301	.0364	18	1.00	SEDGW					
34	552	.0367	2	1.00	JACKS					
35	664	.0386	1	1.00	SAN F					
36	542	.0394	3	1.00	LITTL					
37	458	.0400	6	1.00	HONOL					
38	332	.0416	15	1.00	DENVE					
39	363	.0416	12	1.00	CHICA					
40	443	.0427	6	1.00	HONOL					
41	308	.0449	16	1.00	CHICA					
42	419	.0450	9	1.00	GARDE					

→ Indicates first individual with mean kinship above population average of 0.0320.

GENETIC SUMMARY OF POPULATION

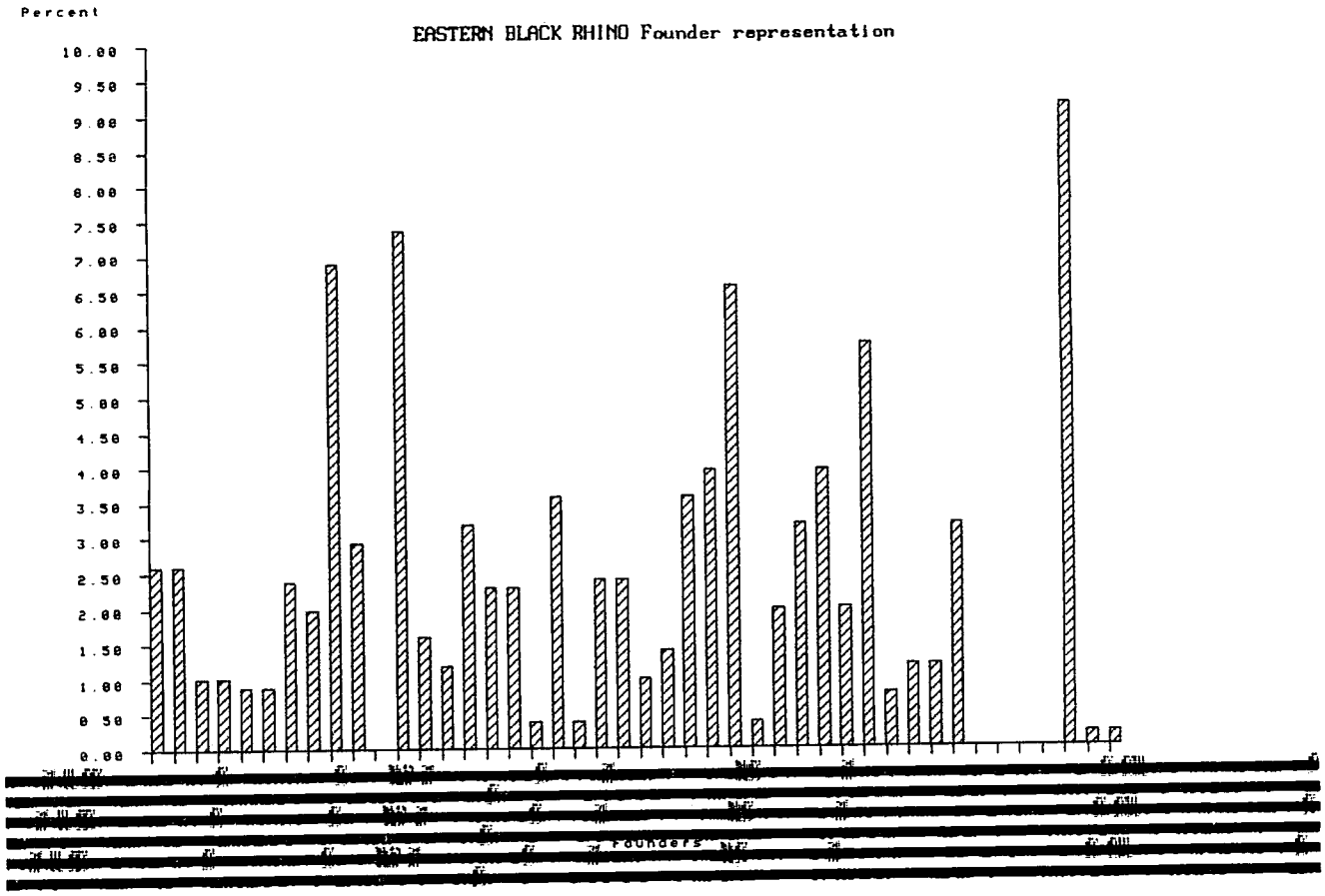
Descendant population Mean Kinship:	0.0320
Gene Diversity:	0.9680
Founder Genome Equivalents:	15.6434
Desc. population mean Kinship Value:	0.0336
Gene Value:	0.9664

ORDERED LISTS OF KINSHIP VALUE BY SEX - EASTERN BLACK RHINO

Rank	MALES	KV	Age	Known		FEMALES	KV	Age	Known	
1	68	.0000	47	1.00	COLUM	660	.0000	6	1.00	KANSA
2	409	.0000	46	1.00	DETRO	683	.0000	5	1.00	CLEVE
3	251	.0049	24	1.00	ST LO	684	.0000	5	1.00	KANSA
4	459	.0150	6	1.00	OKLAH	76	.0059	35	1.00	LOSAN
5	285	.0150	19	1.00	LOSAN	53	.0092	35	1.00	SEDGW
6	381	.0164	12	1.00	RVRBK	225	.0129	30	1.00	CINCI
7	473	.0199	5	1.00	NY BR	330	.0132	16	1.00	SD-WA
8	259	.0206	21	1.00	METRO	212	.0152	22	1.00	ST LO
9	169	.0212	29	1.00	SAN A	233	.0180	28	1.00	SD-WA
10	395	.0244	10	1.00	METRO	202	.0216	26	1.00	METRO
11	388	.0246	11	1.00	ATLAN	190	.0223	28	1.00	SAN A
12	490	.0253	4	1.00	KANSA	235	.0233	28	1.00	CHICA
13	475	.0259	5	1.00	KANSA	294	.0259	17	1.00	CHICA
14	480	.0259	4	1.00	SIOUX	331	.0288	15	1.00	COLO
15	636	.0267	1	1.00	SD-WA	267	.0298	21	1.00	LOSAN
16	518	.0272	3	1.00	CINCI	365	.0301	13	1.00	CHICA
17	372	.0272	11	1.00	CALDW	396	.0313	9	1.00	PORTL
18	427	.0274	8	1.00	CHICA	359	.0318	12	1.00	CALDW
19	457	.0274	5	1.00	CLEVE	364	.0319	12	1.00	SAN A
20	488	.0279	4	1.00	CHICA	317	.0344	15	1.00	CHICA
21	665	.0291	1	1.00	SD-WA	677	.0369	0	1.00	PORTL
22	569	.0293	2	1.00	PITTS	489	.0385	5	1.00	LANSI
23	389	.0295	9	1.00	WILDS	517	.0386	3	1.00	BUSCH
24	435	.0298	7	1.00	LANSI	397	.0414	9	1.00	WILDS
25	362	.0304	12	1.00	CALDW	213	.0419	27	1.00	SAN F
26	292	.0318	18	1.00	SD-WA	591	.0450	2	1.00	METRO
27	301	.0321	18	1.00	SEDGW	418	.0506	9	1.00	BUSCH
28	377	.0324	10	1.00	SAN F	426	.0507	8	1.00	ATLAN
29	247	.0324	30	1.00	CINCI	351	.0521	12	1.00	METRO
30	516	.0332	4	1.00	DENVE	383	.0524	9	1.00	RVRBK
31	432	.0333	8	1.00	BUSCH					
32	376	.0345	11	1.00	PORTL					
33	682	.0348	0	1.00	CALDW					
34	552	.0388	2	1.00	JACKS					
35	542	.0403	3	1.00	LITTL					
36	458	.0411	6	1.00	HONOL					
37	664	.0414	1	1.00	SAN F					
38	363	.0414	12	1.00	CHICA					
39	332	.0415	15	1.00	DENVE					
40	419	.0466	9	1.00	GARDE					
41	443	.0492	6	1.00	HONOL					
42	308	.0497	16	1.00	CHICA					

GENETIC SUMMARY OF POPULATION

Descendant population Mean Kinship:	0.0320
Gene Diversity:	0.9680
Founder Genome Equivalents:	15.6434
Desc. population mean Kinship Value:	0.0336
Gene Value:	0.9664


Percent
EASTERN BLACK RHINO Founder representation
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Founders

SOUTHERN BLACK RHINO

Diceros bicornis minor

Restricted to: (Diceros bicornis minor)
Locations: N.AMERICA/
Dates: During 11/12/1997 <= date
Status: Living during 11 Dec 1997 -> 14 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
Los Angeles Zoo, Los Angeles, CA, USA										
336	F	21 Apr 1983	WILD	334	LOSANGELE	21 Apr 1983	001155	Captive Born	U.S.A.	ZOE
Totals: 0.1.0 (1)										
San Diego Zoological Garden, San Diego, CA, USA										
390	M	- May 1986	WILD	WILD	S.AFRICAR	- Dec 1986	UNK	Wild Born	S.AFRICAR	GUNDWANE
					SANDIEGOZ	15 Dec 1987	587408		U.S.A.	
392	F	- Mar 1986	WILD	WILD	ZIMBABWE	- Apr 1989	UNK	Wild Born	ZIMBABWE	CHIRUNDU
					SANDIEGOZ	18 Jul 1989	589278		U.S.A.	
681	M	31 May 1997	390	392	SANDIEGOZ	31 May 1997	597233	Captive Born	U.S.A.	LIMPOPO
Totals: 2.1.0 (3)										
Disney's Animal Kingdom, Lake Buena Vista, FL, USA										
403	M	18 Aug 1989	WILD	402	FORTWORTH	18 Aug 1989	716	Captive Born	U.S.A.	HARRY
					DISNEY AK	23 Jun 1997	970094		U.S.A.	
486	F	29 Aug 1993	378	402	LA COMA	29 Aug 1993	UNK	Captive Born	U.S.A.	KIT
					DISNEY AK	23 Jun 1997	970093		U.S.A.	
521	M	30 May 1994	378	410	LA COMA	30 May 1994	UNK	Captive Born	U.S.A.	LEE
					DISNEY AK	23 Jun 1997	970091		U.S.A.	
Totals: 2.1.0 (3)										
White Oak Conservation Center /, Yulee, FL, USA										
402	F	- 1979	WILD	WILD	ZIMBABWE	- Apr 1989	UNK	Wild Born	ZIMBABWE	NGWETE
					FORTWORTH	16 Jul 1989	715		U.S.A.	
					LA COMA	6 Jan 1992	UNK		U.S.A.	
					YULEE	19 Jul 1995	950340		U.S.A.	
410	F	- 1983	WILD	WILD	S.AFRICAR	- 1989	UNK	Wild Born	S.AFRICAR	THOMBI
					LA COMA	17 May 1989	UNK		U.S.A.	
					YULEE	19 Jul 1995	950339		U.S.A.	
468	F	- 1982	WILD	WILD	ZIMBABWE	27 Jun 1991	9115	Wild Born	ZIMBABWE	MWENDA
					YULEE	22 Apr 1992	92505		U.S.A.	

Restricted to: (Diceros bicornis minor)
Locations: N.AMERICA/
Dates: During 11/12/1997 <= date
Status: Living during 11 Dec 1997 -> 14 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
522	M	- Jul 1987	WILD	WILD	ZIMBABWE	1 Apr 1988	UNK	Wild Born	ZIMBABWE	TORTOISE
					PAMUZINDA	2 Apr 1988	UNK		ZIMBABWE	
					YULEE	30 Jul 1994	940328		U.S.A.	
523	M	- Jul 1987	WILD	WILD	ZIMBABWE	1 Apr 1988	UNK	Wild Born	ZIMBABWE	CLEM
					PAMUZINDA	2 Apr 1988	UNK		ZIMBABWE	
					YULEE	30 Jul 1994	940329		U.S.A.	
626	M	7 Mar 1996	523	468	YULEE	7 Mar 1996	960014	Captive Born	U.S.A.	TIM
666	M	23 Jan 1997	522	402	YULEE	23 Jan 1997	970004	Captive Born	U.S.A.	TOM
667	M	8 Feb 1997	522	410	YULEE	8 Feb 1997	970006	Captive Born	U.S.A.	
Totals: 5.3.0 (8)										
Dallas Zoo and Aquarium, Dallas, TX, USA										
399	M	- 1982	WILD	WILD	ZIMBABWE	- Apr 1989	UNK	Wild Born	ZIMBABWE	NYAKASIKAN
					DALLAS	16 Jul 1989	896576		U.S.A.	
520	M	3 Jul 1994	399	400	DALLAS	3 Jul 1994	UNK	Captive Born	U.S.A.	INDEPENDEN
668	M	4 Feb 1997	399	433	DALLAS	4 Feb 1997	UNK	Captive Born	U.S.A.	
Totals: 3.0.0 (3)										
Fort Worth Zoological Park, Ft Worth, TX, USA										
379	F	- 1972	WILD	WILD	S.AFRICAR	- 1984	UNK	Wild Born	S.AFRICAR	CHULA
					LA COMA	24 Mar 1984	UNK		U.S.A.	
					FORTWORTH	18 Jul 1995	UNK		U.S.A.	
411	F	28 Feb 1989	378	379	LA COMA	28 Feb 1989	UNK	Captive Born	U.S.A.	MTOTO
					FORTWORTH	19 Dec 1991	UNK		U.S.A.	
465	M	- 1990	WILD	468	ZIMBABWE	27 Jun 1991	9116	Wild Born	ZIMBABWE	BINGA
					SANTLLANA	22 Apr 1992	UNK		U.S.A.	
					FORTWORTH	7 Nov 1997	UNK		U.S.A.	
Totals: 1.2.0 (3)										

Restricted to: (Diceros bicornis minor)
Locations: N.AMERICA/
Dates: During 11/12/1997 <= date
Status: Living during 11 Dec 1997 -> 14 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
Fossil Rim Wildlife Center, Glen Rose, TX, USA										
401	M	- 1985	WILD	WILD	ZIMBABWE	- Apr 1989	UNK	Wild Born	ZIMBABWE	GOTA GOTA
					FORTWORTH	16 Jul 1989	714		U.S.A.	
					EL COYOTE	27 Jul 1991	UNK		U.S.A.	
					FOSSILRIM	18 Jul 1995	9121		U.S.A.	
462	F	1 Dec 1990	WILD	461	ZIMBABWE	23 Jun 1991	9113	Wild Born	ZIMBABWE	CHARERE/CO
					EL COYOTE	22 Apr 1992	UNK		U.S.A.	
					FOSSILRIM	18 Jul 1995	9122		U.S.A.	
466	F	- 1977	WILD	WILD	ZIMBABWE	20 Jun 1991	9104	Wild Born	ZIMBABWE	SINAMPANDE
					FOSSILRIM	22 Apr 1992	9118		U.S.A.	
669	F	2 Feb 1997	401	462	FOSSILRIM	2 Feb 1997	UNK	Captive Born	U.S.A.	
Totals: 1.3.0 (4)										
Bass El Coyote Ranch, , TEXAS, U.S.A.										
378	M	- 1972	WILD	WILD	S.AFRICAR	- 1984	UNK	Wild Born	S.AFRICAR	MACHO
					LA COMA	24 Mar 1984	UNK		U.S.A.	
					EL COYOTE	18 Jul 1995	UNK		U.S.A.	
414	F	- 1984	WILD	WILD	ZIMBABWE	- Apr 1989	UNK	Wild Born	ZIMBABWE	VICTORIA
					EL COYOTE	16 Jul 1989	UNK		U.S.A.	
424	F	11 Sep 1989	WILD	414	EL COYOTE	11 Sep 1989	UNK	Captive Born	U.S.A.	MARGARITA
461	F	- 1977	WILD	WILD	ZIMBABWE	23 Jun 1991	9112	Wild Born	ZIMBABWE	CHANEL
					EL COYOTE	22 Apr 1992	UNK		U.S.A.	
670	M	6 May 1996	401	461	EL COYOTE	6 May 1996	UNK	Captive Born	U.S.A.	TRAVIS
671	F	24 Aug 1996	401	424	EL COYOTE	24 Aug 1996	UNK	Captive Born	U.S.A.	SALSA
672	M	8 Jan 1997	378	414	EL COYOTE	8 Jan 1997	UNK	Captive Born	U.S.A.	ELVIS
Totals: 3.4.0 (7)										
Milwaukee County Zoological Gardens, Milwaukee, WI, USA										
404	M	- 1985	WILD	WILD	ZIMBABWE	- Apr 1989	UNK	Wild Born	ZIMBABWE	BREWSTER/M
					MILWAUKEE	18 Jul 1989	3371		U.S.A.	

Restricted to: (Diceros bicornis minor)
Locations: N.AMERICA/
Dates: During 11/12/1997 <= date
Status: Living during 11 Dec 1997 -> 14 Dec 1997
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Name
405	F	- 1982	WILD	WILD	ZIMBABWE	- Apr 1989	UNK	Wild Born	ZIMBABWE	BARLEY/RUT
					MILWAUKEE	18 Jul 1989	3372		U.S.A.	
574	F	1 Jan 1996	404	405	MILWAUKEE	1 Jan 1996	4141	Captive Born	U.S.A.	POMBE

Totals: 1.2.0 (3)

TOTALS: 18.17.0 (35)
9 Institutions

(Diceros bicornis minor)

Restricted to:
Locations: N.AMERICA/
Dates: During 01/11/1995 <= date
Event: Births
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name
San Diego Zoological Garden, San Diego, CA, USA											
570	F	16 Dec 1995	390	392	SANDIEGOZ	16 Dec 1995	595485	Captive Born	U.S.A.		
						16 Dec 1995 (died)				16 Dec 1995	
					[Death by: Unknown means]						
681	M	31 May 1997	390	392	SANDIEGOZ	31 May 1997	597233	Captive Born	U.S.A.		LIMPOPO
Totals: 1.1.0 (2)											
White Oak Conservation Center /, Yulee, FL, USA											
626	M	7 Mar 1996	523	468	YULEE	7 Mar 1996	960014	Captive Born	U.S.A.		TIM
666	M	23 Jan 1997	522	402	YULEE	23 Jan 1997	970004	Captive Born	U.S.A.		TOM
667	M	8 Feb 1997	522	410	YULEE	8 Feb 1997	970006	Captive Born	U.S.A.		
Totals: 3.0.0 (3)											
Dallas Zoo and Aquarium, Dallas, TX, USA											
668	M	4 Feb 1997	399	433	DALLAS	4 Feb 1997	UNK	Captive Born	U.S.A.		
Totals: 1.0.0 (1)											
Fossil Rim Wildlife Center, Glen Rose, TX, USA											
573	F	29 Dec 1995	467	466	FOSSILRIM	29 Dec 1995	9123	Captive Born	U.S.A.		ECHO/SIA
						29 Oct 1997 (died)				29 Oct 1997	
					[Death by: Infection Associated Unknown Hemic and Lymph New Growths]						
669	F	2 Feb 1997	401	462	FOSSILRIM	2 Feb 1997	UNK	Captive Born	U.S.A.		
Totals: 0.2.0 (2)											
McAllen's Santillana, , Texas, U.S.A.											
575	M	15 Nov 1995	465	464	SANTLLANA	15 Nov 1995	UNK	Captive Born	U.S.A.		
						15 Nov 1995 (died)				15 Nov 1995	
					[Death by: Other/Unknown Unknown Unknown (after Autopsy)]						
Totals: 1.0.0 (1)											
Bass El Coyote Ranch, , TEXAS, U.S.A.											
670	M	6 May 1996	401	461	EL COYOTE	6 May 1996	UNK	Captive Born	U.S.A.		TRAVIS

Restricted to: (Diceros bicornis minor)
Locations: N.AMERICA/
Dates: During 01/11/1995 <= date
Event: Births
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name
671	F	24 Aug 1996	401	424	EL COYOTE	24 Aug 1996	UNK	Captive Born	U.S.A.		SALSA
672	M	8 Jan 1997	378	414	EL COYOTE	8 Jan 1997	UNK	Captive Born	U.S.A.		ELVIS

Totals: 2.1.0 (3)

Milwaukee County Zoological Gardens, Milwaukee, WI, USA

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name
574	F	1 Jan 1996	404	405	MILWAUKEE	1 Jan 1996	4141	Captive Born	U.S.A.		POMBE

Totals: 0.1.0 (1)

TOTALS: 8.5.0 (13)
7 Institutions

Restricted to: (Diceros bicornis minor)
Locations: N.AMERICA/
Dates: During 01/11/1995 <= date
Event: Deaths
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name
San Diego Zoological Garden, San Diego, CA, USA											
570	F	16 Dec 1995	390	392	SANDIEGOZ	16 Dec 1995	595485	Captive Born	U.S.A.		
						16 Dec 1995 (died)				16 Dec 1995	
					[Death by: Unknown means]						
Totals: 0.1.0 (1)											
Disney's Animal Kingdom, Lake Buena Vista, FL, USA											
447	F	3 Dec 1991	378	379	LA COMA	3 Dec 1991	UNK	Captive Born	U.S.A.		GLORIA
					DISNEY AK	23 Jun 1997	970092		U.S.A.		
						22 Sep 1997 (died)				22 Sep 1997	
					[Death by: Infection Associated Unknown Respiratory Unknown (after autopsy)]						
Totals: 0.1.0 (1)											
Gladys Porter Zoo, Brownsville, TX, USA											
464	F	- 1990	WILD	466	ZIMBABWE	27 Jun 1991	9105	Wild Born	ZIMBABWE		KASIKIRI
					SANTLLANA	22 Apr 1992	UNK		U.S.A.		
					BROWNSVIL	- Dec 1995	UNK		U.S.A.		
						9 Feb 1996 (died)				9 Feb 1996	
					[Death by: Other/Unknown Unknown Hemic and Lymph Circulatory, Secondary]						
Totals: 0.1.0 (1)											
Dallas Zoo and Aquarium, Dallas, TX, USA											
433	F	28 Feb 1990	WILD	400	DALLAS	28 Feb 1990	906719	Captive Born	U.S.A.		ZAMBEZI
						1 Nov 1997 (died)				1 Nov 1997	
					[Death by: Infection Associated Unknown Generalized Fungal]						
Totals: 0.1.0 (1)											
Fossil Rim Wildlife Center, Glen Rose, TX, USA											
573	F	29 Dec 1995	467	466	FOSSILRIM	29 Dec 1995	9123	Captive Born	U.S.A.		ECHO/SIA
						29 Oct 1997 (died)				29 Oct 1997	
					[Death by: Infection Associated Unknown Hemic and Lymph New Growths]						
Totals: 0.1.0 (1)											

Restricted to: (Diceros bicornis minor)
Locations: N.AMERICA/
Dates: During 01/11/1995 <= date
Event: Deaths
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name
McAllen's Santillana, , Texas, U.S.A.											
575	M	15 Nov 1995	465	464	SANTLLANA	15 Nov 1995	UNK	Captive Born	U.S.A.		
						15 Nov 1995 (died)				15 Nov 1995	
					[Death by: Other/Unknown Unknown Unknown (after Autopsy)]						

Totals: 1.0.0 (1)

TOTALS: 1.5.0 (6)
6 Institutions

SOUTHERN BLACK RHINO Studbook

(Diceros bicornis minor)

Restricted to:
Locations: N.AMERICA/
Dates: During 01/11/1995 <= date
Event: Transfers
Report ordered by: current (last) location...

Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Death-Date	Name
Disney's Animal Kingdom, Lake Buena Vista, FL, USA											
403	M	18 Aug 1989	WILD	402	FORTWORTH	18 Aug 1989	716	Captive Born	U.S.A.		HARRY
					DISNEY AK	23 Jun 1997	970094		U.S.A.		
447	F	3 Dec 1991	378	379	LA COMA	3 Dec 1991	UNK	Captive Born	U.S.A.		GLORIA
					DISNEY AK	23 Jun 1997	970092		U.S.A.		
						22 Sep 1997	(died)			22 Sep 1997	
					[Death by: Infection Associated Unknown Respiratory Unknown (after autopsy)]						
486	F	29 Aug 1993	378	402	LA COMA	29 Aug 1993	UNK	Captive Born	U.S.A.		KIT
					DISNEY AK	23 Jun 1997	970093		U.S.A.		
521	M	30 May 1994	378	410	LA COMA	30 May 1994	UNK	Captive Born	U.S.A.		LEE
					DISNEY AK	23 Jun 1997	970091		U.S.A.		
Totals: 2.2.0 (4)											
Gladys Porter Zoo, Brownsville, TX, USA											
464	F	~ 1990	WILD	466	ZIMBABWE	27 Jun 1991	9105	Wild Born	ZIMBABWE		KASIKIRI
					SANTLLANA	22 Apr 1992	UNK		U.S.A.		
					BROWNSVIL	~ Dec 1995	UNK		U.S.A.		
						9 Feb 1996	(died)			9 Feb 1996	
					[Death by: Other/Unknown Unknown Hemic and Lymph Circulatory, Secondary]						
Totals: 0.1.0 (1)											
Fort Worth Zoological Park, Ft Worth, TX, USA											
465	M	~ 1990	WILD	468	ZIMBABWE	27 Jun 1991	9116	Wild Born	ZIMBABWE		BINGA
					SANTLLANA	22 Apr 1992	UNK		U.S.A.		
					FORTWORTH	7 Nov 1997	UNK		U.S.A.		
Totals: 1.0.0 (1)											

TOTALS: 3.3.0 (6)
3 Institutions

Compiled by: Dr. Tom Foose thru The Wilds
Data current thru: 15 Dec 1997 North American Regional Studbook

SPARKS v1.42
14 Dec 1997

Age Pyramid Report

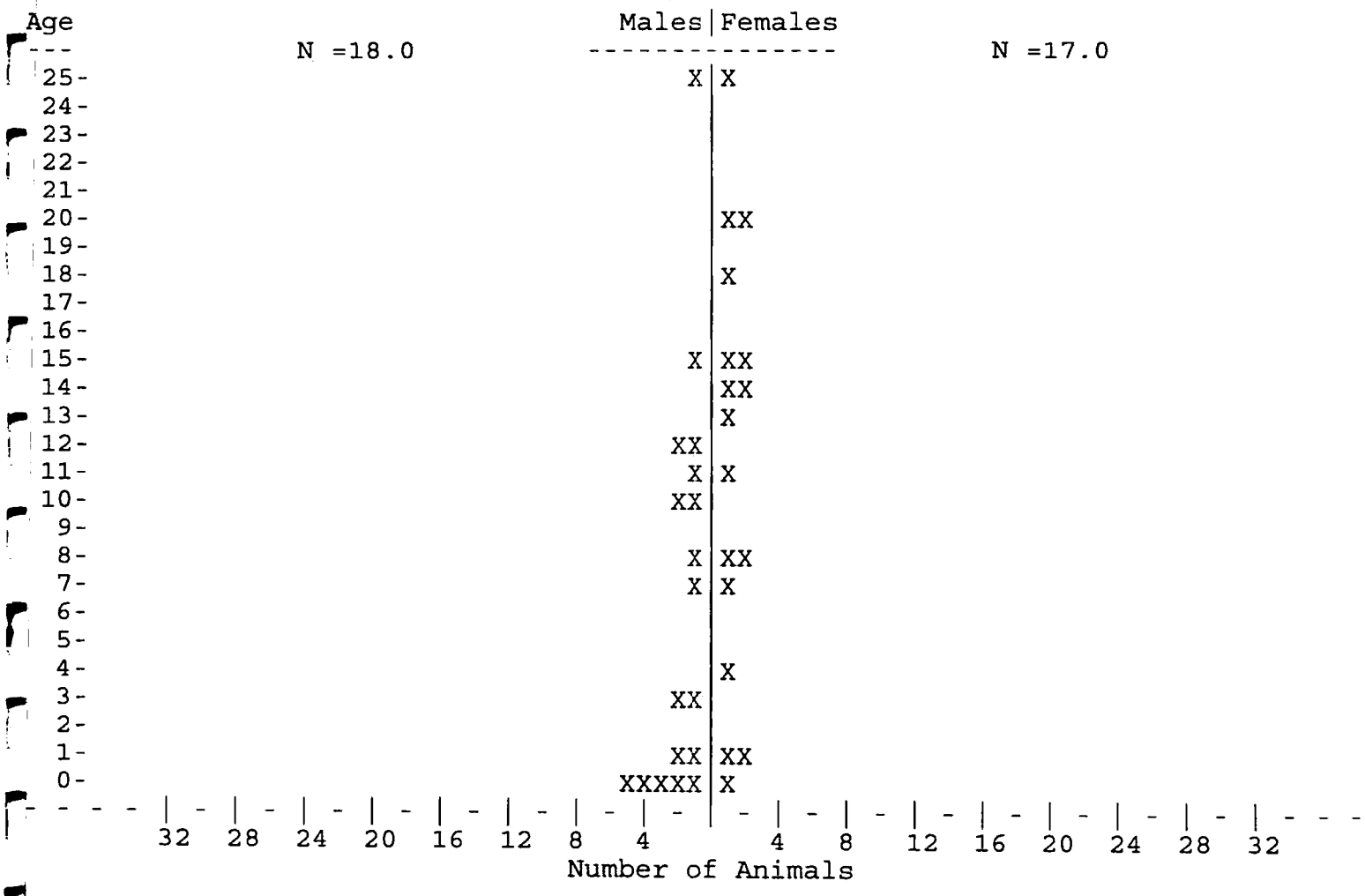
Restricted to: SOUTHERN BLACK RHINO Studbook

Locations: N.AMERICA/

Dates: As of End of 11/12/1997 <= date

Status: Living by

Taxon Name: **DICEROS BICORNIS MINOR**



X >>> Specimens of known sex...

? >>> Specimens of unknown sex...

Taxon Name: **DICEROS BICORNIS MINOR**

Age	Studbook Numbers >>> **Male**				
25	378				
24					
23					
22					
21					
20					
19					
18					
17					
16					
15	399				
14					
13					
12	401	404			
11	390				
10	522	523			
9					
8	403				
7	465				
6					
5					
4					
3	520	521			
2					
1	626	670			
0	666	667	668	672	681

Total= 18

Locations: N.AMERICA/
Dates: As of End of 11/12/1997 <= date
Status: Living by

Taxon Name: **DICEROS BICORNIS MINOR**

Age	Studbook Numbers >>> **Female**	
25	379	
24		
23		
22		
21		
20	461	466
19		
18	402	
17		
16		
15	405	468
14	336	410
13	414	
12		
11	392	
10		
9		
8	411	424
7	462	
6		
5		
4	486	
3		
2		
1	574	671
0	669	

Total= 17

Locations: N.AMERICA/
Dates: During 01/01/1988 <= date

Taxon Name: **DICEROS BICORNIS MINOR**

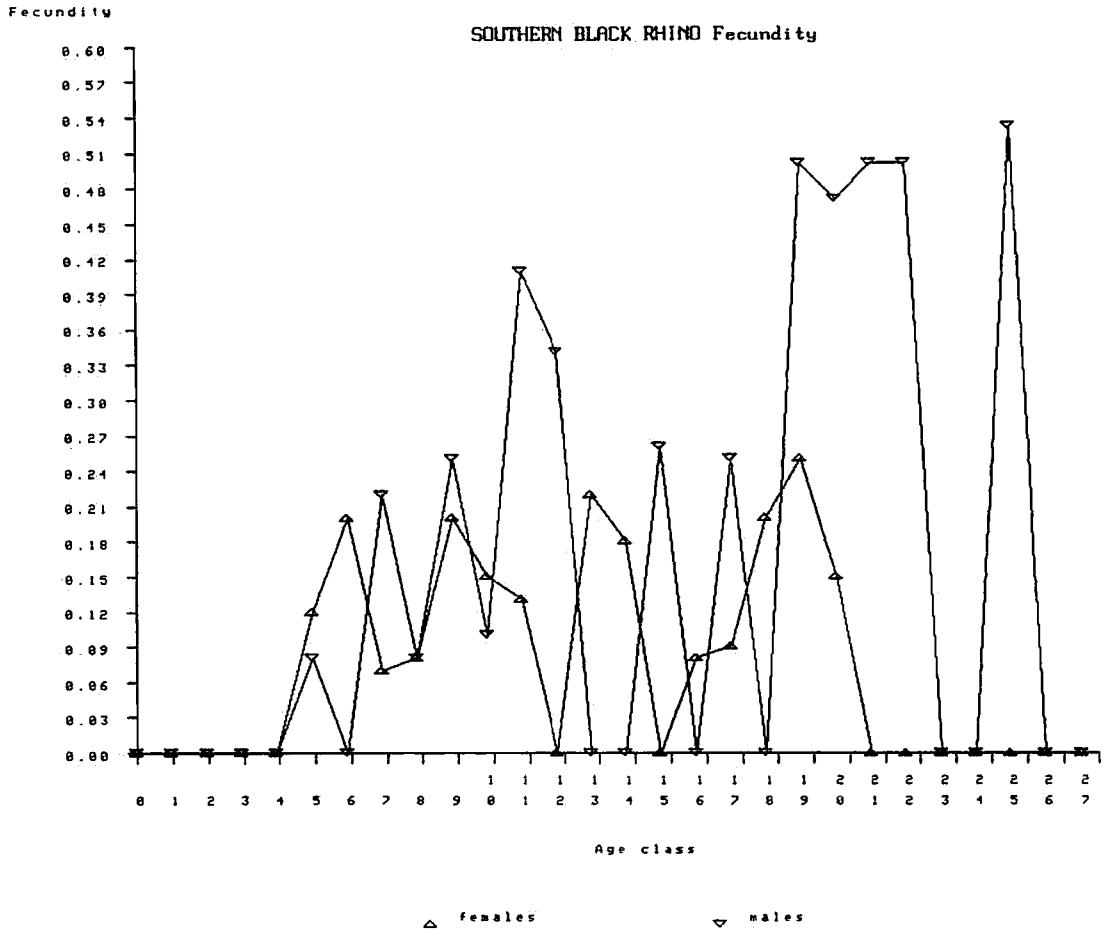
Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	11.1	0.00	8.9	0.15	13.1	0.18	10.9
1- 2	0.00	6.3	0.00	7.7	0.00	6.3	0.13	7.9
2- 3	0.00	5.2	0.00	6.8	0.17	6.0	0.00	6.8
3- 4	0.00	4.0	0.00	7.6	0.00	4.0	0.00	7.6
4- 5	0.00	4.9	0.00	7.8	0.00	4.9	0.12	8.6
5- 6	0.08	6.0	0.12	8.3	0.00	6.0	0.11	9.0
6- 7	0.00	5.6	0.20	7.7	0.00	5.6	0.12	8.6
7- 8	0.22	6.8	0.07	7.2	0.00	6.8	0.13	7.5
8- 9	0.08	6.3	0.08	6.1	0.00	6.3	0.00	6.1
9-10	0.25	6.0	0.20	5.0	0.00	6.0	0.00	5.0
10-11	0.10	5.2	0.15	6.6	0.30	6.8	0.13	7.5
11-12	0.41	3.6	0.13	7.8	0.00	3.6	0.00	7.8
12-13	0.34	2.9	0.00	7.0	0.00	2.9	0.00	7.0
13-14	0.00	1.0	0.22	7.0	0.00	1.0	0.00	7.0
14-15	0.00	2.0	0.18	5.6	0.00	2.0	0.00	5.6
15-16	0.26	2.0	0.00	6.1	0.00	2.0	0.00	6.1
16-17	0.00	2.0	0.08	6.0	0.00	2.0	0.00	6.0
17-18	0.25	2.0	0.09	5.3	0.00	2.0	0.17	6.0
18-19	0.00	2.0	0.20	5.0	0.00	2.0	0.00	5.0
19-20	0.50	2.0	0.25	4.0	0.00	2.0	0.00	4.0
20-21	0.47	1.1	0.15	3.3	0.50	2.0	0.00	3.3
21-22	0.50	1.0	0.00	1.2	0.00	1.0	0.50	2.0
22-23	0.50	1.0	0.00	1.0	0.00	1.0	0.00	1.0
23-24	0.00	1.0	0.00	1.0	0.00	1.0	0.00	1.0
24-25	0.00	1.0	0.00	1.0	0.00	1.0	0.00	1.0
25-26	0.53	1.0	0.00	1.0	0.00	1.0	0.00	1.0
26-27	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
27-28	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

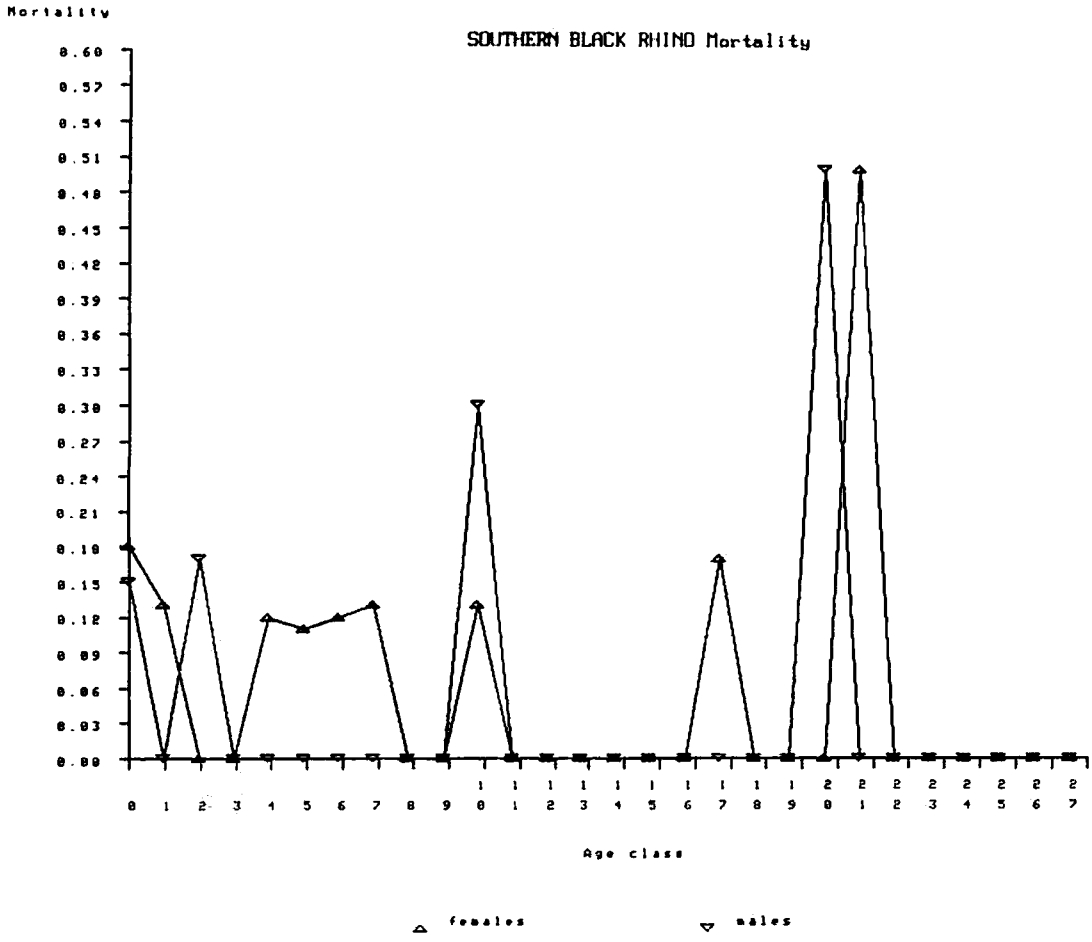
T = 14.951	T = 11.992	30 day mortality: 16%
Ro = 1.857	Ro = 0.811	(4 deaths out of 25 arriving
lambda=1.04	lambda=0.98	within 30 days of birth date)
r = 0.041	r = -0.017	

23 birth events to known age parents tabulated for Mx...
(Average of 25 births to female parents and 22 births to male parents.)

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

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


SOUTHERN BLACK RHINO Fecundity
Fecundity
0.60
0.57
0.54
0.51
0.48
0.45
0.42
0.39
0.36
0.33
0.30
0.27
0.24
0.21
0.18
0.15
0.12
0.09
0.06
0.03
0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
Age class
females
males


Mortality
SOUTHERN BLACK RHINO Mortality
0.60
0.57
0.54
0.51
0.48
0.45
0.42
0.39
0.36
0.33
0.30
0.27
0.24
0.21
0.18
0.15
0.12
0.09
0.06
0.03
0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
Age class
females
males

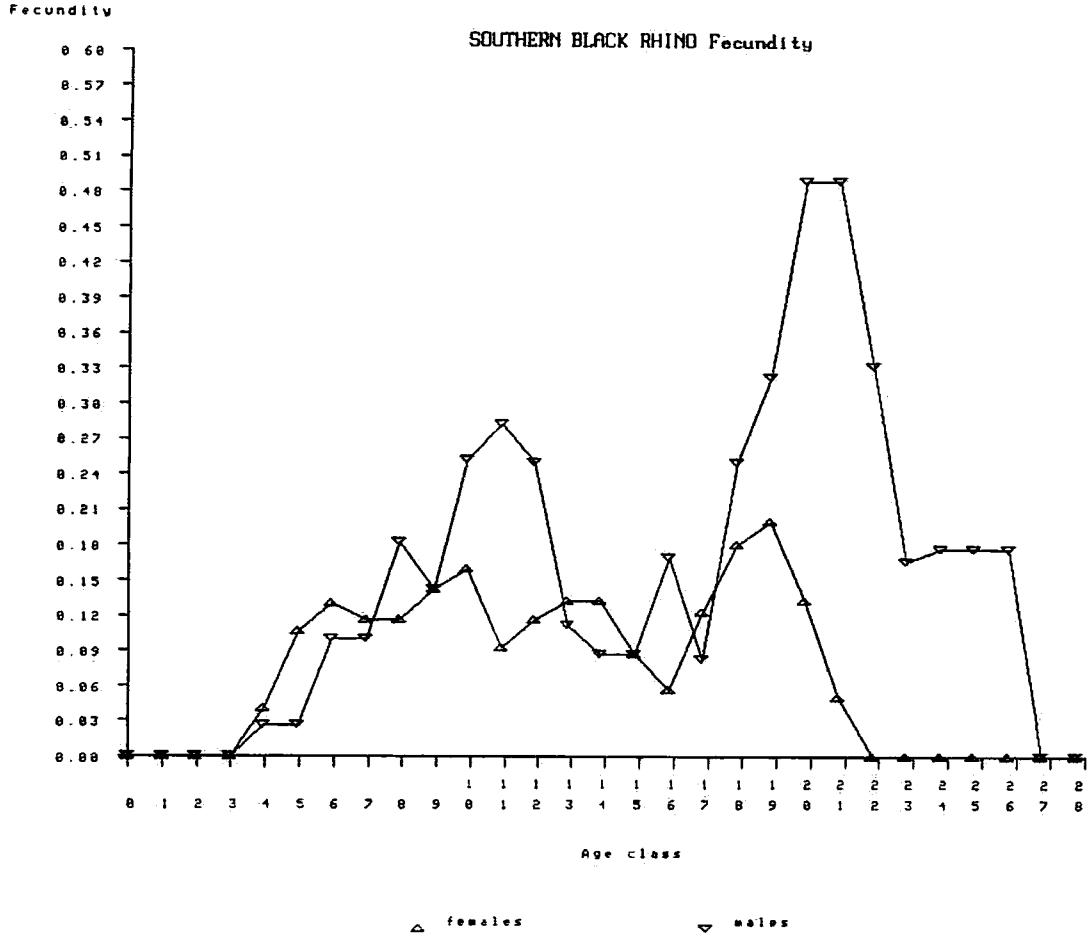
Age Class	Fecundity [Mx]... Male	N	Female	N	Mortality [Qx]... Male	N	Female	N
0- 1	0.00	11.1	0.00	8.9	0.15	13.1	0.18	10.9
1- 2	0.00	6.3	0.00	7.7	0.09	6.3	0.07	7.9
2- 3	0.00	5.2	0.00	6.8	0.06	6.0	0.04	6.8
3- 4	0.00	4.0	0.00	7.6	0.06	4.0	0.04	7.6
4- 5	0.03	4.9	0.04	7.8	0.00	4.9	0.08	8.6
5- 6	0.03	6.0	0.11	8.3	0.00	6.0	0.12	9.0
6- 7	0.10	5.6	0.13	7.7	0.00	5.6	0.12	8.6
7- 8	0.10	6.8	0.12	7.2	0.00	6.8	0.08	7.5
8- 9	0.18	6.3	0.12	6.1	0.00	6.3	0.04	6.1
9-10	0.14	6.0	0.14	5.0	0.10	6.0	0.04	5.0
10-11	0.25	5.2	0.16	6.6	0.10	6.8	0.04	7.5
11-12	0.28	3.6	0.09	7.8	0.10	3.6	0.04	7.8
12-13	0.25	2.9	0.12	7.0	0.00	2.9	0.00	7.0
13-14	0.11	1.0	0.13	7.0	0.00	1.0	0.00	7.0
14-15	0.09	2.0	0.13	5.6	0.00	2.0	0.00	5.6
15-16	0.09	2.0	0.09	6.1	0.00	2.0	0.00	6.1
16-17	0.17	2.0	0.06	6.0	0.00	2.0	0.06	6.0
17-18	0.08	2.0	0.12	5.3	0.00	2.0	0.06	6.0
18-19	0.25	2.0	0.18	5.0	0.00	2.0	0.06	5.0
19-20	0.32	2.0	0.20	4.0	0.17	2.0	0.00	4.0
20-21	0.49	1.1	0.13	3.3	0.17	2.0	0.17	3.3
21-22	0.49	1.0	0.05	1.2	0.17	1.0	0.17	2.0
22-23	0.33	1.0	0.00	1.0	0.00	1.0	0.17	1.0
23-24	0.17	1.0	0.00	1.0	0.00	1.0	0.00	1.0
24-25	0.18	1.0	0.00	1.0	0.00	1.0	0.00	1.0
25-26	0.18	1.0	0.00	1.0	0.00	1.0	0.00	1.0
26-27	0.18	0.0	0.00	0.0	0.00	0.0	0.00	0.0
27-28	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
28-29	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

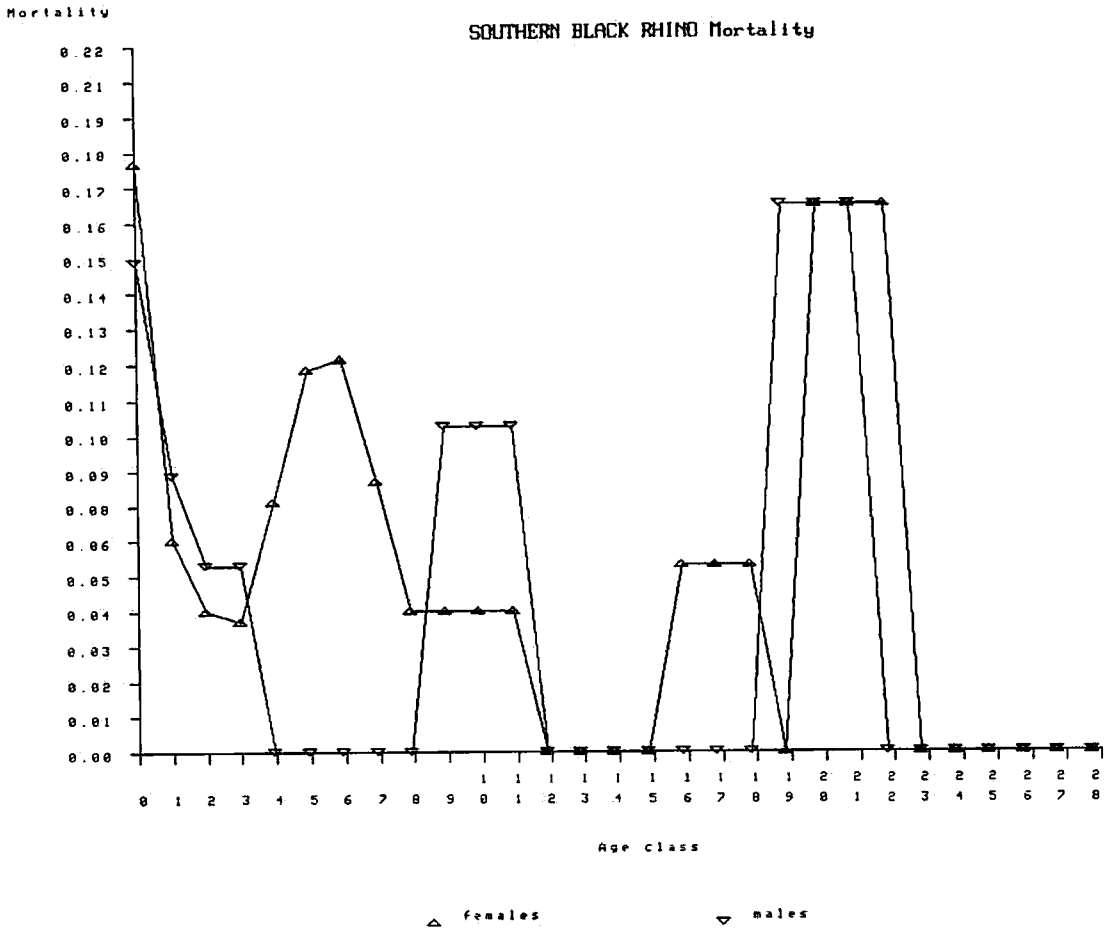
T = 15.317 T = 11.872 30 day mortality: 16%
Ro = 1.951 Ro = 0.838 (4 deaths out of 25 arriving
lambda=1.04 lambda=0.99 within 30 days of birth date)
r = 0.044 r = -0.015

23 birth events to known age parents tabulated for Mx...
(Average of 25 births to female parents and 22 births to male parents.)
plus...

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

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


SOUTHERN BLACK RHINO Fecundity
Fecundity
0.60
0.57
0.54
0.51
0.48
0.45
0.42
0.39
0.36
0.33
0.30
0.27
0.24
0.21
0.18
0.15
0.12
0.09
0.06
0.03
0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Age class
females
males


SOUTHERN BLACK RHINO Mortality
Mortality
0.22
0.21
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.06
0.05
0.04
0.03
0.02
0.01
0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Age class
females
males

FOUNDER ANALYSIS FOR SOUTHERN BLACK RHINO Diceros bicornis minor

Analysis date: 14/12/97
Locations: N.AMERICA/
Dates: During 11/12/1997 <= date
Status: Living during 11 Dec 1997 -> 14 Dec 1997

Studbook numbers beginning with P indicate wild or unknown founders that mated with studbook # without the P to produce captive-born offspring.

Founders

Founders	334	378	379	390	392	399	400
Founders	401	402	404	405	410	414	461
Founders	466	468	522	523	P334	P400	P402
Founders	P414	P461	P468				

Founder contributions

0.5000	2.0000	0.5000	0.5000	0.5000	1.0000	0.7500
1.5000	1.5000	0.5000	0.5000	1.0000	1.2500	1.2500
0.0000	1.0000	1.0000	0.5000	0.5000	0.2500	0.5000
0.7500	0.7500	0.5000				

Fractional contributions

0.0263	0.1053	0.0263	0.0263	0.0263	0.0526	0.0395
0.0789	0.0789	0.0263	0.0263	0.0526	0.0658	0.0658
0.0000	0.0526	0.0526	0.0263	0.0263	0.0132	0.0263
0.0395	0.0395	0.0263				

Number of living descendants

1	4	1	1	1	2	2
3	3	1	1	2	3	3
0	2	2	1	1	1	1
2	2	1				

FOUNDER ANALYSIS FOR SOUTHERN BLACK RHINO Diceros bicornis minor

Analysis date: 14/12/97
Locations: N.AMERICA/
Dates: During 11/12/1997 <= date
Status: Living during 11 Dec 1997 -> 14 Dec 1997

(Allele loss calculations assume animals breed according to Repro. Values.)

Studbook	Sire	Dam	Location	Prop. genome unique among living desc.	Prop. genome unique among all living	Prob. allele will be lost
336 F	P334	334	LOSANGELE	1.0000	1.0000	0.3121
378 M	WILD	WILD	EL COYOTE		0.0630	0.0958
379 F	WILD	WILD	FORTWORTH		0.5000	0.5448
390 M	WILD	WILD	SANDIEGOZ		0.5000	0.0478
392 F	WILD	WILD	SANDIEGOZ		0.5000	0.0942
399 M	WILD	WILD	DALLAS		0.2500	0.0225
401 M	WILD	WILD	FOSSILRIM		0.1300	0.0197
402 F	WILD	WILD	YULEE		0.1070	0.0951
403 M	P402	402	DISNEY AK	0.6385	0.5000	0.0301
404 M	WILD	WILD	MILWAUKEE		0.5000	0.0583
405 F	WILD	WILD	MILWAUKEE		0.5000	0.2086
410 F	WILD	WILD	YULEE		0.2570	0.0995
411 F	378	379	FORTWORTH	0.5650	0.0000	0.0530
414 F	WILD	WILD	EL COYOTE		0.2695	0.0808
424 F	P414	414	EL COYOTE	0.3650	0.2510	0.0267
461 F	WILD	WILD	EL COYOTE		0.2495	0.2761
462 F	P461	461	FOSSILRIM	0.3745	0.2510	0.0363
465 M	P468	468	FORTWORTH	0.7455	0.5000	0.0318
466 F	WILD	WILD	FOSSILRIM		1.0000	0.9461
468 F	WILD	WILD	YULEE		0.2545	0.1082
486 F	378	402	DISNEY AK	0.1835	0.0000	0.0220
520 M	399	400	DALLAS	0.6350	0.3850	0.0413
521 M	378	410	DISNEY AK	0.3100	0.0000	0.0150
522 M	WILD	WILD	YULEE		0.2515	0.0176
523 M	WILD	WILD	YULEE		0.5000	0.0291
574 F	404	405	MILWAUKEE	1.0000	0.0000	0.0343
626 M	523	468	YULEE	0.7455	0.0000	0.0140
666 M	522	402	YULEE	0.3765	0.0000	0.0172
667 M	522	410	YULEE	0.4915	0.0000	0.0154
668 M	399	433	DALLAS	0.6350	0.3850	0.0658
669 F	401	462	FOSSILRIM	0.1165	0.0000	0.0078
670 M	401	461	EL COYOTE	0.3715	0.0000	0.0309
671 F	401	424	EL COYOTE	0.1325	0.0000	0.0067
672 M	378	414	EL COYOTE	0.2880	0.0000	0.0221
681 M	390	392	SANDIEGOZ	1.0000	0.0000	0.0194

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24 Founders 19 Living descendants 44 In analysis

FOUNDER ALLELE REPRESENTATION

Founder	Retention	%Representation	Target	Difference
334 F	0.500	2.632	2.514	-0.117
378 ML	0.937	10.526	5.029	-5.497
379 FL	0.500	2.632	5.029	2.397
390 ML	0.500	2.632	5.029	2.397
392 FL	0.500	2.632	5.029	2.397
399 ML	0.750	5.263	5.029	-0.234
400 F	0.632	3.932	3.178	-0.753
401 ML	0.870	7.895	5.029	-2.866
402 FL	0.893	7.895	5.029	-2.866
404 ML	0.500	2.632	5.029	2.397
405 FL	0.500	2.632	5.029	2.397
410 FL	0.743	5.263	5.029	-0.234
414 FL	0.730	6.584	5.029	-1.555
461 FL	0.750	6.584	5.029	-1.555
466 FL	0.000	0.000	5.029	5.029
468 FL	0.746	5.263	5.029	-0.234
522 ML	0.748	5.263	5.029	-0.234
523 ML	0.500	2.632	5.029	2.397
P334 M	0.500	2.632	2.514	-0.117
P400 M	0.253	1.332	1.272	-0.059
P402 M	0.500	2.632	2.514	-0.117
P414 M	0.500	3.942	2.514	-1.428
P461 M	0.500	3.942	2.514	-1.428
P468 M	0.500	2.632	2.514	-0.117

GENETIC SUMMARY	LIVING DESCENDANT POPULATION	POTENTIAL
Number of founders:	23	24
Mean retention:	0.611	0.829
Founder genomes surviving:	14.053	19.885
Founder Genome Equivalents:	11.738	19.885
Fraction source gene diversity retained:	0.957	0.975
Fraction wild source gene diversity lost:	0.043	0.025
Mean inbreeding coefficient:	0.000	

INBREEDING COEFFICIENTS AND MEAN KINSHIPS FOR SOUTHERN BLACK RHINO Diceros bicornis minor

Analysis date: 14/12/97
Locations: N.AMERICA/
Dates: During 11/12/1997 <= date
Status: Living during 11 Dec 1997 -> 14 Dec 1997

MEAN KINSHIP OF LIVING ANIMALS TO LIVING NON-FOUNDERS

Studbook	Sire	Dam	Inbreeding	Mean kinship	Kinship value	Location
336 F	P334	334	F = 0.0000	mk = 0.0263	kv = 0.0144	LOSANGELE
378 M	WILD	WILD	F = 0.0000	mk = 0.0526	kv = 0.0546	EL COYOTE
379 F	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0149	FORTWORTH
390 M	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0114	SANDIEGOZ
392 F	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0114	SANDIEGOZ
399 M	WILD	WILD	F = 0.0000	mk = 0.0263	kv = 0.0258	DALLAS
401 M	WILD	WILD	F = 0.0000	mk = 0.0395	kv = 0.0354	FOSSILRIM
402 F	WILD	WILD	F = 0.0000	mk = 0.0395	kv = 0.0428	YULEE
403 M	P402	402	F = 0.0000	mk = 0.0395	kv = 0.0493	DISNEY AK
404 M	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0118	MILWAUKEE
405 F	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0118	MILWAUKEE
410 F	WILD	WILD	F = 0.0000	mk = 0.0263	kv = 0.0268	YULEE
411 F	378	379	F = 0.0000	mk = 0.0461	kv = 0.0496	FORTWORTH
414 F	WILD	WILD	F = 0.0000	mk = 0.0329	kv = 0.0325	EL COYOTE
424 F	P414	414	F = 0.0000	mk = 0.0461	kv = 0.0479	EL COYOTE
461 F	WILD	WILD	F = 0.0000	mk = 0.0329	kv = 0.0343	EL COYOTE
462 F	P461	461	F = 0.0000	mk = 0.0461	kv = 0.0487	FOSSILRIM
465 M	P468	468	F = 0.0000	mk = 0.0329	kv = 0.0430	FORTWORTH
466 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	FOSSILRIM
468 F	WILD	WILD	F = 0.0000	mk = 0.0263	kv = 0.0314	YULEE
486 F	378	402	F = 0.0000	mk = 0.0592	kv = 0.0615	DISNEY AK
520 M	399	400	F = 0.0000	mk = 0.0362	kv = 0.0373	DALLAS
521 M	378	410	F = 0.0000	mk = 0.0526	kv = 0.0561	DISNEY AK
522 M	WILD	WILD	F = 0.0000	mk = 0.0263	kv = 0.0228	YULEE
523 M	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0133	YULEE
574 F	404	405	F = 0.0000	mk = 0.0263	kv = 0.0236	MILWAUKEE
626 M	523	468	F = 0.0000	mk = 0.0329	kv = 0.0356	YULEE
666 M	522	402	F = 0.0000	mk = 0.0461	kv = 0.0442	YULEE
667 M	522	410	F = 0.0000	mk = 0.0395	kv = 0.0362	YULEE
668 M	399	433	F = 0.0000	mk = 0.0362	kv = 0.0336	DALLAS
669 F	401	462	F = 0.0000	mk = 0.0559	kv = 0.0531	FOSSILRIM
670 M	401	461	F = 0.0000	mk = 0.0493	kv = 0.0481	EL COYOTE
671 F	401	424	F = 0.0000	mk = 0.0559	kv = 0.0527	EL COYOTE
672 M	378	414	F = 0.0000	mk = 0.0559	kv = 0.0549	EL COYOTE
681 M	390	392	F = 0.0000	mk = 0.0263	kv = 0.0228	SANDIEGOZ

ORDERED LISTS OF MEAN KINSHIP BY SEX - SOUTHERN BLACK RHINO

Rank	MALES	MK	Age		FEMALES	MK	Age	
1	404	.0131	13	MILWAUKEE	466	.0000	21	FOSSILRIM
2	390	.0131	12	SANDIEGOZ	379	.0131	26	FORTWORTH
3	523	.0131	10	YULEE	405	.0131	16	MILWAUKEE
4	399	.0263	16	DALLAS	392	.0131	12	SANDIEGOZ
5	522	.0263	10	YULEE	468	.0263	16	YULEE
6	681	.0263	1	SANDIEGOZ	410	.0263	15	YULEE
7	465	.0328	7	FORTWORTH	336	.0263	15	LOSANGELE
8	626	.0328	2	YULEE	574	.0263	2	MILWAUKEE
9	520	.0361	3	DALLAS	461	.0328	21	EL COYOTE
10	668	.0361	1	DALLAS	414	.0328	14	EL COYOTE
11	401	.0394	13	FOSSILRIM	402	.0394	19	YULEE
12	403	.0394	8	DISNEY AK	→ 411	.0460	9	FORTWORTH
→ 13	667	.0394	1	YULEE	424	.0460	8	EL COYOTE
14	666	.0460	1	YULEE	462	.0460	7	FOSSILRIM
15	670	.0493	2	EL COYOTE	671	.0559	1	EL COYOTE
16	378	.0526	26	EL COYOTE	669	.0559	1	FOSSILRIM
17	521	.0526	4	DISNEY AK	486	.0592	4	DISNEY AK
18	672	.0559	1	EL COYOTE				

→ **Indicates first individual with mean kinship above population average of 0.0426.**

GENETIC SUMMARY OF POPULATION

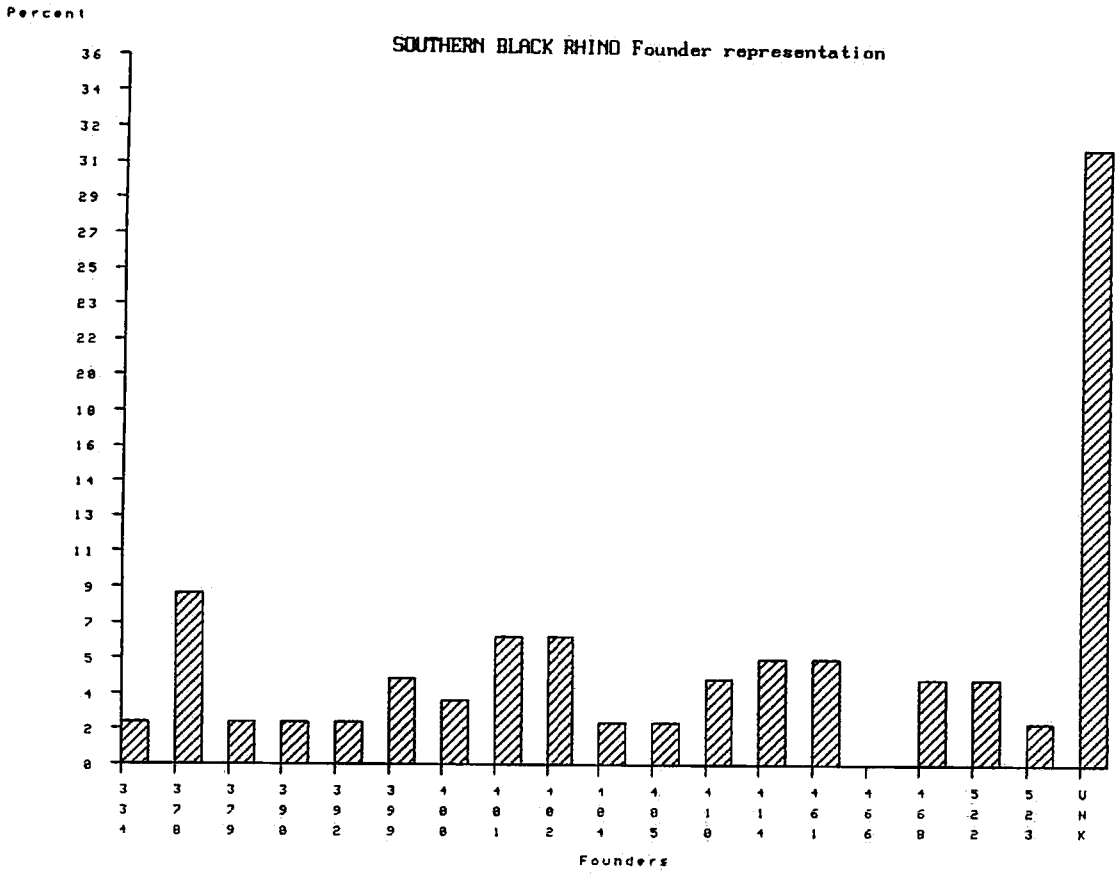
Descendant population Mean Kinship:	0.0426
Gene Diversity:	0.9574
Founder Genome Equivalents:	11.7398
Desc. population mean Kinship Value:	0.0439
Gene Value:	0.9561

ORDERED LISTS OF KINSHIP VALUE BY SEX - SOUTHERN BLACK RHINO

Rank	MALES	KV	Age		FEMALES	KV	Age	
1	390	.0113	12	SANDIEGOZ	466	.0000	21	FOSSILRIM
2	404	.0118	13	MILWAUKEE	392	.0113	12	SANDIEGOZ
3	523	.0132	10	YULEE	405	.0118	16	MILWAUKEE
4	522	.0227	10	YULEE	336	.0143	15	LOSANGELE
5	681	.0227	1	SANDIEGOZ	379	.0149	26	FORTWORTH
6	399	.0257	16	DALLAS	574	.0236	2	MILWAUKEE
7	668	.0335	1	DALLAS	410	.0268	15	YULEE
8	401	.0353	13	FOSSILRIM	468	.0314	16	YULEE
9	626	.0356	2	YULEE	414	.0325	14	EL COYOTE
10	667	.0361	1	YULEE	461	.0343	21	EL COYOTE
11	520	.0373	3	DALLAS	402	.0428	19	YULEE
12	465	.0429	7	FORTWORTH	424	.0479	8	EL COYOTE
13	666	.0441	1	YULEE	462	.0486	7	FOSSILRIM
14	670	.0481	2	EL COYOTE	411	.0496	9	FORTWORTH
15	403	.0492	8	DISNEY AK	671	.0526	1	EL COYOTE
16	378	.0545	26	EL COYOTE	669	.0530	1	FOSSILRIM
17	672	.0549	1	EL COYOTE	486	.0615	4	DISNEY AK
18	521	.0560	4	DISNEY AK				

GENETIC SUMMARY OF POPULATION

Descendant population Mean Kinship:	0.0426
Gene Diversity:	0.9574
Founder Genome Equivalents:	11.7398
Desc. population mean Kinship Value:	0.0439
Gene Value:	0.9561


Percent
SOUTHERN BLACK RHINO Founder representation
36
34
32
31
29
27
25
23
22
20
18
16
14
13
11
9
7
5
4
2
0
334
378
379
390
392
399
408
401
402
404
405
410
411
416
566
668
522
523
UNK
Founders