

AZA SSP

AFRICAN RHINO

MASTERPLAN

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SECTION 1

OVERVIEW, BACKGROUND AND SUMMARY

OVERVIEW OF THE CONSERVATION CRISIS FOR RHINO

- Since the AZA SSPs for Rhino were initiated in 1982, the 5 surviving species of rhino have become even more critically threatened.
- Only about 11,000 rhino survive in the wild; about 1,000 in captivity (Table 1).
- However, well over half of these rhino, both in the wild and in captivity, are of one species, i.e. the southern white rhino. Even with this subspecies there is no cause for complacency as concerns grow that the southern white rhino may be on the verge of a significant decline due to political changes in South Africa where over 95% of them reside.
- There are fewer than 5,000 of the other 4 species combined:

African Black Rhino	< 2,400	Sumatran Rhino	< 500
Indian Rhino	1,900	Javan Rhino	< 100
- The situation is even worse because some of the rhino species are believed to have distinctive subspecies, for example there are only 28-32 of the Northern White Rhino surviving in a single national park in the wild and only 9 in captivity where they are not reproducing.
- Without drastic action, the rhino will be extinct in the wild by the year 2000.
- The most spectacular decline in recent years has been suffered by the Black Rhino, down from 60,000 in 1970 to an estimated 2,350 today. The number continues to decrease. Perhaps even more relevant is the fact that in 1982 when the SSP for African rhinos was initiated there were an estimated 15,000 black rhino in Africa. Today there are just over 2,000, a reduction of 85%.
- In Africa, there has been a spectacular domino effect as the rhino population has crashed in country after country due to poaching.

Uganda:	The rhino, black and white, were exterminated during the 1970's.
Kenya:	Numbers of black rhino declined from an estimated 20,000 in 1970 to a low of perhaps 500 by 1980. (Numbers have stabilized and may be recovering, temporarily.)
Zaire:	The northern white rhino was reduced from several thousand to a low of 16 by 1984.
Zambia:	The 4,000 black rhino in the Luangwa Valley was annihilated from 1980-1985.
Tanzania:	Black rhino declined from an estimated 5,000 to perhaps 200 in the late 1980's
Zimbabwe:	Only 300 black rhino survive from an estimated 1,700 just 2 years ago; in 1993, 50% of the estimated 200 white rhino, the largest population outside South Africa and most of them dehorned, have been lost.
- After Zimbabwe, only South Africa, Namibia, and perhaps Kenya remain as rhino strongholds in Africa.
- The pressure is intensifying in other countries and on other species:
 - Appreciable poaching is occurring for the first time in decades in South Africa.
 - The second largest population (Manas) of Indian/Nepalese rhino in India has been decimated and the largest population (Kaziranga) is under increasing assault.
 - Significant numbers of Sumatran rhino horn continue in illegal trade and the species has virtually vanished from some "protected" areas where populations had been most dense.
 - The population of Javan rhino in Indonesia is stagnating and one conclusion is that poaching is preventing increase.

- Rhinos are also in crisis in captivity.
- Currently, there are 275 rhino of 4 species (Black, White, Indian, Sumatran) comprising 6 "subspecies" (Eastern Black, Southern Black, Southern White, Northern White, Indian, and Western Sumatran) in 69 institutions participating in AZA SSP programs for rhino. Another 12 institutions have indicated interest/intention to participate. (Table 2).
- Target population objectives established by the SSP rhino programs (Table 3) for demographic and genetic reasons aspire to a total SSP population of 430 rhinos (an increase of 155 spaces or about 55%) over the next 7-10 years (~ one-half of a rhino generation). Achievement of the target population objectives will not only require expansion of space, but also its reallocation among the species. This expansion seems feasible considering the ultimate capacity that has been recommended for and/or indicated by the 69 institutions currently participating in and 12 additional facilities expected to participate in the future in AZA Rhino SSPs. (Table 2).
- It should also be noted that space requirements might be reduced (e.g. in the case of black rhino) or increased (e.g. in the case of white rhino) depending future decisions about the validity of maintaining more than one "subspecies" or conservation unit within a species. This problem continues to be one of major concern, especially for the black rhino and efforts to resolve this matter must be intensified.
- While space problems may be manageable, attempts to develop SSP programs for genetic and demographic support of wild populations have been problematic at best (Tables 4-6):

Eastern Black Rhino:	This species reproduces rather reliably in captivity but management has not maximized the reproductive potential and health/husbandry problems continue largely to negate the breeding success that has occurred. The result is the species is in demographic crisis with a real imperative to increase reproduction through improved management.
Southern Black Rhino:	Reproduction has been moderate, but many of the births were conceived in the wild. Captive reproduction may be on the increase, but mortality has been high (30%) of rhino imported.
Southern White Rhino:	Reproduction in this subspecies has been very uneven with only a few facilities, particularly those able to maintain larger social groups, propagating well but with the majority of rhino and institutions not breeding at all with the result that the population is in demographic and consequent genetic crisis due to the age structure is senescing and not enough of the original wild-caught rhino have reproduced.
Northern White Rhino:	The program for this subspecies has been a failure with only 4 individuals and founders which have not reproduced and which are beyond reproductive prime.

Indian/Nepalese Rhino:

This program has been relatively successful with the annual population growth rate about equal to what is occurring in the wild. However, much of the reproduction to date has been by a limited number of breeders. Hence the genetic diversity contained in the captive-born population (i.e., the so-called living descendant population) is inadequate. Prospects do seem good for recruitment of more breeders from the existing captive population.

Sumatran Rhino:

Although not in captivity as long as the other forms, this program also has been a total failure so far with numbers of individuals and founders low, no reproduction occurring, and the death rate high (30% of the rhino imported).

- In summary, the SSP populations of Eastern Black, Southern White, Northern White, and Sumatran Rhino appear to be in demographic difficulty, perhaps crisis. It is too early in the history of the Southern Black Rhino SSP to assess if this population is also in demographic difficulty. There are genetic challenges for all SSP rhino populations. (Tables 4-6).
- The bottom line is that much improvement of captive husbandry is needed which will require more research and intensive management if SSP programs are to contribute significantly to rhino conservation.

BACKGROUND ON THE AZA AFRICAN RHINO SSP

- The SSP programs for black (*Diceros bicornis*) and white rhino (*Ceratotherium simum*), as well as Indian (*Rhinoceros unicornis*) and Sumatran rhino (*Dicerorhinus sumatrensis*), were established in 1982.
- Based on recommendations from the IUCN African Rhino Specialist Group, the SSP programs to date have been managing two conservation units as separate populations within each species:

Black Rhino:	Eastern Black Rhino (<i>Diceros bicornis michaeli</i>) Southern Black Rhino (<i>Diceros bicornis minor</i>).
White Rhino:	Southern White Rhino (<i>Ceratotherium simum</i>) Northern White Rhino (<i>Ceratotherium simum cottoni</i>).
- The first formal masterplans for black and white rhino were formulated in 1986 with major revisions in 1989. Updates on status and sets of recommendations were distributed at the AZA (AAZPA) Annual Conferences each year.
- From the outset, it was realized that SSP programs for all rhino species would need to be closely coordinated. Coordination was considered especially important and appropriate for the two African species.
 - Analysis indicated that the large number of white rhino (the majority of the population) that had been imported from South Africa as young animals in the 1960s and 1970s and maintained in captive facilities as pairs, or even trios, had failed to reproduce.
 - In 1988 and 1989, 34 potential founder southern white rhino were transferred to new locations in an attempt to stimulate reproduction.
 - However, another objective of the coordinated white and black rhino SSP programs was to remove white rhino from facilities that could maintain only a pair and replace them with black (or Indian) rhino because these latter two species appeared to reproduce adequately as pairs.
- These early versions of the masterplans established genetic and demographic objectives and emphasized captive propagation to provide a reservoir for support of the species in the wild.
- The original goals of the SSP programs for both black and southern white rhino were to maintain 90% of genetic diversity (as measured by gene diversity) for 10 rhino generations or 150-175 years. The numbers both of founders and of ultimate population sizes (target populations) required to achieve these genetic objectives were determined from the CAPACITY program developed by Jon Ballou in conjunction with the GENES program developed by Bob Lacy. As the science of genetic management of captive populations has evolved and other Regions have established organized breeding programs over the last decade, the population targets have been adjusted.

In general, the scientific basis for SSP programs has become more sophisticated and diversified over the last 10 years.

- The SSP recognizes husbandry, genetics, and demography as equally important and very interactive components of scientific management.

HUSBANDRY



DEMOGRAPHY

GENETICS

- A protocol for general application of these considerations in formulation of SSP masterplans and recommendations is provided by the AZA SSP Central Dogma (Box 1). The Dogma recognizes that there must be a balance and trade-offs between genetics and demography. Ideal genetics are not realistic. However, genetics should not be ignored completely unless there is a demographic imperative. Genetic decisions tend to have longer-term consequences and be more difficult to change.
- A rigorous review of the interactive application and consequences of husbandry, demography and genetics in relation to the eastern black rhino population has been conducted by Smith and Read (1992) and Read (1993).
- To facilitate coordination at the Regional level, the AZA Rhinoceros (Taxon) Advisory Group (popularly known as the AZA Rhino TAG) was established in 1991.
- The RAG has been active in development of collective and coordinated approaches to problems. In particular, the RAG has organized a Research Committee that is actively developing a number of disciplinary and inter-disciplinary subcommittees on various major research problems: health, nutrition, husbandry, behavior, reproduction, genetics.
- In recognition of the importance of husbandry, an extensive manual is being compiled.
- Concurrently, captive conservation programs for rhinos have also expanded their scope to increase the emphasis placed on research and *in situ* activities in addition to captive propagation.
- To facilitate coordination among Regions as well as to catalyze further development of programs within some Regions, a Global Captive Action Plan (GCAP) for Rhinos was initiated at a Workshop convened under CBSG auspices at the London Zoo in 1992 (Foose 1992). The GCAP has also expanded rapidly into initiation of Global Animal Survival Plans (GASPs), i.e. integration at the international level of Regional Breeding Programs for each of the rhino species. A further GCAP/GASP session was conducted in 1993. The AZA SSPs and RAG have been actively participating in this early development of the Rhino GCAP/GASP through an interactive and iterative process that permits both Regional and global programs to evolve synergistically.
- Finally, to further facilitate coordination of the SSP programs for black and white rhino, it has been decided to combine these revised versions of the SSP masterplans for the two species into a single document.

BOX 1

SSP^r CENTRAL DOGMA

- I. The first priority is to breed individuals of lowest Mean Kinship (MK) which are underrepresented and, therefore, possess the rarest alleles in the population.
- II. Among individuals with low MK, the second priority is to breed those whose alleles may be lost soon. This prioritization should be determined by the manager's knowledge of individuals' age, health, and/or reproductive condition. In the absence of other information low Kinship Value (KV), printed on the Master Plan Report, can be used.
- III. During pairing, pair individuals according to the following ordered criteria:
 - 1ST mate individuals with roughly similar MK to avoid combining rare and common alleles in offspring which reduces long-term gene diversity.
 - 2ND mate individuals whose offspring will have low inbreeding coefficients (f), for the best probability of viable, healthy offspring.
 - 3RD maximize mating success based on the species' biology including suitable age of individuals, mate choice, social structure, etc.
 - 4TH minimize logistical difficulties of moves (e.g. distance, cost, quarantine).
 - 5TH maximize interinstitutional harmony and minimize political conflicts, hopefully this will never enter into the final decision which should be based upon science.

CURRENT SITUATION FOR SSP AFRICAN RHINO POPULATIONS

- An overview of the demographic and genetic status of AZA SSP African rhino populations is presented in Table 6.
- The captive populations of Eastern Black, Southern White, Northern White rhino appear to be in a demographic difficulty, perhaps crisis. It is too early in the history of the population to assess if the AZA Southern Black Rhino SSP is also in demographic difficulties.

Clearly, there appears to be a demographic imperative for African rhino in the AZA SSP.

Eastern Black Rhino:

- There are 40.29 rhino in 25 institutions (Table 7)
- This population has been self-sustaining or slightly increasing. The growth rate of this population is just barely positive, but a reversal could be impending (Table 6, Section 3). Reproduction has been moderate (on the average, births = 15% of the adult female population).
- 80% of the population is captive born (Table 4).
- However, mortality has been quite high due to the health problems for this species under intensive management.
- About 65% (18 of 29) of the adult females are breeders; 60% of current female breeders are also captive born. However, two-thirds of the current breeders are > 22 years of age, beyond the real prime of reproductive life as indicated by demographic analysis of the species. (Table 8, Section 3).
- The age and sex structure is not healthy. There is only 1 female in the population < 4 years of age. 14 of the 15 surviving births since 1-1-1990 have been male; 15 of the 22 total births have been male. (Section 3)

Southern Black Rhino:

- There are 10.18 rhino in 10 institutions. (Table 7).
- This population may be just sustaining itself. The growth rate of this population is at best 0. (Table 6, Section 5).
- Only 17% of the population is captive born and bred; 41% is captive born if rhino bred in the wild but born in captivity are also considered. (Table 4).
- 57% (8 of 14) of the adult females are breeders; at least two of the nulliparous are probably pregnant. (Table 9).
- Currently, the age structure is favorable since most individuals are within reproductive prime. (Section 5).

Southern White Rhino:

- There are 52.72 rhino in 39 institutions; 50.69 of these are considered to be in the managed SSP population. (Table 10).
- This population is not self-sustaining. In part, the negative growth rate has been deliberate in order to reduce the population size and hence the amount of facility space devoted to this species. However, many individuals have not reproduced and serious problems are developing due to intrinsic changes in age structure (Table 6, Section 7).
- Only 3% of the population is captive born and bred. (Table 4).
- Only 35% (23 of 65) of the adult females are breeders (Table 11, Section 7).
- The age structure is senescing. (Section 7)

The average age of individuals in the population has increased from 11 years in 1980 to 21 years today. In a healthy population, the average age should be less than the mean age of reproduction (measured by the generation time, i.e. ~ 19 years.) (K. Willis, personal communication)

Northern White Rhino:

- There are only 2 females and 2 males in the SSP population. None have reproduced and all are of rather advanced age > 20 years in terms of what appear (from information on southern white rhino) to be the prime reproductive years for the species. (Section 9).

There are also genetic challenges in part due to the demographic difficulties (Table 6; Sections 3,5,7, and 9). The genetically effective size N_e is one measure of the genetic health of the population as are the number of founder genome equivalents. As indicated in Table 6, N_e can be calculated from both genetic data and demographic data. The genetic method of calculation can to some extent be interpreted as a retrospective measure. The demographic method of calculation a more current or even prospective measure. In general, N_e s of about 50 and N_e/N (genetically effective to total size) ratios of .50-.70 are desirable.

Eastern Black Rhino:

- The genetically effective size of the population is about 27-29 and the $N_e/N = .40-.43$ (Table 6). An N_e of 45-50 would be preferable and may be achievable if the attempts at improved reproduction succeed.

Southern Black Rhino:

- The genetically effective size of the population is 11-13 and the N_e/N ratio is .38-.46. If reproduction continues as indicated, an N_e/N of about .70 may be possible and acceptable. Again an N_e of about 50 will be optimal.

Southern White Rhino:

- The genetically effective size of the population is 25-40 with the lower limit measured genetically (loss of gene diversity to date) and the upper limited demographically (number of current breeders). The N_e/N ratio is .20-.30. An N_e of 50 and N_e/N ratio of .50 would be necessary to achieve genetic goals and may be achievable if the attempts at improved reproduction succeed.

Northern White Rhino:

- Without reproduction and with the meager number of founders, there seems little hope that this population is viable genetically unless it can be managed globally with the other rhino in captivity and the small remnant in the wild.

Facility space (captive habitat) for rhino is limited; hence, it is important consider the trajectories as well as the targets of population.

It is interesting to compare the genetic and demographic performance of the African rhino SSPs with the Indian/Nepalese Rhino SSP. Demographically, the Indian/Nepalese population seems much healthier. However, much of the population growth is due to reproduction by relative few individuals and lineages. Hence, genetically the Indian/Nepalese Rhino SSP population seems in even worse condition than the Southern White Rhino SSP population.

A global perspective on SSP rhino populations and objectives is provided by Table 29.

GOALS & OBJECTIVES OF THE AFRICAN RHINO SSP

The goal of the AZA SSP for African Rhinos is to develop a self-sustaining captive population of black and white rhino to provide genetic and demographic support for wild populations as the need and opportunity occur.

The objectives of the AZA African Rhino SSP to achieve this goal are:

- (1) Currently, develop such self-sustaining populations for two conservation units of black rhino (eastern African and southern African) and one conservation unit of white rhino (southern African); salvage anything possible from the northern white rhino nucleus for contribution to the global population of this subspecies.
- (2) Ensure that the captive populations are managed demographically to ensure they can be sustained and expanded.
- (3) Attempt to maintain 90% of the gene diversity obtained from the wild for each conservation unit for a period of 110 years to 150 years (the latter ~ 8-10 rhino generations).
- (4) Aspire to target population sizes adequate to achieve the genetic objectives (Table 3; Boxes 2, 3, 4).

Eastern Black Rhino	90
Southern Black Rhino	80
Southern White Rhino	100 (+ 20 research individuals)
Northern White Rhino	Target population objectives are considered premature or inappropriate at this time; immediate objective is 8 offspring from existing animals before they die.

These target objectives will entail creation or conversion of 65 spaces for African rhinos.

- (5) Continue efforts to acquire additional founders to enable achievement of genetic objectives (Table 3).
- (6) Coordinate attainment of target population sizes with the SSP Programs for India/Nepalese and Sumatran Rhino.

Target objectives for these species are:

Indian/Nepalese Rhino	90
Sumatran Rhino	50

Target population size objectives for all rhino will entail creation of 157 additional rhino spaces and reallocation of some spaces to different species.

- (7) Manage rhino populations as much as possible according to AZA Central Dogma (Box 1) as the best means available at this time of achieving SSP objectives.
- (8) Conduct research useful to management of self-sustaining populations in captivity and viable populations in the wild.
- (9) Employ the captive populations as flagship species for conservation of rhino and the ecosystems they occupy.
- (10) Communicate, cooperate, and coordinate with breeding and conservation programs for rhino in other regions of the captive world.

SUMMARY OF AFRICAN RHINO SSP MASTERPLAN RECOMMENDATIONS

The tables of recommendations for breedings, relocations, and surplus present both the mean kinship M_k of individuals and the mean of M_k s in the population. Very generally, breeding an individual with an $M_k <$ population M_k will improve preservation of gene diversity, breeding individuals with $M_k >$ the population M_k will not.

EASTERN BLACK RHINO

- (1) There currently are 69 rhino in this population; the target population is 90 by the year 2000.
- (2) There currently are 28 females and 26 males of breeding age in the population.
- (3) There is a need to attempt production of an average of 7 calves/year for the next 6 years.
 - Toward this objective, 11 more of the adult female non-breeders and 8 more of the adult male non-breeders should be recruited to reproduce.
 - This rate of reproduction will require reduction of the birth interval on reproducing females to no more than 3 years and optimally to 30 months. As described by Smith and Read, ways to accomplish this reduced birth interval are:
 - Weaning calf at 6 months of age
 - Partial weaning of calves so they can be separated from females during days that they are in estrus so they can be placed with males.
 - In some cases, reintroduction of males to females while they are still with their calves.
- (4) A total of 29 breedings of adult females and 1 future breeding of a juvenile female are recommended: 12 for females which have not reproduced previously (Table 12); 18 for females which have bred before (Table 13).
- (5) The current situation or masterplan recommendations will place all adult females with an adult male:
 - 70% of the adult females will be with proven breeders.
- (6) To achieve management objectives, moves of 16 individuals are recommended (Table 14).
- (7) A flow chart of the expected population trajectories produced by these recommendations is presented in Table 15.

Institution-by Institution and Animal-By-Animal Recommendations are provided in Section 2

(GREEN Paper)

SOUTHERN BLACK RHINO

- (1) Currently there are 28 individuals in this population; the goal of the SSP is 50 by the Year 2000.
- (2) There currently are 14 females and 4 males of breeding age in the population.
- (3) There is a need to attempt production of an average of 4 calves/year for 1994-1996 and 5 calves/year for 1997/1999.
 - Toward this objective, 6 more of the adult female non-breeders and 4 more of the adult male non-breeders should be recruited to reproduction.
 - Again, this rate of reproduction will require reduction of the birth interval on reproducing females to no more than 3 years and optimally to 30 months. As described by Smith and Read, ways to accomplish this reduced birth interval are:
 - Weaning calf at 6 months of age
 - Partial weaning of calves so they can be separated from females during days that they are in estrus so they can be placed with males.
 - In some cases, reintroduction of males to females while they are still with their calves.
- (4) A total of 14 breedings of adult females and 4 future breedings for juvenile females are recommended: 10 for females which have not reproduced previously (Table 16); 8 for females which have bred before (Table 17).
- (5) The current situation or masterplan recommendations will place all adult females with an adult male. At least 40%, and perhaps 60%, of the adult females will be with proven breeders.
- (6) To achieve management objectives, relocation of 7 individuals are recommended (Table 18).
- (7) For both demographic and genetic reasons, the immigration of 2 at least more adult males from Zimbabwe is recommended to replace rhino that died soon after the last importation and the export of 2 males to the Australasian ASMP to ameliorate a severe demographic problem (lack of any males for their 6 adult females) there.
- (8) A flow chart of the expected population trajectories produced by these recommendations are presented in Table 19.

Institution-by Institution and Animal-By-Animal Recommendations are provided in Section 4

(LAVENDER Paper)

SOUTHERN WHITE RHINO

- (1) There currently are 124 individuals in this population; 119 are of known pedigree and hence considered to be part of the managed SSP population; the objective (population target) is to stabilize but reorganize the population at 100 breeder animals and 20 research animals.
- (2) 15 of the 35 wild-caught nulliparous females and 8 of the wild caught non-breeder males should reproduce to provide an acceptable level of genetic diversity. (Box 3)
- (3) A total of 22 breedings of adult females and 3 future breedings for juvenile females are recommended: 17 for females which have not reproduced previously (Table 20); 8 for females which have bred before (Table 21).
- (4) A number of wild-caught non-breeder females < 27 years of age are not currently recommended for breeding (Table 22). Considering the demographic and genetic needs of this population, this situation should perhaps be reconsidered.
- (5) A number of rhino will be moved especially into larger enclosures and social groups to induce reproduction. (Table 23).
- (6) Facilities that have been recommended for or indicated interest in conversion from white to black rhino in the immediate future are indicated in Table 24.
- (7) 12 female southern white rhino have been designated for the research program as identified in Table 25.
- (8) To achieve management objectives, 34 relocations are recommended (Table 26).
- (9) For the immediate future, the level of reproduction recommended to achieve genetic objectives will greatly exceed what is necessary to produce a demographically self-sustaining population (i.e. an average of births/year are needed for demographic self-sustainment. To accommodate the relatively large number of births required for genetic reasons over the next several years, a number of surplus must and can be removed from SSP facilities each year. 15 southern white rhino that have been already designated surplus and the reasons for this designation are identified in Table 27.
- (10) A flow chart of the expected population trajectories produced by the masterplan recommendations are presented in Table 28.

Institution-by Institution and Animal-By-Animal Recommendations are provided in Section 6

(YELLOW Paper)

NORTHERN WHITE RHINO

- (1) There currently are 4 (2.2) individuals in this population: no target number has been established: the objective is to produce 8 calves before these rhino are lost.
- (2) An additional objective is to develop reproductive technology (AI and ET) in time to salvage germplasm from these rhino. Hence, the program in progress to reproductively evaluate, investigate, and perhaps stimulate these rhino as well as to conduct reproductive research on southern white rhino is encouraged.

Institution-by Institution and Animal-By-Animal Recommendations are provided in Section 8

(PINK Paper)

Table 1
WILD AND CAPTIVE POPULATIONS
OF RHINO
1 June 1994

Species or Subspecies	Wild Population	Global Captive Population
Southwestern Black Rhino	600	0
Northwestern Black Rhino	30	0
Eastern Black Rhino	470	165
Southern Black Rhino	1,250	45
<i>Total Black Rhino</i>	<i>2,350</i>	<i>210</i>
Northern White Rhino	30 +	9
Southern White Rhino	6,740	630 +
<i>Total White Rhino</i>	<i>6,770</i>	<i>640</i>
<i>AFRICAN RHINO SPECIES</i>	<i>~ 9,100</i>	<i>850</i>
Indian/Nepalese Rhino	1,900	124
Javan Rhino	< 100	0
Eastern Sumatran Rhino (Borneo)	< 100	4
Western Sumatran Rhino (Sumatra/Malaya)	< 400	19
<i>Total Sumatran Rhino</i>	<i>< 500</i>	<i>23</i>
<i>ASIAN RHINO SPECIES</i>	<i>~ 2,400</i>	<i>147</i>
<i>ALL SPECIES</i>	<i>11,500</i>	<i>~ 1,000</i>

Table 2
CURRENT AND TARGET NUMBERS OF RHINO IN AZA SSP RHINO INSTITUTIONS

INSTITUTION	CURRENT NUMBER				RECOMMENDED NUMBER				ULTIMATE CAPACITY (within 7 yrs)			
	BLACK	WHITE	INDIAN	SUMTRN	BLACK	WHITE	INDIAN	SUMTRN	BLACK	WHITE	INDIAN	SUMTRN
ATLANTA	1.1								2.1			1.2
ALBUQUERQUE		1.1			1.1				1.1			
ASHEBORO		2.2								2.2		
BALTIMORE		1.1			1.1				1.1			
BATON ROUGE		1.2					1.1				1.1	
BIRMINGHAM		1.2					1.1				1.1	
BROWNSVILLE		3.2				2.2				2.2		
BUFFALO			1.0				1.1				1.2	
CALGARY		1.1				1.2				1.2		
CHICAGO - BROOKFIELD	3.2				2.2				2.2			
CHICAGO - LINCOLN PARK	1.2				1.2				1.2			
CINCINNATI	2.1		1.0	1.1	2.2		1.1	1.2	2.2		1.2	1.2
CLEVELAND		1.1			1.1				1.1			
COLORADO SPRINGS	2.1								2.2			
COLUMBIA - RIVERBANKS	1.1								1.1			
COLUMBUS	2.1				2.2				2.2			
CUMBERLAND - THE WILDS		3.6				3.12*	1.1			3.12**	2.4	
DALLAS	1.3				1.3				2.3			
DENVER	3.2								2.2			
DETROIT	1.1								1.2			
EL COYOTE RANCH - BASS	1.4				3.7				3.7			
FORT WORTH	1.1	1.1	1.1		1.2	2.4	1.1		1.2	2.4	1.1	
FRESNO		0.1										
GARDEN CITY	1.0				1.1				1.1			
GLEN ROSE - FOSSIL RIM	1.1	3.4			2.4	5.5			2.4	5.5		
HONOLULU	2.0	1.0					1.1				1.1	
HOUSTON		1.2					1.1				1.1	
JACKSON		1.1					1.1				1.1	
JACKSONVILLE		1.1				2.3				2.3		
KNOXVILLE		2.6				2.6				2.5		
LACOMA RANCH - BENSTEN	1.5				1.4				1.4			
LANSING - POTTER PARK	1.0				1.1				1.1			
LOS ANGELES	1.2		1.2	0.1	1.2		2.2	1.1	1.2		2.2	1.2

Table 2 (con't)

CURRENT AND TARGET NUMBERS OF RHINO IN AZA SSP RHINO INSTITUTIONS

INSTITUTION	CURRENT NUMBER			RECOMMENDED NUMBER			ULTIMATE CAPACITY (within 7 yrs)		
	BLACK	WHITE	INDIAN	SUMTRN	BLACK	WHITE	INDIAN	BLACK	WHITE
LOUISVILLE		1.2			1.1			1.1	
MADISON		1.1				1.2			1.2
MEMPHIS		2.1					1.1		1.1
MIAMI	4.3		2.1		4.3		2.2	4.4	2.2
MILWAUKEE	1.1		1.0		2.2			2.2	
MONROE		1.1							
NEW ORLEANS		1.1			1.1			1.1	3.3
NEW YORK			2.3				2.4	1.1	2.4
NORFOLK		1.1				2.4			2.4
OKLAHOMA CITY	1.0		1.1		1.1		1.1	1.1	
OMAHA		1.1			1.1			1.1	
PHILADELPHIA			1.1				1.1		1.1
PHOENIX		1.1			1.1			1.1	
PITTSBURGH		1.1			1.1			1.1	
PORTLAND	1.1				1.1			1.1	
ROCKTON - AFRICAN SAF		2.2				2.2			
ST LOUIS	1.2				2.2			2.2	
SALT LAKE CITY		1.1			1.1			1.1	
SAN ANTONIO	1.2	1.3			1.2	1.2		1.2	
SAN DIEGO - WAP	2.1	5.12	6.6		4.4	4.12	4.4	4.4	4.12
SAN DIEGO - ZOO	4.2		1.0	1.1	2.4		2.2	2.4	
SAN FRANCISCO	1.1		1.1			1.1	1.2	1.1	1.2
SANTILLANA - MCALLEN	1.1				2.2			2.2	
TAMPA - BUSCH GARDENS	2.1				2.1			2.2	
TAMPA - LOWERY PARK			1.0				1.1		1.1
TOLEDO		1.1			1.1			1.1	
TORONTO		2.2	1.2			2.2	1.2		2.2
TULSA		1.2					1.1		1.1
TUCSON		1.1			1.1			1.1	
TYLER - CALDWELL ZOO	2.2				2.2			2.2	
VALLEJO - MARINE WORLD		1.1				1.2			1.2

Table 2 (con't)
CURRENT AND TARGET NUMBERS OF RHINO IN AZA SSP RHINO INSTITUTIONS

INSTITUTION	CURRENT NUMBER				RECOMMENDED NUMBER				ULTIMATE CAPACITY (within 7 yrs)			
	BLACK	WHITE	INDIAN	SUMTRN	BLACK	WHITE	INDIAN	SUMTRN	BLACK	WHITE	INDIAN	SUMTRN
WACO - CNTRL TX ZOO		1.1				1.2				1.2		
WASHINGTON DC			1.2				1.2				1.2	
WICHITA - SEDGEWICK	2.1				1.1				1.1			
WINSTON - WILDLIFE SAF		2.1				2.5				2.5		
YULEE - WHITE OAK	0.1	2.3			3.6	4.12*		1.1	3.6	4.16**		5.5
SUBTOTAL	48.49	55.74	22.20	2.3	56.74	38.79	29.34	8.9	66.85	37.82	33.42	17.20
POTENTIAL PARTICIPANTS												
GRANBY					1.1				1.1			
LITTLE ROCK							1.1				1.1	
KANSAS CITY					1.1				1.1			
MINNESOTA							1.1				2.2	
MINOT - ROOSEVELT PK					1.1				1.1			
MONTGOMERY					1.1				1.1			
ORLANDO - DISNEY					2.2	2.4	2.2		2.2	2.4	2.2	2.2
RACINE					1.1				1.1			
ROLLING HILLS RANCH						1.2			2.2			
SACRAMENTO					1.1				1.1			
SEATTLE					1.1		1.1		1.1		1.1	
SIOUX FALLS - GRT PLNS					1.1				1.1			
TOTAL	50.47	54.74	22.20	2.3	66.84	41.85	34.39	8.9	78.97	39.86	37.46	19.22
RCP/GCAP TARGET									170	120***	90	50

* 6 for research

** 12 for research

*** 20 for research

Table 3
TARGET POPULATION AND FOUNDER OBJECTIVES
AZA RHINO SSP PROGRAMS

RHINO TAXON	TARGET POPULATIONS			ADDITIONAL FOUNDERS NEEDED		
	1987	1989	1994	1987	1989	1994
Eastern Black	75	75	90	0	0	0
Southern Black	75	75	80	25+	15+	8
Southern White	100	100	120	0	0	?
Northern White	---	---	8	20	20	20
Indian Rhino	80	80	90	?	13	11
Sumatran	?	100	50	25	22	20 ?
TOTAL	250	250	298	70+	70+	59

<i>Table 4</i> WILD AND CAPTIVE ORIGINS OF RHINO IN CAPTIVITY IN NORTH AMERICA				
TAXON	TOTAL NUMBER	WILD BORN	CAPTIVE BORN	% CAPTIVE BORN
Eastern Black	69	14	55	80
Southern Black	28	23 (16*)	5 (12)	18 (43*)
Northern White	4	4	0	0
Southern White	119 (Managed Population)	81	38	32
Indian	42	12	30	71
Sumatran	5	5	0	0
TOTAL	267	139 (132*)	128 (135*)	48 (51*)

* 7 born in captivity but conceived in wild

Table 5
AFRICAN RHINO BIRTHS AND DEATHS
IN CAPTIVITY
NORTH AMERICA

YEAR	EASTERN BLACK RHINO				SOUTHERN BLACK RHINO				SOUTHERN WHITE RHINO			
	BIRTHS	DEATHS	NET CHANGE	POPLN 31/12	BIRTHS	DEATHS	NET CHANGE	POPLN 31/12	BIRTHS	DEATHS	NET CHANGE	POPLN 31/12
1984	0	1	-1	62	0	1	-1	7	7	2	+5	129
1985	7	4	+3	60	0	2	-2	5	7	3	+4	132
1986	7	7	0	63	0	0	0	5	9	2	+7	137
1987	2	5	-3	63	1	1	0	6	6	6	0	135
1988	5	2	+3	60	0	0	0	6	7	3	+4	135
1989	5	6	-1	63	3 (2*)	2	+1	18	2	3	-1	131
1990	6	3	+3	64	1 (1*)	0	+1	19	4	4	0	124
1991	6	5	+1	67	2	1	+1	20	7	5	+2	126
1992	4	3	+1	68	2	4	-2	28	4	2	+2	125
1993	6	5	+1	69	2	1	+1	29	1	0	+1	125
10 YR TOTL	48	41	+7		11 (3*)	12	-1		54	30	+24	

* 3 rhino were born in captivity but conceived in the wild

** Net = Births - Deaths / Imports & Exports excluded

*** Popln. 12/31 includes results of imports and exports

Table 6
DEMOGRAPHIC AND GENETIC OVERVIEW OF AZA SSP RHINO POPULATIONS

RHINO TAXON	NUMBER	BREEDERS	LAMBDA	% LAST QTR LIFE	GENE DIVERSITY	F.G.E.	MEAN M_b	$N_{gc}/N_{gd}/N$
Eastern Black	40.29	13.17	~ 1%	25%	.968	15.7	.0316	.40 .43
Southern Black	10.18	4.8	0	0	.950	9.9	.0503	.38 .46
Southern White	52.72 (Total) 50.69 (Nonsurplus)	17.24	~ 0 to - 1%	25%	.965	14.2	.0351	.20 .33
Northern White	2.2	0.0	0	0	0	0	0	0 0
Indian Rhino	22.20	7.8	~ + 4%	10%	.907	5.4	.0934	.18 .36
Sumatran	2.3	0	0	?	0	0	0	0 0

N_{gc} = Genetic N_e calculated from genetic data:

N_{gd} = Genetic N_e calculated from demographic data:

N = Total Current Population Size

Gene Diversity Retained = $[1 - 1/(2) (\# \text{ Founders})] [1 - 1/(2) (N_{gc})]$

$N_e = (4) (M_b) (F_b) / (M_b + F_b)$

Where M_b = Number of Male Breeders and F_b = Number of Female Breeders

Table 7
BLACK RHINOCEROS (LIVING) IN NORTH AMERICA

Diceros bicornis michaeli

INSTITUTION	ANIMALS	(MALE AGES)	(FEMALE AGES)
Atlanta Zoo	1.1	(8 yrs.)	(4 yrs.)
Brookfield Zoo	3.2	(<1, 4, 8.5 yrs.)	(9, 21 yrs.)
Busch Gardens	2.1	(4.5, 8 yrs.)	(5 yrs.)
Caldwell (Tyler) Zoo	2.2	(7.5, 8 yrs.)	(1, 8 yrs.)
Cheyenne Mountain	2.1	(<1, 13 yrs.)	(11.5 yrs.)
Cincinnati Zoo	2.1	(2, 24 yrs.)	(24 yrs.)
Columbus Zoo	2.1	(5.5, 40 yrs.)	(5.5 yrs.)
Dallas Zoo	0.1		(20 yrs.)
Denver Zoo	3.2	(<1, 11, 22 yrs.)	(11.5, 23 yrs.)
Detroit Zoo	1.0	(40 yrs.)	
Garden City, Kansas Zoo	1.0	(5 yrs.)	
Honolulu	2.0	(2, 3 yrs)	
Lincoln Park Zoo	1.2	(12.5 yrs.)	(11.5, 13 yrs.)
Los Angeles Zoo	1.2	(15.5 yrs.)	(17.5, 28 yrs.)
Metro Miami Zoo	4.3	(1.5, 3.5, 6, 17 yrs.)	(9, 21, 24 yrs.)
Oklahoma City	1.0	(2.5 yrs)	
Potter Park Zoo	1.0	(3.5 yrs.)	
Riverbanks Zoo	1.1	(8 yrs.)	(6 yrs.)
San Antonio Zoo	1.2	(23 yrs.)	(8.5, 24.5 yrs.)
San Diego Zoo	2.1	(2.5, 27 yrs.)	(22 yrs.)
San Diego WAP	1.1	(14.5 yrs.)	(20.5 yrs.)
San Francisco Zoo	1.1	(7 yrs.)	(23 yrs.)
Sedgewick County Zoo	2.1	(1.5, 14 yrs.)	(29 yrs.)
St. Louis Zoo	1.2	(18 yrs.)	(12.5, 18.5 yrs.)
Washington Park Zoo	1.1	(7 yrs.)	(5.5 yrs.)
Sub-Total	40.29 = 29		

Table 7
BLACK RHINOCEROS (LIVING) IN NORTH AMERICA
 (Continued)

<i>Diceros bicornis minor</i>			
INSTITUTION	ANIMALS	(M)	(F)
Bass Ranch, Texas (El Coyote Ranch)	1.4	(8 yrs.)	(2, 3, 9, 16 yrs.)
Bentsen Ranch, Texas (LaComa Ranch)	1.5	(21 yrs.)	(<1, 1, 10, 14, 21 yrs.)
Dallas Zoo	1.2	(11 yrs.)	(3, 19 yrs.)
Ft. Worth Zoo	1.1	(3 yrs.)	(4 yrs.)
Fossil Rim WC	1.1	(5 yrs.)	(17 yrs.)
Los Angeles Zoo	0.1	(19 yrs.)	(10, 16 yrs.)
Milwaukee Zoo	2.1	(<1, 8 yrs.)	(11 yrs.)
San Diego Zoo	2.1	(<1, 7 yrs.)	(7 yrs.)
Santillana Ranch (McAllen Ranch)	1.1	(2 yrs.)	(2 yrs.)
White Oak Plantation	0.1		(16 yrs.)
Sub-Total	10.18 = 28		
TOTAL	50.47 = 97		

Table 8
**REPRODUCTIVE SUMMARY
 OF EASTERN BLACK RHINO
 IN NORTH AMERICA**

	TOTAL ADULT	BREEDERS	NONBREEDERS	ADDITIONAL BREEDERS NEEDED	TOTAL BREEDERS
MALES (>6YRS)					
WILD BORN	5	3	2	1	4
CAPTIVE BORN	21	10	11	7	17
TOTAL	26	13	13	8	21
FEMALES (>4YRS)					
WILD BORN	9	8	1	1	9
CAPTIVE BORN	20	10	10	10	20
TOTAL	29	18	11	11	29
FEMALES (>22YRS)					
WILD BORN	8	8	0	0	8
CAPTIVE BORN	4	4	0	0	4
TOTAL	12	12	0	0	12

Table 9
**REPRODUCTIVE SUMMARY
 OF SOUTHERN BLACK RHINO
 IN NORTH AMERICA**

	TOTAL ADULT	BREEDERS	NONBREEDERS	ADDITIONAL BREEDERS NEEDED	TOTAL BREEDERS
MALES (>6YRS)					
WILD BORN	6	4	2	4**	8
CAPTIVE BORN	0	0	0	0	0
TOTAL	6	4	2	4**	8
FEMALES (>4YRS)					
WILD BORN	10	8	2	2	10
CAPTIVE BORN	4*	0	4*	4	4
TOTAL	14	8	6*	6	14

* 3 born in captivity but conceived in wild

** Reason for import of 2 more males from Zimbabwe

Table 11
**REPRODUCTIVE SUMMARY
 OF SOUTHERN WHITE RHINO
 IN NORTH AMERICA**

	TOTAL ADULT	BREEDERS	NONBREEDERS	ADDITIONAL BREEDERS NEEDED	TOTAL BREEDERS
MALES (>6YRS)					
WILD BORN	33	16	17	8	24
CAPTIVE BORN	10	1	9	10	11
TOTAL	43	17	26	18	35
FEMALES (>4YRS)					
WILD BORN	49	18	31	15	33
CAPTIVE BORN	16	5	11	11	16
TOTAL	65	23	42	26	49
FEMALES (>25YRS)					
WILD BORN	32	15	17	7	23
CAPTIVE BORN	0	0	0	0	0
TOTAL	32	15	17	7	23

Table 12
BREEDINGS RECOMMENDED FOR EASTERN BLACK RHINO FEMALES
THAT HAVE NOT REPRODUCED BEFORE
Population Mean $M_k = .0316$

LOCATION	#	ORIGIN	AGE	M_k	MATE	AGE	M_k	MATE BRED	ORIGIN	YRS TOGETHER	REMARKS
Atlanta	426	C	4	.0397	388	7.5	.0262	No	C	0	Breed ASAP
Brookfield	365	C	9	.0230	363	9	.0409	No	C	1	Breed ASAP
Busch	418	C	5	.0412	356	8	.0115	No	C	?	Breed ASAP
Caldwell (Tyler)	2092	C	.75	.0363	435	1.5	.0207	No	C	0	Move to Potter Park
Columbus	397	C	5.5	.0409	389	5.5	.0207	No	C	4.5	Breed ASAP
Dallas	311	W	20	0	110	26.5	.0184	Yes	C	0	Move to SDWAP
Lincoln Park	294	C	13	.0276	308?	13	.0421	Yes	C	11?	?
Miami	351	C	8.5	.0397	395	7	.0207	No	C	?	Breed ASAP
Riverbanks	383	C	5.5	.0397	381	7.5	.0176	No	C	2.5	Breed ASAP
San Antonio	364	C	8	.0369	169	24	.0184	Yes	W	6+	?
St. Louis	330	C	12	.0092	251	20	.0046	Yes	W	2.5	Reproductive workup; Move to SDWAP to breed with 110 or 292
Washington Park	396	C	5.5	.0230	376	7	.0432	No	C	3	Breed ASAP

Table 13
BREEDINGS RECOMMENDED FOR EASTERN BLACK RHINO FEMALES
THAT HAVE REPRODUCED BEFORE
Population Mean $M_A = 0.0316$

LOCATION	#	ORIGIN	AGE	M_A	MATE	AGE	M_A	MATE BRED	ORIGIN	YRS TOGETHER	REMARKS
Brookfield	235	W	24	.0184	363	8.5	.0409	No	C	1	M_A Male > Mean
Caldwell (Tyler)	359	C	8	.0300	362	8	.0334	Yes	C	4+	Breed ASAP
Cheyenne	331	C	11	.0300	305	13	.0265	Yes	C	4+	Breed ASAP
Cincinnati	225	W	26	.0092	247	23	.0300	Yes	W	15+	Breed ASAP
Denver	163	C	23	.0334	161	22	.0438	Yes	C	15+	Breed ASAP
	328	C	11	.0455	332	11	.0432	Yes	C	10+	Breed ASAP
Lincoln Park	317	C	11	.0392	308	12.5	.0421	Yes	C	10	Breed ASAP
Los Angeles	76	W	31	.0046	285	15.5	.0213	Yes	C	15	Breed ASAP
	267	C	18	.0364	285	15.5	.0213	Yes	C	15	Breed ASAP
Miami	202	W	22	.0207	259	17	.0323	Yes	C	5+	Breed ASAP
	255*	W	25	0	259	17	.0323	Yes	C	2	Change Mates Repro. Exam.
San Antonio	190	C	24	.0276	169	22	.0184	Yes	W	10	Breed ASAP
SDZ	192	C	22	.0357	110	26	.0184	Yes	C	5+	Breed ASAP
SDWAP	233	W	24	.0092	292	14	.0230	Yes	C	5+	Breed ASAP
San Francisco	213	W	23	.0276	377	6.5	.0343	No	C	0	Move Mate from Lansing
Sedgewick	53	W	32	.0115	301	14	.0392	Yes	C	5+	Breed ASAP
St. Louis	212	C	18	.0184	251	18	.0046	Yes	W	10	Breed ASAP

* None of 4 offspring have survived to adulthood

Table 14
RELOCATIONS RECOMMENDED FOR EASTERN BLACK RHINO
 Population Mean $M_k = .0316$

CURRENT LOCATION	DESTINATION	#	SEX	AGE	M_k	BREEDER ?	PURPOSE
Caldwell (Tyler)	Lansing (Potter Park)	2092	F	1	.0363	No	Future Breeding
Cincinnati	Cleveland via Columbus	457	M	1.5	.0242	No	Future Breeding
Colorado Springs	?	2099	M	.5	.0328	No	?
Dallas	SDWAP	311	F	19	0	No	Breed with 110
Denver	Honolulu	458	M	2	.0490	No	Holding?
Lansing	San Francisco	377	M	1	.0343	No	Breed with 213
Miami	Hitachi, Japan	472	M	3.5	.0311	No	?
	Great Plains	2090	M	1	.0311	No	?
San Diego Zoo	New York	473	M	1.5	.0273	No	?
San Diego WAP	Australia	302	M	13	.0432		Holding
	Brookfield	427	M	4	.0242	No	?
	Lansing	435	M	3.5	.0207	No	?
San Francisco	Honolulu	443	M	2.5	.0397	No	Holding?
St. Louis	SDWAP	330	F	12	.0092		Breed with 110 or 259
	OKC	459	M	2.5	.0161	No	?
Sedgwick	?	2095	M	1	.0300	No	?

Table 15
**TARGETS AND TRAJECTORIES OF
 REPRODUCTION REQUIRED/DESIRED FOR
 EASTERN BLACK RHINO
 IN NORTH AMERICA**

	1994	1995	1996	1997	1998	1999	2000
INITIAL NUMBER IN SSP POP THIS YEAR	68	71	73	76	77	82	85
# SURPLUS THAT CAN BE REMOVED	0	0	0	0	0	0	0
EXPECTED DEATHS DURING YEAR	4	4	4	4	4	4	4
# BIRTHS FOR DEMOGRAPHIC OBJECTIVES	7	7	7	7	7	7	7
# BIRTHS FOR GENETIC DIVERSITY	---	---	---	---	---	---	---
NEW SPACES FOR BREEDING	3+	3+	3+	3+	3+	3+	3+
NEW SPACES FOR RESEARCH	---	---	---	---	---	---	---
SPACES CONVERTED TO OTHER RHINO SPECIES	0	0	0	0	0	0	0
FINAL NUMBER IN SSP BREEDING POP THIS YR	71	73	76	79	82	85	88

Table 16
BREEDINGS RECOMMENDED FOR SOUTHERN BLACK RHINO FEMALES
THAT HAVE NOT REPRODUCED BEFORE
Population Mean $M_k = .0503$

LOCATION	#	ORIGIN	AGE	M_k	MATE	AGE	M_k	MATE BRED	ORIGIN	YRS TOGETHER	REMARKS
Dallas	433	W/C	4	.0417	399	12	0	Probable	W	< 1	Breed ASAP
El Coyote	424	W/C	4.5	.0417	401	9	0	?	W	< 1	Breed ASAP
	462	W/C	3	.0417	401	9	0	?	W	-	Breed ASAP
La Coma	447	C	3	.0729	403	5	.0521	No	W/C	-	Move to Fort Worth
	2097	C	.5	.0729	?	?	?	?		-	To White Oak?
Fort Worth	411	C	5	.0729	403	5	.0521	No	W/C	-	Breed in Future
Fossil Run	466	W	17	.0208	467	6	0	?	W	2	Breed ASAP
Los Angeles	336	W/C	11	.0417	390	8	.0208	Yes	W	0	To SDWAP
Santillano	464	W/C	3	.0417	465	3	.0417	No	W	2	Breed ASAP
White Oak	468	W	17	0	New Male or 467 at Fossil Rim	-	-	-	-	-	Male with new male from Zimbabwe if arrives by 4/94; otherwise arrange move to Fossil Rim

* Probably pregnant

Table 17
BREEDINGS RECOMMENDED FOR SOUTHERN BLACK RHINO FEMALES
THAT HAVE REPRODUCED BEFORE
Population Mean $M_s = .0503$

LOCATION	#	ORIGIN	AGE	M_s	MATE	AGE	M_s	MATE BRED	ORIGIN	YRS TOGETHER	REMARKS
Dallas	400*	W	20	.0208	399	12	0	Probable	W	5	Continue
El Coyote	414	W	10	.0208	401	9	0	?	W	5	Breed ASAP
	461	W	17	.0208	401	9	0	?	W	-	Breed ASAP
La Coma	379	W	22	.0417	378	22	.0625	Yes	W	10	Breed ASAP
	402	W	15	.0417	378	22	.0625	Yes	W	5	Breed ASAP
	410**	W	11	0	378	22	.0625	Yes	W	5	Breed ASAP
Milwaukee	405	W	12	.0280	404	9	.0208	Yes	W	5	Breed again ASAP (late 94)
San Diego Zoo	392	W	8		390	8	.0208	Yes	W	5	Breed again ASAP (early 95)

* Probably pregnant

** Has reproduced but offspring died

Table 18
RELOCATIONS RECOMMENDED FOR SOUTHERN BLACK RHINO
 Population Mean $M_k = .0503$

CURRENT LOCATION	DESTINATION	#	SEX	AGE	M_k	BREEDER ?	PURPOSE
Los Angeles	Fossil Rim (Already Moved but Died)	334	F	17	.0208	Yes	Breed with 469
	San Diego Zoo	336	F	11	.0417	No	Breed with 390
	Australia (Died)	333	M	20	...	No	Breeder - For 6 ♀♀
La Corra	Ft. Worth	447	F	3	.0729	No	Breed with 403
	White Oak?	2097	F	5	.0729	No	?
Milwaukee	Australia	463	M	1.25	.0417	No	Breeder - to be replaced by male from Zimbabwe
Fossil Rim	Australia	467	M	6	0	No	Breeder - to be replaced by male from Zimbabwe

Table 19
TARGETS AND TRAJECTORIES OF
REPRODUCTION REQUIRED/DESIRED FOR
SOUTHERN BLACK RHINO
IN NORTH AMERICA

	1994	1995	1996	1997	1998	1999	2000
INITIAL NUMBER IN SSP POP THIS YEAR	29	32	34	37	39	43	46
# SURPLUS THAT CAN BE REMOVED	0	0	0	0	0	0	0
EXPECTED DEATHS DURING YEAR	1	2	1	2	1	2	1
# BIRTHS FOR DEMOGRAPHIC OBJECTIVES	4	4	4	4	5	5	5
# BIRTHS FOR GENETIC DIVERSITY	---	---	---	---	---	---	---
NEW SPACES FOR BREEDING	3+	2+	3+	2+	3+	2+	3+
NEW SPACES FOR RESEARCH	---	---	---	---	---	---	---
SPACES CONVERTED TO OTHER RHINO SPECIES	---	---	---	---	---	---	---
FINAL NUMBER IN SSP BREEDING POP THIS YEAR	32	34	37	39	43	46	50

Table 20
**BREEDINGS RECOMMENDED FOR SOUTHERN WHITE RHINO FEMALES
 THAT HAVE NOT REPRODUCED BEFORE**
Population Mean $M_k = .0351$

#	ORIGIN	AGE	M_k	MATE	AGE	M_k	♂ BREEDER	ORIGIN	♀ LOCATION	♂ LOCATION	YRS TOGETHER	BREED LOCATION
190	W	26	0	189	26	.0067	Yes	W	Brownsville	Brownsville	24	Brownsville
83	W	27	0	618	28	.0200	Yes	W	Fossil Rim	Baton Rouge	0	Fossil Rim
467	W	22	0	473	25	0	Yes	W	Knoxville	Knoxville	3	Knoxville
619	W	28	0	473	25	0	Yes	W	Knoxville	Knoxville	6	Knoxville
772	C	11	.0233	754	25	.0067	Yes	W	Louisville	K. Dominion	0	Louisville
791	C	10	.0233	754	25	.0067	Yes	W	Louisville	K. Dominion	0	Louisville
696	W	26	0	?	?	?	?		Madison	?	0	?
387	W	22	0	?	?	?	?		Monroe	?	0	?
565	W	26	0	413	24	0	Yes	W	N. Carolina	N. Carolina	7	N. Carolina
466	W	22	0	187	26	.0200	Yes	W	Baton Rouge *	SDWAP	0	SDWAP*
587	W	24	0	187	26	.0200	Yes	W	Baton Rouge *	SDWAP	0	SDWAP*
188	W	24	0	187	26	.0200	Yes	W	Fresno	SDWAP	0	SDWAP
381	W	26	0	754	25	.0067	Yes	W	Toledo	K. Dominion	0	Toledo
582**	C	15	.0750	143	31	.0067	Yes	W	Toronto	Toronto	2	Toronto
1008	C	3.5	.0233	177	26	0		W	White Oak	White Oak	1	White Oak
417	W	23	0	753	0	.0066	Yes	W	K. Island	K. Dominion	0	Wilds
750	W	2.5	0	753	0	.0066	Yes	W	K. Island	K. Dominion	0	Wilds

* Physical or legal owner objects to Masterplan recommendation

** High M_k , 50% of genome unknown at this time.

Table 21
BREEDINGS RECOMMENDED FOR SOUTHERN WHITE RHINO FEMALES
THAT HAVE REPRODUCED BEFORE
Population Mean $M_L = .0351$

#	ORIGIN	AGE	M_L	MATE	AGE	M_L	✓ BREEDER	ORIGIN	♀ LOCATION	♂ LOCATION	YRS TOGETHER	BREED LOCATION
147	W	31	0	618	28	.0200	Yes	W	Fossil Rim	Baton Rouge*	0	Fossil Rim
620	W	28	.0133	189	26	.0067	Yes	W	Brownsville	Brownsville	6	Brownsville
452	W	26	.0133	473	25	0	Yes	W	Knoxville	Knoxville	6	Knoxville
453	W	26	.0133	473	25	0	Yes	W	Knoxville	Knoxville	6	Knoxville
375	C	17	.0133	473	25	0	Yes	W	Knoxville	Knoxville	6	Knoxville
218	C	21	.0750	143	31	.0067	Yes	W	Toronto	Toronto	20	Toronto
416	W	23	0	753	25	0	Yes	W	K. Island	K. Dominion	0	Wilds
418	W	23	0	753	25	0	Yes	W	K. Island	K. Dominion	0	Wilds

* Physical or legal owner objects to Masterplan recommendation

Table 22
SOUTHERN WHITE RHINO
WILD CAUGHT NONBREEDER FEMALES < 27 YEARS
NOT CURRENTLY RECOMMENDED FOR BREEDING
Mean $M_k = .0351$

LOCATION	NUMBER	AGE	M_k	MATE	AGE	M_k	MATE BRED
Birmingham	470	24	0	469	23	0	No
	471	24	0	469	23	0	No
Baltimore	380	26	0	80	30	0	No
Fort Worth	464	24	0	463	24	0	No
Houston	192	24	0	191	26	0	No
Jackson	475	25	0	707	25	0	No
Jacksonville	318	23	0	390	25	.0167	Yes
Norfolk	696	22	0	687	22	0	No
Rockton	365	25	0	363/364	25	0	No
	366	25	0	363/364	25	0	No
Waco	392	23	0	898	7	.0167	No

Table 23
**FACILITIES CAPABLE OF MAINTAINING MINIMUM/OPTIMUM NUMBER
 OF SOUTHERN WHITE RHINOS
 RECOMMENDED TO PROMOTE REPRODUCTION**

INSTITUTION	CURRENT NUMBER			TO BE ADDED			TOTAL		
	BREEDERS	CALVES	RESEARCH	BREEDERS	CALVES	RESEARCH	BREEDERS	CALVES	RESEARCH
Brownsville	2.2	2		0			2.2	2	
Fort Worth	1.1			1.3	3		2.4	3	
Fossil Rim	4.4	3		0.2			3.6	3	
Jacksonville	1.1			1.2	2		2.3	2	
Knorville	2.5	2		0.1			2.5	2	
Norfolk	1.1			1.3	2		2.4	2	
North Carolina	2.2	2		0.1	?		2.3	2	
San Antonio	1.2	2		1.0			2.2	2	
SDWAP	2.10	5		0			2.10	5	
Toronto	2.2	2		0			2.3	2	
White Oak	2.3	3		2.3	3	0.10	4.6	6	0.10
Wildlife Safari	2.1			1.5	3		2.6	3	
Wilds			0.2	3.4	6	0.8	3.6	6	0.10
TOTAL	22.34 = 56	21	0.2 = 2	10.24 = 34	19	0.18 = 18	30.60 = 90	40	20

There are a total of 86 adult and 35 calf spaces in facilities that can maintain at least 2.3 = 5 breeders. These numbers are close to the target population for breeding (100) adults.

Table 24
**PLACES INDICATING INTEREST IN
 CONVERTING FROM
 WHITE TO BLACK RHINO**

INSTITUTION	# WHITE RHINO (Now)	# BLACK RHINO (Future)
Albuquerque	1.1	1.1
Baltimore	1.1	1.1
Baton Rouge (Not in Agreement)	1.2	?
Cleveland	1.1	1.1
Columbus	1.2	2.2
Honolulu	1.0	1.1?
Louisville	1.2	1.1
New Orleans	1.1	1.1
Omaha	1.1	1.1
Phoenix	1.1	1.1
Pittsburg	1.1	1.1
Salt Lake City	1.1	1.1
Toledo	1.1	1.1
Tucson	1.1	1.1

Table 25
WHITE RHINO DESIGNATED FOR RESEARCH
 Mean $M_L = .0351$

NUMBER	SEX	AGE	M_L	BREEDER	CURRENT INSTITUTION	RESEARCH LOCATION
842 *	F	8.5	.0197	No	Cleveland	Wilds
148 *	F	26	.0066	Yes	Columbus	Wilds
819	F	9.5	.0576	No	SDWAP	Wilds
822	F	9.5	.0576	No	SDWAP	Wilds
750 *	F	15	0	No	Kings Dominion	Wilds
772 **	F	11	.0230	No	Louisville	White Oak Now to remain at Louisville
791 **	F	10	.0230	No	Louisville	White Oak No to remain at Louisville
482	F	19	UNK	No	Pittsburg	White Oak
691 ?	F	13.5	.0350	No	Tulsa	White Oak or Move to Indonesia
693	F	14	UNK	No	Tulsa	White Oak
533	F	15	.0263	Yes	White Oak	White Oak
T008	F	2.5	.0230	Yes	White Oak	White Oak

* Low M_L

** Recommendation to use for research changed because of low M_L . Now to breed.

Table 26
RELOCATIONS RECOMMENDED FOR SOUTHERN WHITE RHINO
Population Mean $M_k = .0351$

CURRENT LOCATION	DESTINATION	#	SEX	AGE	M_k	BREEDER ?	PURPOSE
Baton Rouge *	SDWAP	466	F	22	.0200	No	Breed with 187
Baton Rouge *	SDWAP	587	F	24	0.200	No	Breed with 187
Brownsville	Within SSP/Possibly McComb Ranch	T009	M	3.5	.0167	No	?
Cleveland	Wilds and/or Virginia	842	F	9	.0200	No	Research
Cleveland	Wilds and/or Virginia	790	M	10	.0233	No	Breed 381
Columbus	Argentina via Wilds	81	F	30	0	No	Surplus
Columbus	Wilds	148	F	26	.0067	Yes	Research
Columbus	Memphis	146	M	26	0	No	?
Fossil Rim	? within SSP	82	M	27	0	No	?
Fossil Rim	Houston	219	F	21	.583	No	?
Fresno	SDWAP	188	F	26	0	No	Breed with 187?
Houston	Fossil Rim	612	F	15	.0133	No	Breed Later
Houston	Fossil Rim	192	F	24	0	No	Breed ASAP
Kings Dominion	Wilds	750	F	25	0	No	Breed 753 or 754
Kings Dominion	Wilds	753	M	25	0	No	Breed ♀'s
Kings Dominion	Toledo (3 mos.) then Louisville	754	M	25	.0067	Yes	Breed ♀'s
Kings Dominion	Scotch Plains Zoo	755	M	15	.0133	No	Hold
Kings Island	Wilds	418	F	23	0	No	Breed 753 or 754
Kings Island	Wilds	417	F	23	0	No	Breed 753 or 754
Kings Island	Wilds	416	F	23	0	No	Breed 753 or 754
Knoxville	Marine World	T004	F	3	.0200	No	?
Louisville	Wilds	876	M	8	.0200	No	Breed ♀'s

Table 26 (Continued)
RELOCATIONS RECOMMENDED FOR SOUTHERN WHITE RHINO
Population Mean $M_k = .0351$

CURRENT LOCATION	DESTINATION	#	SEX	AGE	M_k	BREEDER ?	PURPOSE
Marine World	SDWAP	336	M	28	0	No	?
Marine World	SDWAP	337	F	28	0	No	?
Memphis	Marine World	981	M	3	.0200	No	?
Pittsburg	White Oak or Wilds	482	F	19	UNK	No	Research
SDWAP	Taman Safari Indonesia	788	F	10	.0683	No	Breed there
SDWAP	Wilds	819	F	9.5	.0576	819	Research
SDWAP	Wilds	822	F	9.5	.0576	822	Research
SDWAP	Marine World	980	M	2.5	.0200	No	?
SDWAP	Germany	990	M	2	.0333	No	?
SDWAP	Marine World	991	F	1.5	.0217	No	?
Tulsa	White Oak	693	F	14	UNK	No	Research
Tulsa	Taman Safari Indonesia	691	F	14	~ .0350	No	Breed there

* Current owner objects to recommendation.

Table 27
SURPLUS - SOUTHERN WHITE RHINO
Mean M_k = .0351

#	SEX	AGE	M_k	ORIGIN	INSTITUTION	BREEDER	SIBLINGS	OFFSPRING	REASON
790 **	M	10	.0230	C	Cleveland	No	0.3	0	?
81 *	F	30	0	W	Wilds	No	0	0	Age
31	M	36	0	W	Fossil Rim	No	0	0	Age
841	M	9	.0400	C	Honolulu	No	2.1	0	High M_k
876 **	M	8	.0200	C	Louisville	No	0.1?	0	?
481	M	9	Unk	C	Pittsburg	No	---	0	Unknown Pedigree
950	M	4	.0475	C	Toronto	No	2.1	0	High M_k
220	M	20	.0583	C	Toledo	No	5.10	0	High M_k
691	F	10	~.0350	C	Tulsa	No	0	0	Uncertain Pedigree
280	M	20	.0550	C	Winston	No	5.10	0	High M_k
157 *	F	31	.0333	W	SDWAP	Yes	0	1.3	Age
788 *	F	10	.0683	C	SDWAP	No	7.9	0	High M_k
990	M	1.5	.0333	C	SDWAP	No	1.4	0	?
219	F	21	.0583	C	Fossil Rim	No	8.9	0	High M_k
335 **	M	17	.0583	C	Salt Lake City	No	5.10	0	High M_k
542 **	F	15	.0683	C	Salt Lake City	No	7.9	0	High M_k

* Low M_k

** Recommendation to declare surplus at Masterplan Workshop changed in this Plan because of low M_k

Table 28
**TARGETS AND TRAJECTORIES OF
 REPRODUCTION REQUIRED/DESIRED FOR
 SOUTHERN WHITE RHINO
 IN NORTH AMERICA**

	1994	1995	1996	1997	1998	1999	2000
INITIAL NUMBER IN SSP POP THIS YEAR	125	106	100	106	112	118	123
# SURPLUS THAT CAN BE REMOVED	5	6	3	3	3	3	3
EXPECTED DEATHS DURING YEAR	3	3	3	3	3	4	4
ANIMALS SEQUESTERED FOR RESEARCH	12	8	0	0	0	0	0
# BIRTHS FOR DEMOGRAPHIC OBJECTIVES	---	---	---	---	---	---	---
# BIRTHS FOR GENETIC DIVERSITY	---	12	12	12	12	12	10
NEW SPACES FOR BREEDING	20	12	0	0	0	0	0
NEW SPACES FOR RESEARCH	12	8		0	0	0	0
SPACES CONVERTED TO OTHER RHINO SPECIES/USES BREEDERS	11	2	2	4	4	4	4
TOTAL SPACES FOR BREEDERS	136	146	144	140	136	132	128
FINAL NUMBER SSP BREEDING POP THIS YR	105	100	106	112	118	123	126

Table 29
RHINOCEROS POPULATIONS
IN THE WILD AND IN CAPTIVITY (CPTV)
ON BOTH GLOBAL AND REGIONAL LEVELS
AT CURRENT AND TARGET NUMBERS (TRGT)

	WORLD			AFRICA		ASIA		AUSTRALASIA		EUROPE		N. AMERICA		C. & S. AMERICA	
RHINO TAXON	WILD POP	CPTV POP	CPTV TRGT	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP
Eastern Black	600	165	240	5	10 ?	35	40	2	0	55	100	70	90	6	?
Southern Black	1,200	45	210	4	50	2?	0	6	80	2	0	29	80	0	?
Southwestern Black	400	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North & West Black	<100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Northern White	31	9	?	0	?	0	0	0	0	6	?	4	?	0	0
Southern White	5,600	630+	380 +20 Rsrch	24	0	150	100	14	60	210	120	127	100 +20 Rsrch	40	?
Indian/Nepalese	2,000	123	250	0	0	50	80	0	0	32	80	41	90	1	?
Javan (Java)	< 75	0	?	0	0	0	?	0	0	0	0	0	0	0	?
Javan (Vietnam)	< 25	0	?	0	0	0	?	0	0	0	0	0	0	0	?
Mainland Sumatran	110	8	100*	0	0	8	50	0	0	0	(50)*	0	0	0	?
Sumatran Sumatran	250	11	100*	0	0	4	50	0	0	2	0	5	(50)*	0	0
Borneo Sumatran	90	4	100*	0	0	4	50	0	(50)*	0	0	0	0	0	0
African Rhino	7,900	850	850	33	60	187	140	16	140	266	220	230	290	46	?
Asian Rhino	2,600	145	550	0	0	66	230	0	100	34	130	46	140	1	?
All Rhino Taxa	10,500	-1,000	1,400	33	60	253	370	16	240	300	350	276	430	47	?

* A desirable target if and when husbandry of species can be mastered and sufficient founders for *ex situ* populations can be produced by captive propagation in range states.

T.J. Foose
15 February 1994

SECTION 2

EASTERN BLACK RHINO SSP

INSTITUTION BY INSTITUTION

RECOMMENDATIONS

MASTERPLAN REPORT DEFINITIONS

Stud # -- Studbook ID Number

Sex -- ' ~ ' indicates the animal is sterilized or contracepted

Birth/Hatch Date

Arrival -- Arrival date at the current institution

Sire/Dam -- Sire/Dam IDs

Loc ID -- Current institution ID number

Social -- Current social group at the current institution

Genome Known: Proportion of animal's genome known

F -- Inbreeding Coefficient
First value assumes animals of unknown origin are founders.
Second value omits animals of unknown origin.

MK -- Mean Kinship
First value is mean kinship. Second value is mean kinship if animals of unknown origin are omitted.

KV -- Kinship Value
A weighted mean kinship where the weights are the other animals' reproductive values.
Second value omits animals of unknown origin.

GU-All -- Genome Uniqueness
Proportion of genes in an animal that are not found in the rest of the population.

GU-CB -- Genome Uniqueness of Captive-Born Animals
Proportion of genes in an animal that are not found in the rest of the captive-born population.

Vx -- Reproductive Value
Expected future lifetime reproduction by an animal of age x.

Global vs. Restricted

-- Following values may be calculated using all animals in the studbook or using the population specified by the view set for the report.

Live sibs -- Half siblings are counted as complete siblings.

Live offspr -- Living offspring

Repro offspr -- Reproducing offspring

Founder representation

-- Percent of this animal's genes that descended from each founder.

INSTITUTION SHEETS

ARE ORGANIZED

BY COUNTRY: CANADA/U.S.A.

WITHIN COUNTRY: ALPHABETICALLY BY PROVINCE/STATE

Masterplan Report
EASTERN BLACK RHINO Studbook
(*Diceros bicornis michaeli*)

Living Population at: Los Angeles Zoo

LOS ANGELES

Stud #	Sex	Birth Date	Arrival	Sire	Dam	Loc ID	Social	Genome Known	F	MK	KV	GU-All	GU-CB	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
76	F	1 Jan 1966	3 Oct 1966	WILD	WILD			1.0000	.0000	.0045	.0056	.5000		0.000	.	.	.	
									.0000	.0046	.0056	.			1. 0. 0			
															1. 0. 0			
267	F	16 Sep 1976		56				1.0000	.0000	.0364	.0348	.0795		1.060	1. 2. 0	207=50%	56=50%	
		15 Jun 1981		207					.0000	.0369	.0350	.0795			.	.	.	
															.	.	.	
285	M	7 Nov 1978		199				1.0000	.0000	.0210	.0175	.3715		0.850	.	.	.	199=50% 126=25% 124=25%
		15 Jun 1981		126					.0000	.0213	.0177	.3715			1. 0. 0			
															.	.	.	

Recommendations:

- 76 - Breed with 285 as soon as possible
- 267 - Breed with 285 as soon as possible
- 285 - Breed with 76 and 267 as soon as possible

Living Population at: San Diego Wild Animal Park

Stud ID	Sex	Birth Date	Sire	Dam	Loc ID	Genome	F	MK	KV	GU-All	GU-CB	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
		Arrival			Social	Known	[unks = founders]	[unknowns removed]								
233	F	23 Nov 1973	WILD			1.0000	.0000	.0091	.0108	.2445		0.550				
		10 Nov 1986	WILD				.0000	.0092	.0109				2	0	0	
292	M	11 Dec 1979	79			1.0000	.0000	.0227	.0225	.1250		0.980				293=50% 79=50%
		22 Oct 1986	293				.0000	.0230	.0227	.1250			2	0	0	
302	M	7 Aug 1980	247			1.0000	.0000	.0426	.0435	.0060		0.980	3	1	0	247=50% 57=25% 56=25%
		28 Sep 1981	180				.0000	.0432	.0438	.0185			1	0	0	

Recommendations:

- 233 - Breed with 292 as soon as possible
- 292 - Breed with 233 as soon as possible
- 302 - Move to Western Plains Zoo in Australia
- 427 - Move to Brockfield Zoo (already occurred)

Living Population at: San Diego Zoological Garden

SANDIRG02

Stud Sex	Birth Date	Site	Loc ID	Genome	F	MK	KV	GU-ALL	Vx	Live Sibs	Founder	Reproduction
#	Arrival	Dam	Social	Known	[unknowns removed]			GU-CB		Live Offspr		

110	M	31 Aug 1967	46	47	1.0000	.0000	.0182	.0159	.3230	0.860	.	.	47=508 46=508
		11 Jan 1983				.0000	.0184	.0160	.3230		1. 0. 0	0. 1. 0	
192	F	2 May 1972	54	55	0.5000	.0000	.0278	.0228	.2815	0.430	0. 1. 0	57=258 56=258	
		6 Oct 1988				.0000	.0357	.0345	.2815		1. 0. 0		
473	M	15 Nov 1992	110		0.7500	.0000	.0276	.0240	.0000	1.380	.	.	47=258 46=258 57=12.58
		15 Nov 1992	192			.0000	.0273	.0253	.0000		.	.	56=12.58

Recommendations:

- 110 - Breed with 192 as soon as possible
- 192 - Breed with 110 as soon as possible
- 415 - Move to Potter Park, Lansing (already occurred)
- 473 - Move to New York (Bronx) Zoo

Living Population at: San Francisco Zoological Gardens

SAN FRAN

Stud #	Sex	Birth Date	Sire	Dam	Loc ID	Genome	F	MK	KV	GU-All	VX	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
		Arrival			Social	Known	lunks = founders	lunks = founders	removed	GU-CB					
213	P	1 Jan 1971	WILD			1.0000	.0000	.0273	.0309	.0240	0.340	.	.	.	
		16 Apr 1974	WILD				.0000	.0276	.0312			2.	3.	0	
												2.	0.	0	
377	M	12 Jul 1987	302			1.0000	.0000	.0330	.0354	.1155	1.680	.	.	.	247=25% 188=25% 47=12.5%
		13 Apr 1994	239				.0000	.0343	.0357	.1155		.	.	.	46=12.5% 57=12.5% 56=12.5%

Recommendations:

213 - Breed with 377 as soon as possible

377 - Breed with 213 as soon as possible

Living Population at: Cheyenne Mtn Zoological Park

COLO SPRG

Stud Sex	Birth Date	Sire	Dam	Social	Genome	I	MK	KV	GU-All	GU-CB	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder	Representation
[unknowns removed]																

305	M	31 Mar 1981	182		1.0000	.0000	.0261	.0228	.2415		1.070	1.0	0	181=508 182=508		
		10 Nov 1983	181			.0000	.0265	.0229	.2415			1.0	0			
=====																
331	F	11 Dec 1982	169		1.0000	.0000	.0295	.0273	.0000		1.470	0.2	0	169=508 17=258 16=258		
		14 Jan 1987	190			.0000	.0300	.0275	.0600			1.0	0			
=====																
2099	M	20 Oct 1993	305		1.0000	.0000	.0324	.0293	.0000		1.260	-	-	181=258 182=258 169=258		
		20 Oct 1993	331			.0000	.0328	.0295	.0000			-	-	17=12.58 16=12.58		

Recommendations:

- 305 - Breed with 331 as soon as possible
- 331 - Breed with 305 as soon as possible
- 2099 - Move with in BGP

Living Population at: Denver Zoological Gardens

DENVER

Stud #	Sex	Birth Date	Sire	Dam	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Repro Offspr	Founder Representation
		Arrival			Social	Known	(unks = founders)	(unknowns removed)		GU-CH		Live Offspr		
161	M	1 Jan 1972	74			1.0000	.0000	.0432	.0448	.0315	0.990	2.	3.	0 75=50% 74=50%
		4 Sep 1973	75				.0000	.0438	.0451	.0315		3.	0.	0
												0.	1.	0
163	F	6 Jan 1971	124			1.0000	.0000	.0330	.0278	.0440	0.340	3.	0.	0 125=50% 124=50%
		6 Jan 1971	125				.0000	.0334	.0280	.0440		0.	1.	0
328	F	15 Nov 1982	161			1.0000	.0000	.0449	.0436	.0000	1.480	3.	0.	0 75=25% 74=25% 125=25% 124=25%
		15 Nov 1982	163				.0000	.0455	.0439	.0000		1.	0.	0
332	M	11 Jan 1983	247			1.0000	.0000	.0426	.0442	.0100	1.330	3.	1.	0 247=50% 57=25% 56=25%
		13 Jul 1984	180				.0000	.0432	.0445	.0230		1.	0.	0
2100	M	13 Nov 1993	161			1.0000	.0000	.0426	.0405	.0000	1.260	2.	0.	0 75=25% 74=25% 125=25% 124=25%
		13 Nov 1993	163				.0000	.0432	.0408	.0000		.	.	

Recommendations:

- 161 - Breed with 163
- 163 - Breed with 161
- 328 - Breed with 332
- 332 - Breed with 328
- 2100 - Move when appropriate location is available

Living Population at: Busch Gardens Tampa

Stud	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	VX	Live Sibs	Founder	Reproduction
#		Arrival	Dam	Social	Known	[unke = founders]	[unknown removed]		GU-CB		Live Offspr		

356	M	9 Feb 1986	155	225	1.0000	.0000	.0119	.0139	.5000	1.650	1	0	225=508 155=508
		9 Feb 1986				.0000	.0115	.0136	.7400				
418	F	23 Mar 1989	281	55	1.0000	.0000	.0406	.0437	.0760	1.760	0	1	0 213=258 74=298 57=258 56=258
		10 Aug 1990				.0000	.0412	.0440	.0830				
432	M	30 Oct 1989	161	163	1.0000	.0000	.0426	.0417	.0000	1.610	2	0	0 75=258 74=258 125=258 124=258
		21 Aug 1991				.0000	.0432	.0420	.0000				

Recommendations:

- 356 - Breed with 418
- 418 - Breed with 356
- 432 - Maintain

Living Population at Miami Metroparc

METROX000

```

=====
Stud sex Birth Date Sire Loc ID Genome F HK KV GU-A1 GU-CB Vx Live Sibs Live Offspr Founder
# Birth Date Dam Social Known [unke = founders] [unknown removed]
=====
202 F 13 Jun 1973 WILD 1.0000 .0000 .0205 .0229 .0550 0.550 3. 0. 0. 0. 0. 0. 0. 0. 0. 0.
255 F 1 Jan 1970 WILD 1.0000 .0000 .0000 .0000 .0000 1.000 0.240 1. 0. 0. 0. 0. 0. 0. 0. 0. 0.
259 M 10 Apr 1977 182 1.0000 .0000 .0318 .0283 .0690 0.790 1. 0. 0. 0. 0. 0. 0. 0. 0. 0.
351 F 24 Jun 1985 74 1.0000 .0000 .0392 .0431 .0125 1.500 3. 2. 0 213=508 74=508
395 M 18 Mar 1988 52 1.0000 .0000 .0205 .0226 .2505 1.670 3. 1. 0 202=508 52=508
472 M 10 Nov 1990 259 1.0000 .0000 .0307 .0308 .0000 1.530 2. 0. 0 202=508 181=258 182=258
2090 M 11 Feb 1993 259 1.0000 .0000 .0307 .0299 .0000 1.260 2. 0. 0 202=508 181=258 182=258
=====

```

<< Rejected >>

Recommendations:

202 - Breed with 259

255 - Breed with 259. Investigate through records and genetic analysis if *D.b. bicornis*

259 - Breed with 202 and 255

351 - Breed with 395

395 - Breed with 351

472 - Move to Hitech, Japan

2090 - Move to Great Plains Zoo

Living Population at: Zoo Atlanta

ATLANTA

Stud #	Sex	Birth Date	Arrival	Sire	Dam	Loc ID	Genome Known	F	HK	KV	GU-All	GU-CB	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
100	M	26 Aug 1996	18 Oct 1989	268	282	—	1.0000	.0000	.0259	.0284	.5045	.5120	1.650	.	.	.	247=25% 217=25% 170=25%
								.0000	.0262	.0286				.	.	.	57=12.5% 56=12.5%
426	F	6 Jan 1990	23 Nov 1993	74	213	—	1.0000	.0000	.0392	.0441	.0140	.0455	1.730	3.	2.	0	213=50% 74=50%
								.0000	.0397	.0444				.	.	.	

Recommendations:

388 - Breed with 426

426 - Breed with 388

Living Population at: Honolulu Zoo

MONOLULU

Stud Sex	Birth Date	Sire Loc ID	Dam Social	Known	[unks = founders]	MX	KV	GU-ALL	GU-CB	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder	Representation
443 M	30 Jul 1991	74	213	1.0000	.0000	.0392	.0432	.0075	1.460	2.	3.	0	213=508 74=508		
458 H	26 Mar 1992	332	328	1.0000	.0000	.0483	.0485	.0000	1.380	.	.	.	247=258 75=12.58 74=12.58		
	31 Jan 1994									.	.	.	56=12.58		

Recommendations:

443 - Maintain

458 - Maintain

LIVING POPULATION AT: Chicago Lincoln Park Zoological Gardens

CHICAGO

Stud Sex	Birth date	Sire	Dam	Social	Genome	F	MK	KV	CU-All	CU-CB	VX	Live type	Founder	Representation
1	Arrival											Live offspring	Repro offspring	

294	R	21 May 1961	169	1.0000	.0000	.0273	.0252	.0000	1.480	0.	2.	0	169=508	17=258	16=258
		21 Jun 1982	190	—	.0000	.0276	.0254	.1330							

308	M	18 Oct 1981	74	1.0000	.0000	.0415	.0446	.0065	1.070	2.3	0	213-508	74-508
		17 Jun 1982	213	_____	.0000	.0421	.0449	.0155		1.0	0		

317	F	29 Sep 1982	56	207	1.0000	.0000	.0386	.0389	.0510	1.480	1.	2.	0	207-508 56-508
		12 Jun 1984	207	—		.0000	.0392	.0392	.0510		1.	0.	0	

206 4374 P0220 - 762

SECRET

062 92TH P003E - LTC

Recommenät!

Living Population at: Garden City Lee Richardson Zoo

GARDENCTY

Stud Sex	Birth Date	Sire	Dam	Loc ID	Genome	F	MK	KV	GU-All	GU-CB	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder	Representation
	Arrival			Social	Known	[unks = founders]	[unknowns removed]									
419 M	21 May 1989	308			1.0000	.0000	.0446	.0472	.0000		1.610	.	.	.	213=258	74=258 207=258 56=258
	31 Jul 1990	317				.0000	.0452	.0475	.0000			.	.	.		

Recommendations:

419 - Maintain

Living Population at: Badgwick County Zoo

SEDGWICK

Stud #	Sex	Birth Date	Sire	Dam	Loc ID	Social	Genome Known	F	MK	KV	GU-All	Vx	<< Restrictd >>			Founder Representation
		Arrival						[unks = founders]			GU-CB		Live Sibb	Live Offspr	Repro Offspr	
								[unknowns removed]								
53	F	5 Sep 1965	WILD				1.0000	.0000 .0114 .0097	.2480	0.000			1. 1. 0			
		2 Aug 1968	WILD					.0000 .0115 .0098					0. 1. 0			

301	M	25 Feb 1980	56				1.0000	.0000 .0386 .0366 .0325	0.980				0. 3. 0	207=508	56=508	
		23 Jun 1981	207					.0000 .0392 .0369 .0325					1. 0. 0			

2095	M	11 Feb 1993	301				1.0000	.0000 .0295 .0274 .0000	1.260				0. 1. 0	53=508	207=258	56=258
		11 Feb 1993	53					.0000 .0300 .0276 .2520								

Recommendations:

- 53 - Breed with 301
- 301 - Breed with 53
- 2095 - Move as soon as an appropriate location is available

Living Population at: Detroit Zoological Park

DETROIT									
Stud	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All
		Arrival	Dam	Social	Known	[unks = founders]		[unknowns removed]	
						[unknowns removed]		[unknowns removed]	
409	M	12 Jul 1954	WILD	-----	1.0000	.0000	.0000	.0000	1.000
		1 Aug 1986	WILD			.0000	.0000	.0000	0.000
Restrictd >>> Live Sibs									
v* Live Offspr									
Repro Offspr									
Founder Representation									

Recommendations:

409 - Maintain

Living Population at St. Louis Zoological Park

ST LOUIS

Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Founder Representation
		Arrival	Dam	Social	Known	[unks = founders]	[unknowns removed]		GU-CB		Repro Offspr	
212	F	9 Sep 1975	52		1.0000	.0000	.0182	.0159	.1245	0.890	1. 0. 0	53-50% 52=50%
		30 Oct 1984	53			.0000	.0184	.0160	.2565		1. 0. 0	
251	M	22 May 1976	WILD		1.0000	.0000	.0045	.0049	.5000	0.770	1. 0. 0	
		12 Sep 1976	WILD			.0000	.0046	.0050				
310	F	28 Dec 1981	261		1.0000	.0000	.0091	.0100	1.000	1.480	1. 0. 0	262-50% 261=50%
		28 Jun 1991	262			.0000	.0092	.0101	1.000		1. 0. 0	

Recommendations:

- 212 - Breed with 251
- 251 - Breed with 212
- 310 - Move to San Diego WAP to breed with 110 or 292
- 459 - Move to Oklahoma City Zoo (already occurred)

NY BRONX

Living Population at: New York Zoological Park

Restricted >>>									
Stud	Sex	Birth Date	Sire	Dam	Loc ID	Genome	F	MR	KV
		Arrival			Social	Known			GU-All
						Unknown			GU-CB
						(unknowns removed)			Vx
									Live Sibs
									Live Offspr
									Repro Offspr
									Founder Representation

Recommendations:

473 - Receive from San Diego Zoo

Living Population at: Cincinnati Zoo & Botanical Garden

CINCINNAT

Stud #	Sex	Birth Date	Sire	Dam	Loc ID	Social	Genome Known	F	NK	KV	GU-All	GU-CB	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
[unks - founders]																	
[unknowns removed]																	
225	F	1 Jan 1970	WILD				1.0000	.0000	.0091	.0102	.2520		0.240	1	0	0	
		16 Aug 1990	WILD					.0000	.0092	.0103							

247	M	1 Jul 1970	WILD				1.0000	.0000	.0295	.0318	.0205		0.860	4	1	0	
		19 Jul 1972	WILD					.0000	.0300	.0320				3	0	0	

457	M	5 Aug 1992	247				1.0000	.0000	.0239	.0256	.0000		1.380	3	1	0	225=50% 247=50%
		5 Aug 1992	225					.0000	.0242	.0258	.2745						

Recommendations:

- 225 - Breed with 247
- 247 - Breed with 225
- 457 - Move to Cleveland via Columbus

Living Population at: Cleveland Metro Parks Zoo

CLEVELAND

Stud #	Sex	Birth Date	Sire	Dam	Loc ID	Genome	F	MK	XV	GU-All	GU-CH	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
		Arrival			Social	Known	{unks = founder}	{unknowns removed}								

Recommendations:

457 - Receive from Cincinnati via Columbus

Living Population at Columbus Zoological Gardens

COLUMBUS

Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	VX	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
		Arrival	Dam	Social	Known	[unks = founders]	[unknowns removed]		GU-CB					
68	M	1 Jan 1954	WILD	---	1.0000	.0000	.0000	.0000	1.000	0.000	.	.	.	.
		1 Jan 1954	WILD	---		.0000	.0000	.0000	.		.	.	.	.
389	M	12 Sep 1988	292	---	1.0000	.0000	.0205	.0223	.0000	1.670	1.	0.	0	233=50% 293=25% 79=25%
		9 Oct 1989	233	---		.0000	.0207	.0225	.2555		.	.	.	.
397	F	19 Oct 1988	247	---	1.0000	.0000	.0403	.0432	.0140	1.730	4.	0.	0	247=50% 57=25% 56=25%
		10 Apr 1989	180	---		.0000	.0409	.0435	.0320		.	.	.	.

Recommendations:

- 68 - Maintain
- 389 - Breed with 397 as soon as possible
- 397 - Breed with 389 as soon as possible
- 457 - Temporarily receive from Cincinnati until Cleveland ready to receive

Living Population at: Oklahoma City Zoo

OKLAHOMA									
Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All
		Arrival	Dam	Social	Known	[unks - founders]	[unknowns removed]		GU-CE
459	M	21 Oct 1991	251	_____	1.0000	.0000	.0159	.0153	.0000
		4 Nov 1993	212			.0000	.0161	.0154	.5000
Vx									
Live Sibs									
Repro Offspr									
Founder Representation									
251=50% 53=25% 52=25%									

Recommendations:

459 - Receive from St. Louis (already occurred) and maintain

Living Population at: Portland's Washington Park Zoo

WASHINGTON

Stud	Sex	Birth Date	Size	Loc ID	Genome	F	MK	KV	GU-ALL	Vx	Live Sibs	Founder
		Arrival	Dam	Social	Known	[unkn = founders]	[unknowns removed]		GU-CB		Live Offspr	Representation

376	M	7 May 1987	161	1.0000	.0000	.0426	.0419	.0000	1.680	2.	0.	0	75=258	74=258	125=258	124=258
396	F	4 Nov 1988	271	1.0000	.0000	.0227	.0266	.0560	1.730	2.	0.	0	235=508	241=258	32=12.58	31=12.58

Recommendations:
 376 - Breed with 396
 396 - Breed with 376

Stud Sex	Birth Date	Site	Loc ID	Genome	F	HK	KV	CU-All	Vx	Live Site	Founder
#	Arrival	Dam	Social	Known	[unke = founder]	[unknowns removed]				Live Offspr	Representation

381	M	10 Jun 1986	285	1.0000	.0000	.0173	.0171	.0000	1.650	.	76=508 199=258 125=12.58
		23 May 1991	76		.0000	.0176	.0172	.5000	.	.	124=12.58
383	F	2 Jul 1988	74	1.0000	.0000	.0392	.0441	.0135	1.730	3.	213=508 74=508
		6 Jun 1991	213		.0000	.0397	.0444	.0345	.	.	

Recommendations:

381 - Breed with 383

383 - Breed with 381

Living Population at: Great Plains Zoo

SIoux FAL

Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	GU-CE	VX	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
		Arrival	Dam	Social	Known	{unkn = founders}	{unknowns removed}								

Recommendations:

2090 - Receive from Miami

Living Population at: Dallas Zoo

DALLAS

Stud Sex		Birth Date	Sire	Loc ID	Genome	F	MX	KV	GU-All	VX	Live Sibs	Founder Representation
		Arrival	Dam	Social	Known	(unks = founders)	(unknowns removed)		GU-CH		Live Offspr	Repro Offspr
311	F	22 Oct 1974	WILD	_____	1.0000	.0000	.0000	.0000	1.000	0.710	.	.
		13 Dec 1986	WILD			.0000	.0000	.0000	.		.	.

Recommendations:

311 - Maintain

Living Population at: San Antonio Zool Garden & Aquarium

SAN ANTON

Stud #	Sex	Birth Date	Arrival	Sire	Dam	Loc ID	Genome	Known	F	MK	KV	GU-All	GU-CB	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
169	M	22 Aug 1971	22 Apr 1978	WILD	WILD		1.0000		.0000	.0182	.0197	.1295		0.940	0.3	0		
									.0000	.0184	.0198				0.2	0		
190	F	26 Nov 1969	28 Dec 1976	16	17		1.0000		.0000	.0273	.0208	.1120		0.160	0.3	0		17=50% 16=50%
									.0000	.0276	.0209	.1120			0.2	0		
364	F	27 Dec 1985	17 Jul 1987	56	207		1.0000		.0000	.0364	.0365	.0835		1.570	1.2	0		207=50% 56=50%
									.0000	.0369	.0368	.0835			+	+		

Recommendations:

- 169 - Breed with 190 and 364
- 190 - Breed with 169
- 364 - Breed with 169

Living Population at: Tyler's Caldwell Zoo

Stud Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	CU-ALL	CU-CB	VX	Live Sibs	Live Offspr	Repro Offspr	Representation
	Arrival	Dam	Social	Known	[unks = founders]	[unks = founders]	[unknowns removed]							

359	F	1 Feb 1986	169	190	1.0000	.0000	.0295	.0278	.0000	.0545	1.570	0.	2.	0	169=508 17=258 16=258
		19 Jul 1987					.0300	.0281	.0000	.0545		0.	1.	0	
362	M	11 Mar 1986	259	202	1.0000	.0000	.0330	.0335	.0000	1.650	2.	0.	0.	0	202=508 181=258 182=258
		15 Sep 1988					.0334	.0338	.0000		0.	1.	0		
372	M	11 Dec 1986	271	235	1.0000	.0000	.0227	.0265	.0590	1.680	1.	1.	0	235=508 241=258 32=12.58	
		23 Oct 1988					.0230	.0267	.1240						31=12.58
2092	F	30 May 1993	362	359	1.0000	.0000	.0358	.0353	.0000	1.380	.	.	.	.	202=258 169=258 17=12.58
		10 May 1993					.0363	.0356	.0000						16=12.58 181=12.58 182=12.58

Recommendations:

359 - Breed with 362

362 - Breed with 359

372 - Maintain

2092 - Move to Potter Park Landring

SECTION 3
POPULATION ANALYSES FOR
EASTERN BLACK RHINO
SSP POPULATION

Age Pyramid Report

Restricted to: EASTERN BLACK RHINO Studbook

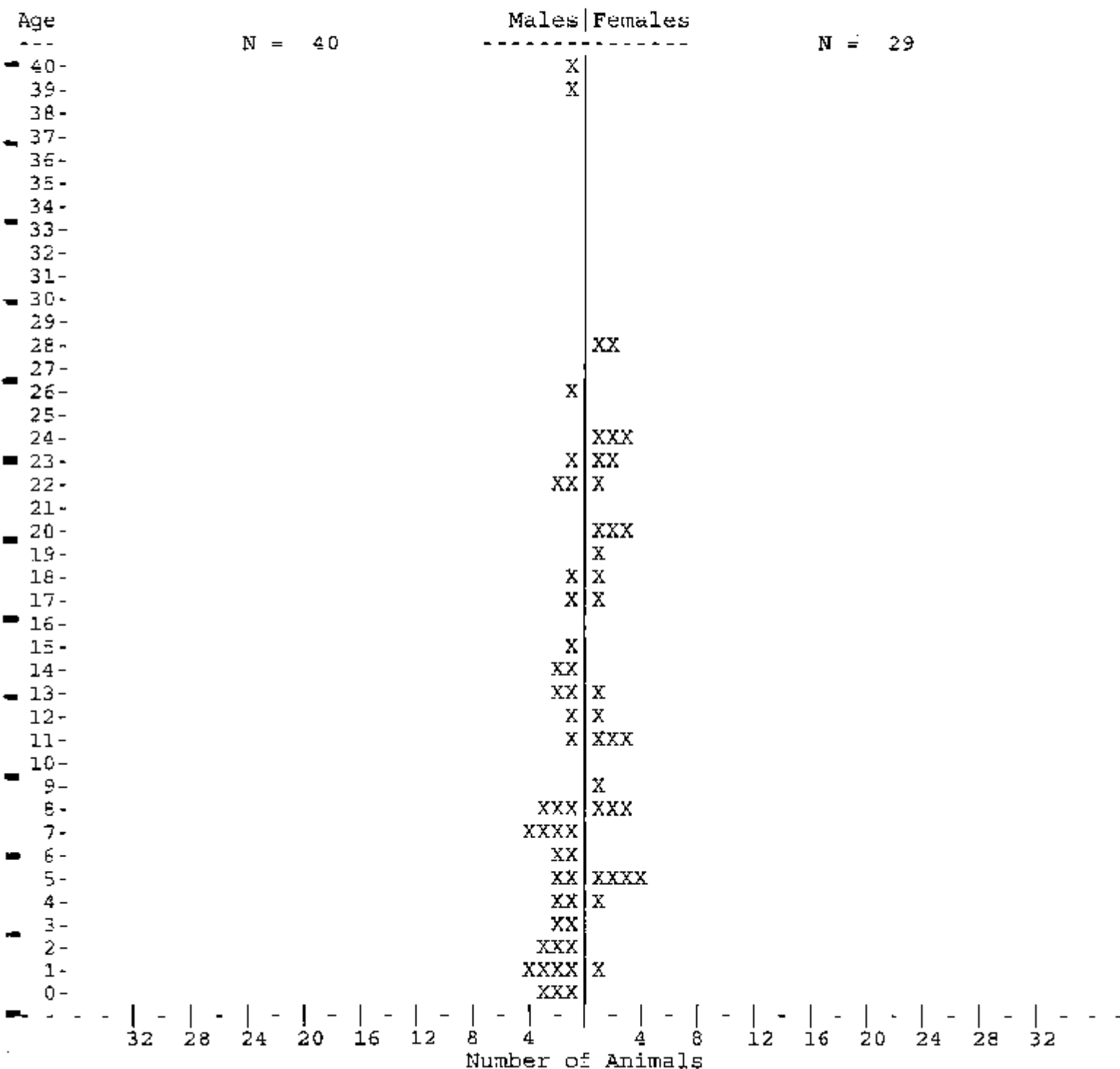
Page 1

Locations: N.AMERICA/

Dates: As of End of 01/01/1994 <= date

Status: Living by

Taxon Name: DICEROS BICORNIS MICHAELI



Age Pyramid Report

Restricted to: EASTERN BLACK RHINO Studbook

Page 3

Locations: N.AMERICA/

Dates: As of End of 01/01/1994 <= date

Status: Living by

=====

Taxon Name: DICEROS BICORNIS MICHAELI

=====

Age Studbook Numbers >>> Male

40	68			
39	409			
38				
37				
36				
35				
34				
33				
32				
31				
30				
29				
28				
27				
26	110			
25				
24				
23	247			
22	161	169		
21				
20				
19				
18	251			
17	259			
16				
15	285			
14	292	301		
13	302	305		
12	308			
11	332			
10				
9				
8	356	362	363	
7	372	376	381	388
6	377	395		
5	389	419		
4	427	432		
3	435	472		
2	443	458	459	
1	457	473	2090	2095
0	2098	2099	2100	

Total= 40

Age Pyramid Report

EASTERN BLACK RHINO Studbook

Page 4

Restricted to:

Locations: N.AMERICA/

Dates: As of End of 01/01/1994 <= date

Status: Living by

Taxon Name: DICEROS BICORNIS MICHAELI

Age Studbook Numbers >>> Female

40				
39				
38				
37				
36				
35				
34				
33				
32				
31				
30				
29				
28	53	76		
27				
26				
25				
24	190	225	255	
23	163	213		
22	192			
21				
20	202	233	235	
19	311			
18	212			
17	267			
16				
15				
14				
13	294			
12	330			
11	317	328	331	
10				
9	365			
8	351	359	364	
7				
6				
5	383	396	397	418
4	426			
3				
2				
1	2092			
0				

Total= 29

Fecundity and Mortality Report EASTERN BLACK RHINO Studbook

Restricted to:

Locations: N.AMERICA/

Dates: During 01/01/1984 <= date

Taxon Name: DICEROS BICORNIS MICHAELI

Age Class	Fecundity [Mx]...				Mortality [Qx]...			
	Male	N	Female	N	Male	N	Female	N
0- 1	0.00	23.7	0.00	15.8	0.14	28.6	0.23	21.8
1- 2	0.00	20.8	0.00	16.9	0.05	21.0	0.05	18.4
2- 3	0.00	17.7	0.00	15.7	0.00	17.7	0.16	18.4
3- 4	0.00	17.7	0.00	14.2	0.00	17.7	0.07	15.0
4- 5	0.00	18.8	0.00	12.9	0.00	18.8	0.07	13.4
5- 6	0.00	18.3	0.00	10.3	0.00	18.3	0.00	10.3
6- 7	0.08	17.7	0.06	8.0	0.00	17.7	0.00	8.0
7- 8	0.13	15.7	0.09	11.2	0.00	15.7	0.00	11.2
8- 9	0.14	11.1	0.04	11.4	0.08	12.0	0.00	11.4
9-10	0.25	10.0	0.05	11.0	0.00	10.0	0.00	11.0
10-11	0.20	10.0	0.07	13.4	0.00	10.0	0.07	14.2
11-12	0.11	9.4	0.07	14.3	0.00	9.4	0.07	15.1
12-13	0.19	10.3	0.11	13.5	0.00	10.3	0.00	13.5
13-14	0.11	9.5	0.04	13.8	0.00	9.5	0.07	14.3
14-15	0.19	7.8	0.15	16.2	0.12	8.2	0.12	16.9
15-16	0.40	6.2	0.03	15.0	0.15	6.6	0.07	15.0
16-17	0.08	6.1	0.18	14.2	0.00	6.1	0.06	15.4
17-18	0.07	7.0	0.15	13.7	0.00	7.0	0.00	13.7
18-19	0.07	7.0	0.07	14.9	0.00	8.0	0.00	14.9
19-20	0.00	7.0	0.17	14.4	0.14	7.0	0.06	15.8
20-21	0.09	5.8	0.17	12.0	0.17	6.0	0.00	12.0
21-22	0.11	4.5	0.09	10.8	0.19	5.3	0.00	10.8
22-23	0.12	4.2	0.09	10.7	0.00	4.2	0.00	10.7
23-24	0.16	3.1	0.00	9.3	0.00	3.1	0.10	10.1
24-25	0.00	3.3	0.14	7.4	0.23	4.3	0.00	8.0
25-26	0.17	3.0	0.08	6.0	0.00	3.0	0.00	6.3
26-27	0.00	2.8	0.00	6.0	0.00	2.8	0.00	7.0
27-28	0.00	1.6	0.18	5.7	0.64	3.1	0.15	6.7
28-29	0.25	2.0	0.00	4.4	0.00	2.0	0.19	5.2
29-30	0.20	2.5	0.00	3.0	0.00	2.5	0.00	3.0
30-31	0.00	4.0	0.00	2.5	0.00	4.0	0.33	3.0
31-32	0.13	4.0	0.00	2.0	0.00	4.0	0.00	2.0
32-33	0.00	4.0	0.00	1.6	0.00	4.0	0.50	2.0
33-34	0.15	3.4	0.00	1.0	0.20	5.0	0.00	1.0
34-35	0.17	3.0	0.00	2.0	0.33	3.0	0.00	2.0
35-36	0.00	2.0	0.00	1.1	0.00	2.0	0.50	2.0
36-37	0.00	2.0	0.00	0.5	0.00	2.0	1.00	1.0
37-38	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
38-39	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
39-40	0.00	1.9	0.00	0.0	0.00	1.9	0.00	0.0
40-41	0.00	0.4	0.00	0.0	0.00	0.4	0.00	0.0
41-42	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
42-43	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 13.645
Ro = 1.674
lambda=1.04
r = 0.038

T = 15.861
Ro = 0.725
lambda=0.98
r = -0.020

30 day mortality: 17%
(8 deaths out of 48 arriving
within 30 days of birth date)

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

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

Smoothing pass 1

Fecundity [Mx]...

Mortality [Qx]...

Age Class	Male	N	Female	N	Male	N	Female	N
0- 1	0.00	23.7	0.00	15.8	0.14	28.6	0.23	21.8
1- 2	0.00	20.8	0.30	16.9	0.03	21.0	0.11	18.4
2- 3	0.00	17.7	0.00	15.7	0.02	17.7	0.09	18.4
3- 4	0.00	17.7	0.00	14.2	0.00	17.7	0.10	15.0
4- 5	0.00	18.8	0.00	12.9	0.00	18.8	0.05	13.4
5- 6	0.03	18.3	0.02	10.3	0.00	18.3	0.02	10.3
6- 7	0.07	17.7	0.05	8.0	0.00	17.7	0.00	8.0
7- 8	0.12	15.7	0.06	11.2	0.03	15.7	0.00	11.2
8- 9	0.17	11.1	0.06	11.4	0.03	12.0	0.00	11.4
9-10	0.20	10.0	0.05	11.0	0.03	10.0	0.02	11.0
10-11	0.19	10.0	0.06	13.4	0.00	10.0	0.05	14.2
11-12	0.17	9.4	0.08	14.3	0.00	9.4	0.05	15.1
12-13	0.14	10.3	0.07	13.5	0.00	10.3	0.05	13.5
13-14	0.16	9.5	0.10	13.8	0.04	9.5	0.06	14.3
14-15	0.23	7.8	0.07	16.2	0.09	8.2	0.09	16.9
15-16	0.22	6.2	0.12	15.0	0.09	6.6	0.08	15.0
16-17	0.18	6.1	0.12	14.2	0.05	6.1	0.04	15.4
17-18	0.07	7.0	0.13	13.7	0.00	7.0	0.02	13.7
18-19	0.05	7.0	0.13	14.9	0.05	8.0	0.02	14.9
19-20	0.05	7.0	0.14	14.4	0.10	7.0	0.02	15.8
20-21	0.07	5.8	0.14	12.0	0.17	6.0	0.02	12.0
21-22	0.11	4.5	0.12	10.8	0.12	5.3	0.00	10.8
22-23	0.13	4.2	0.06	10.7	0.06	4.2	0.03	10.7
23-24	0.09	3.1	0.08	9.3	0.08	3.1	0.03	10.1
24-25	0.11	3.3	0.07	7.4	0.08	4.3	0.03	8.0
25-26	0.06	3.0	0.07	6.0	0.08	3.0	0.00	6.3
26-27	0.06	2.8	0.09	6.0	0.21	2.8	0.05	7.0
27-28	0.08	1.6	0.06	5.7	0.21	3.1	0.11	6.7
28-29	0.15	2.0	0.06	4.4	0.21	2.0	0.11	5.2
29-30	0.15	2.5	0.00	3.0	0.00	2.5	0.17	3.0
30-31	0.11	4.0	0.00	2.5	0.00	4.0	0.11	3.0
31-32	0.04	4.0	0.00	2.0	0.00	4.0	0.28	2.0
32-33	0.09	4.0	0.00	1.6	0.07	4.0	0.17	2.0
33-34	0.11	3.4	0.00	1.0	0.18	5.0	0.17	1.0
34-35	0.11	3.0	0.00	2.0	0.18	3.0	0.17	2.0
35-36	0.06	2.0	0.00	1.1	0.11	2.0	0.50	2.0
36-37	0.00	2.0	0.00	0.5	0.00	2.0	0.50	1.0
37-38	0.00	2.0	0.00	0.0	0.00	2.0	0.33	0.0
38-39	0.00	2.0	0.00	0.0	0.00	2.0	0.00	0.0
39-40	0.00	1.9	0.00	0.0	0.00	1.9	0.00	0.0
40-41	0.00	0.4	0.00	0.0	0.00	0.4	0.00	0.0
41-42	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
42-43	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
43-44	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 13.967
 R0 = 1.742
 lambda=1.04
 r = 0.040

T = 15.868
 R0 = 0.718
 lambda=0.98
 r = -0.021

30 day mortality: 17%
 (8 deaths out of 48 arriving
 within 30 days of birth date)

48 birth events to known age parents tabulated for Mx...plus...

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

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

FOUNDER ANALYSIS FOR EASTERN BLACK RHINO SSP

Sun Jun 05 11:04:19 1994

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	186	199	202	207	213	217
Founders	225	233	235	241	247	251	255
Founders	261	262	293	311	409		

Founder contributions

1.5000	1.5000	0.5000	0.5000	1.0000	1.0000	1.2500
1.2500	4.5000	2.0000	0.0000	4.6250	1.6250	0.5000
1.2500	2.0000	2.0000	0.5000	2.0000	0.2500	2.1250
2.1250	0.5000	0.7500	2.2500	2.5000	3.0000	0.2500
1.0000	1.0000	2.0000	1.0000	3.2500	0.5000	0.0000
0.5000	0.5000	1.2500	0.0000	0.0000		

Fractional contributions

0.0276	0.0276	0.0092	0.0092	0.0184	0.0184	0.0230
0.0230	0.0829	0.0369	0.0000	0.0853	0.0300	0.0092
0.0230	0.0369	0.0369	0.0092	0.0369	0.0046	0.0392
0.0392	0.0092	0.0138	0.0415	0.0461	0.0553	0.0046
0.0184	0.0184	0.0369	0.0184	0.0599	0.0092	0.0000
0.0092	0.0092	0.0230	0.0000	0.0000		

Number of living descendants

6	6	4	4	4	4	3
3	16	10	0	13	6	1
4	8	8	1	5	1	7
7	2	2	5	6	7	1
2	2	4	4	8	1	0
1	1	4	0	0		

FOUNDER ANALYSIS FOR EASTERN BLACK RHINO SSP

Sun Jun 05 11:04:19 1994

Founder studbook numbers in parentheses indicate UNKNOWNs.

Founders

Founders	16	17	31	32	46	47	52
Founders	53 (	54)	56	57	68	74	75
Founders	76	79	124	125	155	169	170
Founders	181	182	188	199	202	207	213
Founders	217	225	233	235	241	247	251
Founders	255	261	262	293	311	409	

Founder contributions

1.5000	1.5000	0.5000	0.5000	1.0000	1.0000	1.2500
1.2500	0.7500	4.5000	2.0000	0.0000	4.6250	1.6250
0.5000	1.2500	2.0000	2.0000	0.5000	2.0000	0.2500
2.1250	2.1250	0.5000	0.7500	2.2500	2.5000	3.0000
0.2500	1.0000	1.0000	2.0000	1.0000	3.2500	0.5000
0.0000	0.5000	0.5000	1.2500	0.0000	0.0000	

Fractional contributions

0.0273	0.0273	0.0091	0.0091	0.0182	0.0182	0.0227
0.0227	0.0136	0.0818	0.0364	0.0000	0.0841	0.0295
0.0091	0.0227	0.0364	0.0364	0.0091	0.0364	0.0045
0.0386	0.0386	0.0091	0.0136	0.0409	0.0455	0.0545
0.0045	0.0182	0.0182	0.0364	0.0182	0.0591	0.0091
0.0000	0.0091	0.0091	0.0227	0.0000	0.0000	

Number of living descendants

6	6	4	4	4	4	3
3	2	16	10	0	13	6
1	4	8	8	1	5	1
7	7	2	2	5	6	7
1	2	2	4	4	8	1
0	1	1	4	0	0	

GENE DROP ANALYSIS FOR EASTERN BLACK RHINO SSP

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Studbook	Sex	Dam	Status	Prop. genome living desc.	unique among all living
53	F	WILD	WILD F		0.2480
68	M	WILD	WILD F		1.0000
76	F	WILD	WILD F		0.5000
110	M	46	47 A	0.3230	0.3230
161	M	74	75 A	0.0315	0.0315
163	F	124	125 A	0.0440	0.0440
169	M	WILD	WILD F		0.1295
190	F	16	17 A	0.1120	0.1120
192	F	54	55 A	0.2815	0.2815
202	F	WILD	WILD F		0.0550
212	F	52	53 A	0.2565	0.1245
213	F	WILD	WILD F		0.0240
225	F	WILD	WILD F		0.2520
233	F	WILD	WILD F		0.2445
235	F	WILD	WILD F		0.0585
247	M	WILD	WILD F		0.0205
251	M	WILD	WILD F		0.5000
255	F	WILD	WILD F		1.0000
259	M	182	181 A	0.0690	0.0690
267	F	56	207 A	0.0795	0.0795
285	M	199	126 A	0.3715	0.3715
292	M	79	293 A	0.1250	0.1250
294	F	169	190 A	0.1330	0.0000
301	M	56	207 A	0.0325	0.0325
302	M	247	180 A	0.0185	0.0060
305	M	182	181 A	0.2415	0.2415
308	M	74	213 A	0.0155	0.0065
311	F	WILD	WILD F		1.0000
317	F	56	207 A	0.0510	0.0510
328	F	161	163 A	0.0000	0.0000
330	F	261	262 A	1.0000	1.0000
331	F	169	190 A	0.0600	0.0000
332	M	247	180 A	0.0230	0.0100
351	F	74	213 A	0.0335	0.0125
356	M	155	225 A	0.7480	0.5000
359	F	169	190 A	0.0545	0.0000
362	M	259	202 A	0.0350	0.0000
363	M	247	180 A	0.0355	0.0105
364	F	56	207 A	0.0835	0.0835
365	F	271	235 A	0.1315	0.0745
372	M	271	235 A	0.1240	0.0590
376	M	161	163 A	0.0000	0.0000
377	M	302	239 A	0.1155	0.1155
381	M	285	76 A	0.5000	0.0000
383	F	74	213 A	0.0345	0.0135
388	M	268	282 A	0.5120	0.5045
389	M	292	233 A	0.2555	0.0000
395	M	52	202 A	0.3105	0.2505
396	F	271	235 A	0.1170	0.0560
397	F	247	180 A	0.0320	0.0140
409	M	WILD	WILD F		1.0000
418	F	281	55 A	0.0830	0.0760
419	M	308	317 A	0.0000	0.0000
426	F	74	213 A	0.0455	0.0140
427	M	292	239 A	0.1230	0.1230
432	M	161	163 A	0.0000	0.0000

Studbook	Sire	Dam	Status	Prop. genome unique among living desc.	unique among all living
435 M	292	233	A	0.2555	0.0000
443 M	74	213	A	0.0270	0.0075
457 M	247	225	A	0.2745	0.0000
458 M	332	328	A	0.0000	0.0000
459 M	251	212	A	0.5000	0.0000
472 M	259	202	A	0.0645	0.0000
473 M	110	192	A	0.0000	0.0000
2090 M	259	202	A	0.0635	0.0000
2092 F	362	359	A	0.0000	0.0000
2095 M	301	53	A	0.2520	0.0000
2098 M	271	235	A	0.1370	0.0680
2099 M	305	331	A	0.0000	0.0000
2100 M	161	163	A	0.0000	0.0000

41 Founders	55 Living descendants	105 In analysis
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FOUNDER ALLELE REPRESENTATION

Founder	Retention	%Representation		Target		Difference	
		with unk	w/o	with unk	w/o	with unk	w/o
16 M	0.500	2.723	2.761	1.732	1.763	-0.990	-0.998
17 F	0.500	2.700	2.737	1.732	1.763	-0.968	-0.974
31 M	0.236	0.944	0.957	0.816	0.830	-0.128	-0.126
32 F	0.232	0.915	0.928	0.802	0.816	-0.113	-0.112
46 M	0.500	1.798	1.823	1.732	1.763	-0.066	-0.060
47 F	0.500	1.852	1.878	1.732	1.763	-0.119	-0.115
52 M	0.751	2.273	2.304	2.600	2.646	0.328	0.342
53 FL	0.752	2.273	2.304	3.465	3.526	1.192	1.222
54 M U	0.500	1.369	0.000	1.732	0.000	0.363	0.000
56 M	0.979	8.213	8.327	3.392	3.452	-4.821	-4.875
57 F	0.664	3.555	3.604	2.302	2.343	-1.252	-1.261
68 ML	0.000	0.000	0.000	3.465	3.526	3.465	3.526
74 M	0.986	8.478	8.596	3.415	3.475	-5.064	-5.121
75 F	0.500	2.919	2.960	1.732	1.763	-1.187	-1.197
76 FL	0.500	0.909	0.922	3.465	3.526	2.556	2.604
79 M	0.500	2.266	2.298	1.732	1.763	-0.534	-0.535
124 M	0.617	3.665	3.716	2.138	2.176	-1.528	-1.541
125 F	0.631	3.588	3.638	2.185	2.223	-1.404	-1.415
155 M	0.500	0.909	0.922	1.732	1.763	0.823	0.841
169 ML	0.871	3.668	3.719	3.465	3.526	-0.203	-0.193
170 M	0.252	0.457	0.464	0.871	0.887	0.414	0.423
181 F	0.744	3.905	3.960	2.578	2.623	-1.328	-1.336
182 M	0.757	3.837	3.891	2.621	2.667	-1.216	-1.223
188 F	0.365	0.895	0.908	1.266	1.289	0.371	0.381
199 M	0.500	1.375	1.394	1.732	1.763	0.358	0.369
202 FL	0.945	4.075	4.132	3.465	3.526	-0.611	-0.606
207 F	0.934	4.585	4.648	3.236	3.293	-1.348	-1.355
213 FL	0.976	5.429	5.504	3.465	3.526	-1.964	-1.978
217 F	0.248	0.452	0.458	0.861	0.876	0.409	0.418
225 FL	0.748	1.818	1.843	3.465	3.526	1.647	1.683
233 FL	0.756	1.818	1.843	3.465	3.526	1.647	1.683
235 FL	0.942	3.636	3.687	3.465	3.526	-0.171	-0.161
241 M	0.467	1.777	1.802	1.618	1.647	-0.159	-0.155
247 ML	0.980	5.915	5.998	3.465	3.526	-2.451	-2.472
251 ML	0.500	0.909	0.922	3.465	3.526	2.556	2.604
255 FL	0.000	0.000	0.000	3.465	3.526	3.465	3.526
261 M	0.500	0.909	0.922	1.732	1.763	0.823	0.841
262 F	0.500	0.909	0.922	1.732	1.763	0.823	0.841
293 F	0.500	2.279	2.311	1.732	1.763	-0.547	-0.548
311 FL	0.000	0.000	0.000	3.465	3.526	3.465	3.526
409 ML	0.000	0.000	0.000	3.465	3.526	3.465	3.526

GENETIC SUMMARY

LIVING DESCENDANT POPULATION

POTENTIAL

	with unknowns	w/o	w/ unk	w/o
Number of founders:	37	36	41	40
Mean retention:	0.617	0.620	0.704	0.709
Founder genomes surviving:	22.829	22.329	28.861	28.361
Founder Genome Equivalents:	16.061	15.729	28.861	28.361
Fraction of wild gene diversity retained:	0.969	0.968	0.983	0.982
Fraction of wild gene diversity lost:	0.031	0.032	0.017	0.018
Mean inbreeding coefficient:	0.000			

INBREEDING COEFFICIENTS AND MEAN KINSHIPS FOR EASTERN BLACK RHINO SSP

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Inbreeding and kinship calculations assume UNKNOWNs are founders.

MEAN KINSHIP OF LIVING ANIMALS TO LIVING NON-FOUNDERS

STUDBOOK	SIRE	DAM	INBREEDING	MEAN KINSHIP	KINSHIP VALUE	GENOME KNOWN
53 F	WILD	WILD	F = 0.0000	mk = 0.0114	kv = 0.0097	1.0000
60 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
76 F	WILD	WILD	F = 0.0000	mk = 0.0045	kv = 0.0056	1.0000
110 M	46	47	F = 0.0000	mk = 0.0182	kv = 0.0159	1.0000
161 M	74	75	F = 0.0000	mk = 0.0432	kv = 0.0448	1.0000
163 F	124	125	F = 0.0000	mk = 0.0330	kv = 0.0278	1.0000
169 M	WILD	WILD	F = 0.0000	mk = 0.0182	kv = 0.0197	1.0000
190 F	16	17	F = 0.0000	mk = 0.0273	kv = 0.0208	1.0000
192 F	54	55	F = 0.0000	mk = 0.0278	kv = 0.0228	0.5000
202 F	WILD	WILD	F = 0.0000	mk = 0.0205	kv = 0.0229	1.0000
212 F	52	53	F = 0.0000	mk = 0.0182	kv = 0.0159	1.0000
213 F	WILD	WILD	F = 0.0000	mk = 0.0273	kv = 0.0309	1.0000
225 F	WILD	WILD	F = 0.0000	mk = 0.0091	kv = 0.0102	1.0000
233 F	WILD	WILD	F = 0.0000	mk = 0.0091	kv = 0.0108	1.0000
235 F	WILD	WILD	F = 0.0000	mk = 0.0182	kv = 0.0208	1.0000
247 M	WILD	WILD	F = 0.0000	mk = 0.0295	kv = 0.0318	1.0000
251 M	WILD	WILD	F = 0.0000	mk = 0.0045	kv = 0.0049	1.0000
255 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
259 M	182	181	F = 0.0000	mk = 0.0318	kv = 0.0283	1.0000
267 F	56	207	F = 0.0000	mk = 0.0364	kv = 0.0348	1.0000
285 M	199	126	F = 0.0000	mk = 0.0210	kv = 0.0175	1.0000
292 M	79	293	F = 0.0000	mk = 0.0227	kv = 0.0225	1.0000
294 F	169	190	F = 0.0000	mk = 0.0273	kv = 0.0252	1.0000
301 M	56	207	F = 0.0000	mk = 0.0386	kv = 0.0366	1.0000
302 M	247	180	F = 0.0000	mk = 0.0426	kv = 0.0435	1.0000
305 M	182	181	F = 0.0000	mk = 0.0261	kv = 0.0228	1.0000
308 M	74	213	F = 0.0000	mk = 0.0415	kv = 0.0446	1.0000
311 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
317 F	56	207	F = 0.0000	mk = 0.0386	kv = 0.0389	1.0000
328 F	161	163	F = 0.0000	mk = 0.0449	kv = 0.0436	1.0000
330 F	261	262	F = 0.0000	mk = 0.0091	kv = 0.0100	1.0000
331 F	169	190	F = 0.0000	mk = 0.0295	kv = 0.0273	1.0000
332 M	247	180	F = 0.0000	mk = 0.0426	kv = 0.0442	1.0000
351 F	74	213	F = 0.0000	mk = 0.0392	kv = 0.0433	1.0000
356 M	155	225	F = 0.0000	mk = 0.0114	kv = 0.0134	1.0000
359 F	169	190	F = 0.0000	mk = 0.0295	kv = 0.0278	1.0000
362 M	259	202	F = 0.0000	mk = 0.0330	kv = 0.0335	1.0000
363 M	247	180	F = 0.0000	mk = 0.0403	kv = 0.0429	1.0000
364 F	56	207	F = 0.0000	mk = 0.0364	kv = 0.0365	1.0000
365 F	271	235	F = 0.0000	mk = 0.0227	kv = 0.0259	1.0000
372 M	271	235	F = 0.0000	mk = 0.0227	kv = 0.0265	1.0000
376 M	161	163	F = 0.0000	mk = 0.0426	kv = 0.0419	1.0000
377 M	302	239	F = 0.0000	mk = 0.0338	kv = 0.0354	1.0000
381 M	285	76	F = 0.0000	mk = 0.0173	kv = 0.0171	1.0000
383 F	74	213	F = 0.0000	mk = 0.0392	kv = 0.0441	1.0000
388 M	260	282	F = 0.0000	mk = 0.0259	kv = 0.0284	1.0000
389 M	292	233	F = 0.0000	mk = 0.0205	kv = 0.0223	1.0000
395 M	52	202	F = 0.0000	mk = 0.0205	kv = 0.0226	1.0000
396 F	271	235	F = 0.0000	mk = 0.0227	kv = 0.0266	1.0000
397 F	247	180	F = 0.0000	mk = 0.0403	kv = 0.0432	1.0000
409 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
418 F	281	55	F = 0.0000	mk = 0.0406	kv = 0.0437	1.0000

STUDBOOK	SIRE	DAM	INBREEDING	MEAN KINSHIP	KINSHIP VALUE	GENOME KNOWN
419 M	308	317	F = 0.0000	mk = 0.0446	kv = 0.0472	1.0000
426 F	74	213	F = 0.0000	mk = 0.0392	kv = 0.0441	1.0000
427 M	292	239	F = 0.0000	mk = 0.0239	kv = 0.0245	1.0000
432 M	161	163	F = 0.0000	mk = 0.0426	kv = 0.0417	1.0000
435 M	292	233	F = 0.0000	mk = 0.0205	kv = 0.0218	1.0000
443 M	74	213	F = 0.0000	mk = 0.0392	kv = 0.0432	1.0000
457 M	247	225	F = 0.0000	mk = 0.0239	kv = 0.0256	1.0000
458 M	332	328	F = 0.0000	mk = 0.0483	kv = 0.0485	1.0000
459 M	251	212	F = 0.0000	mk = 0.0159	kv = 0.0153	1.0000
472 M	259	202	F = 0.0000	mk = 0.0307	kv = 0.0308	1.0000
473 M	110	192	F = 0.0000	mk = 0.0276	kv = 0.0240	0.7500
2090 M	259	202	F = 0.0000	mk = 0.0307	kv = 0.0299	1.0000
2092 F	362	359	F = 0.0000	mk = 0.0358	kv = 0.0353	1.0000
2095 M	301	53	F = 0.0000	mk = 0.0295	kv = 0.0274	1.0000
2098 M	271	235	F = 0.0000	mk = 0.0227	kv = 0.0250	1.0000
2099 M	305	331	F = 0.0000	mk = 0.0324	kv = 0.0293	1.0000
2100 M	161	163	F = 0.0000	mk = 0.0426	kv = 0.0405	1.0000

ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	MALES	MK	Age	Known	FEMALES	MK	Age	Known
1	68	0.0000	40	1.000	255	0.0000	24	1.000
2	409	0.0000	40	1.000	311	0.0000	20	1.000
3	251	0.0045	18	1.000	76	0.0045	28	1.000
4	356	0.0114	8	1.000	225	0.0091	24	1.000
5	459	0.0159	3	1.000	233	0.0091	21	1.000
6	381	0.0173	8	1.000	330	0.0091	12	1.000
7	110	0.0182	27	1.000	53	0.0114	29	1.000
8	169	0.0182	23	1.000	235	0.0182	20	1.000
9	395	0.0205	6	1.000	212	0.0182	19	1.000
10	389	0.0205	6	1.000	202	0.0205	21	1.000
11	435	0.0205	4	1.000	365	0.0227	9	1.000
12	285	0.0210	16	1.000	396	0.0227	6	1.000
13	292	0.0227	14	1.000	190	0.0273	25	1.000
14	372	0.0227	7	1.000	213	0.0273	23	1.000
15	2098	0.0227	1	1.000	294	0.0273	13	1.000
16	427	0.0239	4	1.000	192	0.0278	22	0.500
17	457	0.0239	2	1.000	331	0.0295	11	1.000
18	388	0.0259	8	1.000	359	0.0295	8	1.000
19	305	0.0261	13	1.000	163	0.0330	23	1.000
20	473	0.0276	2	0.750	2092	0.0358	1	1.000
21	247	0.0295	24	1.000	267	0.0364	18	1.000
22	2095	0.0295	1	1.000	364	0.0364	8	1.000
23	472	0.0307	4	1.000	317	0.0386	12	1.000
24	2090	0.0307	1	1.000	351	0.0392	9	1.000
25	259	0.0318	17	1.000	383	0.0392	6	1.000
26	2099	0.0324	1	1.000	426	0.0392	4	1.000
27	362	0.0330	8	1.000	397	0.0403	6	1.000
28	377	0.0338	7	1.000	418	0.0406	5	1.000
29	301	0.0386	14	1.000	328	0.0449	12	1.000
30	443	0.0392	3	1.000				
31	363	0.0403	8	1.000				
32	308	0.0415	13	1.000				
33	302	0.0426	14	1.000				
34	332	0.0426	11	1.000				
35	376	0.0426	7	1.000				
36	432	0.0426	5	1.000				
37	2100	0.0426	1	1.000				
38	161	0.0432	22	1.000				
39	419	0.0446	5	1.000				
40	458	0.0483	2	1.000				

GENETIC SUMMARY OF POPULATION

Descendant population Mean Kinship:	0.0311
Gene Diversity:	0.9689
Founder Genome Equivalents:	16.0903
Desc. population mean Kinship Value:	0.0319
Gene Value:	0.9681

INBREEDING COEFFICIENTS AND MEAN KINSHIPS FOR EASTERN BLACK RHINO SSP

Sun Jun 05 11:04:19 1994

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	GENOME	KNOWN
53 F	WILD	WILD	F = 0.0000	mk = 0.0115	kv = 0.0098	1.0000		
68 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000		
76 F	WILD	WILD	F = 0.0000	mk = 0.0046	kv = 0.0056	1.0000		
110 M	46	47	F = 0.0000	mk = 0.0184	kv = 0.0160	1.0000		
161 M	74	75	F = 0.0000	mk = 0.0438	kv = 0.0451	1.0000		
163 F	124	125	F = 0.0000	mk = 0.0334	kv = 0.0280	1.0000		
169 M	WILD	WILD	F = 0.0000	mk = 0.0184	kv = 0.0198	1.0000		
190 F	16	17	F = 0.0000	mk = 0.0276	kv = 0.0209	1.0000		
192 F	54	55	F = 0.0000	mk = 0.0357	kv = 0.0345	0.5000		
202 F	WILD	WILD	F = 0.0000	mk = 0.0207	kv = 0.0231	1.0000		
212 F	52	53	F = 0.0000	mk = 0.0184	kv = 0.0160	1.0000		
213 F	WILD	WILD	F = 0.0000	mk = 0.0276	kv = 0.0312	1.0000		
225 F	WILD	WILD	F = 0.0000	mk = 0.0092	kv = 0.0103	1.0000		
233 F	WILD	WILD	F = 0.0000	mk = 0.0092	kv = 0.0109	1.0000		
235 F	WILD	WILD	F = 0.0000	mk = 0.0184	kv = 0.0210	1.0000		
247 M	WILD	WILD	F = 0.0000	mk = 0.0300	kv = 0.0320	1.0000		
251 M	WILD	WILD	F = 0.0000	mk = 0.0046	kv = 0.0050	1.0000		
255 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000		
259 M	182	181	F = 0.0000	mk = 0.0323	kv = 0.0286	1.0000		
267 F	56	207	F = 0.0000	mk = 0.0369	kv = 0.0350	1.0000		
285 M	199	126	F = 0.0000	mk = 0.0213	kv = 0.0177	1.0000		
292 M	79	293	F = 0.0000	mk = 0.0230	kv = 0.0227	1.0000		
294 F	169	190	F = 0.0000	mk = 0.0276	kv = 0.0254	1.0000		
301 M	56	207	F = 0.0000	mk = 0.0392	kv = 0.0369	1.0000		
302 M	247	180	F = 0.0000	mk = 0.0432	kv = 0.0438	1.0000		
305 M	182	181	F = 0.0000	mk = 0.0265	kv = 0.0229	1.0000		
308 M	74	213	F = 0.0000	mk = 0.0421	kv = 0.0449	1.0000		
311 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000		
317 F	56	207	F = 0.0000	mk = 0.0392	kv = 0.0392	1.0000		
328 F	161	163	F = 0.0000	mk = 0.0455	kv = 0.0439	1.0000		
330 F	261	262	F = 0.0000	mk = 0.0092	kv = 0.0101	1.0000		
331 F	169	190	F = 0.0000	mk = 0.0300	kv = 0.0275	1.0000		
332 M	247	180	F = 0.0000	mk = 0.0432	kv = 0.0445	1.0000		
351 F	74	213	F = 0.0000	mk = 0.0397	kv = 0.0436	1.0000		
356 M	155	225	F = 0.0000	mk = 0.0115	kv = 0.0136	1.0000		
359 F	169	190	F = 0.0000	mk = 0.0300	kv = 0.0281	1.0000		
362 M	259	202	F = 0.0000	mk = 0.0334	kv = 0.0338	1.0000		
363 M	247	180	F = 0.0000	mk = 0.0409	kv = 0.0433	1.0000		
364 F	56	207	F = 0.0000	mk = 0.0369	kv = 0.0368	1.0000		
365 F	271	235	F = 0.0000	mk = 0.0230	kv = 0.0260	1.0000		
372 M	271	235	F = 0.0000	mk = 0.0230	kv = 0.0267	1.0000		
376 M	161	163	F = 0.0000	mk = 0.0432	kv = 0.0423	1.0000		
377 M	302	239	F = 0.0000	mk = 0.0343	kv = 0.0357	1.0000		
381 M	285	76	F = 0.0000	mk = 0.0176	kv = 0.0172	1.0000		
383 F	74	213	F = 0.0000	mk = 0.0397	kv = 0.0444	1.0000		
388 M	268	282	F = 0.0000	mk = 0.0262	kv = 0.0286	1.0000		
389 M	292	233	F = 0.0000	mk = 0.0207	kv = 0.0225	1.0000		
395 M	52	202	F = 0.0000	mk = 0.0207	kv = 0.0228	1.0000		
396 F	271	235	F = 0.0000	mk = 0.0230	kv = 0.0268	1.0000		
397 F	247	180	F = 0.0000	mk = 0.0409	kv = 0.0435	1.0000		
409 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000		

STUDEBOOK	SIRE	DAM	INBREEDING	MEAN	KINSHIP	KINSHIP	VALUE	GENOME	KNOWN
418 F	281	55	F = 0.0000	mk = 0.0412	kv = 0.0440	1.0000			
419 M	308	317	F = 0.0000	mk = 0.0452	kv = 0.0475	1.0000			
426 F	74	213	F = 0.0000	mk = 0.0397	kv = 0.0444	1.0000			
427 M	292	239	F = 0.0000	mk = 0.0242	kv = 0.0246	1.0000			
432 M	161	163	F = 0.0000	mk = 0.0432	kv = 0.0420	1.0000			
435 M	292	233	F = 0.0000	mk = 0.0207	kv = 0.0220	1.0000			
443 M	74	213	F = 0.0000	mk = 0.0397	kv = 0.0435	1.0000			
457 M	247	225	F = 0.0000	mk = 0.0242	kv = 0.0258	1.0000			
458 M	332	328	F = 0.0000	mk = 0.0490	kv = 0.0489	1.0000			
459 M	251	212	F = 0.0000	mk = 0.0161	kv = 0.0154	1.0000			
472 M	259	202	F = 0.0000	mk = 0.0311	kv = 0.0310	1.0000			
473 M	110	192	F = 0.0000	mk = 0.0273	kv = 0.0253	0.7500			
2090 M	259	202	F = 0.0000	mk = 0.0311	kv = 0.0301	1.0000			
2092 F	362	359	F = 0.0000	mk = 0.0363	kv = 0.0356	1.0000			
2095 M	301	53	F = 0.0000	mk = 0.0300	kv = 0.0276	1.0000			
2098 M	271	235	F = 0.0000	mk = 0.0230	kv = 0.0252	1.0000			
2099 M	305	331	F = 0.0000	mk = 0.0328	kv = 0.0295	1.0000			
2100 M	161	163	F = 0.0000	mk = 0.0432	kv = 0.0408	1.0000			

 ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	MALES	MK	Age	Known	FEMALES	MK	Age	Known
1	68	0.0000	40	1.000	255	0.0000	24	1.000
2	409	0.0000	40	1.000	311	0.0000	20	1.000
3	251	0.0046	18	1.000	76	0.0046	28	1.000
4	356	0.0115	8	1.000	225	0.0092	24	1.000
5	459	0.0161	3	1.000	233	0.0092	21	1.000
6	381	0.0176	8	1.000	330	0.0092	12	1.000
7	169	0.0184	23	1.000	53	0.0115	29	1.000
8	110	0.0184	27	1.000	235	0.0184	20	1.000
9	395	0.0207	6	1.000	212	0.0184	19	1.000
10	389	0.0207	6	1.000	202	0.0207	21	1.000
11	435	0.0207	4	1.000	365	0.0230	9	1.000
12	285	0.0213	16	1.000	396	0.0230	6	1.000
13	292	0.0230	14	1.000	190	0.0276	25	1.000
14	372	0.0230	7	1.000	213	0.0276	23	1.000
15	2098	0.0230	1	1.000	294	0.0276	13	1.000
16	457	0.0242	2	1.000	331	0.0300	11	1.000
17	427	0.0242	4	1.000	359	0.0300	8	1.000
18	388	0.0262	8	1.000	163	0.0334	23	1.000
19	305	0.0265	13	1.000	192	0.0357	22	0.500
20	473	0.0273	2	0.750	2092	0.0363	1	1.000
21	247	0.0300	24	1.000	267	0.0369	18	1.000
22	2095	0.0300	1	1.000	364	0.0369	8	1.000
23	472	0.0311	4	1.000	317	0.0392	12	1.000
24	2090	0.0311	1	1.000	351	0.0397	9	1.000
25	259	0.0323	17	1.000	383	0.0397	6	1.000
26	2099	0.0328	1	1.000	426	0.0397	4	1.000
27	362	0.0334	8	1.000	397	0.0409	6	1.000
28	377	0.0343	7	1.000	418	0.0412	5	1.000
29	301	0.0392	14	1.000	328	0.0455	12	1.000
30	443	0.0397	3	1.000				
31	363	0.0409	8	1.000				
32	308	0.0421	13	1.000				
33	302	0.0432	14	1.000				
34	332	0.0432	11	1.000				
35	376	0.0432	7	1.000				
36	432	0.0432	5	1.000				
37	2100	0.0432	1	1.000				
38	161	0.0438	22	1.000				
39	419	0.0452	5	1.000				
40	458	0.0490	2	1.000				

GENETIC SUMMARY OF POPULATION

Descendant population Mean Kinship:	0.0316
Gene Diversity:	0.9684
Founder Genome Equivalents:	15.8176
Desc. population mean Kinship Value:	0.0327
Gene Value:	0.9673

BOX 2
TARGET POPULATION CALCULATIONS USING CAPACITY 3.0 (J. Ballou)
FOR EASTERN BLACK RHINO SSP

Capacity 3.0

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

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.030	Length of Program (Years):	115
% Diversity Retained to Date:	96.8	% Hetero. To Retain:	90.0
Effective Size of Population:	30.0		
Estimated Ne/N Ratio:	0.40	Growth rate per Generation:	1.56
Current Year:	15	# Generations during 115 Years:	7

Effective Size Required to Maintain 90.0% of the
Original Founder's Heterozygosity for 115 Years: 45

Actual Population Size Required (Based on Ne/N Ratio): 113

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

		LENGTH OF PROGRAM (YEARS)					Model	
		105	115	125	135	15	Parameters	
Ne/N Ratio	0.40	100	100	120	143	****	Lambda	1.030
	0.50	80	80	96	114	****	Gen. Length:	15.0
	0.60	67	67	80	95	****	Effective Size:	30
	0.70	57	57	69	81	****	Het. to Date:	96.8
	0.75	53	53	64	76	****	Years Elapsed:	15

**** = Not Possible with these parameters

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

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.030	Length of Program (Years):	120
% Diversity Retained to Date:	97.5	% Hetero. To Retain:	90.0
Effective Size of Population:	30.0		
Estimated Ne/N Ratio:	0.50	Growth rate per Generation:	1.56
Current Year:	15	# Generations during 120 Years:	8

Effective Size Required to Maintain 90.0% of the
Original Founder's Heterozygosity for 120 Years: 48

Actual Population Size Required (Based on Ne/N Ratio): 96

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

		LENGTH OF PROGRAM (YEARS)					Model	
		105	115	125	135	150	Parameters	
Ne/N Ratio	0.40	100	100	120	143	168	Lambda	1.030
	0.50	80	80	96	114	134	Gen. Length:	15.0
	0.60	67	67	80	95	112	Effective Size:	30
	0.70	57	57	69	81	96	Het. to Date:	97.5
	0.75	53	53	64	76	89	Years Elapsed:	15

**EASTERN BLACK RHINO
REPRODUCTIVE HISTORY OF EACH FEMALE**

STBK #	NO. OF OFFSPRING	AGE	OFFSPRING		
			STBK #	Sex	Fate
53	2		189	1/0	Dead
			212	0/1	Alive
			2095	1/0	Alive
55	7		138	0/1	Dead
			192	0/1	Alive
			208	1/0	Dead
			258	1/0	Havana
			319	1/0	Dead
			361	1/0	Dead
			418	0/1	Alive
67	0				
76	4		152	0/1	Dead
			206	0/1	Dead
			209	1/0	Japan - Dead
			381	1/0	Alive
121	5		179	0/1	Dead
			186	0/1	Dead
			232	0/1	Dead
			252	1/0	Zurich-Alive
			353	0/1	Dead
125	3		126	0/1	Dead
			163	0/1	Alive
			204	1/0	Dead

EASTERN BLACK RHINO
REPRODUCTION HISTORY OF EACH FEMALE
(Continued)

STBK #	NO. OF OFFSPRING	AGE	OFFSPRING		
			STBK #	Sex	Fate
163	6		246	0/1	Dead
			279	0/1	Dead
			304	1/0	Dead
			328	0/1	Alive
			376	1/0	Alive
			432	1/0	Alive
			2100	1/0	Alive
180	5		268	1/0	Dvur Kralove - Alive
			302	1/0	Alive
			332	1/0	Alive
			363	1/0	Alive
			397	0/1	Alive
190	4		300	1/0	Dead
			294	0/1	Alive
			331	0/1	Alive
			359	0/1	Alive
192	0				
202	3		272	1/0	Dead
			362	1/0	Alive
			395	1/0	Alive
			472	1/0	Alive
			2070	1/0	Alive

**EASTERN BLACK RHINO
REPRODUCTIVE HISTORY OF EACH FEMALE
(Continued)**

STBK #	NO. OF OFFSPRING	AGE	OFFSPRING		
			STBK #	Sex	Fate
212	3		367	0/1	Dead
			423	0/1	Dead
			459	1/0	Alive
213	8		250	1/0	Sri Lanka - Alive
			281	1/0	Dead
			308	1/0	Alive
			337	1/0	Dead
			351	0/1	Alive
			383	0/1	Alive
			426	0/1	Alive
			443	1/0	Alive
225	6		226	0/1	Dead
			243	1/0	Dead
			309	0/1	Dead
			343	0/1	Dead
			356	1/0	Alive
			457	1/0	Alive
233	2		389	1/0	Alive
			435	1/0	Alive
235	4		365	0/1	Alive
			372	1/0	Alive
			396	0/1	Alive
			444	0/1	Dead
			2098	1/0	Alive

**EASTERN BLACK RHINO
REPRODUCTION HISTORY OF EACH FEMALE**
(Continued)

STBK #	NO. OF OFFSPRING	AGE	OFFSPRING		
			STBK #	Sex	Fate
255	4		257	1/0	Dead
			348	1/0	Dead
			382	0/1	Dead
			398	0/1	Dead
267	1		360	0/1	Dead
294	0				
297	0				
311	0				
317	1		419	1/0	Alive
328	2		460	0/1	Dead
			458	1/0	Alive
330	0				
331	0				
351	0				
359	0				
364	0				

**EASTERN BLACK RHINO
REPRODUCTIVE HISTORY OF EACH FEMALE**
(Continued)

STBK #	NO. OF OFFSPRING	AGE	OFFSPRING		
			STBK #	Sex	Fate
365	0				
383	0				
396	0				
397	0				
418	0				
426	0				
T2065	0				

SECTION 4

SOUTHERN BLACK RHINO SSP

INSTITUTION BY INSTITUTION

RECOMMENDATIONS

MASTERPLAN REPORT DEFINITIONS

Stud # -- Studbook ID Number

Sex -- ' - ' indicates the animal is sterilized or contracepted

Birth/Hatch Date

Arrival -- Arrival date at the current institution

Sire/Dam -- Sire/Dam IDs

Loc ID -- Current institution ID number

Social -- Current social group at the current institution

Genome Known: Proportion of animal's genome known

F -- Inbreeding Coefficient
First value assumes animals of unknown origin are founders.
Second value omits animals of unknown origin.

MK -- Mean Kinship
First value is mean kinship. Second value is mean kinship if animals of unknown origin are omitted.

KV -- Kinship Value
A weighted mean kinship where the weights are the other animals' reproductive values.
Second value omits animals of unknown origin.

GU-All -- Genome Uniqueness
Proportion of genes in an animal that are not found in the rest of the population.

GU-CB -- Genome Uniqueness of Captive-Born Animals
Proportion of genes in an animal that are not found in the rest of the captive-born population.

Vx -- Reproductive Value
Expected future lifetime reproduction by an animal of age x.

Global vs. Restricted

-- Following values may be calculated using all animals in the studbook or using the population specified by the view set for the report.

Live sibs -- Half siblings are counted as complete siblings.

Live offspr -- Living offspring

Repro offspr -- Reproducing offspring

Founder representation.

-- Percent of this animal's genes that descended from each founder.

INSTITUTION SHEETS

ARE ORGANIZED

BY COUNTRY: CANADA/U.S.A.

WITHIN COUNTRY: ALPHABETICALLY BY PROVINCE/STATE

Masterplan Report
SOUTHERN BLACK RHINO Studbook
(*Diceros bicornis minor*)

Living Population at: Los Angeles Zoo

LOSANGELE

Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Repro Offspr	Representation
		Arrival	Dam	Social	Known	Unknowns removed							
336	F	21 Apr 1983	WILD 001155		1.0000	.0417	.0306	1.000	1.160				334=50%
		21 Apr 1983	334					1.000					

Recommendations:

336 - Move to San Diego Zoo. Breed with 190

Living Population at: San Diego Zoological Garden

SANDIEG02

<< Restricted >>												
Stud ID	Sex	Birth Date Arrival	Sire Dam	Loc ID Social	Genome Known	F (unks = founders) (unknowns removed)	MK	KV	GU-All GU-CB	Vx	Live Sibs Live Offspr Repro Offspr	Founder Representation
390	M	May 1986 15 Dec 1987	WILD WILD	587408	1.0000	.0000	.0208	.0277	.5000	2.200	. 1. .	. 0. 0
392	F	Mar 1986 10 Jul 1989	WILD WILD	589278	1.0000	.0000	.0208	.0277	.5000	1.440	. 1. .	. 0. 0
2094	M	12 Aug 1993 12 Aug 1993	390 392	_____	1.0000	.0000	.0417	.0353	.0000 1.000	2.100	. .	392=50% 390=50%

Recommendations:

390 - Breed with 392

392 - Breed with 390

2094 - Move to Western Plains Zoo in Australia

336 - Receive from Los Angeles. Breed with 390

Living Population at: Dallas Zoo

DALLAS

Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	vx	Live Sibs	Founder Representation
		Arrival	Dam	Social	Known	[unks = founders] [unknown removed]			GU-CE		Live Offspr	Repro Offspr
399	M	- 1982	WILD	896576	1.0000	.0000	.0000	.0000	1.000	2.260	.	.
		16 Jul 1989	WILD			.	.	.	.	.	.	.
400	F	- 1974	WILD	896577	1.0000	.0000	.0208	.0174	.5000	0.480	.	.
		16 Jul 1989	WILD			.	.	.	.	.	.	.
433	F	28 Feb 1990	WILD	906719	1.0000	.0000	.0417	.0348	.5000	1.320	.	400=50%
		28 Feb 1990	400			.	.	.	1.000	.	.	.

Recommendations:

- 399 - Breed with 400 and 433 as soon as possible
- 400 - Breed (again) with 399 as soon as possible
- 433 - Breed with 399 as soon as possible

Living Population at: Fort Worth Zoological Park

FORTWORTH

Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Offspr	Repro Offspr	Founder Representation
		Arrival	Dam	Social	Known	[unks = founders]	[unknowns removed]		GU-CB				
403	M	18 Aug 1989	WILD	716	1.0000	.0000	.0521	.0647	.5000	2.160	0.	1.	0 402=50%
		18 Aug 1989	402			.	.	.	.7390		.	.	
411	F	20 Feb 1989	378		1.0000	.0000	.0729	.0628	.0000	1.480	0.	2.	0 379=50% 378=50%
		19 Dec 1991	379			.	.	.	.3715		.	.	

Recommendations:

- 403 - Breed with 411 as soon as possible
- 411 - Breed with 403 as soon as possible
- 447 - Receive from La Coma

Living Population at: Fossil Rim Wildlife Center

WATERFALL

===== << Restricted >> =====												
Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Founder
		Arrival	Dam	Social	Known	[unks = founders]			GU-CB		Live Offspr	Representation
[unknowns removed]												
=====												
466	F	- 1977	WILD	_____	1.0000	.0000	.0208	.0174	.5000	0.490	.	.
		22 Apr 1992	WILD			.	.	.	.		0.	1. 0
=====												
467	M	- 1988	WILD	_____	1.0000	.0000	.0000	.0000	1.000	2.170	.	.
		22 Apr 1992	WILD			.	.	.	.		.	.
=====												

Recommendations:

466 - Breed with new male if she is not already pregnant

467 - Move to Western Plains Zoo in Australia

Receive new male from Zimbabwe

Living Population at: MCALLEN'S SANTILLANA

SANTILLANA

Stud #	Sex	Birth Date	Arrival	Sire	Dam	Loc ID	Genome	F	HK	KV	GU-All	GU-CD	Vx	Liiva Sibs	Liiva Offspr	Repro Offspr	Founder Representation
464	F	1990	22 Apr 1992	WILD	466		1.0000	.0000	.0417	.0348	.5000	1.000	1.320	.	.	.	466=50%
465	M	1990	22 Apr 1992	WILD	468		1.0000	.0000	.0417	.0564	.5000	1.000	2.140	.	.	.	468=50%

Recommendations:

- 464 - Breed with 465 as soon as possible
- 465 - Breed with 464 as soon as possible

Living Population at: BASS EL COYOTE RANCH

EL COYOTE

Stud #	Sex	Birth Date Arrival	Sire Dam	Loc ID Social	Genome Known	F			KV	GU-All GU-CB	Vx	<< Restricted >>		Founder Representation
						[unks = founders] [unknowns removed]						Live	Sibs Live Offspr Repro Offspr	
401	M	~ 1985 27 Jul 1991	WILD WILD	_____	1.0000	.0000	.0000	.0000	1.000	2.220	.	.	.	.
414	F	1 Jan 1988 16 Jul 1989	WILD WILD	_____	1.0000	.0000	.0208	.0195	.5000	1.580	.	.	0. 1. 0	.
424	F	11 Sep 1989 11 Sep 1989	WILD 414	_____	1.0000	.0000	.0417	.0390	.5000 1.000	1.480	.	.	.	414-50%
461	F	~ 1977 22 Apr 1992	WILD WILD	_____	1.0000	.0000	.0208	.0174	.5000	0.490	.	.	0. 1. 0	.
462	F	1 Dec 1990 22 Apr 1992	WILD 461	_____	1.0000	.0000	.0417	.0348	.5000 1.000	1.320	.	.	.	461-50%

Recommendations:

401 - Breed with 414, 424, 461, 462 as soon as possible

414 - Breed with 401 as soon as possible

424 - Breed with 401 as soon as possible

461 - Breed with 401 as soon as possible

462 - Breed with 401 as soon as possible

Consider obtaining additional male from Africa

Stud	Sex	Birch Date	Site	Loc ID	Genome	F	MK	KV	GU-All	VX	Live Siba	Live Offspr	Repro Offspr	Representation
#	Attila	Dam	Social	Known	[unknown removed]	[unk = founders]	GU-CB	VX	Repro Offspr	Representation				

[illegible]

Recommenoed

178 - Breed with 379, 402, 410 as soon as possible

379 - Read with 378 as soon as possible

402 - Breed with 378 as soon as possible

010 - Breed with 178 as soon as possible

447 - Move to Fort Worth

2097 - Move to White Oak

Living Population at: Milwaukee County Zoological Gardens

MILWAUKEE

											<< Restricted >>				
Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All		Live Sibs	Live Offspr	Repro Offspr	Founder Representation	
		Arrival	Dam	Social	Known	[unks = founders] [unknowns removed]			GU-CB	Vx					
=====															
404	M	- 1985	WILD	3371	1.0000	.0000	.0208	.0277	.5000	2.220	.	.			
		18 Jul 1989	WILD			.	.	.	.		1.	0.	0		
=====															
405	F	- 1982	WILD	3372	1.0000	.0000	.0208	.0277	.5000	1.070	.	.			
		10 Jul 1989	WILD			.	.	.	.		1.	0.	0		
=====															
463	M	29 Dec 1992	404	_____	1.0000	.0000	.0417	.0553	.0000	2.100	.	.		405=50% 404=50%	
		29 Dec 1992	405			.	.	.	1.000		.	.			
=====															

Recommendations:

- 404 - Breed with 405 as soon as possible
- 405 - Breed with 404 again as soon as possible
- 463 - Move to Western Plains Zoo in Australia

SECTION 5

POPULATION ANALYSES FOR

SOUTHERN BLACK RHINO

SSP POPULATION

Age Pyramid Report

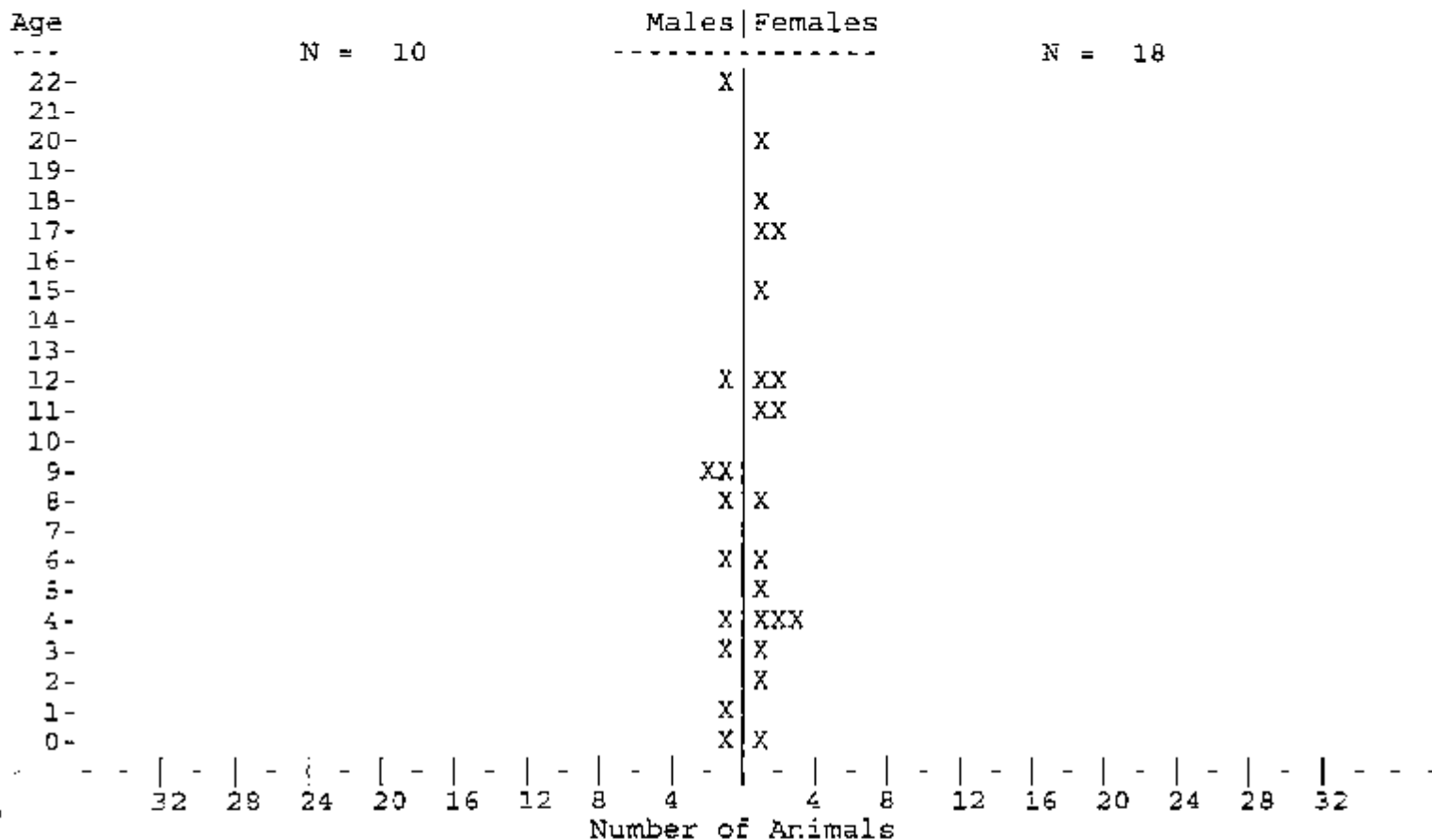
Restricted to: SOUTHERN BLACK RHINO Studbook
 Locations: N.AMERICA/
 Dates: As of End of 01/06/1994 <= date
 Status: Living by

Page 1

=====

Taxon Name: DICEROS BICORNIS MINOR

=====



X >>> Specimens of known sex...

? >>> Specimens of unknown sex...

Age Pyramid Report

Restricted to: SOUTHERN BLACK RHINO Studbook

Locations: N.AMERICA/

Dates: As of End of 01/06/1994 <= date

Status: Living by

Page 2

Taxon Name: DICEROS BICORNIS MINOR

Age Studbook Numbers >>> Male

22	378	
21		
20		
19		
18		
17		
16		
15		
14		
13		
12	399	
11		
10		
9	401	404
8	390	
7		
6	457	
5		
4	403	
3	465	
2		
1	463	
0	2094	

Total= 10

Age Pyramid Report

Restricted to: SOUTHERN BLACK RHINO Studbook

Page 3

Locations: N.AMERICA/

Dates: As of End of 01/06/1994 <= date

Status: Living by

=====

Taxon Name: DICEROS BICORNIS MINOR

=====

Age Studbook Numbers >>> Female

22			
21			
20	400		
19			
18	379		
17	461	466	
16			
15	402		
14			
13			
12	405	468	
11	336	410	
10			
9			
8	392		
7			
6	414		
5	411		
4	424	433	464
3	462		
2	447		
1			
0	2097		

Total= 18

Fecundity and Mortality Report
SOUTHERN BLACK RHINO Studbook

Restricted to:

Page 1

Locations: N.AMERICA/

Dates: During 01/01/1984 <= date

=====

Taxon Name: DICEROS BICORNIS MINOR

=====

Age Class	Fecundity [Mx]...				Mortality [Qx]...			
	Male	N	Female	N	Male	N	Female	N
0- 1	0.00	3.1	0.00	5.1	0.52	5.8	0.16	6.1
1- 2	0.00	2.2	0.08	6.1	0.00	2.2	0.00	6.1
2- 3	0.00	3.0	0.00	7.3	0.00	3.0	0.00	7.3
3- 4	0.00	3.5	0.00	7.1	0.00	3.5	0.00	7.1
4- 5	0.00	3.9	0.00	6.3	0.21	4.7	0.14	7.1
5- 6	0.00	4.0	0.00	3.3	0.00	4.0	0.23	4.3
6- 7	0.00	3.1	0.00	3.1	0.00	3.1	0.00	3.1
7- 8	0.29	3.5	0.11	4.5	0.00	3.5	0.00	4.5
8- 9	0.00	3.1	0.10	5.0	0.00	3.1	0.00	5.0
9-10	0.00	1.9	0.10	5.0	0.00	1.9	0.00	5.0
10-11	0.00	2.5	0.15	6.6	0.50	4.0	0.13	7.5
11-12	0.00	2.0	0.09	5.6	0.00	2.0	0.00	5.6
12-13	0.00	2.2	0.00	3.5	0.00	2.2	0.00	3.5
13-14	0.00	2.0	0.17	3.0	0.00	2.0	0.00	3.0
14-15	0.00	2.0	0.17	3.0	0.00	2.0	0.00	3.0
15-16	0.25	2.0	0.10	5.1	0.00	2.0	0.17	5.9
16-17	0.00	2.0	0.10	5.0	0.00	2.0	0.00	5.1
17-18	0.25	2.0	0.00	2.5	0.00	2.0	0.31	3.2
18-19	0.00	2.0	0.00	1.4	0.00	2.0	0.00	1.4
19-20	0.50	2.0	0.00	1.0	0.00	2.0	0.00	1.0
20-21	0.47	1.1	0.00	0.4	0.50	2.0	0.00	0.4
21-22	0.50	1.0	0.00	0.0	0.00	1.0	0.00	0.0
22-23	0.00	0.4	0.00	0.0	0.00	0.4	0.00	0.0
23-24	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
24-25	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
T = 15.259				T = 10.177				30 day mortality: 27%
Ro = 0.392				Ro = 0.601				(3 deaths out of 11 arriving
lambda=0.94				lambda=0.95				within 30 days of birth date)
r = -0.061				r = -0.050				

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

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

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

Smoothing pass 1

Age Class	Fecundity [Mx]...				Mortality [Qx]...			
	Male	N	Female	N	Male	N	Female	N
0-1	0.00	3.1	0.00	5.1	0.52	5.8	0.16	6.1
1-2	0.00	2.2	0.04	6.1	0.00	2.2	0.00	6.1
2-3	0.00	3.0	0.03	7.3	0.00	3.0	0.00	7.3
3-4	0.00	3.5	0.00	7.1	0.07	3.5	0.05	7.1
4-5	0.00	3.9	0.00	6.3	0.07	4.7	0.12	7.1
5-6	0.00	4.0	0.00	3.3	0.07	4.0	0.12	4.3
6-7	0.10	3.1	0.04	3.1	0.00	3.1	0.08	3.1
7-8	0.10	3.5	0.07	4.5	0.00	3.5	0.00	4.5
8-9	0.10	3.1	0.10	5.0	0.00	3.1	0.00	5.0
9-10	0.00	1.9	0.12	5.0	0.17	1.9	0.04	5.0
10-11	0.00	2.5	0.11	6.6	0.17	4.0	0.04	7.5
11-12	0.00	2.0	0.08	5.6	0.17	2.0	0.04	5.6
12-13	0.00	2.2	0.09	3.5	0.00	2.2	0.00	3.5
13-14	0.00	2.0	0.11	3.0	0.00	2.0	0.00	3.0
14-15	0.08	2.0	0.15	3.0	0.00	2.0	0.06	3.0
15-16	0.08	2.0	0.12	5.1	0.00	2.0	0.06	5.9
16-17	0.17	2.0	0.07	5.0	0.00	2.0	0.16	5.1
17-18	0.08	2.0	0.03	2.5	0.00	2.0	0.10	3.2
18-19	0.25	2.0	0.00	1.4	0.00	2.0	0.10	1.4
19-20	0.32	2.0	0.00	1.0	0.17	2.0	0.00	1.0
20-21	0.49	1.1	0.00	0.4	0.17	2.0	0.00	0.4
21-22	0.32	1.0	0.00	0.0	0.17	1.0	0.00	0.0
22-23	0.17	0.4	0.00	0.0	0.00	0.4	0.00	0.0
23-24	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
24-25	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
25-26	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 15.749
 Ro = 0.460
 lambda=0.95
 r = -0.049

T = 10.340
 Ro = 0.597
 lambda=0.95
 r = -0.050

30 day mortality: 27%
 (3 deaths out of 11 arriving
 within 30 days of birth date)

9 birth events to known age parents tabulated for Mx...plus...

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

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

Fecundity and Mortality Report
SOUTHERN BLACK RHINO Studbook

Restricted to:

Locations: N.AMERICA/

Dates: During 01/01/1989 <= date

Page 1

=====

Taxon Name: DICEROS BICORNIS MINOR

=====

Age Class	Fecundity [Mx]...				Mortality [Qx]...			
	Male	N	Female	N	Male	N	Female	N
0- 1	0.00	3.1	0.00	4.6	0.42	4.8	0.17	5.8
1- 2	0.00	1.8	0.10	5.1	0.00	1.8	0.00	5.1
2- 3	0.00	2.3	0.00	6.3	0.00	2.3	0.00	6.3
3- 4	0.00	2.8	0.00	6.1	0.00	2.8	0.00	6.1
4- 5	0.00	3.7	0.00	4.6	0.00	3.7	0.19	5.3
5- 6	0.00	4.0	0.00	2.6	0.00	4.0	0.00	2.6
6- 7	0.00	3.1	0.00	3.1	0.00	3.1	0.00	3.1
7- 8	0.29	3.5	0.14	3.5	0.00	3.5	0.00	3.5
8- 9	0.00	3.1	0.15	3.3	0.00	3.1	0.00	3.3
9-10	0.00	1.9	0.17	3.0	0.00	1.9	0.00	3.0
10-11	0.00	1.5	0.22	4.6	0.67	3.0	0.18	5.5
11-12	0.00	1.0	0.00	3.6	0.00	1.0	0.00	3.6
12-13	0.00	0.4	0.00	2.5	0.00	0.4	0.00	2.5
13-14	0.00	0.0	0.17	3.0	0.00	0.0	0.00	3.0
14-15	0.00	0.0	0.17	3.0	0.00	0.0	0.00	3.0
15-16	0.00	1.0	0.10	4.9	0.00	1.0	0.00	4.9
16-17	0.00	1.0	0.10	5.0	0.00	1.0	0.00	5.1
17-18	0.25	2.0	0.00	2.5	0.00	2.0	0.31	3.2
18-19	0.00	2.0	0.00	1.4	0.00	2.0	0.00	1.4
19-20	0.50	2.0	0.00	1.0	0.00	2.0	0.00	1.0
20-21	0.47	1.1	0.00	0.4	0.50	2.0	0.00	0.4
21-22	0.50	1.0	0.00	0.0	0.00	1.0	0.00	0.0
22-23	0.00	0.4	0.00	0.0	0.00	0.4	0.00	0.0
23-24	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
24-25	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 14.123

Ro = 0.405

lambda=0.94

r = -0.064

T = 9.898

Ro = 0.811

lambda=0.98

r = -0.021

30 day mortality: 20%

(2 deaths out of 10 arriving
within 30 days of birth date)

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

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

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

Smoothing pass 1

Age Class	Fecundity [Mx]...				Mortality [Qx]...			
	Male	N	Female	N	Male	N	Female	N
0- 1	0.00	3.1	0.00	4.8	0.42	4.8	0.17	5.8
1- 2	0.00	1.8	0.05	5.1	0.00	1.8	0.00	5.1
2- 3	0.00	2.3	0.03	6.3	0.00	2.3	0.00	6.3
3- 4	0.00	2.8	0.00	6.1	0.00	2.8	0.06	6.1
4- 5	0.00	3.7	0.00	4.6	0.00	3.7	0.06	5.3
5- 6	0.00	4.0	0.00	2.6	0.00	4.0	0.06	2.6
6- 7	0.10	3.1	0.05	3.1	0.00	3.1	0.00	3.1
7- 8	0.10	3.5	0.10	3.5	0.00	3.5	0.00	3.5
8- 9	0.10	3.1	0.15	3.3	0.00	3.1	0.00	3.3
9-10	0.00	1.9	0.18	3.0	0.22	1.9	0.06	3.0
10-11	0.00	1.5	0.13	4.6	0.22	3.0	0.06	5.5
11-12	0.00	1.0	0.07	3.6	0.22	1.0	0.06	3.6
12-13	0.00	0.4	0.06	2.5	0.00	0.4	0.00	2.5
13-14	0.00	0.0	0.11	3.0	0.00	0.0	0.00	3.0
14-15	0.00	0.0	0.15	3.0	0.00	0.0	0.00	3.0
15-16	0.00	1.0	0.12	4.9	0.00	1.0	0.00	4.9
16-17	0.08	1.0	0.07	5.0	0.00	1.0	0.10	5.1
17-18	0.08	2.0	0.03	2.5	0.00	2.0	0.10	3.2
18-19	0.25	2.0	0.00	1.4	0.00	2.0	0.10	1.4
19-20	0.32	2.0	0.00	1.0	0.17	2.0	0.00	1.0
20-21	0.49	1.1	0.00	0.4	0.17	2.0	0.00	0.4
21-22	0.32	1.0	0.00	0.0	0.17	1.0	0.00	0.0
22-23	0.17	0.4	0.00	0.0	0.00	0.4	0.00	0.0
23-24	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
24-25	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
25-26	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 15.316

T = 10.058

30 day mortality: 20%

Ro = 0.525

Ro = 0.806

(2 deaths out of 10 arriving

lambda=0.96

lambda=0.98

within 30 days of birth date)

r = -0.042

r = -0.021

8 birth events to known age parents tabulated for Mx...plus...

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

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

FOUNDER ANALYSIS FOR SOUTHERN BLACK RHINO SSP

Sun Jun 05 10:58:03 1994

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

Founders

Founders	334	378	379	390	392	399	400
Founders	401	402	404	405	410	414	461
Founders	466	467	468	P334	P400	P402	P414
Founders	P461	P466	P468				

Founder contributions

0.5000	1.5000	1.0000	0.5000	0.5000	0.0000	0.5000
0.0000	1.0000	0.5000	0.5000	0.0000	0.5000	0.5000
0.5000	0.0000	0.5000	0.5000	0.5000	0.5000	0.5000
0.5000	0.5000	0.5000				

Fractional contributions

0.0417	0.1250	0.0833	0.0417	0.0417	0.0000	0.0417
0.0000	0.0833	0.0417	0.0417	0.0000	0.0417	0.0417
0.0417	0.0000	0.0417	0.0417	0.0417	0.0417	0.0417
0.0417	0.0417	0.0417				

Number of living descendants

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

GENE DROP ANALYSIS FOR SOUTHERN BLACK RHINO SSP

Sun Jun 05 10:58:03 1994

Studbook	Sire	Dam	Status	Prop. genome living desc.	unique among all living
336 F	P334	334	A	1.0000	1.0000
378 M	WILD	WILD	F		0.1195
379 F	WILD	WILD	F		0.2420
390 M	WILD	WILD	F		0.5000
392 F	WILD	WILD	F		0.5000
399 M	WILD	WILD	F		1.0000
400 F	WILD	WILD	F		0.5000
401 M	WILD	WILD	F		1.0000
402 F	WILD	WILD	F		0.2610
403 M	P402	402	A	0.7390	0.5000
404 M	WILD	WILD	F		0.5000
405 F	WILD	WILD	F		0.5000
410 F	WILD	WILD	F		1.0000
411 F	378	379	A	0.3715	0.0000
414 F	WILD	WILD	F		0.5000
424 F	P414	414	A	1.0000	0.5000
433 F	P400	400	A	1.0000	0.5000
447 F	378	379	A	0.3965	0.0000
461 F	WILD	WILD	F		0.5000
462 F	P461	461	A	1.0000	0.5000
463 M	404	405	A	1.0000	0.0000
464 F	P466	466	A	1.0000	0.5000
465 M	P468	468	A	1.0000	0.5000
466 F	WILD	WILD	F		0.5000
467 M	WILD	WILD	F		1.0000
468 F	WILD	WILD	F		0.5000
2094 M	390	392	A	1.0000	0.0000
2097 F	378	402	A	0.3675	0.0000

24 Founders

12 Living descendants

36 In analysis

FOUNDER ALLELE REPRESENTATION

Founder	Retention	%Representation	Target	Difference
334 F	0.500	4.167	2.500	-1.667
378 ML	0.881	12.500	5.000	-7.500
379 FL	0.758	8.333	5.000	-3.333
390 ML	0.500	4.167	5.000	0.833
392 FL	0.500	4.167	5.000	0.833
399 ML	0.000	0.000	5.000	5.000
400 FL	0.500	4.167	5.000	0.833
401 ML	0.000	0.000	5.000	5.000
402 FL	0.739	8.333	5.000	-3.333
404 ML	0.500	4.167	5.000	0.833
405 FL	0.500	4.167	5.000	0.833
410 FL	0.000	0.000	5.000	5.000
414 FL	0.500	4.167	5.000	0.833
461 FL	0.500	4.167	5.000	0.833
466 FL	0.500	4.167	5.000	0.833
467 ML	0.000	0.000	5.000	5.000
468 FL	0.500	4.167	5.000	0.833
P334 M	0.500	4.167	2.500	-1.667
P400 M	0.500	4.167	2.500	-1.667
P402 M	0.500	4.167	2.500	-1.667
P414 M	0.500	4.167	2.500	-1.667
P461 M	0.500	4.167	2.500	-1.667
P466 M	0.500	4.167	2.500	-1.667
P468 M	0.500	4.167	2.500	-1.667

GENETIC SUMMARY

	LIVING DESCENDANT POPULATION	POTENTIAL
Number of founders:	20	24
Mean retention:	0.544	0.833
Founder genomes surviving:	10.878	20.000
Founder Genome Equivalents:	9.942	20.000
Fraction of wild gene diversity retained:	0.950	0.975
Fraction of wild gene diversity lost:	0.050	0.025
Mean inbreeding coefficient:	0.000	

INBREEDING COEFFICIENTS AND MEAN KINSHIPS FOR SOUTHERN BLACK RHINO SSP

Sun Jun 05 10:58:03 1994

MEAN KINSHIP OF LIVING ANIMALS TO LIVING NON-FOUNDERS

STUDBOOK	SIRE	DAM	INBREEDING	MEAN KINSHIP	KINSHIP VALUE
336 F	P334	334	F = 0.0000	mk = 0.0417	kv = 0.0306
378 M	WILD	WILD	F = 0.0000	mk = 0.0625	kv = 0.0511
379 F	WILD	WILD	F = 0.0000	mk = 0.0417	kv = 0.0356
390 M	WILD	WILD	F = 0.0000	mk = 0.0208	kv = 0.0277
392 F	WILD	WILD	F = 0.0000	mk = 0.0208	kv = 0.0277
399 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000
400 F	WILD	WILD	F = 0.0000	mk = 0.0208	kv = 0.0174
401 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000
402 F	WILD	WILD	F = 0.0000	mk = 0.0417	kv = 0.0440
403 M	P402	402	F = 0.0000	mk = 0.0521	kv = 0.0647
404 M	WILD	WILD	F = 0.0000	mk = 0.0208	kv = 0.0277
405 F	WILD	WILD	F = 0.0000	mk = 0.0208	kv = 0.0277
410 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000
411 F	378	379	F = 0.0000	mk = 0.0729	kv = 0.0628
414 F	WILD	WILD	F = 0.0000	mk = 0.0208	kv = 0.0195
424 F	P414	414	F = 0.0000	mk = 0.0417	kv = 0.0390
433 F	P400	400	F = 0.0000	mk = 0.0417	kv = 0.0348
447 F	378	379	F = 0.0000	mk = 0.0729	kv = 0.0594
461 F	WILD	WILD	F = 0.0000	mk = 0.0208	kv = 0.0174
462 F	P461	461	F = 0.0000	mk = 0.0417	kv = 0.0348
463 M	404	405	F = 0.0000	mk = 0.0417	kv = 0.0553
464 F	P466	466	F = 0.0000	mk = 0.0417	kv = 0.0348
465 M	P468	468	F = 0.0000	mk = 0.0417	kv = 0.0564
466 F	WILD	WILD	F = 0.0000	mk = 0.0208	kv = 0.0174
467 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000
468 F	WILD	WILD	F = 0.0000	mk = 0.0208	kv = 0.0282
2094 M	390	392	F = 0.0000	mk = 0.0417	kv = 0.0553
2097 F	378	402	F = 0.0000	mk = 0.0729	kv = 0.0631

 ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	MALES	MK	Age	FEMALES	MK	Age
1	399	0.0000	12	410	0.0000	11
2	401	0.0000	9	400	0.0208	20
3	467	0.0000	6	461	0.0208	17
4	404	0.0208	9	466	0.0208	17
5	390	0.0208	8	405	0.0208	12
6	465	0.0417	4	468	0.0208	12
7	463	0.0417	1	392	0.0208	8
8	2094	0.0417	1	414	0.0208	6
9	403	0.0521	5	379	0.0417	18
10	378	0.0525	22	402	0.0417	15
11				336	0.0417	11
12				424	0.0417	5
13				464	0.0417	4
14				433	0.0417	4
15				462	0.0417	4
16				411	0.0729	5
17				447	0.0729	3
18				2097	0.0729	1

GENETIC SUMMARY OF POPULATION

Descendant population Mean Kinship:	0.0503
Gene Diversity:	0.9497
Founder Genome Equivalents:	9.9310
Desc. population mean Kinship Value:	0.0508
Gene Value:	0.9492

SECTION 6

SOUTHERN WHITE RHINO SSP

INSTITUTION BY INSTITUTION

RECOMMENDATIONS

MASTERPLAN REPORT DEFINITIONS

Stud # -- Studbook ID Number

Sex -- ' ~ ' indicates the animal is sterilized or contracepted

Birth/Hatch Date

Arrival -- Arrival date at the current institution

Sire/Dam -- Sire/Dam IDs

Loc ID -- Current institution ID number

Social -- Current social group at the current institution

Genome Known: Proportion of animal's genome known

F -- Inbreeding Coefficient
First value assumes animals of unknown origin are founders.
Second value omits animals of unknown origin.

MK -- Mean Kinship
First value is mean kinship. Second value is mean kinship if animals of unknown origin are omitted.

KV -- Kinship Value
A weighted mean kinship where the weights are the other animals' reproductive values.
Second value omits animals of unknown origin.

GU-All -- Genome Uniqueness
Proportion of genes in an animal that are not found in the rest of the population.

GU-CB -- Genome Uniqueness of Captive-Born Animals
Proportion of genes in an animal that are not found in the rest of the captive-born population.

Vx -- Reproductive Value
Expected future lifetime reproduction by an animal of age x.

Global vs. Restricted

-- Following values may be calculated using all animals in the studbook or using the population specified by the view set for the report.

Live sibs	--	Half siblings are counted as complete siblings.
Live offspr	--	Living offspring
Repro offspr	--	Reproducing offspring

Founder representation

-- Percent of this animal's genes that descended from each founder.

INSTITUTION SHEETS

ARE ORGANIZED

BY COUNTRY: CANADA/U.S.A.

WITHIN COUNTRY: ALPHABETICALLY BY PROVINCE/STATE

Masterplan Report
SOUTHERN WHITE RHINOCEROS Studbook
(Ceratotherium simum simum)

Living Population at: Calgary Zoo

CALGARY

Stud #	Sex	Birth Date Arrival	Sire Dam	Loc ID Social	Genome Known	F [unks = founders] [unknowns removed]	MK	KV	GU-All GU-CB	Vx	<< Restricted >>			Founder Representation
											Live Sibs	Live Offspr	Repro Offspr	
47	F	- 1963 14 May 1966	WILD WILD	100546	1.0000	.0000 .0000	.0000 .0000	.0000 .0000	1.000 .	0.000	.	.	.	.
213	M	19 Dec 1972 19 Sep 1988	52 152	102965	1.0000	.0000 .0000	.0543 .0550	.0424 .0428	.5005 .5005	0.820	5, 9, 0	152-50%	52-50%	

Recommendations:

47 - Maintain

213 - Maintain

Add another female white rhino

ROCKYTON

Living Population at: African Lion Safari

Stud #	Sex	Birth Date	Sire	Dam	Loc ID	Genome	F	MK	KV	GU-All	GU-CH	Vx	Live Sibb	Live Offspr	Repro Offspr	Founder Representation
		Arrival			Social	Known	[unks - foundere]	[unknowns removed]								
363	M	- 1969	WILD	100210	1.0000	.0000	.0000	.0000	.0000	1.000	0.390	.	.	.	.	.
		3 May 1973	WILD			.0000	.0000	.0000	.	.	.	.	.	.	.	.
364	M	- 1969	WILD	100211	1.0000	.0000	.0000	.0000	.0000	1.000	0.390	.	.	.	.	.
		3 May 1973	WILD			.0000	.0000	.0000	.	.	.	.	.	.	.	.
365	F	- 1969	WILD	920008	1.0000	.0000	.0000	.0000	.0000	1.000	0.250	.	.	.	.	.
		5 Nov 1992	WILD			.0000	.0000	.0000	.	.	.	.	.	.	.	.
366	F	- 1969	WILD	100213	1.0000	.0000	.0000	.0000	.0000	1.000	0.250	.	.	.	.	.
		3 May 1973	WILD			.0000	.0000	.0000	.	.	.	.	.	.	.	.

Recommendations:

- 363 - Breed if possible
- 364 - Breed if possible
- 365 - Breed if possible
- 366 - Breed if possible

Living Population at: Metropolitan Toronto Zoo

TORONTO

<< Restricted >>												
Stud	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Founder
I		Arrival	Dam	Social	Known	[unks = founders]	[unknowns removed]		GU-CB		Live Offspr	Representation
											Repro Offspr	
143	M	1963	WILD	4314	1.0000	.0000	.0066	.0085	.5000	0.000	.	.
		8 Aug 1974	WILD			.0000	.0067	.0086	.		2.	0. 0
218	F	3 Feb 1973	52	4316	1.0000	.0000	.0740	.0592	.0005	0.490	7. 8. 0	157=50% 52=50%
		8 Aug 1974	157			.0000	.0750	.0598	.0180		3. 1. 0	
582	F	13 Oct 1979	12159		0.5000	.0000	.0469	.0360	.5000	0.820	3. 0. 0	157=25% 52=25%
		9 Jan 1992	218			.0000	.0750	.0598	.5000		.	.
950	M	13 Jan 1990	143	25243	1.0000	.0000	.0469	.0424	.0000	1.450	2. 1. 0	143=50% 157=25% 52=25%
		13 Jan 1990	218			.0000	.0475	.0428	.5000		.	.

Recommendations:

- 143 - Breed with 218 and 582
- 218 - Breed with 143
- 582 - Breed with 143
- 950 - Surplus

Living Population at: Birmingham Zoo

BIRMINGHAM

Stud Sex Birth Date Site Loc ID Genome F MK KV GU-A11 GU-CB Vx Live sibbs Founder
Arrival Dam Social Known [unkn = founder] [unknowns removed] Regio Offspr Representation

469	M	1971	24 Feb 1976	WILD	315	1.0000	.0000	.0000	.0000	.0000	1.000	0.580					
470	F	1971	24 Feb 1976	WILD	316	1.0000	.0000	.0000	.0000	.0000	1.000	0.380					
471	F	1971	24 Feb 1976	WILD	317	1.0000	.0000	.0000	.0000	.0000	1.000	0.380					

Recommendations:

- 469 - Breed if possible
- 470 - Breed if possible
- 471 - Breed if possible

Consider converting to Indian rhino in future

Living Population at Phoenix Zoo

PHOENIX

Stud	Sex	Birth Date	Sire	Loc ID	Genome	F	MX	KV	GU-A11	VX	Live Sibs	Founder	#	Arrival	Dam	Social	Known	[unks = founders]	[unknowns removed]	Repro Offspr	Live Offspr	Representation
34	M	- 1961	WILD	137	1.0000	.0000	.0066	.0090	.5000	0.000	2	0	0									
		28 Jul 1963	WILD			.0000	.0067	.0091	.													
153	F	- 1963	WILD	1672	1.0000	.0000	.0132	.0119	.2485	0.000	2	1	0									
		1 May 1975	WILD			.0000	.0133	.0120	.													

Recommendations:

34 - Maintain

153 - Maintain

Consider converting to black rhino in future

Living Population at: Reid Park Zoo

TUCSON

<< Restricted >>												
Stud	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All		Live Sibs	Founder
I		Arrival	Dam	Social	Known	[unks = founders]			GU-CB	Vx	Live Offspr	Representation
[unknowns removed]												
Repro Offspr												
203	M	11 Oct 1972	52	678	1.0000	.0000	.0543	.0414	.5000	0.700	5. 9. 0	151-50% 52-50%
		7 Oct 1985	151			.0000	.0550	.0418	.5000		.	.
238	F	15 Apr 1973	52	679	1.0000	.0000	.0576	.0428	.0005	0.490	6. 8. 0	150-50% 52-50%
		7 Jan 1985	150			.0000	.0583	.0432	.2605		.	.

Recommendations:

203 - Maintain

238 - Maintain

Consider converting to black rhino in future

Living Population at: Chaffee Zool Gardens of Fresno

FREBRO

<< Restricted >>											
Stud	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	CU-All		
		Arrival	Dam	Social	Known	[unks = founders]			GU-CB	Vx	
						[unknowns removed]					
188	F	" 1968	WILD	1157	1.0000	.0000	.0000	.0000	1.000	0.190	.
		19 Sep 1971	WILD			.0000	.0000	.0000	.		.

Recommendations:

188 - Move to San Diego WAP to breed with 187

Living Population at: Marine World Africa USA

REDWOOD

===== << Restricted >> =====												
Stud #	Sex	Birth Date Arrival	Sire Dam	Loc ID Social	Genome Known	F [unks = founders] [unknowns removed]	MR	KV	GU-All GU-CB	Vx	Live Sibs Live Offspr Repro Offspr	Founder Representation
=====												
336	M	1966	WILD	1022	1.0000	.0000	.0000	.0000	1.000	0.150	.	.
		1 May 1972	WILD			.0000	.0000	.0000	.		.	.
=====												
337	F	1966	WILD	1023	1.0000	.0000	.0000	.0000	1.000	0.110	.	.
		1 May 1972	WILD			.0000	.0000	.0000	.		.	.
=====												

Recommendations:

- 336 - Move to San Diego WAP for breeding attempt
- 337 - Move to San Diego WAP for breeding attempt
- 981 - Receive from Memphis
- 980 - Receive from San Diego WAP
- 991 - Receive from San Diego WAP
- T004 - Receive from Knoxville

Living Population at: San Diego Wild Animal Park

SD-WAP

Stud #	Sex	Birth Date Arrival	Sire Dam	Loc ID Social	Genome Known	F			KV	GU-All GU-CB	Vx	<< Restricted >>			Founder Representation
						[unks = founders] [unknowns removed]						Live	Sibs	Live Offspr	
												Repro	Offspr		
150	F	- 1963 17 Feb 1971	WILD WILD	100258	1.0000	.0000 .0000	.0132 .0133	.0094 .0095	.2400	0.000		0.	2.	0	
154	F	- 1963 17 Feb 1971	WILD WILD	100262	1.0000	.0000 .0000	.0132 .0133	.0116 .0118	.2435	0.000		2.	0.	0	
156	F	- 1963 17 Feb 1971	WILD WILD	100264	1.0000	.0000 .0000	.0099 .0100	.0121 .0123	.3830	0.000		0.	1.	0	
157	F	- 1963 17 Feb 1971	WILD WILD	100265	1.0000	.0000 .0000	.0329 .0333	.0289 .0292	.0595	0.000		1.	3.	0	
159	F	- 1963 17 Feb 1971	WILD WILD	100267	1.0000	.0000 .0000	.0066 .0067	.0083 .0084	.5000	0.000		1.	1.	0	
187	M	- 1968 30 May 1990	WILD WILD	690329	1.0000	.0000 .0000	.0197 .0200	.0239 .0241	.1255	0.310		2.	1.	0	
277	F	- 1963 1 Nov 1972	WILD WILD	100271	1.0000	.0000 .0000	.0000 .0000	.0000 .0000	1.000	0.000		1.	1.	0	
788	F	22 Dec 1983 22 Dec 1983	52 157	012004	1.0000	.0000 .0000	.0674 .0683	.0562 .0567	.0005 .0710	1.110		7.	8.	0	157=50% 52=50%
819	F	24 Jun 1984 24 Jun 1984	52 155	026210	1.0000	.0000 .0000	.0576 .0583	.0435 .0500	.2495 .2495	1.110		7.	8.	0	155=50% 52=50%
822	F	28 Aug 1984 28 Aug 1984	52 150	026342	1.0000	.0000 .0000	.0576 .0583	.0464 .0469	.0000 .2600	1.110		6.	8.	0	150=50% 52=50%

=====

Living Population at: San Diego Wild Animal Park

SD-WAP

=====

<< Restricted >>=====

Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	GU-CB	VX	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
		Arrival	Dam	Social	Known	[unks = founders]	[unknowns removed]								
980	M	20 Nov 1991	187	691716	1.0000	.0000	.0197	.0244	.0000		1.410	1.	2.	0	159=50% 187=50%
		20 Nov 1991	159			.0000	.0200	.0246	.6225			.	.	.	
990	M	15 May 1992	187	692265	1.0000	.0000	.0329	.0344	.0000		1.360	1.	4.	0	157=50% 187=50%
		15 May 1992	157			.0000	.0333	.0347	.1955			.	.	.	
991	F	3 Oct 1992	187	692553	1.0000	.0000	.0214	.0256	.0000		1.290	2.	0.	0	156=50% 187=50%
		3 Oct 1992	156			.0000	.0217	.0258	.5015			.	.	.	

=====

Recommendations:

- 150 - Breed if possible with 187
- 154 - Breed if possible with 187
- 156 - Breed again if possible with 187
- 157 - Declared surplus but low M_s; breed again if possible
- 159 - Breed again if possible with 187
- 187 - Breed with 150, 154, 156, 157, 159, 277, 188
- 277 - Breed if possible with 187
- 788 - Surplus. Move to Taman Safari Indonesia
- 819 - Move to Wilde
- 822 - Move to Wilde
- 980 - Move to Marine World
- 990 - Surplus. Move to Germany
- 991 - Not surplus. Move to Marine World if possible
- 188 - Receive from Fresno to breed with 187
- 336 - Receive from Marine World
- 337 - Receive from Marine World

Living Population at: Jacksonville Zoological Park

JACKSONVIL

Stud	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	GU-CB	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
1		Arrival	Dam	Social	Known	{unks = founders [unknowns removed]}									
318	F	- 1971	WILD	1943	1.0000	.0000	.0000	.0000	1.000	1.000	0.180	.	.	.	.
		5 Jan 1983	WILD			.0000	.0000	.0000	.	.	.	.	.	.	.
390	M	- 1969	WILD	350	1.0000	.0000	.0164	.0170	.2525	0.390	.	.	.	.	.
		18 Dec 1975	WILD			.0000	.0167	.0171	.	.	2.	1.	0	0.	1. 0

Recommendations:

318 - Breed if possible with 390

390 - Breed if possible with 318

T020 - Receive from San Antonio to breed with 390 in future

Living Population at: White Oak Plantation

YULEE

<< Restricted >>											
Stud	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs
I		Arrival	Dam	Social	Known	[unks - founders]			GU-CE		Live Offspr
						[unknowns removed]					Repro Offspr
177	M	1968	WILD	8451	1.0000	.0000	.0000	.0000	1.000	0.310	.
		21 Jun 1984	WILD			.0000	.0000	.0000	.		.
379	M	1968	WILD	89507	1.0000	.0000	.0066	.0077	.5000	0.310	.
		15 Apr 1989	WILD			.0000	.0067	.0078	.		0. 1. 0
391	F	1968	WILD	920441	1.0000	.0000	.0164	.0170	.2480	0.190	.
		3 Dec 1992	WILD			.0000	.0167	.0171	.		2. 1. 0
533	F	5 Mar 1979	390	89506	1.0000	.0000	.0263	.0256	.0000	0.820	2. 0. 0
		12 Apr 1989	391			.0000	.0267	.0259	.2505		0. 1. 0
T008	F	3 Sep 1991	379	9147	1.0000	.0000	.0230	.0244	.0000	1.310	.
		3 Sep 1991	533			.0000	.0233	.0246	.5000		.

Recommendations:

- 177 - Breed with T008
- 379 - Maintain
- 391 - Maintain for future breeding or research
- 533 - Use for research
- T008 - Breed with 177 then use for research
- 482 - Receive from Pittsburg for research
- 693 - Receive from Tulsa for research

HONOLULU

Living Population at: Honolulu Zoo

Stud #	Sex	Birth Date	Arrival	Sire	Dam	Loc ID	Social	Genome	Known	F	MK	KV	GU-A11	GU-CB	Vx	<< Restricted >>			Founder Representation	
																Live Sibs	Live Offspr	Popro Offspr		
84	M	27 Jul 1985		420	860275			1.0000		.0000	.0395	.3411	.2625		1.550	2.	2.	0	420-508	156-258
		29 Oct 1986		599						.0000	.0400	.3415	.3795						52-258	

Recommendations:

841 - surplus

Already have added black rhino

Consider also adding Indian rhino in the future

Living Population at Louisville Zoological Garden

LOUISVILLE

=====

Stud	Sex	Birth Date	Size	Loc ID	Genome	F	MK	KV	GU-A11	GU-CB	Vx	Live Sibs	Founder	Reproduction
		Arrival	Dam	Social	Known	[unke = founders]	[unknown removed]					Repro Offspr		

< Restricted >=====

772	F	3 Mar 1983	618	100906	1.0000	.0000	.0230	.0242	.0000	.3790		1.060	1.	2.	0	453-508	618-508
-----	---	------------	-----	--------	--------	-------	-------	-------	-------	-------	--	-------	----	----	---	---------	---------

791	F	11 Jan 1984	618	100905	1.0000	.0000	.0230	.0249	.0000	2.110		2.	1.	0	620-508	618-508
-----	---	-------------	-----	--------	--------	-------	-------	-------	-------	-------	--	----	----	---	---------	---------

876	M	25 Nov 1986	50	101130	1.0000	.0000	.0197	.0254	.2420	1.550		0.	1.	0	51-508	50-508
-----	---	-------------	----	--------	--------	-------	-------	-------	-------	-------	--	----	----	---	--------	--------

Recommendations:

772 - Maintain for future breeding

791 - Maintain for future breeding

876 - Move to Wilds when 754 received

754 - Recelive from Kings Dominion via Toledo for future breeding with 772 and 791

Living Population at: Greater Baton Rouge Zoo

BATONROUGE

<< Restricted >>												
Stud #	Sex	Birth Date Arrival	Sire Dam	Loc ID Social	Genome Known	F [unka = founders] [unknowns removed]	MK	KV	GU-All GU-CB	Vx	Live Sibs Live Offspr Repro Offspr	Founder Representation
466	F	- 1972 26 Oct 1974	WILD WILD	129	1.0000	.0000 .0000	.0000 .0000	.0000 .0000	1.000 .	0.440	. . .	. . .
587	F	- 1970 18 Jan 1991	WILD WILD	_____	1.0000	.0000 .0000	.0000 .0000	.0000 .0000	1.000 .	0.310	. . .	. . .
618	M	- 1966 16 May 1988	WILD WILD	_____	1.0000	.0000 .0000	.0197 .0200	.0219 .0221	.1250 .	0.150	. 1. .	. 2. 0

Recommendations:

- 466 - Move to San Diego WAP to breed with 187
- 587 - Move to San Diego WAP to breed with 187
- 618 - Move to Fossil Rim to breed with 83 and 147
- Consider converting to Indian rhino in future

Living Population at: Louisiana Purchase Gardens & Zoo

MONROE

<< Restricted >>											
Stud	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs
I		Arrival	Dam	Social	Known	[unks = founders]			GU-CE		Live Offspr
						[unknowns removed]					Repro Offspr
386	M	1970	WILD	141173	1.0000	.0000	.0000	.0000	1.000	0.480	.
		24 Apr 1972	WILD			.0000	.0000	.0000	.		.
387	F	1972	WILD	142174	1.0000	.0000	.0000	.0000	1.000	0.440	.
		24 Apr 1972	WILD			.0000	.0000	.0000	.		.

Recommendations:

386 - Maintain

387 - Breed when appropriate mate and location identified

Living Population at: Audubon Park Zoological Garden

AUDUBON

<< Restricted >>															
Stud #	Sex	Birth Date Arrival	Sire Dam	Loc ID Social	Genome Known	F [unks = founders] [unknowns removed]	MK	KV	GU-All GU-CB	Vx	Live Live Offspr Repro Offspr	Sibs Live Offspr Repro Offspr	Founder Representation		
T002	F	2 Feb 1990 4 Feb 1993	465 453	1509	1.0000	.0000 .0000	.0197 .0200	.0225 .0227	.0000 .4990	1.320	0. .	2. .	0 .	453=50%	465=50%
T005	M	26 Jan 1991 13 Apr 1993	390 391	1542	1.0000	.0000 .0000	.0230 .0233	.0253 .0255	.0000 .4995	1.410	1. .	1. .	0 .	391=50%	390=50%

Recommendations:

T002 - Maintain

T005 - Maintain

Consider converting to black and adding Indian (at Research Center) in future

Living Population at: Baltimore Zoo

										<< Restricted >>									
Stud	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	GU-CB	VX	Live Sibs	Live Offspr	Repro Offspr	Founder	Representation			
		Arrival	Dam	Social	Known	[unks = founders]	[unknowns removed]												
80	M	- 1964	WILD	92-038	1.0000	.0000	.0000	.0000	1.000	.0000	0.020	.	.	.	.	.			
		7 May 1992	WILD			.0000	.0000	.0000	.			.	.	.	.	.			

380	F	- 1968	WILD	92-039	1.0000	.0000	.0000	.0000	1.000	.0000	0.190	.	.	.	.	.			
		7 May 1992	WILD			.0000	.0000	.0000	.			.	.	.	.	.			

Recommendations:

80 - Maintain

380 - Breed when appropriate mate and location identified

Living Population at: Jackson Zoological Park

JACKSON

<< Restricted >>											
Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	GU-CB	Vx
		Arrival	Dam	Social	Known	[unks = founders]		[unknowns removed]			
475	F	1969	WILD	000220	1.0000	.0000	.0000	.0000	1.000	0.250	.
		2 Sep 1974	WILD			.0000	.0000	.0000	.		.
707	M	1973	WILD	000676	1.0000	.0000	.0000	.0000	1.000	0.820	.
		20 Dec 1980	WILD			.0000	.0000	.0000	.		.

Recommendations:

475 - Breed in future when appropriate mate and location identified

707 - Maintain

Living Population at Omaha's Henry Doorly Zoo

OMAHA

Stud Sex		Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Restricted >>			Founder
Arrival		Den	Social	Known	[unks = founders]	[unknowns removed]			GU-CB		Live Sibs	Live Offspr	Repro Offspr	Representation
39	F	1963	WILD	315	1.0000	.0000	.0000	.0000	1.000	0.000	.	.	.	.
		14 Nov 1966	WILD			.0000	.0000	.0000	.	.	.	.	.	.
861	M	11 May 1986	420	5585	1.0000	.0000	.0197	.0261	.5120	1.550	2.	3.	0	155=50% 420=50%
		18 Dec 1989	155			.0000	.0200	.0263	.5120		.	.	.	.

Recommendations:

39 - Maintain

861 - Maintain

Consider converting to black rhino in future

Living population at Rio Grande Zoological Park

RIO GRAND

Stud #	Sex	Birth Date	Arrival	Sire Dam	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
358	F	-	1966	WILD	10312	1.0000	.0000	.0000	.0000	1.000	0.110	.	.	.	.
		27 Nov	1973	WILD			.0000	.0000	.0000	.		.	.	.	.
359	M	-	1965	WILD	10311	1.0000	.0000	.0000	.0000	1.000	0.070	.	.	.	.
		27 Nov	1973	WILD			.0000	.0000	.0000	.		.	.	.	.

Recommendations:

358 - Maintain

359 - Maintain

Consider converting to black rhino in future

Living Population at: Cleveland Metroparks Zoological Park

CLEVELAND

<< Restricted >>												
Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Founder
		Arrival	Dam	Social	Known	[unks = founders]	[unknowns removed]		GU-CB		Live Offspr	Representation
790	M	3 Jan 1984	618	850505	1.0000	.0000	.0230	.0285	.0000	1.550	0. 3. 0	452=50% 618=50%
		23 May 1985	452			.0000	.0233	.0287	.3695		.	
842	F	19 Aug 1985	40	860603	1.0000	.0000	.0197	.0221	.2515	1.170	2. 0. 0	397=50% 40=50%
		6 Jun 1986	397			.0000	.0200	.0223	.4990		.	

Recommendations:

- 790 - Move to Wilds and/or to Virginia when breeding center ready
- 842 - Move to Wilds and/or to Virginia when breeding center ready
- Convert to black rhino (Male 457 from Cincinnati already identified)

Living Population at Toledo Zoological Gardens

TOLEDO

Stud #	Sex	Birth Date	Sire	Dam	Loc ID	Genome	F	MX	KV	GU-All	Vx	Live Sibs	Repro Offspr	Founder Representation
		Arrival			Social	Known	{unks = founders}	{unknowns removed}						
220	M	20 Jun 1973	52	880033	154	1.0000	.0000	.0576	.0458	.0000	0.820	5.	9.	0 154=50% 52=50%
		15 Nov 1988					.0000	.0583	.0463	.2565				
361	F	- 1968	WILD	880031		1.0000	.0000	.0000	.0000	1.000	0.190			
		11 Nov 1988	WILD				.0000	.0000	.0000	.				

Recommendations:

- 220 - Surplus. Maintain for 3 months as reproductive stimulus
- 361 - Breed with 754
- 754 - Receive from Kings Dominion for 3 months then move to Louisville
- Consider converting to black rhino in future

Living Population at: The Wilds

WILDS

Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	HK	KV	GU-All	Vx	Live Sibs	Live Offspr	Repr Offspr	Founder Representation
		Arrival	Dem	Social	Known	[unko = founders] [unknowns removed]			GU-CB					
81	F	12 Nov 1993	WILD		1.0000	.0000	.0000	.0000	1.000	0.020	.	.	.	.
148	F	12 Nov 1993	WILD		1.0000	.0000	.0066	.0055	.5000	0.190	.	.	1. 0. 0	.
416	F	30 Apr 1994	WILD		1.0000	.0000	.0000	.0000	1.000	0.380	.	.	.	.
417	F	30 Apr 1994	WILD		1.0000	.0000	.0000	.0000	1.000	0.380	.	.	.	.
418	F	30 Apr 1994	WILD		1.0000	.0000	.0000	.0000	1.000	0.380	.	.	.	.
750	F	3 Jun 1994	WILD		1.0000	.0000	.0000	.0000	1.000	0.250	.	.	.	.
753	M	3 Jun 1994	WILD		1.0000	.0000	.0000	.0000	1.000	0.390	.	.	.	.

Recommendations:

- 81 - Surplus. Move to Argentina
- 148 - Receive from Columbus (occurred). Breed with 753 (or 876)
- 416 - Receive from Kings Island (occurred). Breed with 753 (or 876)
- 417 - Receive from Kings Island (occurred). Breed with 753 (or 876)
- 418 - Receive from Kings Island (occurred). Breed with 753 (or 876)
- 750 - Receive from Kings Dominion (occurred). Breed with 753 (or 876)
- 753 - Receive from Kings Dominion (occurred). Breed with 148, 416, 417, 418, 750
- 876 - Receive from Louisville when 754 arrives there
- 819 - Receive from San Diego WAP for research
- 822 - Receive from San Diego WAP for research
- 790 - Temporarily receive until Virginia breeding center ready
- 842 - Temporarily receive until Virginia breeding center ready

TULSA

Living Population at: Tulsa Zoo and Living Museum

Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
		Arrival	Dam	Social	Known	[unks - founders]	[unknowns removed]		GU-CB					
691	F	1 Nov 1980	420	5592	.	.0000	.	.	.	.	3.	1.	0	429=50% 420=50%
		3 Nov 1982	429			.	.	.	.	.	.	.	.	.
693	F	17 Mar 1980		5591	.	.0000	.	.	.	.	.	.	.	.
		3 Nov 1982				.	.	.	.	.	.	.	.	.
718	M	13 Apr 1981		5590	.	.0000	.	.	.	.	.	.	.	.
		3 Nov 1982				.	.	.	.	.	.	.	.	.

Recommendations:

- 691 - Surplus. Move to Taman Safari Indonesia
 - 693 - Surplus. Move to White Oak for research
 - 718 - Surplus. Remove from SSP space as soon as possible
- Consider converting to Indian or black rhino in future.

Living Population at Wildlife Safari Inc

WINSTON

Stud #	Sex	Birth Date	Sire	Dam	Loc ID	Genome	F	MK	KV	GU-All	GU-CB	Vx	Live Sibbs	Live Offspr	Repro Offspr	Founder Representation
							[unk = founders]	[unk = founders removed]								
29	M	1959	WILD	350002		1.0000	.0000	.0000	.0000	1.000	1.000	0.000	.	.	.	.
		14 Jun 1988	WILD				.0000	.0000	.0000	.	.	.	.	.	.	.
30	F	1960	WILD	350003		1.0000	.0000	.0000	.0000	1.000	1.000	0.000	.	.	.	.
		14 Jun 1988	WILD				.0000	.0000	.0000	.	.	.	.	.	.	.
230	M	29 May 1974			52	106751	1.0000	.0543	.0435	.0000	.0000	0.940	5.	9.	0	148-508 52-508
		26 Jun 1975			148		.0000	.0550	.0439	.5000	.	.	.	.	.	.

Recommendations:

29 - Maintain

30 - Maintain

280 - Surplus

Receive more rhino in future to develop collection of at least 2.3

Living Population at: Pittsburgh Zoo

PITTSBURG

=====p<< Restricted >>=====											
Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	GU-CB	Founder
		Arrival	Dam	Social	Known	[unks = founders]				Vx	Live Sibs
						[unknowns removed]					Live Offspr
											Repro Offspr
481	M	30 Dec 1975	_____	201	.	.0000	.	.	.	.	.
		11 Jul 1977	_____			.	.	.	.	.	.
482	F	25 Nov 1975	_____	202	.	.0000	.	.	.	.	.
		11 Jul 1977	_____			.	.	.	.	.	.

Recommendations:

481 - Surplus

482 - Move to Wilds or White Oak for research

Consider converting to black rhino in the future

Living Population at: Knoxville Zoological Gardens

KNOXVILLE

<< Restricted >>											Founder Representation		
Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Live Offspr	Repro Offspr
		Arrival	Dam	Social	Known	{unks = founders}			GU-CB				
						{unknowns removed}							
452	F	- 1968	WILD	142	1.0000	.0000	.0132	.0168	.2555	0.190	.	.	.
		2 Nov 1976	WILD			.0000	.0133	.0170	.		1.	1.	0
453	F	- 1968	WILD	141	1.0000	.0000	.0132	.0140	.2440	0.190	.	.	.
		2 Nov 1976	WILD			.0000	.0133	.0141	.		0.	2.	0
465	M	- 1972	WILD	1237	1.0000	.0000	.0132	.0155	.2570	0.700	.	.	.
		17 May 1988	WILD			.0000	.0133	.0156	.		0.	2.	0
467	F	- 1972	WILD	1416	1.0000	.0000	.0000	.0000	1.000	0.440	.	.	.
		17 Jan 1991	WILD			.0000	.0000	.0000	.		.	.	.
473	M	- 1969	WILD	1249	1.0000	.0000	.0000	.0000	1.000	0.390	.	.	.
		30 Aug 1988	WILD			.0000	.0000	.0000	.		.	.	.
575	F	19 Aug 1977	573	1259	1.0000	.0000	.0132	.0082	.0000	0.700	.	.	574=50% 573=50%
		9 Nov 1988	574			.0000	.0133	.0083	1.000		.	.	
619	F	- 1966	WILD	144	1.0000	.0000	.0000	.0000	1.000	0.110	.	.	.
		15 Aug 1974	WILD			.0000	.0000	.0000	.		.	.	.
T004	F	8 Jan 1991	465	1413	1.0000	.0000	.0197	.0238	.0000	1.310	1.	1.	0 452=50% 465=50%
		8 Jan 1991	452			.0000	.0200	.0241	.4875		.	.	

Recommendations:

- 452 - Breed with 473
- 453 - Breed with 473
- 465 - Maintain
- 467 - Breed with 473
- 473 - Breed with 452, 453, 467, 575, 619
- 575 - Breed with 473
- 619 - Breed with 473
- T004 - Move to Marine World or Winston

Living Population at Memphis Zoological Garden & Aquarium

MEMPHIS

Stud Sex Birth Date Size Loc ID Genome F MK KV GU-A1 GU-CB VX Live Sibs Live Offspr Repro Offspr Founder Representation

=====

146	M	-	1968	WILD	1.0000	.0000	.0000	.0000	.0000	1.000	0.310						
			12 Nov 1993	WILD													
397	F	-	1972	WILD	0271	1.0000	.0000	.0132	.0152	.2525	0.440						
			16 Apr 1976	WILD			.0000	.0133	.0153	.							
											2.	1.	0				
981	M	9 Mar 1991	40	11835	1.0000	.0000	.0197	.0235	.2515	1.410							
		9 Mar 1991	397			.0000	.0200	.0237	.4990								

=====

Recommendations:

- 146 - Maintain for future breeding
- 397 - Maintain for future breeding
- 981 - Move to Marine World

Living Population at: Brownsville's Gladys Porter Zoo

BROWNSVILLE

Stud #	Sex	Birth Date	Sire	Dam	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
		Arrival			Social	Known	[unks = founders]	[unknowns removed]		GU-CB					
189	M	11 Sep 1968	WILD	WILD	261	1.0000	.0000	.0066	.0083	.5000	0.310	1.	0.	0	
		11 Sep 1970	WILD				.0000	.0067	.0084	.		.			
190	F	11 Sep 1968	WILD	WILD	262	1.0000	.0000	.0000	.0000	1.000	0.190	.	.	.	
		11 Sep 1970	WILD				.0000	.0000	.0000	.		.			
202	M	28 Aug 1972	180		3120	1.0000	.0000	.0164	.0118	.0000	0.700	2.	2.	0	181=50% 180=50%
		8 Jan 1987	181				.0000	.0167	.0119	.7465		.	.	.	
620	F	18 May 1966	WILD	WILD	3621	1.0000	.0000	.0132	.0148	.2680	0.110	1.	1.	0	
		18 May 1968	WILD				.0000	.0133	.0150	.		.			
T009	M	14 Dec 1990	189		_____	1.0000	.0000	.0164	.0196	.0000	1.410	0.	1.	0	620=50% 189=50%
		14 Dec 1990	620				.0000	.0167	.0200	.7320		.	.	.	

Recommendations:

- 189 - Breed with 190 and 620
- 190 - Breed with 189
- 202 - Maintain
- 620 - Breed with 189
- T009 - Move to McComb Ranch when facilities ready

Living Population at: Fort Worth Zoological Park

FORTWORTH

Stud	Sex	Birth Date	Sire	Dam	Loc ID	Genome	F	MK	KV	GU-All	GU-CH	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
		Arrival			Social	Known	(unke = founders)	(unknowns removed)								
463	M	- 1970	WILD	WILD	747	1.0000	.0000	.0000	.0000	1.000		0.480	.	.	.	.
		15 Dec 1990					.0000	.0000	.0000	.			.	.	.	.
464	F	- 1970	WILD	WILD	792	1.0000	.0000	.0000	.0000	1.000		0.310	.	.	.	.
		18 Oct 1991					.0000	.0000	.0000	.			.	.	.	.

Recommendations:

- 463 - Maintain for future breeding
- 464 - Maintain for future breeding
- Expand size of group that can be maintained to at least 2.3

Living Population at: Houston Zoological Gardens

HOUSTON

<< Restricted >>											
Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs
		Arrival	Dam	Social	Known	[unks = founders]			GU-CB		Live Offspr
						[unknowns removed]					Repro Offspr
191	M	- 1968	WILD	441	1.0000	.0000	.0000	.0000	1.000	0.310	.
		8 Jul 1970	WILD			.0000	.0000	.0000	.		.
192	F	- 1967	WILD	440	1.0000	.0000	.0000	.0000	1.000	0.150	.
		8 Jul 1971	WILD			.0000	.0000	.0000	.		.
612	F	6 May 1979	562	11944	1.0000	.0000	.0132	.0096	1.000	0.820	.
		21 Nov 1989	566			.0000	.0133	.0097	1.000		.

Recommendations:

191 - Maintain

192 - Move to Fossil Rim for future breeding

612 - Move to Fossil Rim for future breeding

219 - Receive from Fossil Rim

Consider converting to Indian rhino in future

Living Population at: San Antonio Zoo Garden & Aquarium

SAN ANTON

=====
 Stud Sex Birth Date Site Loc ID Genome F MK KV CU-A11 CU-CS VK Live Sibs Live Offspr Founder
 # Arrival Dam Social Known [unkn = founder] [unknown removed] Repro Offspr Representation
 =====>>> Restricted <<<=====

180 M ~ 1965 WILD 701002 1.0000 .0000 .0132 .0113 .2535 0.070 3. 2. 0 1. 0. 0
 5 Oct 1970 WILD .0000 .0133 .0114 . 1. 0. 0
 =====>>> Restricted <<<=====

181 F ~ 1965 WILD 701003 1.0000 .0000 .0066 .0041 .5000 0.060 1. 0. 0 1. 0. 0
 5 Oct 1970 WILD .0000 .0067 .0042 . 1. 0. 0
 =====>>> Restricted <<<=====

182 F ~ 1969 WILD 710202 1.0000 .0000 .0066 .0072 .5000 0.250 2. 2. 0 2. 0. 0
 13 Feb 1971 WILD .0000 .0067 .0072 . 2. 0. 0
 =====>>> Restricted <<<=====

2020 F 18 Feb 1993 180 930215 1.0000 .0000 .0164 .0164 .0000 1.220 3. 1. 0 3. 0. 0
 18 Feb 1993 182 .0000 .0167 .0166 .7465 1.220 3. 1. 0 3. 0. 0
 =====>>> Restricted <<<=====

Recommendations:

- 180 - Maintain for possible future breeding
- 181 - Maintain for possible future breeding
- 182 - Maintain for possible future breeding
- 2020 - Move to Jacksonville

Living Population at: Waco's Cameron Park Zoo

WACO

Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Repro Offspr	Founder Representation
		Arrival	Dam	Social	Known	[unks - founders]	[unknowns removed]		GU-CB		Live Offspr		
392	F	1970	WILD		1.0000	.0000	.0000	.0000	1.000	0.310	.	.	.
		7 Jun 1993	WILD			.0000	.0000	.	.	.	.	.	.
898	M	14 Jul 1987	34		1.0000	.0000	.0164	.0194	.0000	1.530	1.	1.	0 153=50% 34=50%
		22 Jun 1993	153			.0000	.0167	.0196	.7515	.	.	.	.

Recommendations:

392 - Maintain

898 - Maintain

Living Population at: Fossil Rim Wildlife Center

WATERFALL

<< Restricted >>												Founder Representation	
Stud #	Sex	Birth Date	Sire	Loc ID	Genome	F	MK	KV	GU-All	Vx	Live Sibs	Live Offspr	Repro Offspr
		Arrival	Dam	Social	Known	(unks = founders)	(unknowns removed)		GU-CE				
31	M	- 1958	WILD	12031	1.0000	.0000	.0000	.0000	1.000	0.000	.	.	.
		15 Dec 1988	WILD			.0000	.0000	.0000	.		.	.	.
50	M	- 1965	WILD	12050	1.0000	.0000	.0132	.0163	.2540	0.070	.	.	.
		9 Nov 1989	WILD			.0000	.0133	.0164	.		1.	1.	0
82	M	- 1967	WILD	1282	1.0000	.0000	.0000	.0000	1.000	0.230	.	.	.
		20 Jan 1989	WILD			.0000	.0000	.0000	.		.	.	.
83	F	- 1967	WILD	1283	1.0000	.0000	.0000	.0000	1.000	0.150	.	.	.
		20 Jan 1989	WILD			.0000	.0000	.0000	.		.	.	.
147	F	- 1963	WILD	12147	1.0000	.0000	.0000	.0000	1.000	0.000	.	.	.
		14 Dec 1989	WILD			.0000	.0000	.0000	.		1.	1.	0
219	F	8 May 1973	52	1219	1.0000	.0000	.0576	.0440	.0005	0.490	8.	8.	0
		28 Nov 1988	153			.0000	.0583	.0444	.2520		.	.	153=50% 52=50%
T013	F	6 Dec 1992	50	12052	1.0000	.0000	.0197	.0235	.2420	1.220	1.	0.	0
		6 Dec 1992	51			.0000	.0200	.0237	.4880		.	.	51=50% 50=50%

Recommendations:

- 31 - Surplus
- 50 - Maintain
- 82 - Maintain
- 83 - Breed with 618 from Baton Rouge
- 147 - Breed if possible
- 219 - Surplus. Move to Houston
- T013 - Maintain for future breeding
- 192 - Receive from Houston for future breeding probably with 618
- 612 - Receive from Houston for future breeding probably with 618
- 618 - Receive from Baton Rouge to breed with 83

Living Population at: Salt Lake City's Bogie Zoo

Bogie

Stud sex	Birth Date	Site	Loc ID	Genome	F	MK	KV	GU-ALL	GU-CB	VX	Live sibs	Founder	Reproduction
#	Arrival	Dom	Social	Known	[unke = founders]				[unknowns removed]				

335	M	24 Aug 1976	52	00927	1.0000	.0000	.0576	.0478	.0000	1.160	5.	9.	0	154=508 52=508
542	F	14 Jun 1979	52	02794	1.0000	.0000	.0674	.0545	.0000	0.820	7.	6.	0	157=508 52=508

Recommendations:

- 135 - Maintain. Had been considered surplus, but rare representative of a female founder 154
- 542 - Maintain. Had been considered surplus, but rare representative of a female founder 157

=====

Living Population at: Virginia Zoological Park

NORFOLK

											<< Restricted >>		
Stud #	Sex	Birth Date Arrival	Sire Dam	Loc ID Social	Genome Known	F [unks = founders [unknowns removed]	MK	KV	GU-All GU-CB	Vx	Live Sibs Live Offspr Repro Offspr	Founder Representation	
686	F	~ 1972 1 Jun 1974	WILD WILD	172002	1.0000	.0000 .0000	.0000 .0000	.0000 .0000	1.000 ,	0.440	. . .	. . .	
687	M	~ 1972 1 Jun 1974	WILD WILD	172000	1.0000	.0000 .0000	.0000 .0000	.0000 .0000	1.000 ,	0.700	. . .	. . .	

=====

Recommendations:

- 686 - Maintain for breeding center being developed
- 687 - Maintain for breeding center being developed
- 790 - Receive from Cleveland perhaps via Wilds when breeding center ready
- 842 - Receive from Cleveland perhaps via Wilds when breeding center ready

Living Population at Paramount's Kings Dominion

DOSWELL

Stud #	Sex	Birth Date	Slrs	Dem	Loc ID	Social	Genome	F	MK	KV	GU-All	GU-CH	Vx	Live Sibs	Live Offspr	Repro Offspr	Founder Representation
		Arrival					Known	[unks = foundera]									
								[unknowns removed]									
754	M	~ 1969	WILD		022		1.0000	.0000	.0066	.0082	.5000		0.390	.	.	.	
		3 Oct 1973	WILD					.0000	.0067	.0083	.			1.	0.	0	
755	M	10 Jun 1979	754		750		1.0000	.0000	.0132	.0165	.5000		1.400	.	.	.	752=50% 754=50%
		10 Jun 1979	752					.0000	.0133	.0166	1.000			.	.	.	
														.	.	.	

Recommendations:

754 - Move to Toledo for 3 months to attempt breeding then to Louisville to breed 772 and 790

755 - Move to Scotch Plains Zoo

Living Population at: Henry Vilas Zoo

MADISON

<< Restricted >>											
Stud	Sex	Birth Date	Sire	Loc ID	Genome	F	HK	KV	GU-All		Live Sibs
I		Arrival	Dam	Social	Known	{unks = founders}			GU-CS	Vx	Live Offspr
						{unknowns removed}					Repro Offspr
696	F	- 1968	WILD	643	1.0000	.0000	.0000	.0000	1.000	0.190	.
		6 Jul 1976	WILD			.0000	.0000	.0000	.		.
697	M	- 1968	WILD	642	1.0000	.0000	.0000	.0000	1.000	0.310	.
		6 Jul 1976	WILD			.0000	.0000	.0000	.		.

Recommendations:

696 - Maintain

697 - Maintain

Consider holding another female white rhino

SECTION 7

POPULATION ANALYSES FOR

SOUTHERN WHITE RHINO

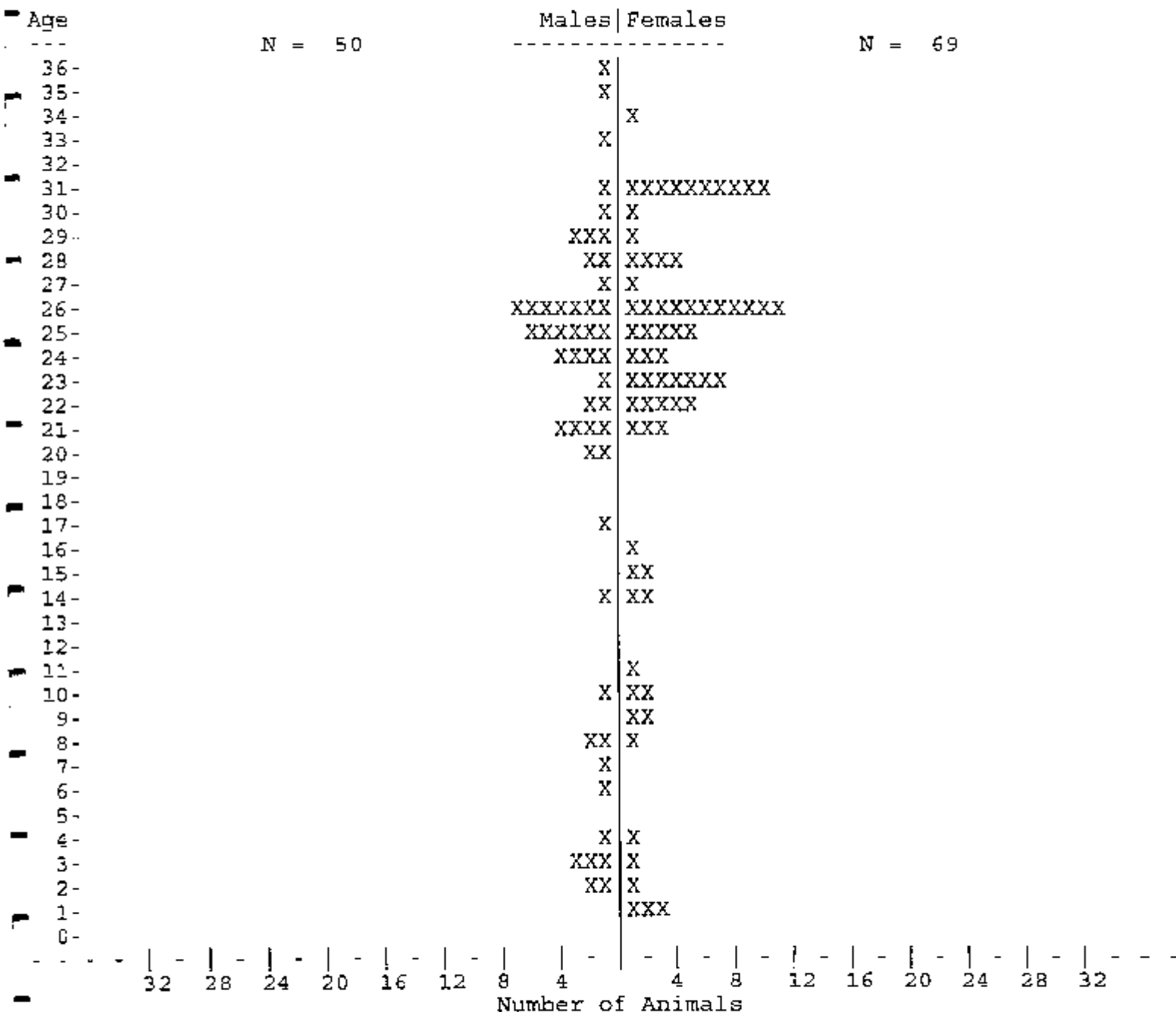
SSP POPULATION

Age Pyramid Report

Restricted to: SOUTHERN WHITE RHINOCEROS Studbook
 Cooperative Management: In SSP and managed
 Status: Living by 5 Jun 1994

Page 1

Taxon Name: CERATOTHERIUM SIMUM SIMUM



X >>> Specimens of known sex...

? >>> Specimens of unknown sex...

Age Pyramid Report

Restricted to: SOUTHERN WHITE RHINOCEROS Studbook
 Cooperative Management: In SSP and managed
 Status: Living by 5 Jun 1994

Page

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Taxon Name: CERATOTHERIUM SIMUM SIMUM

=====

Age Studbook Numbers >>> Male

36	31						
35	29						
34							
33	34						
32							
31	143						
30	80						
29	50	180	359				
28	336	618					
27	82						
26	146	177	187	189	191	379	697
25	363	364	390	473	753	754	
24	386	413	463	573			
23	469						
22	465	687					
21	202	203	213	707			
20	220	280					
19							
18							
17	335						
16							
15							
14	755						
13							
12							
11							
10	790						
9							
8	841	861					
7	876						
6	898						
5							
4	950						
3	981	T005	T009				
2	980	990					
1							
0							

Total= 50

Age Pyramid Report

Restricted to: SOUTHERN WHITE RHINOCEROS Studbook
 Cooperative Management: In SSP and managed
 Status: Living by 5 Jun 1994

Page 3

Taxon Name: CERATOTHERIUM SIMUM SIMUM

Age Studbook Numbers >>> Female

36										
35										
34	30									
33										
32										
31	39	47	147	150	153	154	156	157	159	277
30	81									
29	181									
28	337	358	619	620						
27	83									
26	148	188	190	192	380	381	391	452	453	565
	696									
25	182	365	366	475	750					
24	464	574	587							
23	318	392	416	417	418	470	471			
22	387	397	466	467	686					
21	218	219	238							
20										
19										
18										
17										
16	575									
15	533	612								
14	542	582								
13										
12										
11	772									
10	788	791								
9	819	822								
8	842									
7										
6										
5										
4	T002									
3	T004									
2	T008									
1	991	T013	T020							
0										

Total= 69

Fecundity and Mortality Report

Restricted to: SOUTHERN WHITE RHINOCEROS Studbook

Page 1

Locations: N.AMERICA/

Dates: During 01/01/1970 <= date

Taxon Name: CERATOTHERIUM SIMUM SIMUM

Age Class	Fecundity [Mx]...				Mortality [Qx]...			
	Male	N	Female	N	Male	N	Female	N
0- 1	0.00	80.3	0.00	71.5	0.18	97.6	0.17	85.0
1- 2	0.00	60.1	0.00	53.7	0.05	64.2	0.07	60.3
2- 3	0.00	50.9	0.00	62.0	0.06	53.0	0.03	63.4
3- 4	0.00	55.3	0.00	81.2	0.00	55.8	0.02	82.5
4- 5	0.00	62.8	0.00	95.3	0.02	63.8	0.01	95.3
5- 6	0.00	68.6	0.00	97.1	0.01	68.7	0.01	98.2
6- 7	0.00	70.3	0.02	100.7	0.01	71.9	0.01	101.6
7- 8	0.02	72.2	0.04	104.3	0.01	72.3	0.01	106.0
8- 9	0.00	71.9	0.01	114.2	0.00	72.2	0.03	114.9
9-10	0.02	75.1	0.05	116.4	0.00	75.8	0.00	117.1
10-11	0.05	78.3	0.04	110.8	0.01	79.6	0.00	110.8
11-12	0.02	70.6	0.07	102.7	0.00	70.6	0.03	104.3
12-13	0.08	67.3	0.06	96.8	0.01	69.0	0.03	97.5
13-14	0.10	63.7	0.11	90.7	0.00	63.7	0.01	91.0
14-15	0.16	62.0	0.07	85.6	0.05	63.0	0.02	86.0
15-16	0.08	58.1	0.05	80.2	0.03	59.0	0.00	80.2
16-17	0.13	56.9	0.10	77.0	0.00	56.9	0.04	79.6
17-18	0.10	55.4	0.03	72.8	0.02	56.8	0.01	72.9
18-19	0.17	52.9	0.10	69.5	0.00	52.9	0.03	71.5
19-20	0.11	51.2	0.05	68.0	0.06	52.0	0.00	68.0
20-21	0.20	47.5	0.05	67.5	0.00	47.5	0.01	68.6
21-22	0.11	44.3	0.06	63.7	0.00	44.3	0.02	64.6
22-23	0.15	40.9	0.05	59.7	0.00	40.9	0.02	60.1
23-24	0.20	38.8	0.09	52.2	0.00	39.0	0.02	52.6
24-25	0.17	33.8	0.07	45.1	0.06	34.7	0.00	45.1
25-26	0.05	26.8	0.11	39.0	0.00	26.8	0.05	40.1
26-27	0.10	19.5	0.00	29.7	0.05	20.0	0.03	32.0
27-28	0.09	14.5	0.03	22.2	0.06	15.4	0.09	23.4
28-29	0.10	12.9	0.06	18.7	0.00	12.9	0.00	18.7
29-30	0.06	10.2	0.11	16.4	0.00	10.2	0.00	16.4
30-31	0.00	7.7	0.00	14.9	0.00	7.7	0.00	14.9
31-32	0.00	5.9	0.00	6.8	0.16	6.4	0.24	8.3
32-33	0.00	5.0	0.00	1.9	0.00	5.0	0.50	2.0

Fecundity and Mortality Report

Restricted to: SOUTHERN WHITE RHINOCEROS Studbook

Page 2

Locations: N.AMERICA/

Dates: During 01/01/1970 <= date

Taxon Name: CERATOTHERIUM SIMUM SIMUM

33-34	0.00	3.3	0.00	1.0	0.00	3.3	0.00	1.0
34-35	0.00	2.0	0.00	0.4	0.00	2.0	0.00	0.4
35-36	0.00	1.4	0.00	0.0	0.00	1.4	0.00	0.0
36-37	0.00	0.4	0.00	0.0	0.00	0.4	0.00	0.0
37-38	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
38-39	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 19.072

T = 17.638

30 day mortality: 14%

Ro = 1.283

Ro = 0.826

(26 deaths out of 186 arriving
within 30 days of birth date)

lambda=1.01

lambda=0.99

r = 0.013

r = -0.011

159 birth events to known age parents tabulated for Mx...plus...

33 births to UNK or MULT dams...

40 births to UNK or MULT sires...

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

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

Restricted to: **Fecundity and Mortality Report**
SOUTHERN WHITE RHINOCEROS Studbook
 Locations: N.AMERICA/
 Dates: During 01/01/1984 <= date

Page 1

=====

Taxon Name: **CERATOTHERIUM SIMUM SIMUM**

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Age Class	Fecundity [Mx]...				Mortality [Qx]...			
	Male	N	Female	N	Male	N	Female	N
0- 1	0.00	28.3	0.00	25.4	0.19	34.8	0.18	30.9
1- 2	0.00	24.3	0.00	21.2	0.04	25.2	0.08	24.8
2- 3	0.00	20.2	0.00	14.1	0.00	20.2	0.07	14.3
3- 4	0.00	15.3	0.00	12.7	0.00	15.3	0.08	13.1
4- 5	0.00	10.7	0.00	12.6	0.00	10.7	0.00	12.6
5- 6	0.00	9.6	0.00	13.0	0.00	9.6	0.00	13.0
6- 7	0.00	9.3	0.04	15.5	0.09	10.9	0.00	15.5
7- 8	0.00	8.2	0.08	14.8	0.00	8.2	0.06	16.5
8- 9	0.00	7.9	0.00	14.7	0.00	7.9	0.00	14.7
9-10	0.00	7.4	0.08	14.3	0.00	7.4	0.00	14.3
10-11	0.00	7.9	0.00	12.6	0.00	7.9	0.00	12.6
11-12	0.00	10.6	0.00	13.3	0.00	10.6	0.00	13.3
12-13	0.00	13.0	0.09	18.7	0.00	13.0	0.05	19.0
13-14	0.00	13.2	0.02	24.4	0.00	13.2	0.00	24.4
14-15	0.03	19.8	0.02	27.9	0.05	20.0	0.00	27.9
15-16	0.00	24.0	0.02	31.7	0.00	24.0	0.00	31.7
16-17	0.07	34.0	0.10	42.9	0.00	34.0	0.02	43.6
17-18	0.04	34.8	0.00	42.0	0.00	34.8	0.00	42.0
18-19	0.21	35.4	0.09	45.0	0.00	35.4	0.02	45.5
19-20	0.07	36.2	0.01	45.0	0.08	37.0	0.00	45.0
20-21	0.18	34.5	0.04	46.5	0.00	34.5	0.02	47.0
21-22	0.07	35.3	0.06	55.7	0.00	35.3	0.02	56.6
22-23	0.10	31.9	0.06	52.7	0.00	31.9	0.02	53.1
23-24	0.05	33.4	0.10	47.8	0.00	33.4	0.02	48.2
24-25	0.17	31.8	0.07	42.1	0.06	32.7	0.00	42.1
25-26	0.05	25.8	0.11	36.2	0.00	25.8	0.03	37.1
26-27	0.09	19.5	0.00	29.7	0.05	20.0	0.03	32.0
27-28	0.08	14.5	0.03	22.2	0.06	15.4	0.09	23.4
28-29	0.09	12.9	0.06	18.7	0.00	12.9	0.00	18.7
29-30	0.06	10.2	0.11	16.4	0.00	10.2	0.00	16.4
30-31	0.00	7.7	0.00	14.9	0.00	7.7	0.00	14.9
31-32	0.00	5.9	0.00	6.8	0.16	6.4	0.24	8.3
32-33	0.00	5.0	0.00	1.9	0.00	5.0	0.50	2.0
33-34	0.00	3.3	0.00	1.0	0.00	3.3	0.00	1.0
34-35	0.00	2.0	0.00	0.4	0.00	2.0	0.00	0.4
35-36	0.00	1.4	0.00	0.0	0.00	1.4	0.00	0.0
36-37	0.00	0.4	0.00	0.0	0.00	0.4	0.00	0.0

Fecundity and Mortality Report

Restricted to: SOUTHERN WHITE RHINOCEROS Studbook
 Locations: N.AMERICA/
 Dates: During 01/01/1984 <= date

Page 2

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Taxon Name: CERATOTHERIUM SIMUM SIMUM

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37-38	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0
38-39	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0

T = 21.614	T = 18.295	30 day mortality: 18%
Ro = 0.823	Ro = 0.635	(12 deaths out of 66 arriving
lambda=0.99	lambda=0.98	within 30 days of birth date)
r = -0.009	r = -0.025	

65 birth events to known age parents tabulated for Mx...plus...
 12 births to UNK or MULT dams...
 14 births to UNK or MULT sires...

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

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

FOUNDER ANALYSIS FOR SOUTHERN WHITE RHINO SSP

Sun Jun 05 10:45:11 1994

Founder studbook numbers in parentheses indicate UNKNOWNs.

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

Founders	29	30	31	34	39	40	47
Founders	50	51	52	80	81	82	83
Founders	143	146	147	148	150	151	152
Founders	153	154	155	156	157	159	177
Founders	180	181	182	187	188	189	190
Founders	191	192	277	318	336	337	358
Founders	359	363	364	365	366	379	380
Founders	381	386	387	390	391	392	397
Founders	413	416	417	418	420	452	453
Founders	463	464	465	466	467	469	470
Founders	471	473	475	562	565	566	573
Founders	574	587	618	619	620	686	687
Founders	696	697	707	750	752	753	754
Founders(-	P218)						

Founder contributions

0.0000	0.0000	0.0000	0.5000	0.0000	1.0000	0.0000
1.0000	1.0000	6.7500	0.0000	0.0000	0.0000	0.0000
0.5000	0.0000	0.0000	0.5000	1.0000	0.5000	0.5000
1.0000	1.0000	1.0000	0.7500	2.5000	0.5000	0.0000
1.0000	0.5000	0.5000	1.5000	0.0000	0.5000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000
0.0000	0.0000	0.0000	1.2500	1.2500	0.0000	1.0000
0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000
0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.5000	0.0000	0.5000	0.5000
0.5000	0.0000	1.5000	0.0000	1.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.5000
0.5000						

Fractional contributions

0.0000	0.0000	0.0000	0.0132	0.0000	0.0263	0.0000
0.0263	0.0263	0.1776	0.0000	0.0000	0.0000	0.0000
0.0132	0.0000	0.0000	0.0132	0.0263	0.0132	0.0132
0.0263	0.0263	0.0263	0.0197	0.0658	0.0132	0.0000
0.0263	0.0132	0.0132	0.0395	0.0000	0.0132	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0132	0.0000
0.0000	0.0000	0.0000	0.0329	0.0329	0.0000	0.0263
0.0000	0.0000	0.0000	0.0000	0.0263	0.0263	0.0263
0.0000	0.0000	0.0263	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0132	0.0000	0.0132	0.0132
0.0132	0.0000	0.0395	0.0000	0.0263	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0132	0.0000	0.0132
0.0132						

Number of living descendants

0	0	0	1	0	2	0
2	2	15	0	0	0	0
1	0	0	1	2	1	1
2	2	2	2	6	1	0
2	1	1	3	0	1	0
0	0	0	0	0	0	0
0	0	0	0	0	1	0
0	0	0	3	3	0	2
0	0	0	0	2	2	2
0	0	2	0	0	0	0
0	0	0	1	0	1	1
1	0	3	0	2	0	0
0	0	0	0	1	0	1
1						

FOUNDER ANALYSIS FOR SOUTHERN WHITE RHINO SSP

Sun Jun 05 10:45:11 1994

Founder calculations omit UNKNOWNs.

Founders							
Founders	29	30	31	34	39	40	47
Founders	50	51	52	80	81	82	83
Founders	143	146	147	148	150	151	152
Founders	153	154	155	156	157	159	177
Founders	180	181	182	187	188	189	190
Founders	191	192	277	318	336	337	358
Founders	359	363	364	365	366	379	380
Founders	381	386	387	390	391	392	397
Founders	413	416	417	418	420	452	453
Founders	463	464	465	466	467	469	470
Founders	471	473	475	562	565	566	573
Founders	574	587	618	619	620	686	687
Founders	696	697	707	750	752	753	754

Founder contributions

0.0000	0.0000	0.0000	0.5000	0.0000	1.0000	0.0000
1.0000	1.0000	6.7500	0.0000	0.0000	0.0000	0.0000
0.5000	0.0000	0.0000	0.5000	1.0000	0.5000	0.5000
1.0000	1.0000	1.0000	0.7500	2.5000	0.5000	0.0000
1.0000	0.5000	0.5000	1.5000	0.0000	0.5000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.5000	0.0000
0.0000	0.0000	0.0000	1.2500	1.2500	0.0000	1.0000
0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000
0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.5000	0.0000	0.5000	0.5000
0.5000	0.0000	1.5000	0.0000	1.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.5000	0.0000	0.5000

Fractional contributions

0.0000	0.0000	0.0000	0.0133	0.0000	0.0267	0.0000
0.0267	0.0267	0.1800	0.0000	0.0000	0.0000	0.0000
0.0133	0.0000	0.0000	0.0133	0.0267	0.0133	0.0133
0.0267	0.0267	0.0267	0.0200	0.0667	0.0133	0.0000
0.0267	0.0133	0.0133	0.0400	0.0000	0.0133	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0133	0.0000
0.0000	0.0000	0.0000	0.0333	0.0333	0.0000	0.0267
0.0000	0.0000	0.0000	0.0000	0.0267	0.0267	0.0267
0.0000	0.0000	0.0267	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0133	0.0000	0.0133	0.0133
0.0133	0.0000	0.0400	0.0000	0.0267	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0133	0.0000	0.0133

Number of living descendants

0	0	0	1	0	2	0
2	2	15	0	0	0	0
1	0	0	1	2	1	1
2	2	2	2	6	1	0
2	1	1	3	0	1	0
0	0	0	0	0	0	0
0	0	0	0	0	1	0
0	0	0	3	3	0	2
0	0	0	0	2	2	2
0	0	2	0	0	0	0
0	0	0	1	0	1	1
1	0	3	0	2	0	0
0	0	0	0	1	0	1

GENE DROP ANALYSIS FOR SOUTHERN WHITE RHINO SSP

Sun Jun 05 10:45:11 1994

Studbook	Sire	Dam	Status	Prop. genome living desc.	unique among all living
29 M	WILD	WILD	F		1.0000
30 F	WILD	WILD	F		1.0000
31 M	WILD	WILD	F		1.0000
34 M	WILD	WILD	F		0.5000
39 F	WILD	WILD	F		1.0000
47 F	WILD	WILD	F		1.0000
50 M	WILD	WILD	F		0.2540
80 M	WILD	WILD	F		1.0000
81 F	WILD	WILD	F		1.0000
82 M	WILD	WILD	F		1.0000
83 F	WILD	WILD	F		1.0000
143 M	WILD	WILD	F		0.5000
146 M	WILD	WILD	F		1.0000
147 F	WILD	WILD	F		1.0000
148 F	WILD	WILD	F		0.5000
150 F	WILD	WILD	F		0.2400
153 F	WILD	WILD	F		0.2485
154 F	WILD	WILD	F		0.2435
156 F	WILD	WILD	F		0.3830
157 F	WILD	WILD	F		0.0595
159 F	WILD	WILD	F		0.5000
177 M	WILD	WILD	F		1.0000
180 M	WILD	WILD	F		0.2535
181 F	WILD	WILD	F		0.5000
182 F	WILD	WILD	F		0.5000
187 M	WILD	WILD	F		0.1255
188 F	WILD	WILD	F		1.0000
189 M	WILD	WILD	F		0.5000
190 F	WILD	WILD	F		1.0000
191 M	WILD	WILD	F		1.0000
192 F	WILD	WILD	F		1.0000
202 M	180	181	A	0.7465	0.0000
203 M	52	151	A	0.5000	0.5000
213 M	52	152	A	0.5005	0.5005
218 F	52	157	A	0.0180	0.0005
219 F	52	153	A	0.2520	0.0005
220 M	52	154	A	0.2565	0.0000
238 F	52	150	A	0.2605	0.0005
277 F	WILD	WILD	F		1.0000
280 M	52	148	A	0.5000	0.0000
318 F	WILD	WILD	F		1.0000
335 M	52	154	A	0.2565	0.0000
336 M	WILD	WILD	F		1.0000
337 F	WILD	WILD	F		1.0000
358 F	WILD	WILD	F		1.0000
359 M	WILD	WILD	F		1.0000
363 M	WILD	WILD	F		1.0000
364 M	WILD	WILD	F		1.0000
365 F	WILD	WILD	F		1.0000
366 F	WILD	WILD	F		1.0000
379 M	WILD	WILD	F		0.5000
380 F	WILD	WILD	F		1.0000
381 F	WILD	WILD	F		1.0000
386 M	WILD	WILD	F		1.0000
387 F	WILD	WILD	F		1.0000
390 M	WILD	WILD	F		0.2525
391 F	WILD	WILD	F		0.2480
392 F	WILD	WILD	F		1.0000
397 F	WILD	WILD	F		0.2525
413 M	WILD	WILD	F		1.0000

Studbook	Sire	Dam	Status	Prop. genome unique among living desc.	unique among all living
416 F	WILD	WILD	F		1.0000
417 F	WILD	WILD	F		1.0000
418 F	WILD	WILD	F		1.0000
452 F	WILD	WILD	F		0.2555
453 F	WILD	WILD	F		0.2440
463 M	WILD	WILD	F		1.0000
464 F	WILD	WILD	F		1.0000
465 M	WILD	WILD	F		0.2570
466 F	WILD	WILD	F		1.0000
467 F	WILD	WILD	F		1.0000
469 M	WILD	WILD	F		1.0000
470 F	WILD	WILD	F		1.0000
471 F	WILD	WILD	F		1.0000
473 M	WILD	WILD	F		1.0000
475 F	WILD	WILD	F		1.0000
533 F	390	391	A	0.2505	0.0000
542 F	52	157	A	0.0600	0.0000
565 F	WILD	WILD	F		1.0000
573 M	WILD	WILD	F		0.5000
574 F	WILD	WILD	F		0.5000
575 F	573	574	A	1.0000	0.0000
582 F	P218	218	A	0.5000	0.5000
587 F	WILD	WILD	F		1.0000
612 F	562	566	A	1.0000	1.0000
618 M	WILD	WILD	F		0.1250
619 F	WILD	WILD	F		1.0000
620 F	WILD	WILD	F		0.2680
686 F	WILD	WILD	F		1.0000
687 M	WILD	WILD	F		1.0000
696 F	WILD	WILD	F		1.0000
697 M	WILD	WILD	F		1.0000
707 M	WILD	WILD	F		1.0000
750 F	WILD	WILD	F		1.0000
753 M	WILD	WILD	F		1.0000
754 M	WILD	WILD	F		0.5000
755 M	754	752	A	1.0000	0.5000
772 F	618	453	A	0.3790	0.0000
788 F	52	157	A	0.0710	0.0005
790 M	618	452	A	0.3695	0.0000
791 F	618	620	A	0.3590	0.0000
819 F	52	155	A	0.2495	0.2495
822 F	52	150	A	0.2600	0.0000
841 M	420	599	A	0.3795	0.2625
842 F	40	397	A	0.4990	0.2515
861 M	420	155	A	0.5120	0.5120
876 M	50	51	A	0.4880	0.2420
898 M	34	153	A	0.7515	0.0000
950 M	143	218	A	0.5000	0.0000
980 M	187	159	A	0.6225	0.0000
981 M	40	397	A	0.4990	0.2515
990 M	187	157	A	0.1955	0.0000
991 F	187	156	A	0.5015	0.0000
T002 F	465	453	A	0.4990	0.0000
T004 F	465	452	A	0.4875	0.0000
T005 M	390	391	A	0.4995	0.0000
T008 F	379	533	A	0.5000	0.0000
T009 M	189	620	A	0.7320	0.0000
T013 F	50	51	A	0.4880	0.2420
T020 F	180	182	A	0.7465	0.0000

92 Founders

38 Living descendants

131 In analysis

FOUNDER ALLELE REPRESENTATION

Founder	Retention	%Representation		Target		Difference	
		with unk	w/o	with unk	w/o	with unk	w/o
29 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
30 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
31 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
34 ML	0.500	1.316	1.333	1.136	1.143	-0.179	-0.191
39 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
40 M	0.752	2.632	2.667	0.854	0.859	-1.778	-1.808
47 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
50 ML	0.746	2.632	2.667	1.136	1.143	-1.495	-1.524
51 F	0.742	2.632	2.667	0.843	0.848	-1.788	-1.819
52 M	1.000	17.746	17.983	1.136	1.143	-16.610	-16.840
80 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
81 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
82 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
83 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
143 ML	0.500	1.316	1.333	1.136	1.143	-0.179	-0.191
146 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
147 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
148 FL	0.500	1.316	1.333	1.136	1.143	-0.179	-0.191
150 FL	0.760	2.632	2.667	1.136	1.143	-1.495	-1.524
151 F	0.500	1.316	1.333	0.568	0.571	-0.748	-0.762
152 F	0.500	1.316	1.333	0.568	0.571	-0.748	-0.762
153 FL	0.752	2.632	2.667	1.136	1.143	-1.495	-1.524
154 FL	0.757	2.632	2.667	1.136	1.143	-1.495	-1.524
155 F	0.750	2.632	2.667	0.852	0.857	-1.780	-1.810
156 FL	0.617	1.943	1.969	1.136	1.143	-0.807	-0.827
157 FL	0.941	6.626	6.715	1.136	1.143	-5.490	-5.572
159 FL	0.500	1.316	1.333	1.136	1.143	-0.179	-0.191
177 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
180 ML	0.747	2.632	2.667	1.136	1.143	-1.495	-1.524
181 FL	0.500	1.316	1.333	1.136	1.143	-0.179	-0.191
182 FL	0.500	1.316	1.333	1.136	1.143	-0.179	-0.191
187 ML	0.875	3.947	4.000	1.136	1.143	-2.811	-2.857
188 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
189 ML	0.500	1.316	1.333	1.136	1.143	-0.179	-0.191
190 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
191 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
192 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
277 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
318 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
336 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
337 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
358 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
359 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
363 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
364 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
365 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
366 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
379 ML	0.500	1.316	1.333	1.136	1.143	-0.179	-0.191
380 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
381 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
386 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
387 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
390 ML	0.748	3.303	3.347	1.136	1.143	-2.166	-2.204
391 FL	0.752	3.276	3.320	1.136	1.143	-2.140	-2.177
392 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
397 FL	0.748	2.632	2.667	1.136	1.143	-1.495	-1.524
413 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
416 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
417 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
418 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
420 M	0.763	2.632	2.667	0.866	0.871	-1.765	-1.795
452 FL	0.745	2.632	2.667	1.136	1.143	-1.495	-1.524

Founder	Retention	%Representation		Target		Difference	
		with unk	w/o	with unk	w/o	with unk	w/o
453 FL	0.756	2.632	2.667	1.136	1.143	-1.495	-1.524
463 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
464 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
465 ML	0.743	2.632	2.667	1.136	1.143	1.136	1.143
466 FL	0.000	0.000	0.000	1.136	1.143	-1.495	-1.524
467 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
469 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
470 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
471 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
473 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
475 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
562 M	0.500	1.316	1.333	1.136	1.143	1.136	1.143
565 FL	0.000	0.000	0.000	1.136	1.143	-0.748	-0.762
566 F	0.500	1.316	1.333	1.136	1.143	1.136	1.143
573 ML	0.500	1.316	1.333	1.136	1.143	-0.748	-0.762
574 FL	0.500	1.316	1.333	1.136	1.143	-0.179	-0.191
587 FL	0.000	0.000	0.000	1.136	1.143	-0.179	-0.191
618 ML	0.875	3.947	4.000	1.136	1.143	1.136	1.143
619 FL	0.000	0.000	0.000	1.136	1.143	-2.811	-2.857
620 FL	0.732	2.632	2.667	1.136	1.143	1.136	1.143
686 FL	0.000	0.000	0.000	1.136	1.143	-1.495	-1.524
687 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
696 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
697 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
707 ML	0.000	0.000	0.000	1.136	1.143	1.136	1.143
750 FL	0.000	0.000	0.000	1.136	1.143	1.136	1.143
752 F	0.500	1.316	1.333	1.136	1.143	1.136	1.143
753 ML	0.000	0.000	0.000	1.136	1.143	-0.748	-0.762
754 ML	0.500	1.316	1.333	1.136	1.143	1.136	1.143
P218 M U	0.500	1.316	1.333	1.136	1.143	-0.179	-0.191
			0.000	0.568	0.000	-0.748	0.000

GENETIC SUMMARY

LIVING DESCENDANT POPULATION

POTENTIAL

	with unknowns	w/o	w/ unkn	w/o
Number of founders:	38	37	92	91
Mean retention:	0.653	0.657	0.957	0.962
Founder genomes surviving:	24.795	24.295	88.006	87.506
Founder Genome Equivalents:	14.505	14.198	88.006	87.506
Fraction of wild gene diversity retained:	0.966	0.965	0.994	0.994
Fraction of wild gene diversity lost:	0.034	0.035	0.006	0.006
Mean inbreeding coefficient:	0.000			

INBREEDING COEFFICIENTS AND MEAN KINSHIPS FOR SOUTHERN WHITE RHINO SSP

Sun Jun 05 10:45:11 1994

Inbreeding and kinship calculations assume UNKNOWNs are founders.

MEAN KINSHIP OF LIVING ANIMALS TO LIVING NON-FOUNDERS

STUDBOOK	SEX	DAM	INBREEDING	MEAN KINSHIP	KINSHIP VALUE	GENOME KNOWN
29 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
30 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
31 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
34 M	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0090	1.0000
39 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
47 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
50 M	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0163	1.0000
80 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
81 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
82 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
83 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
143 M	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0085	1.0000
146 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
147 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
148 F	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0055	1.0000
150 F	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0094	1.0000
153 F	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0119	1.0000
154 F	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0116	1.0000
156 F	WILD	WILD	F = 0.0000	mk = 0.0099	kv = 0.0121	1.0000
157 F	WILD	WILD	F = 0.0000	mk = 0.0329	kv = 0.0289	1.0000
159 F	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0083	1.0000
177 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
180 M	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0113	1.0000
181 F	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0041	1.0000
182 F	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0072	1.0000
187 M	WILD	WILD	F = 0.0000	mk = 0.0197	kv = 0.0239	1.0000
188 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
189 M	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0083	1.0000
190 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
191 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
192 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
202 M	180	181	F = 0.0000	mk = 0.0164	kv = 0.0118	1.0000
203 M	52	151	F = 0.0000	mk = 0.0543	kv = 0.0414	1.0000
213 M	52	152	F = 0.0000	mk = 0.0543	kv = 0.0424	1.0000
218 F	52	157	F = 0.0000	mk = 0.0740	kv = 0.0592	1.0000
219 F	52	153	F = 0.0000	mk = 0.0576	kv = 0.0440	1.0000
220 M	52	154	F = 0.0000	mk = 0.0576	kv = 0.0458	1.0000
238 F	52	150	F = 0.0000	mk = 0.0576	kv = 0.0428	1.0000
277 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
280 M	52	148	F = 0.0000	mk = 0.0543	kv = 0.0435	1.0000
318 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
335 M	52	154	F = 0.0000	mk = 0.0576	kv = 0.0478	1.0000
336 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
337 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
358 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
359 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
363 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
364 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
365 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
366 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
379 M	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0077	1.0000
380 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
381 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
386 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
387 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000

STUDBOOK	SIRE	DAM	INBREEDING	MEAN	KINSHIP	KINSHIP	VALUE	GENOME	KNOWN
390 M	WILD	WILD	F = 0.0000	mk = 0.0164	kv = 0.0170	1.0000			
391 F	WILD	WILD	F = 0.0000	mk = 0.0164	kv = 0.0170	1.0000			
392 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
397 F	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0152	1.0000			
413 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
416 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
417 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
418 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
452 F	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0168	1.0000			
453 F	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0140	1.0000			
463 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
464 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
465 M	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0155	1.0000			
466 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
467 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
469 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
470 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
471 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
473 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
475 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
533 F	390	391	F = 0.0000	mk = 0.0263	kv = 0.0256	1.0000			
542 F	52	157	F = 0.0000	mk = 0.0674	kv = 0.0545	1.0000			
565 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
573 M	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0041	1.0000			
574 F	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0041	1.0000			
575 F	573	574	F = 0.0000	mk = 0.0132	kv = 0.0082	1.0000			
582 F	P218	218	F = 0.0000	mk = 0.0469	kv = 0.0368	0.5000			
587 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
612 F	562	566	F = 0.0000	mk = 0.0132	kv = 0.0096	1.0000			
618 M	WILD	WILD	F = 0.0000	mk = 0.0197	kv = 0.0219	1.0000			
619 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
620 F	WILD	WILD	F = 0.0000	mk = 0.0132	kv = 0.0148	1.0000			
686 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
687 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
696 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
697 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
707 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
750 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
753 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000			
754 M	WILD	WILD	F = 0.0000	mk = 0.0066	kv = 0.0082	1.0000			
755 M	754	752	F = 0.0000	mk = 0.0132	kv = 0.0165	1.0000			
772 F	618	453	F = 0.0000	mk = 0.0230	kv = 0.0242	1.0000			
788 F	52	157	F = 0.0000	mk = 0.0674	kv = 0.0562	1.0000			
790 M	618	452	F = 0.0000	mk = 0.0230	kv = 0.0285	1.0000			
791 F	618	620	F = 0.0000	mk = 0.0230	kv = 0.0249	1.0000			
819 F	52	155	F = 0.0000	mk = 0.0576	kv = 0.0495	1.0000			
822 F	52	150	F = 0.0000	mk = 0.0576	kv = 0.0464	1.0000			
841 M	420	599	F = 0.0000	mk = 0.0395	kv = 0.0411	1.0000			
842 F	40	397	F = 0.0000	mk = 0.0197	kv = 0.0221	1.0000			
861 M	420	155	F = 0.0000	mk = 0.0197	kv = 0.0261	1.0000			
876 M	50	51	F = 0.0000	mk = 0.0197	kv = 0.0254	1.0000			
898 M	34	153	F = 0.0000	mk = 0.0164	kv = 0.0194	1.0000			
950 M	143	218	F = 0.0000	mk = 0.0469	kv = 0.0424	1.0000			
980 M	187	159	F = 0.0000	mk = 0.0197	kv = 0.0244	1.0000			
981 M	40	397	F = 0.0000	mk = 0.0197	kv = 0.0235	1.0000			
990 M	187	157	F = 0.0000	mk = 0.0329	kv = 0.0344	1.0000			
991 F	187	156	F = 0.0000	mk = 0.0214	kv = 0.0256	1.0000			
T002 F	465	453	F = 0.0000	mk = 0.0197	kv = 0.0225	1.0000			
T004 F	465	452	F = 0.0000	mk = 0.0197	kv = 0.0238	1.0000			
T005 M	390	391	F = 0.0000	mk = 0.0230	kv = 0.0253	1.0000			
T008 F	379	533	F = 0.0000	mk = 0.0230	kv = 0.0244	1.0000			
T009 M	189	620	F = 0.0000	mk = 0.0164	kv = 0.0198	1.0000			
T013 F	50	51	F = 0.0000	mk = 0.0197	kv = 0.0235	1.0000			
T020 F	180	182	F = 0.0000	mk = 0.0164	kv = 0.0164	1.0000			

 ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	MALES	MK	Age	Known	FEMALES	MK	Age	Known
1	31	0.0000	36	1.000	30	0.0000	34	1.000
2	29	0.0000	35	1.000	39	0.0000	31	1.000
3	80	0.0000	30	1.000	47	0.0000	31	1.000
4	359	0.0000	29	1.000	147	0.0000	31	1.000
5	336	0.0000	28	1.000	277	0.0000	31	1.000
6	82	0.0000	27	1.000	81	0.0000	30	1.000
7	146	0.0000	26	1.000	337	0.0000	28	1.000
8	177	0.0000	26	1.000	358	0.0000	28	1.000
9	191	0.0000	26	1.000	619	0.0000	28	1.000
10	697	0.0000	26	1.000	83	0.0000	27	1.000
11	363	0.0000	25	1.000	192	0.0000	27	1.000
12	364	0.0000	25	1.000	188	0.0000	26	1.000
13	473	0.0000	25	1.000	190	0.0000	26	1.000
14	753	0.0000	25	1.000	380	0.0000	26	1.000
15	386	0.0000	24	1.000	381	0.0000	26	1.000
16	413	0.0000	24	1.000	565	0.0000	26	1.000
17	463	0.0000	24	1.000	696	0.0000	26	1.000
18	469	0.0000	23	1.000	365	0.0000	25	1.000
19	687	0.0000	22	1.000	366	0.0000	25	1.000
20	707	0.0000	21	1.000	475	0.0000	25	1.000
21	34	0.0066	33	1.000	750	0.0000	25	1.000
22	143	0.0066	31	1.000	464	0.0000	24	1.000
23	189	0.0066	26	1.000	587	0.0000	24	1.000
24	379	0.0066	26	1.000	392	0.0000	24	1.000
25	754	0.0066	25	1.000	318	0.0000	23	1.000
26	573	0.0066	24	1.000	416	0.0000	23	1.000
27	50	0.0132	29	1.000	417	0.0000	23	1.000
28	180	0.0132	29	1.000	418	0.0000	23	1.000
29	465	0.0132	22	1.000	470	0.0000	23	1.000
30	755	0.0132	15	1.000	471	0.0000	23	1.000
31	390	0.0164	25	1.000	387	0.0000	22	1.000
32	202	0.0164	22	1.000	466	0.0000	22	1.000
33	898	0.0164	7	1.000	467	0.0000	22	1.000
34	T009	0.0164	3	1.000	686	0.0000	22	1.000
35	618	0.0197	28	1.000	159	0.0066	31	1.000
36	187	0.0197	26	1.000	181	0.0066	29	1.000
37	861	0.0197	8	1.000	148	0.0066	26	1.000
38	876	0.0197	8	1.000	182	0.0066	25	1.000
39	981	0.0197	3	1.000	574	0.0066	24	1.000
40	980	0.0197	3	1.000	156	0.0099	31	1.000
41	790	0.0230	10	1.000	150	0.0132	31	1.000
42	T005	0.0230	3	1.000	153	0.0132	31	1.000
43	990	0.0329	2	1.000	154	0.0132	31	1.000
44	841	0.0395	9	1.000	620	0.0132	28	1.000
45	950	0.0469	4	1.000	452	0.0132	26	1.000
46	203	0.0543	22	1.000	453	0.0132	26	1.000
47	213	0.0543	21	1.000	397	0.0132	22	1.000
48	280	0.0543	20	1.000	575	0.0132	17	1.000
49	220	0.0576	21	1.000	612	0.0132	15	1.000
50	335	0.0576	18	1.000	391	0.0164	26	1.000

Rank	MALES	MK	Age Known	FEMALES	MK	Age Known
51						
52				T020	0.0164	1 1.000
53				842	0.0197	9 1.000
54				T002	0.0197	4 1.000
55				T004	0.0197	3 1.000
56				T013	0.0197	1 1.000
57				991	0.0214	2 1.000
58				772	0.0230	11 1.000
59				791	0.0230	10 1.000
60				T008	0.0230	3 1.000
61				533	0.0263	15 1.000
62				157	0.0329	31 1.000
63				582	0.0469	15 0.500
64				238	0.0576	21 1.000
65				219	0.0576	21 1.000
66				819	0.0576	10 1.000
67				822	0.0576	10 1.000
68				542	0.0674	15 1.000
69				788	0.0674	10 1.000
				218	0.0740	21 1.000

GENETIC SUMMARY OF POPULATION

Descendant population Mean Kinship:	0.0345
Gene Diversity:	0.9655
Founder Genome Equivalents:	14.5126
Desc. population mean Kinship Value:	0.0303
Gene Value:	0.9697

INBREEDING COEFFICIENTS AND MEAN KINSHIPS FOR SOUTHERN WHITE RHINO SSP

Sun Jun 05 10:45:11 1994

Inbreeding and kinship calculations on: genes from UNKNOWN ancestors.

MEAN KINSHIP OF LIVING ANIMALS TO LIVING NON-FOUNDERS

STUDBOOK	SIRE	DAM	INBREEDING	MEAN KINSHIP	KINSHIP VALUE	GENOME KNOWN
29 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
30 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
31 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
34 M	WILD	WILD	F = 0.0000	mk = 0.0067	kv = 0.0091	1.0000
39 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
47 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
50 M	WILD	WILD	F = 0.0000	mk = 0.0133	kv = 0.0154	1.0000
80 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
81 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
82 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
83 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
143 M	WILD	WILD	F = 0.0000	mk = 0.0067	kv = 0.0086	1.0000
146 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
147 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
148 F	WILD	WILD	F = 0.0000	mk = 0.0067	kv = 0.0056	1.0000
150 F	WILD	WILD	F = 0.0000	mk = 0.0133	kv = 0.0095	1.0000
153 F	WILD	WILD	F = 0.0000	mk = 0.0133	kv = 0.0120	1.0000
154 F	WILD	WILD	F = 0.0000	mk = 0.0133	kv = 0.0118	1.0000
156 F	WILD	WILD	F = 0.0000	mk = 0.0100	kv = 0.0123	1.0000
157 F	WILD	WILD	F = 0.0000	mk = 0.0333	kv = 0.0292	1.0000
159 F	WILD	WILD	F = 0.0000	mk = 0.0067	kv = 0.0084	1.0000
177 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
180 M	WILD	WILD	F = 0.0000	mk = 0.0133	kv = 0.0114	1.0000
181 F	WILD	WILD	F = 0.0000	mk = 0.0067	kv = 0.0042	1.0000
182 F	WILD	WILD	F = 0.0000	mk = 0.0067	kv = 0.0072	1.0000
187 M	WILD	WILD	F = 0.0000	mk = 0.0200	kv = 0.0241	1.0000
188 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
189 M	WILD	WILD	F = 0.0000	mk = 0.0067	kv = 0.0084	1.0000
190 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
191 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
192 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
202 M	180	181	F = 0.0000	mk = 0.0167	kv = 0.0119	1.0000
203 M	52	151	F = 0.0000	mk = 0.0550	kv = 0.0416	1.0000
213 M	52	152	F = 0.0000	mk = 0.0550	kv = 0.0428	1.0000
218 F	52	157	F = 0.0000	mk = 0.0750	kv = 0.0598	1.0000
219 F	52	153	F = 0.0000	mk = 0.0583	kv = 0.0444	1.0000
220 M	52	154	F = 0.0000	mk = 0.0583	kv = 0.0463	1.0000
238 F	52	150	F = 0.0000	mk = 0.0583	kv = 0.0432	1.0000
277 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
280 M	52	148	F = 0.0000	mk = 0.0550	kv = 0.0439	1.0000
318 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
335 M	52	154	F = 0.0000	mk = 0.0583	kv = 0.0483	1.0000
336 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
337 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
358 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
359 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
363 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
364 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
365 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
366 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
379 M	WILD	WILD	F = 0.0000	mk = 0.0067	kv = 0.0078	1.0000
380 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
381 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
386 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000

STUDBOOK	SIRE	DAM	INBREEDING	MEAN KINSHIP	KINSHIP VALUE	GENOME KNOWN
387 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
390 M	WILD	WILD	F = 0.0000	mk = 0.0167	kv = 0.0171	1.0000
391 F	WILD	WILD	F = 0.0000	mk = 0.0167	kv = 0.0171	1.0000
392 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
397 F	WILD	WILD	F = 0.0000	mk = 0.0133	kv = 0.0153	1.0000
413 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
416 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
417 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
418 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
452 F	WILD	WILD	F = 0.0000	mk = 0.0133	kv = 0.0170	1.0000
453 F	WILD	WILD	F = 0.0000	mk = 0.0133	kv = 0.0141	1.0000
463 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
464 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
465 M	WILD	WILD	F = 0.0000	mk = 0.0133	kv = 0.0156	1.0000
466 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
467 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
469 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
470 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
471 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
473 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
475 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
533 F	390	391	F = 0.0000	mk = 0.0267	kv = 0.0259	1.0000
542 F	52	157	F = 0.0000	mk = 0.0683	kv = 0.0550	1.0000
565 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
573 M	WILD	WILD	F = 0.0000	mk = 0.0067	kv = 0.0042	1.0000
574 F	WILD	WILD	F = 0.0000	mk = 0.0067	kv = 0.0042	1.0000
575 F	573	574	F = 0.0000	mk = 0.0133	kv = 0.0083	1.0000
582 F	P218	218	F = 0.0000	mk = 0.0750	kv = 0.0598	0.5000
587 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
612 F	562	566	F = 0.0000	mk = 0.0133	kv = 0.0097	1.0000
618 M	WILD	WILD	F = 0.0000	mk = 0.0200	kv = 0.0221	1.0000
619 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
620 F	WILD	WILD	F = 0.0000	mk = 0.0133	kv = 0.0150	1.0000
686 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
687 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
696 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
697 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
707 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
750 F	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
753 M	WILD	WILD	F = 0.0000	mk = 0.0000	kv = 0.0000	1.0000
754 M	WILD	WILD	F = 0.0000	mk = 0.0067	kv = 0.0083	1.0000
755 M	754	752	F = 0.0000	mk = 0.0133	kv = 0.0166	1.0000
772 F	618	453	F = 0.0000	mk = 0.0233	kv = 0.0244	1.0000
788 F	52	157	F = 0.0000	mk = 0.0683	kv = 0.0567	1.0000
790 M	618	452	F = 0.0000	mk = 0.0233	kv = 0.0287	1.0000
791 F	618	620	F = 0.0000	mk = 0.0233	kv = 0.0251	1.0000
819 F	52	155	F = 0.0000	mk = 0.0583	kv = 0.0500	1.0000
822 F	52	150	F = 0.0000	mk = 0.0583	kv = 0.0469	1.0000
841 M	420	599	F = 0.0000	mk = 0.0400	kv = 0.0415	1.0000
842 F	40	397	F = 0.0000	mk = 0.0200	kv = 0.0223	1.0000
861 M	420	155	F = 0.0000	mk = 0.0200	kv = 0.0263	1.0000
876 M	50	51	F = 0.0000	mk = 0.0200	kv = 0.0257	1.0000
898 M	34	153	F = 0.0000	mk = 0.0167	kv = 0.0196	1.0000
950 M	143	218	F = 0.0000	mk = 0.0475	kv = 0.0428	1.0000
980 M	187	159	F = 0.0000	mk = 0.0200	kv = 0.0246	1.0000
981 M	40	397	F = 0.0000	mk = 0.0200	kv = 0.0237	1.0000
990 M	187	157	F = 0.0000	mk = 0.0333	kv = 0.0347	1.0000
991 F	187	156	F = 0.0000	mk = 0.0217	kv = 0.0258	1.0000
T002 F	465	453	F = 0.0000	mk = 0.0200	kv = 0.0227	1.0000
T004 F	465	452	F = 0.0000	mk = 0.0200	kv = 0.0241	1.0000
T005 M	390	391	F = 0.0000	mk = 0.0233	kv = 0.0255	1.0000
T006 F	379	533	F = 0.0000	mk = 0.0233	kv = 0.0246	1.0000
T009 M	189	620	F = 0.0000	mk = 0.0167	kv = 0.0200	1.0000
T013 F	50	51	F = 0.0000	mk = 0.0200	kv = 0.0237	1.0000
T020 F	180	182	F = 0.0000	mk = 0.0167	kv = 0.0166	1.0000

 ORDERED LISTS OF MEAN KINSHIP BY SEX:

Rank	MALES	MR	Age	Known	FEMALES	MR	Age	Known
1	31	0.0000	36	1.000	30	0.0000	34	1.000
2	29	0.0000	35	1.000	39	0.0000	31	1.000
3	80	0.0000	30	1.000	47	0.0000	31	1.000
4	359	0.0000	29	1.000	147	0.0000	31	1.000
5	336	0.0000	28	1.000	277	0.0000	31	1.000
6	82	0.0000	27	1.000	81	0.0000	30	1.000
7	146	0.0000	26	1.000	337	0.0000	28	1.000
8	177	0.0000	26	1.000	358	0.0000	28	1.000
9	191	0.0000	26	1.000	619	0.0000	28	1.000
10	697	0.0000	26	1.000	83	0.0000	27	1.000
11	363	0.0000	25	1.000	192	0.0000	27	1.000
12	364	0.0000	25	1.000	188	0.0000	26	1.000
13	473	0.0000	25	1.000	190	0.0000	26	1.000
14	753	0.0000	25	1.000	380	0.0000	26	1.000
15	386	0.0000	24	1.000	381	0.0000	26	1.000
16	413	0.0000	24	1.000	565	0.0000	26	1.000
17	463	0.0000	24	1.000	696	0.0000	26	1.000
18	469	0.0000	23	1.000	365	0.0000	25	1.000
19	687	0.0000	22	1.000	366	0.0000	25	1.000
20	707	0.0000	21	1.000	475	0.0000	25	1.000
21	34	0.0067	33	1.000	750	0.0000	25	1.000
22	143	0.0067	31	1.000	464	0.0000	24	1.000
23	189	0.0067	26	1.000	587	0.0000	24	1.000
24	379	0.0067	26	1.000	392	0.0000	24	1.000
25	754	0.0067	25	1.000	318	0.0000	23	1.000
26	573	0.0067	24	1.000	416	0.0000	23	1.000
27	50	0.0133	29	1.000	417	0.0000	23	1.000
28	180	0.0133	29	1.000	418	0.0000	23	1.000
29	465	0.0133	22	1.000	470	0.0000	23	1.000
30	755	0.0133	15	1.000	471	0.0000	23	1.000
31	390	0.0167	25	1.000	387	0.0000	22	1.000
32	202	0.0167	22	1.000	466	0.0000	22	1.000
33	898	0.0167	7	1.000	467	0.0000	22	1.000
34	T009	0.0167	3	1.000	686	0.0000	22	1.000
35	618	0.0200	28	1.000	159	0.0067	31	1.000
36	187	0.0200	26	1.000	181	0.0067	29	1.000
37	861	0.0200	8	1.000	148	0.0067	26	1.000
38	876	0.0200	8	1.000	182	0.0067	25	1.000
39	981	0.0200	3	1.000	574	0.0067	24	1.000
40	980	0.0200	3	1.000	156	0.0100	31	1.000
41	790	0.0233	10	1.000	150	0.0133	31	1.000
42	T005	0.0233	3	1.000	153	0.0133	31	1.000
43	990	0.0333	2	1.000	154	0.0133	31	1.000
44	841	0.0400	9	1.000	620	0.0133	28	1.000
45	950	0.0475	4	1.000	452	0.0133	26	1.000
46	203	0.0550	22	1.000	453	0.0133	26	1.000
47	213	0.0550	21	1.000	397	0.0133	22	1.000
48	280	0.0550	20	1.000	575	0.0133	17	1.000
49	220	0.0583	21	1.000	612	0.0133	15	1.000
50	335	0.0583	18	1.000	391	0.0167	26	1.000

Rank	MALES	MK	Age Known	FEMALES	MK	Age Known
51						
52				T020	0.0167	1 1.000
53				842	0.0200	9 1.000
54				T002	0.0200	4 1.000
55				T004	0.0200	3 1.000
56				T013	0.0200	1 1.000
57				991	0.0217	2 1.000
58				772	0.0233	11 1.000
59				791	0.0233	10 1.000
60				T008	0.0233	3 1.000
61				533	0.0267	15 1.000
62				157	0.0333	31 1.000
63				238	0.0583	21 1.000
64				219	0.0583	21 1.000
65				819	0.0583	10 1.000
66				822	0.0583	10 1.000
67				542	0.0683	15 1.000
68				788	0.0683	10 1.000
69				218	0.0750	21 1.000
				582	0.0750	15 0.500

GENETIC SUMMARY OF POPULATION

Descendant population Mean Kinship:	0.0351
Gene Diversity:	0.9649
Founder Genome Equivalents:	14.2405
Desc. population mean Kinship Value:	0.0315
Gene Value:	0.9685

BOX 3

DERIVATION OF ADDITIONAL BREEDERS AND ULTIMATE POPULATION SIZE NEEDED FOR SOUTHERN WHITE RHINO

The number of additional breeders needed/desired from among the non-breeder wild borns has been derived by using the CAPACITY Program (Version 3.0) to generate the table below.

Assumption/values for the purposes of the calculations are:

Generation Time 19 Years, the average of the values for females and males (Refer to Demographic Analyses)

Length of Program 190 Years, i.e. the equivalent of 10 rhino generations.

Current Year Program considered to be in 10th year

% Diversity Retained To Date In the living descendant population (using analyses with unknowns omitted), the gene diversity retained is 96.5 %, i.e. the amount of diversity contained in 14.24 Founder Genome Equivalents. There are, however, 24.3 founder genomes surviving. If the founder representation of all 24.3 could be perfectly equalized, then 24.3 FGE's would be possible. However, it is assumed here that the amount of gene diversity that can be redeemed by adjusting founder lineages is about half of the total, or approximately, 19.3 FGE's which is equivalent to 97.4% retention of genetic diversity, which is the initial value used.

As each new breeder is added, the diversity retained to date is recalculated assuming that each new breeder will add .5 to the FGE's of the population used to calculate the % diversity retained to date. (This increment to the FGE's assumes that future descendants of these founders will be preferentially and not randomly reproduced in the population through multiple generations. Hence, while it would be difficult to realize such a significant increase in FGEs in the F1 generation, through multiple generations of preferential reproduction, it is assumed that this increment is reasonable.)

This approach has been used rather than projecting hypothetical matings and then calculating FGEs and % diversity retained from GENES because of the great uncertainties about which white rhino might actually reproduce.

Effective Size of Population The number that the CAPACITY Program expects here is the current effective size of the population. Using the simple formula N_e based on the number of male (17) and female (24) breeders, the N_e is actually about 40. To be more conservative, a second set of calculations has been performed using 25 as the initial N_e (i.e., $\frac{1}{2}$ the total number 120 X .2 the N_e/N ratio suggested by the amount of diversity retained in the living descendant population.)

As additional wild-born non-breeders do reproduce, it is assumed that each more or less immediately adds 1 to the effective size of the population.

Estimated N_e/N Ratio Currently for white rhino it is low, probably about .2; the value used here is .5, believed to be an achievable objective.

% Diversity To Be Retained 90%

N_e The Ultimate Population Size needed to achieve the Genetic Objectives, i.e. 90% of gene diversity for 190 Years or 10 white rhino generations.

Growth Rate* 1.05

However, growth rate is not in population size since the total numbers of the population are actually greater than what are needed. Rather the growth rate is the expansion of the genetically desirable population or from another perspective the improvement in the effective size of the population due to improved management. At 5% per year, N_e would increase by a factor of 2.5 in a rhino generation (19 years).

EFFECTS OF RECRUITING ADDITIONAL NON-BREEDER WILD-BORN TO REPRODUCE

Initial $N_t = 40$

# OF NEW BREEDERS	N_t NOW	FGE	% DIVERSITY RETAINED	ULTIMATE N_t NEEDED
0	40	19.3	97.4	120
4	44	21.3	97.7	114
8	48	23.3	97.9	110
12	52	25.3	98.0	106
16	56	27.3	98.2	104
20	60	29.3	98.3	102
24	64	31.3	98.4	102
28	68	33.3	98.5	100

EFFECTS OF RECRUITING ADDITIONAL NON-BREEDER WILD-BORN TO REPRODUCE

Initial $N_t = 25$

# OF NEW BREEDERS	N_t NOW	FGE	% DIVERSITY RETAINED	ULTIMATE N_t NEEDED
0	25	19.3	97.4	138
4	29	21.3	97.7	124
8	33	23.3	97.9	116
12	37	25.3	98.0	112
16	41	27.3	98.2	108
20	45	29.3	98.3	104
24	49	31.3	98.4	102
28	53	33.3	98.5	100

There are currently 31 non-breeder, wild-born females and 17 non-breeder, wild-born males in the population. A reasonable objective may be to try recruiting about half of them, i.e. 15 females and 8 males for a total of 23 additional breeders, each of which might produce 2 offspring. Equivalently, more wild-born non-breeders might be recruited to reproduce but produce only 1 offspring before death since many of the wild-caughts are rather old.

The amount of gene diversity retained depends not only on the number of founder lineages represented but also on their relative representation. The more even this representation, the greater the diversity retained. Hence, it should be possible to increase the gene diversity retained by adjusting the relative representation of founders in particular by removing some of the representatives the very over-represented lineages as replacements become available from other breedings.

The bottom line is that a target population of 100 does seem capable of achieving the genetic objectives, i.e. preserving 90% of original gene diversity for at least 110 and perhaps up to 190 years (~ 10 white rhino generations) if genetic management can be applied at the level described.

BOX 4

TARGET POPULATION CALCULATIONS FOR SOUTHERN WHITE RHINO SSP WITH CAPACITY 3.0

Capacity 3.0

=====

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

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.050	Length of Program (Years):	150
% Diversity Retained to Date:	97.4	% Hetero. To Retain:	90.0
Effective Size of Population:	25.0		
Estimated Ne/N Ratio:	0.50	Growth rate per Generation:	2.08
Current Year:	10	# Generations during 150 Years:	10

Effective Size Required to Maintain 90.0% of the
Original Founder's Heterozygosity for 150 Years: 72

Actual Population Size Required (Based on Ne/N Ratio): 144

=====

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

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.050	Length of Program (Years):	150
% Diversity Retained to Date:	98.5	% Hetero. To Retain:	90.0
Effective Size of Population:	68.0		
Estimated Ne/N Ratio:	0.50	Growth rate per Generation:	2.08
Current Year:	10	# Generations during 150 Years:	10

Effective Size Required to Maintain 90.0% of the
Original Founder's Heterozygosity for 150 Years: 50

Actual Population Size Required (Based on Ne/N Ratio): 100

=====

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

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.050	Length of Program (Years):	150
% Diversity Retained to Date:	97.4	% Hetero. To Retain:	90.0
Effective Size of Population:	40.0		
Estimated Ne/N Ratio:	0.50	Growth rate per Generation:	2.08
Current Year:	10	# Generations during 150 Years:	10

Effective Size Required to Maintain 90.0% of the
Original Founder's Heterozygosity for 150 Years: 60

Actual Population Size Required (Based on Ne/N Ratio): 120

=====

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

No. of Years per Generation (T):	15.0	PROGRAM GOALS:	
Annual Growth Rate (lambda):	1.050	Length of Program (Years):	150
% Diversity Retained to Date:	98.5	% Hetero. To Retain:	90.0
Effective Size of Population:	53.0		
Estimated Ne/N Ratio:	0.50	Growth rate per Generation:	2.08
Current Year:	10	# Generations during 150 Years:	10

Effective Size Required to Maintain 90.0% of the
Original Founder's Heterozygosity for 150 Years: 50

Actual Population Size Required (Based on Ne/N Ratio): 100

**SOUTHERN WHITE RHINO
REPRODUCTIVE HISTORY OF EACH FEMALE**

STBK #	NO. OF OFFSPRING	AGE	OFFSPRING		
			STBK #	Sex	Fate
147	9	11	282	F	Dead
		13	286	M	Europe
		14	535	M	China
		16	543	M	IAE
		18	668	M	China
		20	784	F	Alive
		21	821	F	New Zealand
		23	860	M	Dealer
		25	926		
148	2	6	280	M	Alive
		7	409	F	Germany-Dealer
150	9	10	238	F	Alive
		11	284	M	Out SSP
		13	333	F	Out SSP
		14	536	M	Japan
		16	540	F	New Zealand
		17	649	F	Germany
		19	783	M	Out SSP
		21	822	F	Alive
		23	877	F	Dead

**SOUTHERN WHITE RHINO
REPRODUCTION HISTORY OF EACH FEMALE**
(Continued)

STBK #	NO. OF OFFSPRING	AGE	OFFSPRING		
			STBK #	Sex	Fate
153	5	10	219	F	Alive
		12	468	M	Japan
		20	700	F	IAE
		26	898	M	Alive
		29	963	M	IAE
154	8	10	220	M	Alive
		11	283	F	Dead
		13	335	M	Alive
		16	541	M	New Zealand
		20	774	F	Dead
		22	824	F	Dead
		23	863	F	Dealer
		25	930	F	N. Zealand-Dealer
156	4	14	599	F	Alive
		22	825	F	Dead
		24	909	M	Dead
		29	991	F	Alive
157	8	10	218	F	Alive
		14	537	M	Japan
		16	542	F	Alive
		17	648	F	Cuba
		19	689	M	Dead
		20	788	F	Alive
		25	928	F	Germany-Dealer
		29	990	M	Alive

**SOUTHERN WHITE RHINO
REPRODUCTIVE HISTORY OF EACH FEMALE**
(Continued)

STBK #	NO. OF OFFSPRING	AGE	OFFSPRING		
			STBK #	Sex	Fate
159	9	11	281	M	Dead
		14	534	M	Germany
		18	667	F	China
		19	773	F	Dealer
		21	820	F	New Zealand
		23	864	M	Germany-Dealer
		25	929	F	Germany-Dealer
		28	980	M	Alive
		9	212	F	Dead
181	3	11	275	F	Guatemala
		15	583	F	Germany
		7	202	M	Alive
182	9	10	237	F	Dead
		11	398	M	Guatemala
		13	763	M	Dealer
		14	549	M	Russia-Dead
		20	831	F	New Zealand
		22	897	M	New Zealand
		24	968	M	Mexico
		26	T007	M	Dead
		28	T020	F	Alive
218	4	22	826	M	Germany-Dealer
		27	950	M	Alive
		6	582	F	Alive
		9	748	M	Out SSP

**SOUTHERN WHITE RHINO
REPRODUCTION HISTORY OF EACH FEMALE**
(Continued)

STBK #	NO. OF OFFSPRING	AGE	OFFSPRING		
			STBK #	Sex	Fate
277	10	11	285	M	IAE
		12	288	M	Mexico
		13	529	M	Quinn?
		15	539	M	Japan
		17	647	M	China
		18	701	M	Europe
		20	775	M	Dealer
		21	823	M	New Zealand
		23	862	M	Germany-Dealer
		25	925	F	Germany-Dealer
391	2	10	533	F	Alive
		16	809	F	Germany-Dealer
391	3	18	921	M	New Zealand
		20	T003	F	Dead
		22	T005	M	Audubon
397	7	11	771	M	Dead
		12	795	M	Dead
		13	842	F	Alive
		15	914	M	New Zealand
		19	981	M	Alive
		7	924	F	Dead
		9	627	M	Germany-Dealer
416	10	1	590	F	S. America

SOUTHERN WHITE RHINO
REPRODUCTIVE HISTORY OF EACH FEMALE
(Continued)

STBK #	NO. OF OFFSPRING	AGE	OFFSPRING		
			STBK #	Sex	Fate
418	1	9	589	M	Germany
452	5	11	588	M	Dead
		12	623	F	IAE
		16	790	M	IAE
		18	882	F	IAE
		23	T004	F	Alive
453	5	11	793	F	Dead
		13	626	F	Dealer?
		15	772	F	Alive
		22	T002	F	Alive
		24	T014	M	Dead
474(Dead)	1	14	922	F	Dead
533	4	16	879	M	Dead
		17	878	F	Dead
		19	927	M	Germany-Dealer
		23	T008	F	Alive
574	1	7	575	F	Alive
575	1	21	T011	F	Dead
599	2	7	841	M	Alive
		9	947	F	Alive

SOUTHERN WHITE RHINO
REPRODUCTIVE HISTORY OF EACH FEMALE
(Continued)

STBK #	NO. OF OFFSPRING	AGE	OFFSPRING		
			STBK #	Sex	Fate
620	6	12	621	M	Dead
		13	622	M	IAE
		16	676	M	Germany
		18	791	F	Alive
		21	920	M	Dead
		22	T009	M	Alive
751(Dead)	1	10	756	F	Dead
752(Dead)	1	10	755	M	Alive

SECTION 8

NORTHERN WHITE RHINO SSP

INSTITUTION BY INSTITUTION

RECOMMENDATIONS

MASTERPLAN REPORT DEFINITIONS

Stud # -- Studbook ID Number

Sex -- '-' indicates the animal is sterilized or contracepted

Birth/Hatch Date

Arrival -- Arrival date at the current institution

Sire/Dam -- Sire/Dam IDs

Loc ID -- Current institution ID number

Social -- Current social group at the current institution

Genome Known: Proportion of animal's genome known

F -- Inbreeding Coefficient
First value assures animals of unknown origin are founders.
Second value omits animals of unknown origin.

MK -- Mean Kinship
First value is mean kinship. Second value is mean kinship if animals of unknown origin are omitted.

KV -- Kinship Value
A weighted mean kinship where the weights are the other animals' reproductive values.
Second value omits animals of unknown origin.

GU-All -- Genome Uniqueness
Proportion of genes in an animal that are not found in the rest of the population.

GU-CB -- Genome Uniqueness of Captive-Born Animals
Proportion of genes in an animal that are not found in the rest of the captive-born population.

Vx -- Reproductive Value
Expected future lifetime reproduction by an animal of age x.

Global vs. Restricted

-- Following values may be calculated using all animals in the studbook or using the population specified by the view set for the report.

Live sibs -- Half siblings are counted as complete siblings.

Live offspr -- Living offspring

Repro offspr -- Reproducing offspring

Founder representation

-- Percent of this animal's genes that descended from each founder.

INSTITUTION SHEETS

ARE ORGANIZED

BY COUNTRY: CANADA/U.S.A.

WITHIN COUNTRY: ALPHABETICALLY BY PROVINCE/STATE

Masterplan Report
NORTHERN WHITE RHINO Studbook
(*Ceratotherium sinu cottoni*)

Living Population at: San Diego Wild Animal Park

SD-WAP

Stud #	Sex	Birth Date Arrival	Sire Dam	Loc ID Social	Genome Known					GU-All GU-CB	Vx	<< Restricted >>		Founder Representation
						F	MK	KV				Live Sibs	Live Offspr	
						[unks = founders]						Repro Offspr		
						[unknowns removed]								
348	M	~ 1972 12 Aug 1990	WILD WILD	_____								.	.	
												.	.	
												.	.	
373	M	~ 1972 14 Oct 1989	WILD WILD	_____								.	.	
												.	.	
												.	.	
374	F	~ 1974 14 Oct 1989	WILD WILD	_____								.	.	
												.	.	
												.	.	
376	F	~ 1972 14 Oct 1989	WILD WILD	_____								.	.	
												.	.	
												.	.	

Recommendations:

Continue intensive efforts at reproductive analysis and management to induce breeding.

Cooperate with attempts to manage all individuals in captivity and in wild as part of a global metapopulation.

SECTION 9
POPULATION ANALYSES FOR
NORTHERN WHITE RHINO
SSP POPULATION

Age Pyramid Report

Restricted to: NORTHERN WHITE RHINO Studbook

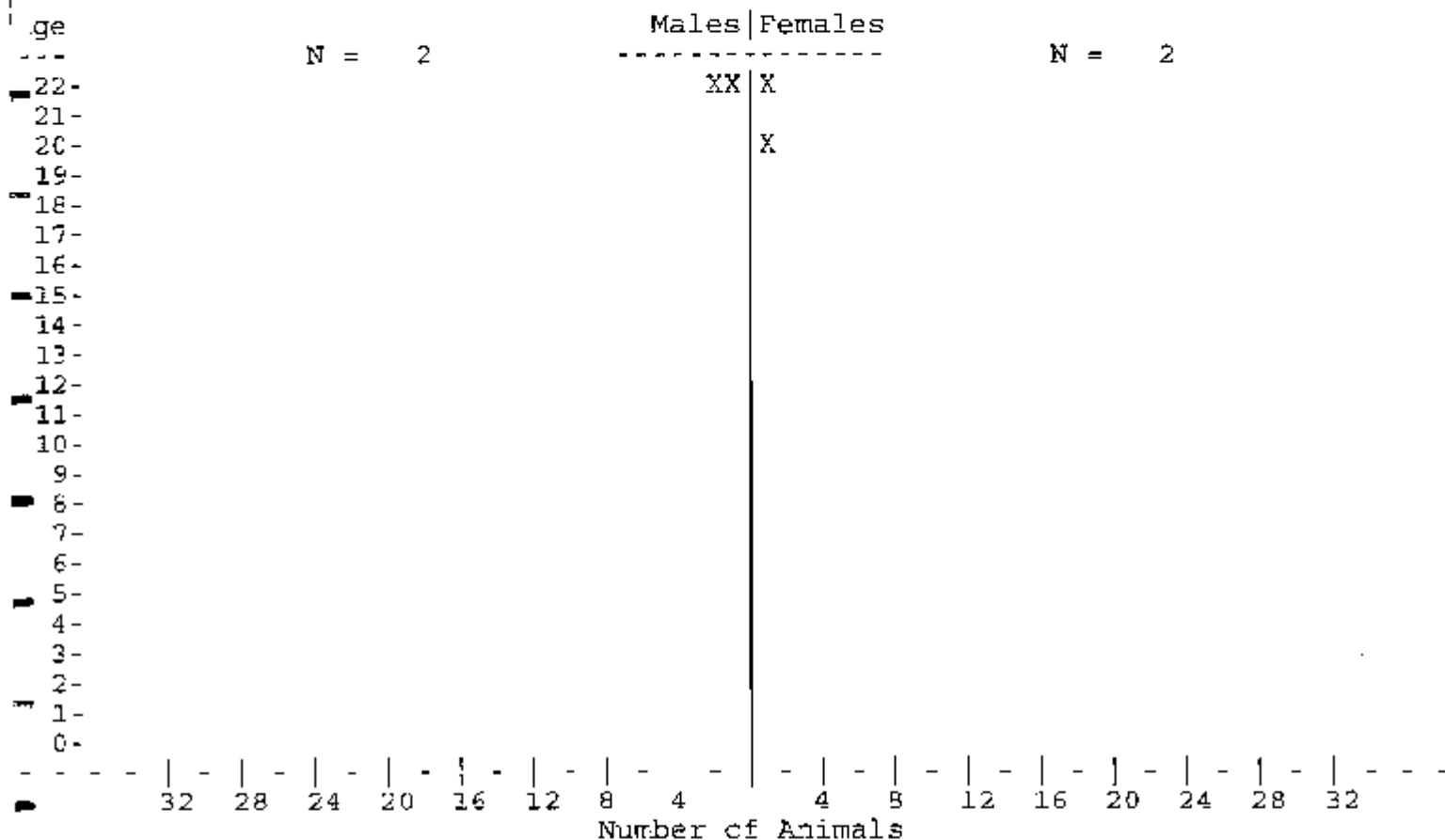
Page 1

Locations: N.AMERICA/

Dates: As of End of 01/06/1994 <= date

Status: Living by

Taxon Name: CERATOTHERIUM SIMUM COTTONI



X >>> Specimens of known sex...

? >>> Specimens of unknown sex...

Age Pyramid Report

Restricted to: NORTHERN WHITE RHINO Studbook

Page 2

Locations: N.AMERICA/

Dates: As of End of 01/06/1994 <= date

Status: Living by

=====

Taxon Name: CERATOTHERIUM SIMUM COTTONI

=====

Age Studbook Numbers >>> Male

22 348 373

21

20

19

18

17

16

15

14

13

12

11

10

9

8

7

6

5

4

3

2

1

0

Total= 2

Age Pyramid Report

Restricted to: NORTHERN WHITE RHINO Studbook

Page 3

Locations: N.AMERICA/

Dates: As of End of 01/06/1994 <= date

Status: Living by

Taxon Name: CERATOTHERIUM SIMUM COTTONI

Age Studbook Numbers >>> Female

22	376
21	
20	374
19	
18	
17	
16	
15	
14	
13	
12	
11	
10	
9	
8	
7	
6	
5	
4	
3	
2	
1	
0	

Total= 2