Rhino Global Captive Action Plan Workshop

Regional Captive Propagation Programs

RHINO

GLOBAL CAPTIVE ACTION PLAN (GCAP)

FIRST EDITION

1 SEPTEMBER 1992

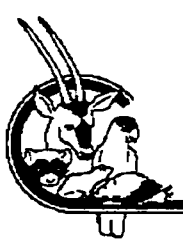
EDITED BY
THOMAS J. FOOSE, PH.D.
IUCN /SSC CBSG

A Joint Endeavor of the

IUCN/SSC Captive Breeding Specialist Group
&
Regional Captive Propagation Programs

with Input from the

IUCN/SSC Asian Rhino Specialist Group
&
IUCN/SSC African Rhino Specialist Group



Regional Captive
Propagation Program

A contribution of the IUCN/SSC Captive Breeding Specialist Group, Regional Captive Propagation Programs, the IUCN/SSC Asian Rhino Specialist Group, and the IUCN/SSC African Rhino Specialist Group.

Cover Artwork by Linda Escher.

Foose, T.J. (ed.). Rhino Global Captive Action Plan (GCAP), First Addition. IUCN/SSC Captive Breeding Specialist Group, Apple Valley, MN. 1992: 1-189.

Additional copies of this publication can be ordered through the IUCN/SSC Captive Breeding Specialist Group, 12101 Johnny Cake Ridge Road, Apple Valley, MN 55124. Send checks for US $35.00 (for printing and shipping costs) payable to CBSG; checks must be drawn on a US Bank. Funds may be wired to First Bank NA ABA No. 091000022, for credit to CBSG Account No. 1100 1210 1736.

The work of the Conservation Breeding Specialist Group is made possible by generous contributions from the following members of the CBSG Institutional Conservation Council

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1 April 1995

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SECTION 1

SUMMARY & OVERVIEW

OVERVIEW OF THE WORLD'S RHINOS

- At maximum, there are 12 or 13 (if *Dicerorhinus sumatrensis lasiotis* still survives) distinct taxa of rhino that may deserve conservation efforts as separate units.

- All 13 taxa are threatened with extinction. In terms the new Mace-Lande (1991) categories and criteria: 7 (or 8) are critical, 4 are endangered, 1 is vulnerable. (Table 1)

- There are an estimated 11,640 rhino surviving in the wild: 8991 African, 2650 Asian. Thus, 77% of the surviving wild rhino are African, indeed 48% (almost half) are southern white rhino; 23 % of the surviving wild rhino are Asian. (Table 2)

- The surviving wild rhino occupy 40 major protected areas: 20 African and 20 Asian. (Table 3).

- A conservative estimate of the operating budgets for these protected areas is US $20,000,000 (Table 4).

- 8 of the 13 taxa are present in captivity (Table 2).

- There are 928 rhino registered in captivity: 785 African, 143 Asian. (Table 2) Captive specimens represent about 7.5% of the surviving rhino on the planet.

- Combining wild and captive, there are an estimated 12,569 rhino on the planet.

- At least 290 captive facilities worldwide maintain specimens of at least 1 taxon of rhino (Table 5). 266 facilities maintain African rhino; 52 maintain Asian rhino. At least 200 of the captive facilities for rhino are in "hard currency" countries and have combined annual operating budgets of US $ 1,000,000,000.

- Organized Captive Propagation Programs are in progress in 5 Regions of the zoo/aquarium world:

	Australasia	Japan	India	Europe	North America	S.E. Asia
Black	X			X	X	X
White	X	X		Soon	X	
Indian/Nepali		X	X	X	X	
Sumatran	Proposed			Soon	X	X

- The rates of growth (Table 6) are lower for all taxa in captivity than in adequately protected areas of the wild. However, rates of growth are improving.

- The potential genetic foundation for 4 (Eastern Black, Southern Black, Southern White, and Indian/Nepali) of the 8 taxa in captivity is good (Table 7) and the amount of the wild gene pool still retainable is high > 90 % (Tables 8 & 9). The genetic foundation of the 3 Sumatran taxa needs to be reinforced. The genetic foundation of the Northern white rhino population is limited and additional reinforcement is not advisable at this time.

- The distribution of genetic diversity is uneven among the Regional programs (Tables 7-9).

BACKGROUND

INTRODUCTION

This document represents the first version of a Global Captive Action Plan (GCAP) for Rhino. It is the result of Workshop conducted at the Zoological Society of London 9-10 May 1992.

The purpose of this GCAP is to provide a strategic overview and framework for effective and efficient application and allocation of captive resources to rhino conservation. A primary focus of the GCAP is on captive propagation programs that can serve as genetic and demographic reservoirs to support survival and recovery of wild populations in the future. While captive breeding programs are emphasized in the GCAPs, the Plans also attempt: (1) to identify where and how the captive community can assist with transfer of intensive management information and technology to the wild; (2) to develop priorities for the limited financial support the captive community can provide for *in situ* conservation (e.g., adopt-a-sanctuary programs).

GCAPs are developed by a Global Action Plan Working Group which includes representatives from each of the Regional Captive Programs. The GCAPs provide a strategic framework within which the Taxon Advisory Groups (TAGs) in the various organized Regions (ASMP, EEP, SSP, SSCJ) of the zoo and aquarium world will formulate and implement their own Strategic Regional Collection Plans. In reality, Global and the Regional Plans will be interactively and iteratively developed. The Regional TAGs are integrally involved in the development of the Global Captive Action Plans. (Figure 1)

Ideally, the Regional TAGs then consider this first draft of the GCAP within a regional context to develop a draft of a Regional Collection Plan (RCP). Once draft Regional Plans are formulated, the GCAP process continues as the RCP's of various regions are reviewed at the global level in an attempt to coordinate and, where necessary and agreeable, adjust Regional priorities in an attempt to maximize effectiveness of the international captive community in responding to conservation needs. The GCAP and RCP process are thus both interactive and iterative. In this way RCP's of the various Regions will not develop in isolation from one another and captive resources can be allocated efficiently and effectively to taxa in need.

Ultimately, the GCAP will recommend how responsibilities for captive programs might best be distributed among organized Regions of the global captive community. Further, the Global Captive Action Plan Working Groups will facilitate interaction and coordination among Regional TAGs as they develop their Regional Collection Plans and Regional Breeding Programs in an attempt to optimize use of captive space and resources for conservation on an international basis.

The Regional TAGs will most accurately assess captive holding/exhibit space in their Regions using surveys and censuses to supplement studbook databases, ISIS records, national or regional inventories, etc. It is through the Regional Collection Plans and the Regional Breeding Programs developed thereunder that the recommendations of the Global Captive Action Plans will be realized. However, to maximize the efficiency and effectiveness of captive resources, Regional Programs will need to be integrated and coordinated to form global programs, i.e. the Global Animal Survival Plans (GASPs).

Any and all taxa that are maintained in captivity should be managed as populations. Hence, once taxa are selected for captive propagation, they must be managed by Regional (RCPP) and Global (GCPP or GASP) Captive Propagation Programs. Therefore there should be studbooks, coordinators, masterplans, taxon advisory groups or other management provisions for these taxa. Moreover, animal spaces as well as the animals themselves should be managed. If zoos and aquaria are to respond to the need and aspire to goals such as suggested in will increasingly need to be more collective, i.e. more through Taxon Advisory Groups rather than individual taxon management and/or propagation committees. Hence in the case of the rhinos, it is proposed that a Global Propagation and Management Group (Figure 2) be organized to develop and implement the Global Action Plan which in essence will encompass the GASP's for all taxa being maintained in captivity. Further, realizing that human resources are often the most limited, the Rhino GCAP recommends creation of a paid position to act as chair of this Global Committee.

CAMPs

GCAPs are actually one product of a broader process known as Conservation Assessment and Management Plans (CAMPs). As populations of wildlife like rhino are reduced and fragmented in the wild, more intensive management becomes necessary for their survival and recovery. This intensive management may include, but is not limited to, captive breeding (Figure 3). CAMPs provide strategic guidance for application of intensive management techniques to threatened taxa.

Conservation strategies and action plans for threatened taxa must be based on viable populations, i.e. sufficiently large and well distributed to survive stochastic risks as well as deterministic threats. Viable conservation strategies and action plans also frequently will require management in addition to protection for small populations.

Viable population strategies may often require that the taxa be managed as metapopulations, i.e. systems of disjunct subpopulations that are interactively managed with regulated interchanges among them and interventions within them to enhance survival of the taxon (Figure 4). The management actions may include: establishment, enlargement, or more management of protected areas; poaching control; reintroduction or translocation; captive breeding; sustainable use programs; education efforts. (It's so much easier working with extinct species, they much less controversial.)

Viable metapopulations often will probably need to include captive components. The IUCN Policy Statement on Captive Breeding (IUCN 1987) recommends in general that captive propagation programs be a component of conservation strategies for taxa whose wild population is below 1000 individuals.

CAMPs are developed as collaborative efforts of the IUCN/SSC CBSG with the other taxa-based IUCN/SSC Specialist Groups and the Regional Taxon Advisory Groups of the zoo/aquaria community worldwide. Within the Species Survival Commission (SSC) of IUCN, the primary goal of the Captive Breeding Specialist Group (CBSG) is to contribute to the development of holistic (i.e. integrating *in situ* and *ex situ*) and viable conservation strategies and action plans by the taxa-based Specialist Groups of the SSC.

The CAMP process reviews the wild and captive status of all taxa in the taxonomic group under consideration, on a taxon-by-taxon basis. CAMPs assess the degree of threat for each taxon in the wild and recommend intensive action that may reduce the risks for threatened taxa. For this purpose, the process utilizes information from SSC Specialist Groups and their Action Plans as well as additional data from experts on the taxa.

Concerning taxonomy, the most conservative approach, relative to the preservation of biodiversity, is to attempt risk assessment and management recommendations initially in terms of the maximal distinction among possible "subspecies" until taxonomic relationships are better elucidated. Splitting rather than lumping maximizes preservation of options. Taxa can always be merged ("lumped") later if further information invalidates the distinctions or if biological or logistic realities of sustaining viable populations precludes maintaining taxa as separate units for conservation.

The CAMP process is also providing an opportunity to test the applicability of the Mace/Lande Criteria (Conservation Biology) as a major consideration for assessment of threat. The Mace/Lande system is being considered as the new IUCN Categories of Threat and are still under active development. The scheme attempts to assess threat in terms of likelihood of extinction within a specified period of time.

The proposed system defines 3 categories for threatened taxa:

Critical 50% probability of extinction within 5 years or 2 generations, whichever is longer.

Endangered 20% probability of extinction within 20 years or 10 generations, whichever is longer.

Vulnerable 10% probability of extinction within 100 years.

Criteria are proposed to estimate the risk of extinction of taxa and assign a degree of threat based on information about size, distribution, and trend of their population as well as conditions of their habitat. Their purpose is to provide a system that is more objective and rational than previous schemes have been. Definition of these categories and assessment of threat is based on population viability theory. Table 1 contains a Mace-Lande risk assessment for rhino taxa.

Based on these assessments, the CAMP process provides a set of recommendations about which taxa are in need of various kinds of intensive management attention, especially involving the captive community. At the CAMP level, the recommendations for intensive management are provided for use by managers of both wild and captive populations.

GCAPs

The GCAP specifically relates the CAMP process to the captive community. GCAPs recommend what the captive community could and should attempt to contribute to the intensive management needs of the threatened taxa.

(1) Population and Habitat Viability Assessment and Conservation Management Plan (PHVA) Workshops.

(2) Intensive (captive-type) protection and management in the wild
   (A) identifying where and how the captive community can assist with transfer of intensive management information and technology (i.e., recognizing natural sanctuaries as megazoos.)
   (B) developing priorities for the limited financial support the captive community can provide for *in situ* conservation (e.g., adopt-a-sanctuary programs)

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

(4) Captive propagation programs that sooner or later could be linked to interactions with wild populations;

(5) Genetic resource banking and application of reproductive technology, which will become available to enhance populations of animals in captivity, and the wild. Major initiatives are under way to establish a comprehensive and coordinated system of genetic resource banks.

In general, captive populations and programs can serve three roles in such holistic conservation strategies:

(A) Living ambassadors that can educate the public at all levels and can generate funds for *in situ* conservation.

(B) Scientific resources that can provide information and technologies beneficial to protection and management of populations in the wild.

(C) Genetic and demographic reservoirs that can be used to reinforce survival of taxa in the wild either by revitalizing populations that are languishing in natural habitats or by re-establishing populations that have become extinct.

The third of these roles may often be a benefit for the longer term as return to the wild may not be a prospect for the immediate future. However, it is proposed that captive and wild populations should and can be intensively and interactively managed with interchanges of animals occurring as needed and as feasible (Figure 4). There may be many problems with such interchanges including epidemiologic risks, logistic difficulties, financial limitations, etc. But with effort, based on limited but growing experience, these problems can be resolved. The bottom line is that strategies and priorities should try to maximize options and minimize regrets. Captive populations are support, not a substitute, for wild populations.

Where captive programs are recommended by CAMPs and GCAPs, there is an attempt to propose the level of captive programs required, reflecting status and prospects in the wild as well as taxonomic distinctiveness. The level of captive program is defined by its genetic and demographic objectives which translate into a target population size (i.e., how many to ultimately maintain) that will be required to achieve these objectives. Target population depends on a number of factors:

- level of demographic security
- kind and amount of genetic diversity
- period of time
- size of the wild population
- size of other captive populations of similar species
- reproductive technology available

There will be multiple genetic and demographic objectives depending on the status and prospects of the taxon in the wild and hence different captive population targets: some taxa need large populations for a long time; others need small incipient nuclei or reduced gene pools that can be expanded later if needed.

The approximate scheme that has evolved for Global Captive Action Plans so far is:

Captive Recommendation	Level of Captive Program
90% / 100 Years I	Population sufficient to preserve 90% of the average heterozygosity of the wild gene pool for 100 years, developed as soon as possible (1-5 years).
90% / 100 Years II	Population sufficient to preserve 90% of the average heterozygosity of the wild gene pool for 100 years but developed more gradually (5-10 years).
Nucleus I	A captive nucleus (50-100 individuals) to always represent 98% of the wild gene pool. This type of program will require periodic, but in most cases modest immigration/importation of individuals from the wild population to maintain this high level of genetic diversity in such a limited captive population. Reproductive technology will facilitate this strategy.
Nucleus II	A well managed captive nucleus (25-100) for taxa not of conservation concern but present in captivity or otherwise of interest.
Elimination	Taxa are not of conservation concern and are not otherwise of interest. The population should be managed to extinction.

The program goals for 90%/100 Years I and II taxa are different from what has been recommended as the general guideline for captive programs in the past, i.e. 90% of genetic diversity for 200 years. A shorter time period is proposed for 2 reasons:

- It buys time for more taxa that might be excluded from captive programs if a longer time period (e.g. 200 years) is adopted.
- It maintains more incentive to secure or restore viable populations *in situ*.

Captive programs at the 90/100 I level are recommended for 7 taxa of rhino: Eastern Black, Southern Black, Southern White, Indian/Nepali, and 3 geographical varieties of Sumatran Rhino (representing the populations on Sumatra, Borneo, and in Peninsular Malaysia). Additionally, a last, crash effort is recommended to attempt to develop a successful breeding program with the Northern White Rhino in captivity. If this effort does succeed, the GCAP will probably adjust its recommendation concerning the level of captive program for this taxon.

Computer models and software exist (Ballou 1991) to establish rough targets based on the genetic and demographic considerations. During the Workshop, Simon Wakefield, Georgina Mace, and Tom Foose assisted the Taxon Working Groups with these analyses. Results of such calculations for various taxa of rhino are presented in Section 9. These analyses were used by the Working Groups to recommend target population objectives for their taxa. Target population size objectives are recommended at both the global and regional level. (Table 2).

GCAPs must also confront the realities of limitation in captive habitat (space and other resources. The priorities for captive propagation must be reconciled by the potential or capacity of zoos and aquaria. TAGs in many Regions are now conducting surveys of the amount of captive space available. These surveys are rather sophisticated considering the captive ecologies and taxonomic affinities of the taxa, zoogeographic themes of the institutions. The recommendations for target size require an expansion of rhino space in zoos by 46% over the next 15 years. Initial surveys in North America and some preliminary indications for Europe suggest such expansion is feasible and likely. The recommendations also entail adjustments to current sizes of captive populations, e.g., the Rhino GCAP is recommending that the captive population of Southern White Rhino be reduced while the populations for the other rhino taxa are recommended to increase.

A Glossary of the relationships among the CAMP, GCAP, etc. is provided in Section 11.

WORKSHOP

As is usual, the CAMP and GCAP process for rhinos was initiated by a Global Workshop. Participants included the International and Regional Studbook Keepers and most of the Regional Species Coordinators for each of the rhino taxa, African and Asian. Also participating were the Chairs of the African and Asian Rhino Specialist Groups as well as a few of their other members. A list of participants is included at the end of this Section. Also appended is the agenda for the Workshop.

Also appended is a draft agenda for this Workshop. The Workshop commenced with a plenary session in which some overview and orientation were presented. All participants then formulated the goals and objectives for the Workshop.

Goals:

- Prepare the first draft of a Rhino Global Captive Action Plan:
  - This Plan will include goals, priorities, guidelines for both *ex situ* and *in situ* rhino conservation activities by zoos worldwide.
  - The Plan will be the first step in a continuing process to develop a truly global effort by zoos in rhino conservation through facilitation and coordination of interactions among the various Regional programs.

- Form a Rhino Global Captive Propagation and Management Committee as the vehicle for continuing development of the Global Captive Action Plan.
  - This Committee will consist of the various Regional Rhino Coordinators at both the single taxon and the taxon advisory group (TAG) level.
  - The Committee will also invite the Chairs of the SSC Rhino Specialist Groups to serve as advisors.
  - Other advisors will be appointed by the Committee.
  - The Committee will have assigned Responsibilities

Objectives:

- Recommend intensive management actions for each taxon.
  - Population and habitat viability analyses (PHVA),
  - Problem-oriented research,
  - More intensive in-situ management,
  - Captive breeding
- Confirm which rhino taxa are to be selected for captive breeding programs.
- Establish target populations for those taxa to be maintained in captivity.
- Identify expansion in the capacity of captive facilities needed to accommodate these target populations.
- Suggest interactions between regional programs that may be beneficial to the captive propagation programs for the various taxa.
- Prioritize *in situ* protected areas, important populations, and significant projects for financial and technical support by zoos.
  - In particular, propose a plan for Regional responsibilities for *in situ* conservation.
- Delineate and prioritize research (conservation) both by species and also by family
- Compile a statement of goals and objectives for each species/taxon
- Consider "subspecies" (geographically distinct population) issues:
  - Assess current state of information
  - Describe a further process for arriving at conclusive guidelines for how captive community will treat possible subspecies, i.e. geographically defined populations.

After this plenary session, participants then divided into Working Groups:

- 4 were taxa-oriented: Black Rhino, White Rhino, Indian/Nepali Rhino, Javan & Sumatran Rhino;
- 4 were problem oriented: Research, Systematics, In Situ Support, and Target Population.

Periodically, the working groups reconvened into plenary session for review and refinement of their work in relation to the other groups. A final plenary session synthesized the various results into the Rhino Global Captive Action Plan which is reported here.

The results of the Workshop, i.e. the first version of the Global Captive Action Plan, are presented as:

(1) a collection of overviews in both narrative and tabular form of the status of rhinos;
(2) a set of goals, objectives and recommendations.
(3) a series of reports from each of the working groups.

GLOBAL CAPTIVE ACTION PLAN

GOALS

- **Affirm that the paramount purpose of captive programs for rhino conservation is the survival and recovery of all distinct taxa in the wild.**

- **Contribute to rhino conservation by:**

  - **Developing, maintaining, and using captive breeding programs to provide a genetic and demographic reserve to re-establish or revitalize wild populations when the need and opportunity occurs.**

  - **Conducting problem-oriented research that will contribute to management of rhino in both captivity and the wild; collaborating on such research where appropriate with field researchers; communicating and transferring the results of such research to managers of other captive and wild populations**

  - **Providing where possible financial as well as technical support for *in situ* conservation.**

OBJECTIVES/RECOMMENDATIONS

- **Conduct captive breeding programs for selected taxa of rhino. 7 taxa currently selected are:**

- *Diceros bicornis michaeli*	Eastern Black
- *Diceros bicornis minor*	Southern Black
- *Ceratotherium simum simum*	Southern White
- *Rhinoceros unicornis*	Indian/Nepali
- *Dicerorhinus sumatrensis harrisoni.*	Borneo Sumatran
- *Dicerorhinus sumatrensis sumatrensis I**	Sumatra Sumatran
- *Dicerorhinus sumatrensis sumatrensis II**	Mainland Sumatran

  (* Peninsular Malaysian and Sumatran populations treated as distinct taxa)

- **Additionally, conduct a crash effort to initiate a captive breeding program for *Ceratotherium simum cottoni*, using the founder stock already in captivity.**

  If this program were successful, space could and would be allocated, perhaps by reducing the captive habitat occupied by southern white rhino.

- **Form a special task force to conduct the crash program for the Northern white rhino.**

  The initial members appointed to this group are: Larry Killmar, Nick Lindsay, Bob Reece, Ollie Ryder, Kristina Tomasova, Tom Foose.

- **Consider other taxa for captive breeding at the request and recommendation of the SSC Rhino Specialist Groups in the future if the situation in the wild dictates and in captivity permits (space, husbandry): e.g. *Rhinoceros sondaicus*, the Javan.**

- **Adopt a policy of recognizing the maximum number of distinct taxa for conservation action until or unless further information indicates a taxon no longer should be treated as a separate unit.**

- **Assist the SSC Rhino Specialist Groups in collecting information needed to decide what constitute distinct taxa of rhino and recognize the Specialist Groups as the ultimate authority on this issue.**

- **Use the assistance available from zoos for the other taxa to support *in situ* efforts.**

- **Establish captive target populations in general sufficient to preserve 90% of the gene diversity of the wild populations for 100 years.**

- **Attain designated target populations (Table 1) for the taxa in captivity within 1 rhino generation (~ 15 years) for the Eastern Black, Southern White, and Indian/Nepali; within 2 generations (~30 years) for the Southern Black and the 3 Sumatran taxa.**

Taxa	Current Population	Target Population	% Increase	
			Total	Per Year
Eastern Black	163	200	22%	1.3%
Southern Black	52	175	337%	4.0%
Southern White	570	300	- 49%	4.2%
Indian/Nepali	120	230	92%	4.5%
Borneo Sumatran	2	150	750% *	7.0%
Mainland Sumatran	8	150	750% *	7.0%
Sumatra Sumatran	13	150	750% *	7.0%

* Based on premise that Current Population, consisting of founders, will be rapidly augmented by rescue of more rhino from wild so that initial number will be 20.

- **Distribute responsibilities for the captive populations over the various Regions of the zoo world as indicated in Table 2.**

- **Expand the captive capacity for rhino from 928 to 1355, i.e. 427 new spaces, an increase of 46% over a 15 year period (i.e. 1 rhino generation).**

  This rate of expansion will require creation of about 30 new spaces/year in zoos worldwide.

- **Reallocate existing rhino space (785 African spaces of which 570 are for southern white rhino; 143 Asian spaces) to achieve the target distribution of 675 African spaces, 680 Asian spaces.**

  A conclusion of these calculations is that most new rhino spaces will need to be "Asian".

- **Redistribute founder material among the Regional Programs for selected taxa to provide more viable genetic foundations within all of the Regions.**

  This is especially true for the Indian/Nepali Rhino where movement of new founder material into Europe and from Asia to both Europe and North America would be beneficial.

- **Obtain additional founders from the wild for several of the taxa to be propagated in captivity in order to provide a viable genetic foundation for the population.**

	Existing	Additional	Total
Borneo Sumatran	2	18	20
Mainland Sumatran	8	12	20
Sumatra Sumatran	13	7	20

- **Accord the highest priority to research in 3 areas which are critical for conservation programs for rhino:**

  - **Genetic studies to clarify taxonomic status of "subspecies", i.e. geographically defined populations;**

  - **Veterinary and husbandry investigations to ameliorate the disease syndrome that afflicts the Black, and possibly other browsing rhino, in captivity, and probably in the wild.**

  - **Development of effective methods of assisted reproduction, especially with the objective of using these techniques to expand more rapidly the populations of the taxa in desperately low numbers, e.g. northern whites and perhaps eventually Javan.**

- **Establish a research collection of White Rhino (100 total) in both North America (50) and in Europe/UK (50) at a site determined by the Regional Coordinators.**

- **Develop aggressively the funding needed for the research priorities.**

- **Formulate a plan with defined objectives and schedules to initiate systematic genetic resource banking of rhino taxa.**

  This would be the assignment of a special task force to be formed by Dr. Betsy Dresser and Dr. Tom Foose.

- **Collaborate on habitat and population viability analyses (PHVAs) for selected taxa.**

  The most immediate need identified is a PHVA for the Indian/Nepali rhino.

- **Accept as a challenge, the objective of providing $1,000,000/year for 10 years to *in situ* rhino conservation, especially through "Adopt-A-Park" programs.**

  Distributed over the 200 "hard currency" rhino institutions (Table 2), this level of contribution is equal on the average to $5,000/institution. Considered from another perspective, this level of contribution represents just a little over $1,000 per rhino currently maintained in the zoos of the world; it will represent $ 740 once captive target populations are attained. It has been estimated that the annual cost of protecting and managing minimally viable populations of rhino in the wild is about $20,000,000/year. The level of support proposed for zoos is thus only about 5%, but if effectively applied could be very catalytic and crucial support. A number of institutions (Table 3) are already contributing to *in situ* rhino conservation at or above this level.

- **Specifically, to initiate the *in situ* program:**
  - **A. Attempt to secure $250,000/year for "adopt-a-park" programs for an additional 10 high-priority protected areas for Asian rhino by recruiting the 30 "hard currency" zoos with Asian rhinos to contribute $8,500/year for 3 years.**
  - **B. Also attempt to secure $14,000 per year to support the annual costs of the IUCN SSC/Asian Rhino Specialist Group by recruiting an additional $7,000/year from North American Zoos, $ 3,500/year from European Zoos, and $3,500/year from Australian Zoos with interests in Asian rhino.**
  - **C. Attempt to secure $250,000/year for "adopt-a-park" programs for an additional 10 high-priority protected areas for African rhino by recruiting 100 "hard currency" zoos with African rhinos to contribute $2,500/year for 3 years.**
  - **D. Also attempt to secure $27,000 per year to support the annual costs of the IUCN SSC/African Rhino Specialist Group by recruiting an additional $11,000/year from North American Zoos, $ 11,000/year from European Zoos, and $5,000/year from Australian Zoos with interests in African rhino.**

- **Establish an active Global Management and Propagation Committee to further develop and coordinate the Global Captive Action Plan.**

- **Support a paid, initially part-time position of Global Captive Rhino Coordinator to implement the Global Captive Action Plan in a timely manner; the estimated cost would be $ 20,000/year which if distributed over the 200 "hard currency" rhino institutions would be $100/year.**

- **Establish Taxon Advisory Groups (TAGs) for rhino in the Regions where they do not yet exist: Europe, Asia.**

- **Develop and implement a business plan to achieve the goals and objectives of the Global Captive Action Plan.**

  The total cost per zoo if the proposals presented above are implemented would be ~ $9,000/year for institutions with Asian rhinos and ~ $ 3,000/year for African rhino institutions.

TABLE 1
CONSERVATION ASSESSMENT & MANAGEMENT PLAN
RHINO

TAXON		WILD POPULATION									RSRCH	CAPTIVE PROGRAM	
SCIENTIFIC NAME		RANGE	EST#	SUB POP	TRND	AREA	M/L STS	THRTS	PVA/ WKSP	WILD MGMT	TAX/SRV/ HUSB	NUM	CAP REC
Diceros	bicomis												
Diceros	b. bicomis	Namibia	400	2	I	A	E	H			T,H	0	
Diceros	b. longipes	Cameroon, C.A.R.	<100	2	D	A	C	H			T,S,H	0	
Diceros	b. michaeli	Kenya, N. Tanzania	600	15	S	A	C	H	Y		T,S,H	52	90/100 I
Diceros	b. minor	S.Tanzania, Zambia, Zimbabwe, S.Africa	2,300	7	D	A	E	H			T,H	163	90/100 I
Ceratotherium	simum												
Ceratotherium	s. cottoni	Zaire, Sudan (?)	31	1	I	A	C	H		Y	H	10	NUC II
Ceratotherium	s. simum	S.Africa, Zimbabwe, Kenya	5,560	6	I	A	V	H,L				570	90/100 I
Rhinoceros	unicomis	India, Nepal	1,700	10	S	A	E	L,H	Y			120	90/100 I
Rhinoceros	sondaicus												
Rhinoceros	s. annamiticus	Vietnam	<25	2	D	A	C	H			S	0	
Rhinoceros	s. sondaicus	Java (Indonesia)	<75	1	S	A	C	L,H		Y		0	
Dicerorhius	sumaterensis												
Dicerorhinus	s. harrisoni	Kalimantan, Sabah, Sarawak	100	3	D	AA	C	L,H			T,S	2	90/100 I
Dicerorhinus	s. lasiotus	Burma (?)	?	?	D	A	C	L,H			S	0	
Dicerorhinus	s. sumatrensis I	Peninsular Malaysia	150	4	D	A	C	L,H			T,S,H	8	90/100 I
Dicerorhinus	s. sumatrensis II	Sumatra (Indonesia)	600	3	D	AA	E	L,H			T,S,H	13	90/100 I

Refer to Section 13 for an explanation of the column categories.

T.J. Foose
15 June 1992

TABLE 2
GLOBAL AND REGIONAL
CURRENT AND TARGET POPULATIONS FOR
RHINO IN CAPTIVITY

	WORLD			AFRICA		ASIA		AUSTRALASIA		EUROPE		N. AMERICA		C.& S. AMERICA	
RHINO TAXON	WILD POP	CPTV POP	CPTV TRGT	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP	CPTV POP	TRGT POP
Eastern Black	600	163	200	5	5	35	40	2	0	55	65	67	90	6	?
Southern Black	2,300	42	175	4	15	2?	0	0	80	6	0	30	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	10	?	0	?	0	0	0	0	6	?	4	?	0	0
Southern White	5,560	570	200 + 100 Rsrch	24	0	150	0	14	60	210	70 + 50 Rsrch	132	70 + 50 Rsrch	40	?
Indian/Nepali	1,700	120	230	0	0	45	78	0	0	32	76	40	76	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	150	8	150	0	0	8	50	0	0	0	100	0	0	0	?
Sumatran Sumatran	600	13	150	0	0	7	50	0	0	2	0	6	100	0	0
Borneo Sumatran	100	2	150	0	0	3	50	0	100	0	0	0	0	0	0
African Rhino	**8,991**	**785**	**675**	**33**	**20**	**189**	**40**	**16**	**140**	**266**	**185**	**233**	**290**	**46**	**?**
Asian Rhino	**2,650**	**143**	**680**	**0**	**0**	**63**	**228**	**0**	**100**	**34**	**176**	**46**	**176**	**1**	**?**
All Rhino Taxa	**11,641**	**928**	**1355**	**25**	**20**	**252**	**268**	**16**	**240**	**300**	**361**	**279**	**466**	**47**	**?**

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15 June 1992

TABLE 3
STRATEGIC SUPPORT OF *IN SITU* PROTECTED AREAS FOR RHINO BY THE GLOBAL AND REGIONAL CAPTIVE COMMUNITIES

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

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TABLE 4
ANNUAL COSTS FOR CONSERVATION OF VIABLE POPULATIONS OF RHINO

TAXON	TARGET POPULATION	DENSITY (km/rhino)	AREA (km^2) REQUIRED	COST per km^2	ANNUAL COST
N. Black	2,000	3	6,000	$400	$2,400,000
S. Black	2,000	3	6,000	$400	$2,400,000
S.W. Black	2,000	3	6,000	$400	$2,400,000
N.W. Black	2,000	3	6,000	$400	$2,400,000
N. White	2,000	1.5	3,750	$400	$1,500,000
S. White	2,500	1.5	3,750	$400	$1,500,000
Indian/Nepali	2,500	0.5	1,250	$250	$300,000
Borneo Sumatran	2,000	10	20,000	$100	$2,000,000
Sumatra Sumatran	2,000	10	20,000	$100	$2,000,000
Mainland Sumatran	2,000	10	20,000	$100	$2,000,000
Javan	2,500	5	12,500	$100	$1,250,000
TOTALS	23,500.00	50.50	105,250.00	$3,050.00	$20,150,000.00

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TABLE 5
RHINO INSTITUTIONS

TAXON	WORLD	AFRICA	ASIA					AUSTRALASIA	EUROPE	N.A.	S.A.
			CHN	IND	JPN	S.E.	M.E.				
Eastern Black	55	3	2	3	4	1	1	1	11	24*	4
Southern Black	14	1	0	0	1?	0	0	1	2	9	0
Southwestern Black	0	0	0	0	0	0	0	0	0	0	0
North/West Black											
Northern White	2	0	0	0	0	0	0	0	1	1	0
Southern White	215 **	12	6	3	23	6	6	6	87	45*	21
Indian/Nepali	45 *	0	1	12	3	1	0	0	14	13*	1
Mainland Sumatran	2	0	0	0	0	1	0	0	0	0	0
Sumatra Sumatran	8	0	0	0	0	5	0	0	1	4	0
Borneo Sumatran	1										
Javan (Java)	0	0	0	0	0	0	0	0	0	0	0
Javan (Vietnam)											
African Rhino	**266**	**16**	**8**	**5**	**29**	**6**	**8**	**7**	**95**	**70**	**23**
Asian Rhino	**52**	**0**	**1**	**12**	**3**	**5**	**0**	**0**	**15**	**11***	**1**
All Rhino	**290 *****	**16**	**8**	**13**	**30**	**7**	**8**	**7**	**101**	**74***	**23**

* San Diego Zoo & San Diego Wild Animal Park = 1 Institution

** 139 of the white rhino institutions maintain ≤ 2 individuals

*** ~ 200 "Hard Currency" Zoos with rhinos
~ $ 1 billion annual operation budgets

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15 June 1992

TABLE 6
DEMOGRAPHIC PERFORMANCE OF GLOBAL AND REGIONAL POPULATIONS OF RHINO IN CAPTIVITY

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

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

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15 June 1992

TABLE 7
GENETIC COMPOSITION
IN TERMS OF FOUNDERS OF
GLOBAL AND REGIONAL POPULATIONS OF
RHINO IN CAPTIVITY

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

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

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15 June 1992

TABLE 8
GENETIC COMPOSITION
IN TERMS OF FOUNDER GENOME EQUIVALENTS
OF GLOBAL AND REGIONAL POPULATIONS OF
RHINO IN CAPTIVITY

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

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

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15 June 1992

TABLE 9
GENETIC COMPOSITION
IN TERMS OF GENE DIVERSITY OF
GLOBAL AND REGIONAL POPULATIONS OF
RHINO IN CAPTIVITY

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

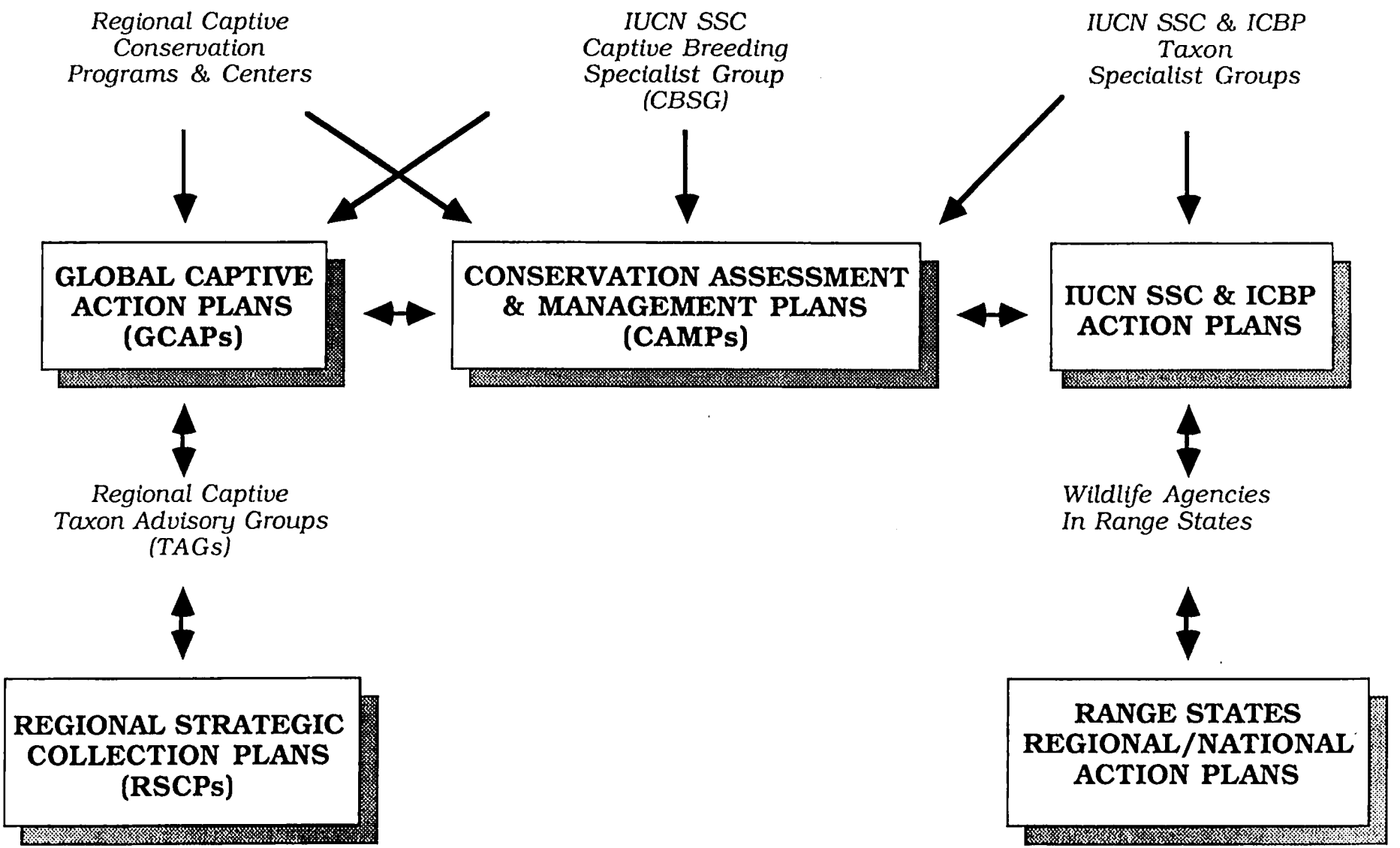
T.J. Foose
15 June 1992

TABLE 10
MACE/LANDE CATEGORIES AND CRITERIA OF THREAT

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

FIGURE 1

GLOBAL AND REGIONAL STRATEGIC CONSERVATION ACTION PLANS



T.J.F./CBSG
1 August 1992

FIGURE 2

GLOBAL CAPTIVE PROPAGATION AND MANAGEMENT GROUP

CHAIR: T.J. Foose, CBSG Executive Office (Pro Tem)

REGIONAL COORDINATORS:

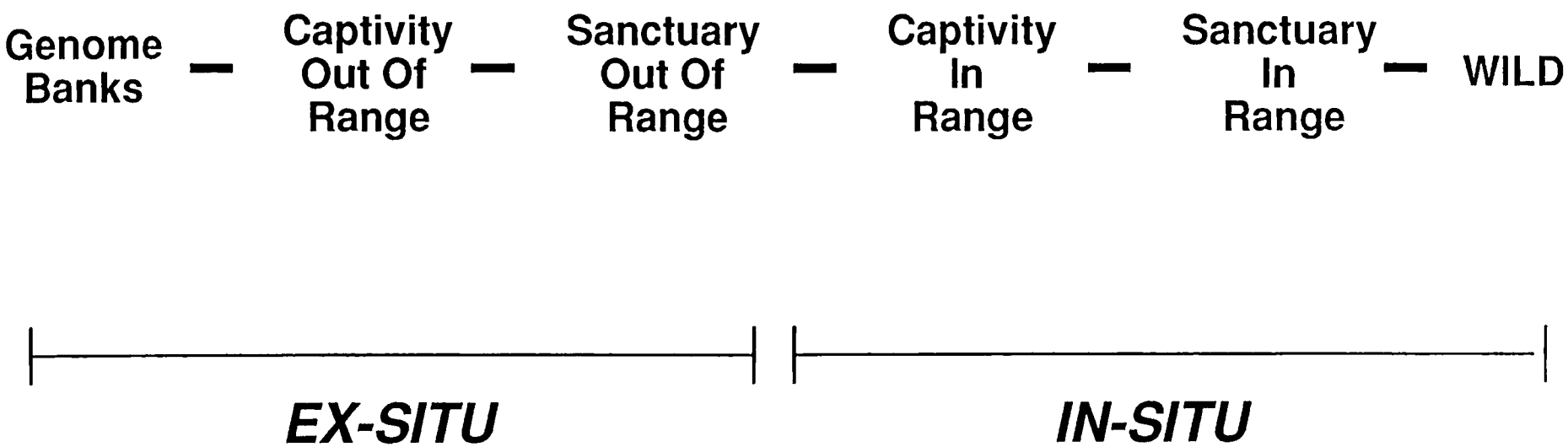
		African			Asian		
	TAG	Black		White	Indian/Nepali	Sumatran	Javan
Africa (PAAZAB, ZDNAPWM, KWS)		V. Wilson M. Kock R. Brett					
Asia							
Japan (SSCJ)	M. Masui	Otsu					
India (IESBP)			(To be Appointed by the Central Zoo Authority of India)				
S.E. Asia (SEAZ)					B. Harrison	Tajuddin Jansen M.	
Australasia (ASMP)		J. Kelly		P. Garland		D. Miller (All Asian)	
Europe (EEP/JMSG)		R. Frese	A. Dixon N. Lindsay (UK)	K. Tomasova	K. Tobler	C. Furley	
North America (AAZPA SSP)	R.Reece	E. Maruska D. Farst J. Jackson		R. Rockwell	M. Dee	J. Doherty J. Dolan	

Advisors:

M. Brooks	Chairman, African Rhino Specialist Group	G. Amato	E. Miller
M. Khan	Chairman, Asian Rhino Specialist Group	O. Ryder	
N. Van Strien		B. Dressser	

FIGURE 3

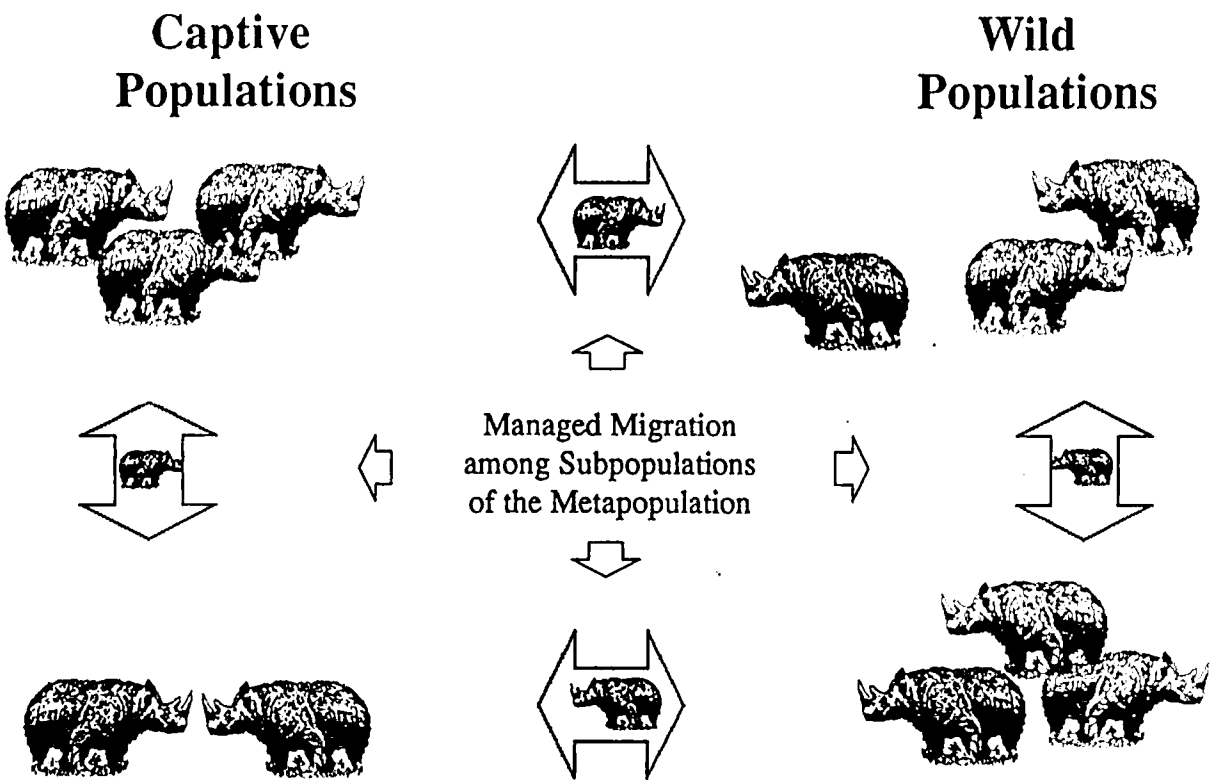
OPTIONS FOR RHINO CONSERVATION



Modified from Mark Stanley-Price (1991)

FIGURE 4

Metapopulation



RHINO

GLOBAL CAPTIVE ACTION PLAN (GCAP)

FIRST EDITION

1 SEPTEMBER 1992

SECTION 2

BLACK RHINO

BLACK RHINO WORKING GROUP

Working Group: *(Chairperson) Reinhard Frese, (Recorder) Bruce Read, Christian R. Schmidt, Mitsuko Masui, Charlie Hoessle, Koen Brouwer, Betsy Dresser, Vivian Wilson, Alexandra Dixon, Jim Jackson, Simon Wakefield & Kristina Tomasova*

Goal: Establish target captive populations for four geographic areas 1) Africa 2) Austral-Asia 3) Europe 4) Americas.

Facts: When reviewing the age structure of the captive population in the studbook we observe that we have an aging population that has most of the reproduction in the founder and 1st generation.

Data: Michaeli

Living Population

75 Males
94 Females

Surviving Active Breeding Animals (1987-1990)

11 Males (born between 1956-1981)
21 Females (born between 1961-1982)

Animals kept in institutions with out the opposite sex.

7 Males
6 Females (between 6-25yrs of age + 2 over 25yrs)

Post Reproductive Animals (assumption that female on the average stop reproducing at 25 yrs of age)

- Males (can breed until they die)
16 Females over the age of 25 yrs.

Pre Reproductive Animals (animals under 6 years of age)

20 Males
20 Females

Result:

1) Of the 94 females in the population 31 females are of reproductive age and are at institutions with males, but are not reproducing. Therefore, not contributing to the gene pool.

2) Of the 75 males 37 are old enough to breed and are not contributing to the gene pool.

Mortality/Births

Year	1987	1988	1989	1990	Total
Births	2	7	8	7	24
Deaths	5	5	6	7	23

0-6	9/39%
6-25	7/30%
26+	7/30%

Target Goal: To increase the recruitment rate and carrying capacity of the captive population through: 1) increasing the birth rate; 2) enlarging the number of holding facilities; 3) increasing the holding space at existing facilities.

Recommendations:

1) A target captive population for Michaeli of 200 animals globally in the four geographic regions.

   Support for this recommendation: a) By adding the additional females to the breeding population (31 and 6) we are estimating that 1/2 of these will begin to produce offspring. The rate of mortality of the youngest age group was kept at 39%. This doubled the rate of recruitment; b) By breeding females at the age of 3-4 yrs we have lowered the average age of reproduction and c) By shortening the birth interval we have increased the number offspring produced.
   Effective size of 20 - Lambda of .05 - generation length 13 - program length 100 yrs. (reflect the ratio of .3 if the ratio is .2 we are looking at a population of 250).

   Goals: a) increase the number of breeding animals; b) increase the number of births per lifetime; c) manage for equal family size; d) achieve target founder representation.

2) A target captive population for Minor of 125 animals globally in three regions (Africa, Australia and North America).

   Support for this recommendation: a) All the animals that are in the captive population are in the age bracket for potential reproduction or younger and will soon be in this age bracket; b) This population is just being formed and can learn from the problems of the existing East African rhino population; c) The wild population is larger than the East African one. Effective size of 20 - Lambda 1.03 - generation length 15 - program length 100 yrs. (123 reflects a ratio of .3 if the ratio is .2 we are looking at a population of 185).

   Goals: a) increase the captive population size by recruitment from the wild and increased birth rate; b) achieve target founder representation; c)

Recommendation for implementation:

1) Look at the possibilities of expanding the captive holding space by: a) increase the number of animals held at each breeding institution; b) expand the total number of holding and breeding facilities in the four geographic areas; c) encourage those institutions that have open holding space to move animals in; d) to utilize unsuitable white rhino space for black rhino.

2) Increase the recruitment rate by: a) pairing up single animals (for example the single female in Rome); b) place young (3 yr old) females in breeding situations; c) shorten the birth intervals of producing females (two - four years); d) identify and evaluate female in reproductive situations that are not reproducing.

3) It is essential to move all 31 presently non breeding females and 6 isolated females into a breeding situation.

4) Of the 7 isolated and 37 presently non reproductive males it is a priority to identify the potential founder animals and transfer them into a breeding situation.

5) Micheali should be kept in Africa, Asia (excluding Australia), North America, South America & Europe.

6) Minor should be kept in Africa. Australia & North America.

7) All regional coordinators should cooperatively establish guidelines for captive management of black rhino within their region.

8) All potentially reproductive animals need to be brought in the breeding nucleus. If this effort is not effective this population will not stabilize and will become extinct.

RHINO

GLOBAL CAPTIVE ACTION PLAN (GCAP)

FIRST EDITION

1 SEPTEMBER 1992

SECTION 3

WHITE RHINO

WHITE RHINO

Working Group: *Paul Garland, Martin Brooks, Nick Linsay, Robert Reece, Oliver Ryder, Petr Spala, Kristina Tomasova, Wim Verberkmoes*

SOUTHERN WHITE RHINOCEROS

Review of Wild Population

1991 = 5560 in free ranging populations.

Estimated 6 generations since bottle neck of 20-100 animals (1900). No inbreeding problems detected to date as evidenced by high reproductive rate. Also small populations were dispersed within the region and have not reflected any inbreeding problems.

Between 1987 - 1991 there has been a natural increase in the world population of 5.2% per annum.

In the last 3 years there has been significant increase in poaching of white rhino throughout the region. As an example in 1991 the Swaziland population was estimated at 60 animals but is now possible down to 13 due to recent poaching activities.

Recommendations: (Wild Populations)

1. **Protect in situ Core Populations.** We have identified 6 core populations in Southern Africa as follows:

   - Hluhluwe/Umfolozi Population 1988
     Number 1 priority to protect core poopulation as it represents the best genetic base - now close to carrying capacity.
   - Itala Game Reserve Population 160.
   - Mkuzi Game Reserve Population 132
   - Pilanesberg National Park Population 201
   - Krueger National Park Population 1065
     Carrying capacity is much higher than current level.
   - Hwange National Park Population 100

   A. Continue to liase with African Rhino Specialist Group to monitor the ongoing status and population trends in these key areas.

   B. To liase with the African Rhino Specialist Group to identify projects that the zoo community could assist in.

2. **Support Populations Outside South Africa.**

   A. Recognize that Hwange National Park, Zimbabae offers the best medium opportunity for reinforcing in situ populations outside of South Africa.

   B. Liase with the African Rhino Specialist Group to establish priorities and projects to achieve the above.

3. **Genetic Resource Banking.**

   A. Develop artificial reproductive techniques that will asssist in the establishment of protocols and procedures to support genetic resource banking.

4. **Support Anti-Poaching**

   A. Liase with the African Rhino Specialist Group to establish the role of the zoo community in assisting anti-poaching and to establish priorities.

Review of Captive Population

USA - 122 of which about 50 are contributing to population growth. Similar situation with limited breeding exists in Europe.

No more than 30% of world captive population is estimated to be breeding or in breeding situations at this time.

Therefore we estimate the effective population of white rhino in captivity at about 180 individuals.

Recommendations: (Captive Populations)

1. **Size of Captive Population.**

   A. Action plan be developed by the regional taxon coordinators to determine the global minimum viable populations. Develop management plans for regional subsets and determine frequency of migrations between populations.

   B. The current managed populations (SSP/JSMC/EEP/ASMP) are now recognized as being actively managed to meet the global MVP recommendations. Other regions need to be included.

2. **Action Plan.**

A. Regional taxon coordinators be responsible for the establishment of the CAP by December 1992.

3. **Regional Capacity.**

A. Regional coordinators to define regional capacity by September 1992.

4. **Artificial Breeding Techniques.**

A. Establish 2 separate research populations, one in Europe/UK and one in North America.

B. Regional taxon coordinators to identify suitable animals and best research site in liason with research group.

C. Develop funding sources to undertake the artificial breeding research program.

NORTHERN WHITE RHINOCEROS

Review of Wild Population

The current wild population is limited to 31 animals in the Garamba National Park in Zaire and is expanding steadily at 10% per annum.

It is under threat from civil war.

Recommendations: (Support by Captive Community)

1. **Support Garamba Population.**

A. Liase with current in situ support organization (Frankfurt Zoological Society/National Parks Authority in Zaire) to identify and priortize project needs.

2. **Genetic Resource Banking.** (As for Southern White Rhino)

Review of Captive Population

Population about 10 and is distributed between Dvur Kralove and San Diego. There has been poor reproduction which places the entire captive population in jeopardy.

Recommendations: (Captive Population)

1. **Action Plan.**

   A. Identify people to assist current population and to develop an action plan. (Robert Reece, Tom Foose, Larry Kilmar, Christina Thomasova, Nick Lindsey). 90 Days!

Status of Northern White Rhinoceros: Action Needs for the Captive Population

Working Group: *O. Ryder, R. Reece, T. Foose*

The senescent age structure of the captive population as well as the limited number of founders that have reproduced forecast an imminent extinction of this population.

Urgent priorities for reproductive and genetic research have been identified. Additionally, the development and implementation of a detailed action plan has been recognized as a necessary response to the declining status of the captive population for several years. However, as yet, no implementation has occurred.

From the perspective of the conservation of this unique form of rhino and the involvement of the captive population in reinforcing a global conservation plan, the potential of the captive population must be realistically assessed with urgency.

If, within the next 12 months, no positive results have been achieved in reproductive enhancement or gamete preservation involving the captive population, then the world community must recognize that the captive population will not contribute to the conservation of the northern white rhinoceros. While this will inevitably fuel criticism of *ex situ* conservation efforts for rhinos in particular, acknowledgement of the reality of the situation will allow for alternative or redesigned strategies to proceed. Translocation of animals that have reproductive potential into *in situ* reserves either in Zaire or newly created reserves within the historic range are examples of redesigned strategies.

The urgent priorities for making the captive populations of northern white rhinoceros responsive to the global conservation strategy for this unique form of rhinoceros are:

(1) Development of a captive action plan that incorporates identified research needs into the programs at the zoos maintaining the northern white rhinoceros. The chair of the action plan group should immediately identify technical advisors to assist in the preparation of the detailed plan (suggested: Ryder, Hodges, Dresser, Schaffer, others to be named). Produce budgets for identified activities.

(2) Produce a Memorandum of Understanding under the auspices of the IUCN/CBSG global white rhino coordinator to be signed by the directors of Zoological Society of San Diego and Vychodoceska Zoo (Dvur Kralove) that recognizes the activities of the northern white rhinoceros captive action plan group and provides assurances of cooperation.

(3) Appointment of a person to be in charge of collecting and interpreting the available reproductive data (suggested: Hodges).

(4) Assemble and distribute protocols for collection, storage and shipment of necessary biological samples.

(5) Collect and freeze semen according to optimized protocols from all males held in captivity. Query the Vychodoceska Zoo and San Diego Zoo concerning any cryopreserved sperm. Both have made sperm collections. Determine the status of these samples. Arrange for the long term storage at multiple sites.

(6) Develop a detailed research program with the goal of achieving the capability to conduct embryo transfer of northern white rhinoceros to southern white rhinoceros females within a 3-5 year period. Produce budgets for same.

(7) Provide regular communication to CBSG, ARSG and other appropriate bodies concerning the ongoing developments.

(8) Explore options for translocation to protected and managed areas in Africa within the historic range.

NORTHERN WHITE RHINOCEROS (Ceratotherium simum cottoni)
PARC NATIONAL DE LA GARAMBA
POPULATION STRUCTURE AND DYNAMICS, APRIL 1992

ADULT MALES:		STATUS:
M2	'Eleti'	dominant, territory changed in 09.88.
M3	'Kondo akatani'	prior to 09.88 classed as old sub-adult, took over territory of M2.
M4	'Bac'	probably dominant.
M5	'Bawesi'	dominant
M6	'Longuecorne'	dominant
M7	'Moitier'	young male
M9	'Notch'	dominant

ADULT FEMALES:		
F1	'Mama Moke'	with JF
F3	'Kunalina'	with JM
F4	'Boletina'	with IF
F5	'Mama Giningamba'	with JM
F6	'Pacque'	with JM and SP
3aF	'Kuni'	born c.9-10/83, with JM

SUB-ADULTS:		
1aM	'Moke'	S2, male, born mid 1983
4aM	'Bolete moke'	S2, male, born c. 08-09.1983
5aM	'Giningamba'	S2, male, born 02.85
4bF	'Mai'	S2, female, born 05.85
3bF	'Juillet'	S2, female, born 07.85,
6aF	'Oeuf de Pacque'	S1, female, born 03.86
4cF	'Noel'	S1, female, born 10-11.87
5bF	'Grizmek'	S1, female, born 10.87
6bM	'Elikya'	S1, male, born 06.88
1bM	'Mpiko'	S1, male, born 03-04.89

JUVENILES:		
4dF	'Minzoto'	J3, female, born 08-09.89
5cM	'Molende'	J3, male, born 08.89
3cM	'Solo'	J3, male, born 12.89
3aaM	'Bonne Annee'	J2, male, born 12.90
1cF	'Nawango'	J2, female, born 02.91
5dF	'Jengatu'	J1, female, born 07.91 (M3 sire?)
3dM	'Mamu'	J1, male, born 09.91
4eF	'Sifa'	I2, female, born 01.92

TOTAL KNOWN INDIVIDUALS:	
Male adults (MA)	7
Female adults (FA)	6
Males sub-adults (SM)	5
Female sub-adults (SF)	5
Male juveniles (JM)	4
Female juveniles (JF)	3
Female infant (IF)	1
TOTAL	31
SEX RATIO	16M : 15F
ADULT:SUBAD & JUV.RATIO	1 : 1.4

(Kes Smith)

NORTHERN WHITE RHINO Studbook

Restricted to: (Ceratotherium simum cottoni)

Status: Living by 1 Sep 1992

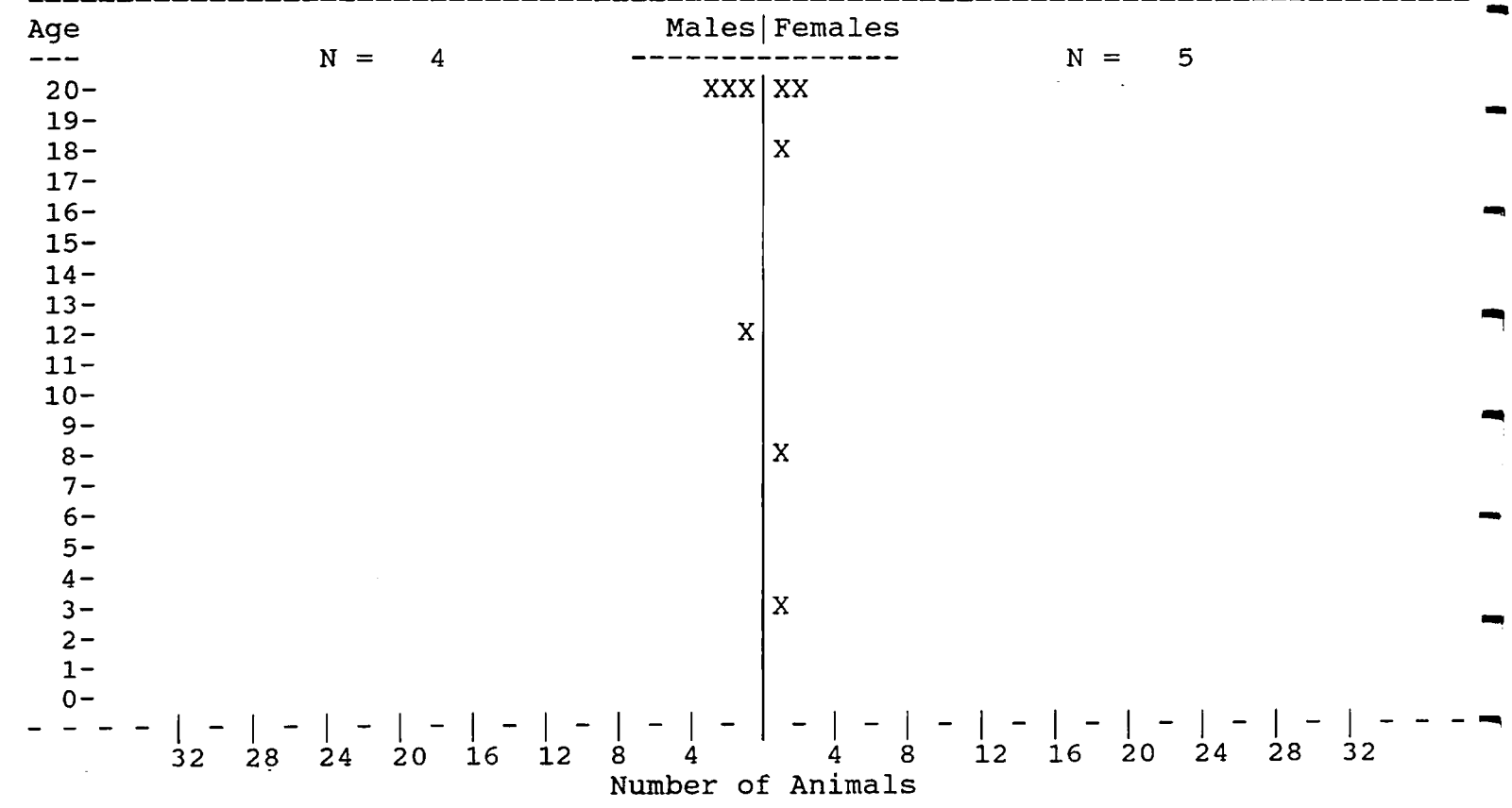
Stud #	Sex	Birth Date	Sire	Dam	Location	Date	Local ID	Birth-Origin	Country	Breeder #
348	M	1 Jan 1972	WILD	WILD	SUDAN	1 Apr 1973	UNK	Wild Born	SUDAN	KHM 04
					SD-WAP	12 Aug 1990	UNK		U.S.A.	
372	M	1 Jan 1972	WILD	WILD	SUDAN	19 Jun 1975	UNK	Wild Born	SUDAN	DVU 12
					DVURKRALV	19 Sep 1975	UNK		CZECHOSLO	
373	M	1 Jan 1972	WILD	WILD	SUDAN	19 Jun 1975	UNK	Wild Born	SUDAN	DVU 13
					DVURKRALV	19 Sep 1975	UNK		CZECHOSLO	
					SD-WAP	14 Oct 1989	UNK		U.S.A.	
374	F	1 Jan 1974	WILD	WILD	SUDAN	19 Jun 1975	UNK	Wild Born	SUDAN	DVU 14
					DVURKRALV	19 Sep 1975	UNK		CZECHOSLO	
					SD-WAP	14 Oct 1989	UNK		U.S.A.	
376	F	1 Jan 1972	WILD	WILD	SUDAN	19 Jun 1975	UNK	Wild Born	SUDAN	DVU 16
					DVURKRALV	19 Sep 1975	UNK		CZECHOSLO	
					SD-WAP	14 Oct 1989	UNK		U.S.A.	
377	F	1 Jan 1972	WILD	WILD	SUDAN	19 Jun 1975	UNK	Wild Born	SUDAN	DVU 17
					DVURKRALV	19 Sep 1975	UNK		CZECHOSLO	
630	M	8 Jun 1980	373	351	DVURKRALV	8 Jun 1980	UNK	Captive Born	CZECHOSLO	DVU 22
789	F	15 Nov 1983	372	351	DVURKRALV	15 Nov 1983	UNK	Captive Born	CZECHOSLO	DVU 23
943	F	11 Jul 1989	372	351	DVURKRALV	11 Jul 1989	UNK	Captive Born	CZECHOSLO	DVU 24

TOTALS: 4.5.0 (9)

Age Pyramid Report

Restricted to: NORTHERN WHITE RHINO Studbook
Status: Living by 1 Sep 1992

Taxon Name: **CERATOTHERIUM SIMUM COTTONI**



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

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

SPARKS v1.1
1 Sep 1992

RHINO

GLOBAL CAPTIVE ACTION PLAN (GCAP)

FIRST EDITION

1 SEPTEMBER 1992

SECTION 4

INDIAN/NEPALI RHINO

INDIAN/NEPALI RHINO WORKING GROUP

Working Group: *(Chairman) Michael Dee, Kathleen Tobler, B. G. Mugadur, Prof. M. V. Subba Rao, Dr. Tuhin Chakraborthy, Sally Walker*

CAPTIVE POPULATION

At the present time the population of this species is increasing at a rate of (roughly) 3 per cent per year. We would like to bring it up to 5 per cent per year so that the goal of 90 per cent heterozygosity can be maintained over a period of 100 years. The population will need to increase to 228 animals in order to reach this goal.

There are 45 known institutions that maintain this species. The majority of these institutions (37) are located on three continents: N. America (13), Europe (13) and India (11). Of these institutions, 22 have had successful breeding: N. America (7); Europe (8), and India (7 known for sure).

In the captive world population there are 120 animals (71:49). Of those which have not bred, 18 are females under breeding age and 34 are males under breeding age. Some of these underaged animals are in pair situations and should breed at some point in the future. Of the total number 11 are single males.

Referring back to the figure of 228 animals which would be necessary to preserve 90% heterozygosity for 100 years, with the present reproducing females (30) plus the 18 juveniles which should reproduce within the next five years, we can project a minimum of 14 calves per year. By these calculations we can assume that the population of 228 animals can be achieved in 12 to 14 years.

According to the above figures a total of 18 new captive breeding situations need to be created. Of the zoos in the two continents (i.e. N. America and Europe) and the Asian region (i.e. India, Japan, Singapore, Nepal) there are a total of 27 institutions which are potentially likely candidates for taking up a captive propagation programme.

North America -- 7 Europe -- 6 Asian Region -- 14

With the current captive population this number could increase by 42 animals every three years if managed properly. This would give us our goal of 228 animals in ten years.

Projected births

North America -- 15 Europe -- 12 Asian Region -- 15

Target Population Totals

North America -- 75 Europe -- 75 Asian Region -- 78

With reference to the situation of zoos in India, there is a surfeit of males to females. There is, however, a source of additional female calves which are moved to the Assam State Zoo from the wild as a result of rescue operations during monsoon. Unfortunately, these calves are in a debilitated condition when rescued and frequently do not survive long after reaching the zoo. The Working Group considered some assistance to the Assam State Zoo in locating references and information on the care and treatment of stressed animals might be useful. It may well be that a protocol for such treatment would have to be developed. The Working Group suggested that Dr. Suzie Jackson who is coordinating the Wildlife Veterinary and Animal Husbandry Information Network be consulted on this issue by C.B.S.G., India/Zoo Outreach Organisation.

It is likely that a Special Interest Group for Indian rhino may be formed under the auspices of C.B.S.G., India. The working group endorses this endeavor and requests this group or CBSG, India until it forms to act as liaison for the various initiatives discussed in this document.

WILD POPULATIONS

According to the Asian Rhino Action Plan, compiled by Mohammed Khan, Chairman, IUCN/SSC Asian Rhino Specialist Group, there are several protected areas in India that have very small populations of Indian rhinos Laokhowa 5, Orang 65, Pobitara 40, Manas 80, Dudhwa 7. In addition there are two protected areas in West Bengal, Jaldapara 35-45 and Gurumara 11.

There is also one such population in a protected area, Royal Bardia in Nepal with about 40 animals, a great percentage of which were translocated from Chitwan National Park. However, breeding has been successful in Bardia.

It is recommended that these small protected areas be recognized and included in the list for potential sponsorship by western zoos under an Adopt a Park programme. All of these are candidates for intensive management that would include technical training, marking equipment, radio telemetry equipment, research (including genetic studies) etc. as well as grass roots education programmes, anti-poaching programme and habitat restoration. It is possible that a zoo or group of zoos with limited resources could take up one of these areas.

It is further recommended that a P.H.V.A. Workshop and International Symposium be conducted under the joint auspices of the Asian Rhino Specialist Group, the Captive Breeding Specialist Group assisted by CBSG India, the Government of India, and the Government of West Bengal in Jaldapara Sanctuary for Indian rhino be held in Jaldapara Sanctuary as early as possible, preferably no later than 1993. In addition to creating a Action Plan for each population the P.H.V.A. will serve the purpose of drawing attention to the importance of this and other small populations. This will have the additional benefit of strengthening the hand of the local, state and central forest and environmental authorities in obtaining funding and help from international aid agencies.

The two protected areas with relatively large populations still continue to be plagued by poaching, natural calamities, etc. These areas would also be excellent candidates for sponsorship programmes on a larger scale.

The present Chief Wildlife Warden of West Bengal was contacted in January 1992 and after the Workshop and a discussion held on the subject of a P.H.V.A. in Jaldapara. He is very much in agreement that such a Workshop may be useful and feasible but would like more detail regarding the long range strategy and significance of such a workshop and assurance that the Rhino Specialist Group would be involved. The Working Group suggests that Dr. George Rabb, Mr. Moh'd Khan, or Dr. U.S. Seal should address these issues with Mr. Dey. The Working Group also feels that financial assistance will be needed and should be provided to the Government of West Bengal for this workshop.

List of Invitees from India should include:

Indian representatives of the Asian Rhino Specialist Group.

Representatives from the Official Forest and Wildlife Establishment, i.e. Secretary to Government, MOEFWL, Inspector General for Forests, Addl. I. G. (Wildlife), Jt. Directors (Wildlife), MOEFWL, Regional Dy. Director (WL), Eastern and Northern Region, Chief Wildlife Wardens of states with rhinos populations, Representatives from the Wildlife Institute of India.

Representatives from the Captive Breeding community, i.e. the Zoo Authority of India, the Indian Zoo Directors' Association, Directors and Veterinary doctors of zoos presently holding rhinos as well as zoos selected by the Zoo Authority of India to take up a rhino breeding programme, Principle Investigator, Zoo Consultancy Project, Wildlife Institute of India.

Representatives from various governmental and non-governmental research, education, and conservation organizations, i.e. CBSG, India, Zoological Survey of India, Worldwide Fund for Nature, Zoo Outreach Organization, Botanical Survey of India and active group from the states of Assam, West Bengal and Uttar Pradeh.

The working group recommends that CBSG, India or the Indian Rhino Special Interest Group when it forms act as liaison to initiate and coordinate the PHVA until required governmental permissions can be obtained and the Department of Forest, Government of West Bengal can take over.

Education/Awareness

The Indian zoo, wildlife and conservation community should use the opportunity of this P.H.V.A. to highlight the importance of the rhino as a symbol of endangered species as well as to focus on the smaller protected areas. A comprehensive Education Programme using the Indian rhino and rhino habitat as its focus is recommended. Zoos in other parts of the world may be interested in a collaborative support project for such educational endeavors.

Note of Dudhwa Reintroduction

The working group is aware of the reintroduction of Rhino into Dudhwa National Park and subsequent breeding successes. We acknowledge this effort as major stride in rhino conservation. The group is also aware that a single male has sired all of the offspring which have been bred so far and that the authorities in India share our concern over the question of genetic representation. Since obtaining a male from the wild is problematic, and since there are surplus males in the Kanpur Zoo in the same state, it may be advisable to consider introducing a captive born male into Dudhwa at least temporarily to provide addition genetic potential. The technical problems arising from such an experiment are fully acknowledged and the Workshop should make a commitment toward providing any advice, help and expertise which may be requested by the Indian wildlife authorities for this project.

Note on Wildlife Protection Act Amendments and Zoo Act

The Working Group is aware that the Government of India recently passed Amendments to the Indian Wildlife (Protection) Act 1972 which imposes far stricter penalties for poaching.

Also included in the Amendments Bill was a comprehensive body of legislation entitled the Indian Zoo Act which has resulted in the setting up of a Zoo Authority of India that will effectively ensure that endangered species of animals in zoos are maintained in breeding groups.

The working group felt that the Workshop should include in their report an endorsement or congratulatory note on these very constructive initiatives.

The Working Group respectfully recommends that the Zoo Authority of India, when formulating an organised captive breeding strategy for Indian zoos, appoint a Species Coordinator for Indian rhinos who would be responsible for monitoring activities regarding this species in all the zoos and generally looking after its interests in all respects. The Species Coordinator could be the Regional Studbook Keeper or any other interested person. Zoo Outreach Organisation will circulate information to the Zoo Authority about various Species programmes around the world.

Note of Project Elephant

The working group is aware of the recent initiative of the Government of India to carry out a Project Elephant. We hope that in course of time a similar initiative might be launched for the Greater One-horned Asian Rhino.

Note on zoo space

The working group felt it should be noted that there are a number of captive facilities in India consisting of several hundred acres of forested area in isolated locations relatively near the natural habitat of rhino. The Indian Forest establishment should be acknowledged for having the

foresight to set aside these areas. These facilities would contribute substantially -- both qualitatively and quantatively -- to the total amount of potential captive space in the global zoo community. For large species such as rhinos these areas may be useful both for extensive captive breeding programmes as well as acclimatization for introduction or reintroduction activities.

RHINO

GLOBAL CAPTIVE ACTION PLAN (GCAP)

FIRST EDITION

1 SEPTEMBER 1992

SECTION 5

SUMATRAN - JAVAN RHINO

SUMATRAN-JAVAN RHINO WORKING GROUP

Working Group: *(Chair) R. Tilson, M. Khan, N. Van Strien, J. Manansang, M. Hutchins, P. Wells*

I. Taxa To Be Bred In Captivity

(1) Sumatran
(2) Bornean
(3) Peninsular Malaysian

II. Target Populations

A. Sumatran Rhinos

Recommend 150 individuals for each taxon;
ca. 20 founders for each taxon (ideally 10.10)
Two additional founders for Sumatran
Seventeen additional founders for Bornean
Twelve additional founders for Peninsular Malaysian

Animals should only be obtained from doomed populations; the existing captive Sumatran population should be used to develop effective husbandry protocols; ideally, the captive breeding programs should have some reproductive success before further captures are initiated. However, this does not preclude the acquisition of animals that become available opportunistically (e.g., rehabilitated or orphaned animals).

B. Javan Rhinos

Recommend adoption of Indonesian Rhino Conservation Strategy which states that the possibility of using captive breeding as a means of establishing additional populations is not under consideration. It is recommended that zoos be willing to offer assistance when requested for technological support of translocation.

III. Capacity Expansion Needs

If the above target population goals are to be achieved, there needs to be a substantial expansion of captive carrying capacity to accommodate additional animals (422 additional spaces needed worldwide; recommend 100 in Indonesia, 50 in Malaysia and 272 proportionally maintained in other regional programs; this would include at least 100 in North America). Careful attention should be given to the development of well-integrated regional programs in order to use space efficiently. There needs to be a concerted public

relations effort to encourage zoos to develop the necessary spaces. An alternative worth exploring is to develop large dedicated breeding facilities which can house several animals, particularly in the countries of origin.

IV. Interactions Between Regional Programs

Recommend that reporting protocol developed at Bogor Conference be implemented.

There should be a concerted effort to transfer relevant management technology (husbandry and veterinary care) between all regions.

Each region holding rhinos should identify a coordinator/management committee who is responsible for communication with the other regions and with other relevant organizations/agencies. (suggest Rhino Newsletter as a possible vehicle; suggest newsletter be translated into Indonesian/Malaysian)

Coordinator/management committee should prepare a masterplan for their respective regions. The plan should include both husbandry protocols and appropriate genetic and demographic analyses as needed.

Where they do not already exist, the Asian Rhino Specialist Group should stimulate the formation of such management committees.

As recommended by the AAZPA Rhino Advisory Group, we encourage those institutions that hold rhinos to ensure that all animals of breeding age in the captive population are in situations where males and females are together on a regular basis to increase the probability of reproduction.

V. Priorities For In Situ Protected Areas

Indonesia

(1) Ujung Kulon National Park (Javan)
(2) Kerinci-Seblat (Sumatran)
(3) Gunung Leuser (Sumatran)

Malaysia

(1) Taman Negara (Peninsular Malaysian)
(2) Endau Rompin (Peninsular Malaysian)
(3) Tabin Wildlife Reserve (Bornean)

Financial assistance: Recommend that zoological parks holding rhinos consider involvement in well-planned adopt-a-park programs in consultation with the Asian Rhino SSC and the relevant regional association. A component of such programs should include a community education aspect.

Technological assistance: especially in the following areas: biotelemetry, (for tracking), fecal analysis (nutritional, hormonal studies, parasites), infrasound (for possible use in censusing, identification), field necropsy protocols and training, standardized censusing techniques, foot prints (for possible identification), standardized techniques for recording field observations by guards, technological support for capture and translocations.

VI. Regional Priorities For In Situ Conservation

Recommend implementation of Asian Rhino SSC Action Plan and Indonesian Rhino Conservation Strategy (see attached).

VII. Statement Of Goals And Objectives

Goals and objectives for the three taxa are delineated in the Asian Rhino SSC Action Plan and the Indonesian Rhino Conservation Strategy and in notes from the 1992 AAZPA Rhino Advisory Group Mid-year Meeting (see attached).

VIII. Subspecies

Recommend that three subspecies are maintained until validation using molecular DNA and classical taxonomic studies are completed (see IUCN SSC Asian Rhino Action Plan). Holders should collect blood or tissue samples so that such studies can be undertaken.

INTERNATIONAL STUDBOOK

FOR

SUMATRAN RHINOCEROS
(*Dicerorhinus sumatrensis*)

30 SEPTEMBER 1992

Compiled by:

Dr. Thomas J. Foose & Dr. Zainal Zahari Zainuddin

SUMMARY - CAPTIVE PROGRAMS
SUMATRAN RHINO - 1984 TO 1992

COUNTRY	CAPTURED	BORN	IMPORTED	EXPORTED	DIED	ALIVE
P. MALAYSIA	2/9	0/1	1/0	0/2	2/2	1/6
SABAH	5/1	0/0	0/0	0/0	3/0	2/1
INDONESIA	7/11	0/0	0/1	4/7	0/1	3/4
THAILAND	0/0	0/0	0/1	0/0	0/1	0/0
U.K.	0/0	0/0	1/2	0/0	0/1	1/1
U.S.A.	0/0	0/0	2/5	0/0	0/2	2/3
TOTAL	**14/21**	**0/1**	**4/9**	**4/9**	**5/7**	**9/15**

T.J. Foose
30 September 1992

SUMATRAN RHINOCEROS
LIVING IN CAPTIVITY
(30 September 1992)

COUNTRY	INSTITUTION	MALES	FEMALES	TOTAL
Indonesia	Jakarta	1	1	2
	Surabaya	1	1	1
	Taman Safari	1	2	3
	Ipuh	0	0	0
	Subtotal Indonesia	***3***	***4***	***7***
Malaysia				
Peninsula	Malacca	0	2	2
	Sungai Dusun	1	4	5
	Subtotal P. Malaysia	***1***	***6***	***7***
Sabah	Sepilok	2	1	3 *
	Subtotal Sabah	***2***	***1***	***3*** *
United Kingdom	Port Lympne	1	1	2
	Subtotal U.K.	***1***	***1***	***2***
United States	Cincinnati	1	0	1
	Los Angeles	0	1	1
	New York	0	1	1
	San Diego	1	1	2
	Subtotal U.S.A.	***2***	***3***	***5***
WORLD TOTAL		**9**	**15**	**24**

SUMATRAN RHINO MORTALITY BY YEAR
1984 - 1992

	1984	1985	1986	1987	1988	1989	1990	1991	1992
Captures	2	2	8	6	6	2	1	5	3
Births	0	0	1	0	0	0	0	0	0
Deaths	1	0	3	2	2	1	0	0	3
Population at Risk	2	3	11	15	19	19	19	24	27
% Mortality	50	0	27	13	11	5	0	0	11

T.J. Foose
30 September 1992

SUMATRAN RHINO
MORTALITY SUMMARY
BY COUNTRY OF ORIGIN
1984-1992

	CAPTURED	DIED	% MORTALITY	LAST DEATH
Indonesia	18	5	29	1992
P. Malaysia	11	4	36	1989
Sabah	6	3	50	1992
Total	**35**	**12**	**34**	

T.J. Foose
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SUMMARY OF MORTALITY
SUMATRAN RHINO IN CAPTIVITY
1984-1992

Animal	Sex	Date & Place of Capture	Date & Place of Death	Date to Death Place	Cause of Death	Condition & Age at Capture
2 Erong	M	01-05-84 Malaysia	01-06-84 Malacca	01-05-84	Inanition	Poor/Calf (est. 3 mo.) Discovered abandoned in jungle
3 Melintang	F	18-04-85 Malaysia	15-11-86 Bangkok	00-07-86	Accident: Ensnared Neck in Enclosure	Good/Adult
5 Riau	F	23-01-86 Sumatra	23-01-86 Sumatra	23-01-86	Accident: Died of Trauma in Corral Trap	Good/Adult
9 Napangga	M	15-06-86 Sumatra	06-08-87 Malacca	25-04-87	Acute Colic	Poor/Adult
10 Subur	F	25-06-86 Sumatra	30-10-86 England	25-08-86	Digestive	Marginal/Adult
11 Julia	F	06-07-86 Malaysia	15-12-89 Malacca	06-07-86	Cecal Impaction	Good/Adult
14	M	26-03-87 Sabah	26-03-87 Sabah	26-03-87	Capture Trauma	?/Adult
16 Seridelima	F	01-07-87 Malaysia	23-09-88 Malacca	01-07-87	Salmonella	Marginal/Adult
17 Tenegang	M	14-07-87 Sabah	22-04-92 Sepilok	14-07-87	Hindgut Obstruction	?/Adult
21	M	24-05-88 Sabah	25-05-88 Sabah	24-05-88	Capture Trauma	?/Adult
24 Mahato	F	22-07-88 Sumatra	10-05-92 Cicinnati	05-06-89	Unknown	Good/Adult
33 Rami	F	12-06-91 Sumatra	25-05-92 San Diego	23-11-91	Gut Torsion	Good/Adult

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RHINO

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SECTION 6

RESEARCH

RESEARCH WORKING GROUP

Working Group: *B. Dresser, N. Czekala*

1.1 Veterinary research

Different species will require different types of veterinary input. In general for all species the following holds true:

Development of protocols and recording systems for the veterinary management and collection of data are needed. Medical training and the development of suitable handling areas for routine sampling and to facilitate emergency care should be encouraged. Three main categories of sampling would be:

a) Non-invasive collection of normal baseline physiological data from healthy animals (Including paediatric parameters).

b) Opportunistic sampling of animals under clinical care (including routine procedures e.g. sedation, translocation etc.). This may include various clinico-pathological samples; drug serum levels (e.g. antibiotics, antiparasiticides, anesthetics etc.); toxicological studies; virological studies; etc.

c) Autopsies should be routine and pathological samples collected from dead/euthanized. At this time the following tissue samples (2-4 cm in size) should be collected and stored in formalin: liver, kidney, spleen and whole reproductive tracts (male and female) and eyes. If an animal is euthanized, fresh tissue samples should be taken and the reproductive tract should be removed; eggs or sperm prepared for freezing and banked in liquid nitrogen. Pathologists with special interest/expertise in rhinos should be identified as a source of expertise.

Constraints in successfully managing black rhino in captivity include serious disease problems. Of particular note is haemolytic anaemia (HA) and oral/skin ulcers which has resulted in numerous mortalities in captive rhinos. Black rhinos have an inherent problem with their red blood cell enzymes resulting in a high susceptibility to oxidant stressors. Continued research related to this problem is vital including further RBC studies, infectious diseases especially the role of leptospires, nutritional aspects especially vitamin E levels and the role of low phosphorous levels in the aetiology of HA.

There are serological banks for rhinos that are being coordinated by Dr Eric Miller (St. Louis Zoo) in conjunction with Dr Evan Bloomer - for captive samples (Fossil Rim, Texas) and Dr Dave Jessup - for free-living samples (International Wildlife Veterinary Services, California). Institutions involved with veterinary research in black rhino are encouraged to coordinate through Dr Miller. All captive institutions involved with black rhino are also encouraged to contribute financially to support of veterinary research on this species.

1.2 Behavioral research

A minimum of 1 personnel (keeper) should spend a minimum of 1 hour per day observing and recording the behavior of captive animals. The following behaviors should be recorded on a continuous basis: vocalization, urine spraying, chasing, aggression (pushing, shoving, slashing with lower canine) and mounting. The data should be collected at the same time daily (e.g. 8.00 - 9.00 am). Each time a behavior occurs, the time (to the closest minute) and identity of the animal exhibiting the behavior should be recorded. The date and amount of time the animals were observed should also be recorded. It would also be useful to record the ambient temperature and weather conditions (sunny, raining etc). Descriptive notes should be taken on any new or unusual behaviors. Each data sheet should also note whether a pair was together or apart.

1.3 Nutritional research

(1) Due to digestive tract morphology, the domestic horse probably represents the best nutritional model for all rhinoceros species. Proper documentation of quantities and nutrient composition of diets for to captive rhino populations should be a priority.

(2) Institutions holding rhinos are encouraged to collaborate with Dr. Ellen Dierenfeld at the New York Zoological Society on the further analysis and development of diets.

(3) Whenever possible, blood and tissue (liver, heart, adipose, skeletal muscle) samples should be collected and properly retained for analysis of vitamin E and mineral concentrations.

1.4 Reproductive research

(1) It is vital to develop technology to permit evaluation of the oestrus cycle and pregnancy in the rhino. Urine faecal, saliva and blood samples should be collected in collaboration with specific studies for determination of hormone metabolites. Technology should be developed to permit pregnancy diagnosis of free-ranging populations. This has been successfully developed for black rhino but needs to be adapted for other species.

(2) Pheromone and scent marking studies should be performed in captivity and in the wild.

(3) Collection, evaluation and storage of semen should be carried out collaboratively between zoos and universities.

(4) Institutes holding rhinos should collaborate with Dr Nancy Czekala (San Diego Zoo) and Dr Helen Shaw (Institute of Zoology, Zoological Society of London) in their studies of hormone metabolites in urine, faecal and saliva samples.

(5) Of interest is the use of faecal samples to determine the sex of rhinos in the wild. The ability to differentiate between males and females in captivity through faecal analysis could be extremely helpful to those working with rhinos in the field.

(6) Reproductive technologies such as embryo transfer, artificial insemination and in vitro fertilization are tools that need to be developed for the rhino. Institutions interested in collaborating in the development of techniques for the rhino should contact Dr Betsy Dresser (Cincinnati Zoo). Females being considered for euthanasia can be hormonally treated and attempts made to recover oocytes of embryos at necropsy.

Current status - Assisted Reproductive Technology

(1) Artificial Insemination/Semen Collection and Preparation

Semen has been collected from white,black and sumatran rhinos through electro-ejaculation, rectal massage and at necropsy(from the epididymides). General quality of semen has been poor to begin with - approximate motility at 50%. Cryopreservation of rhino semen has usually resulted in a 20% loss of motility, with a resulting viability of only 30%.

Another problem or unknown involved with artificial insemination may also be due to the volume of semen available for insemination and the mechanism by which semen is packaged. Freezing semen by methods adequate for bovids may not be suitable for rhinos. Therefore once semen is thawed and available for insemination, the volume necessary to produce a pregnancy may still remain a question.

Only in Indian Rhinos is the time of ovulation somewhat predicable. For other species at the present time, attempts at artificial insemination are premature. Instrumentation for A.I. also needs to be developed.

Anaesthesia for development of reproductive technology such as A.I. needs to be further explored. Chutes for restraint are becoming further utilized and more facilities are incorporating them into their management plans.

Some banks for rhino semen exist but they are few in number and are reporting low sperm viability.

(2) Embryo Collection and Transfer

Viable embryos have not yet been collected for any subspecies of rhino, therefore no transfers have been attempted.

(3) In vitro fertilization

Only a few oocytes have been recovered at necropsy from white and black rhinos. Attempts have been made to put the oocytes with frozen-thawed semen but no such attempts have resulted in confirmed fertilizations.

Reproductive Endocrinology

In order to promote timed matings, assisted reproduction, determine and treat infertility, assess ovarian suppression, techniques must be established and validated to measure ovarian hormones and hormonal metabolites.

Indian Rhino Ovarian and pregnancy status can be determined by urinary hormone analysis.

Black Rhino Ovarian and pregnancy status can be determined by urinary hormone analysis - Hodges (Gottigen, Germany). Ovarian and pregnancy status can be determined by salivary hormone analysis (Czekala, S.D.) Pregnancy diagnosis by faecal hormone analysis (Bambeng, Vienna).

Reproductive success is poor. The cause, whether ovarian suppression, male infertility etc. needs to be examined if target populations ore to by realized.

Sumatran Rhino No techniques have been validated for ovarian or pregnancy hormone monitoring. A major hindrance is the lack of known normal cycling or pregnant females to permit assay validation. Urinary hormones are being tested by Helen Shaw (Z.S.L.) and Nancy Czekala (S.D.). Faecal hormone analysis is being attempted (Czekala, S.D.).

White Rhino Urinary hormones are currently evaluated by Bamberg (Vienna), Hodges (Gottigen) and Shaw (London)

1.5 Genetic research

(1) Ongoing and proposed research on taxonomic issues should continue. Resolution of the subspecies question is a high priority and has important implications for the development of a global plan management for rhinos.

(2) In a case of an autopsy the following tissue samples (2-4 cm in size) should be collected and frozen for genetic analysis: liver, kidney, spleen.

(3) Hair samples should also be collected, sealed in plastic bags and stored at room temperature (i.e., if a freezer is not available)

The procedures and arrangements should be worked out. the veterinarian in charge should be thoroughly familiar with the procedures for bleeding and preparing the blood for analysis.

Samples for research on taxonomic status are currently being analyzed at the New York Zoological Society. Any samples are of great value (blood samples, Skin biopsies, Necropsy sample etc.) Please contact George Amato, Conservation Geneticist (N.Y.Z.S). In addition, for maximizing genetic variability accurate stud books are necessary. It should be noted if a female is put together with a number of males and if necessary, paternity testing can be done.

Northern Whites

Cytogenetics have been studied at San Diego on a total of 32 *C.simum* individuals from 9 different institutions, including 8 males and 19 females of the southern subspecies (*C.s.simum*), 2 females and 3 females of the northern subspecies (*C.s.cottoni*) as well as one subspecies hybrid. A summary of the diploid chromosome number of these animals were found to be 2n=82 with the exception of one 2n=81 *C.s.cottoni* male which appears to be the result of a simple Robertsonian translocation between two of the smaller acrocentric chromosomes. (Houch and Ryder, in prep.)

The finding of an apparently aberrant karyotype in the breeding bull (No. 372, Sudan) raises the possibility that this individual, through the production of duplication/deficient gametes as a result of the nondisjunction of homologous elements in the meiosis, could contribute to the production of aneuploid zygotes resulting in foetal wastage. The chromosomal status of No. 372 Sudan's surviving offspring (Nabire and Najin) as well as investigation of any aborted foetuses could shed light on the question. These studies would seem to be an urgent priority.

1.6 Genetic resource banking

There is ample justification for collecting and preserving and variety of samples for research, population management and reproductive enhancement in support of conservation efforts. These materials include blood samples, skin biopsies, gametes and embryos. These samples provide potential source for DNA, cell strains and viable organisms.

Research activities focusing of collection, preparation and long-term storage of these biological resources need to be delineated, efforts coordinated and funding secured to realize the potential conservation benefit.

1.7 Other

(1) Field workers have identified a need to record foot print patterns of animals and how they change with age. Such information could be used to aid census efforts in the wild.

(2) Captive animals could also be used to work out additional technological and practical problems facing field researchers. For example, there is a need to develop a method to radio telemetry equipment to rhinos. Captive rhinos should be used to help develop this technology.

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SECTION 7

SYSTEMATICS

SYSTEMATICS WORKING GROUP

Working Group: *G. Amato and O. Ryder*

The CBSG created an Ad Hoc Advisory Group to comment on the current state of data in reference to the following questions:

1. Does the genetic data currently presented support attempts to conserve *D. b. michaeli* and *D. b. minor* as separate populations?

2. What further specific studies would test the hypotheses that these populations have or have not diverged sufficiently to justify conservation as separate populations?

Responses were communicated to this meeting by G. Amato, J. Cracraft, G. McCracken, E. Maruska, R. Lande, R. Lacy, R. Wayne, O. Ryder, K. Willis, and R. Wiese.

One important, yet not totally unexpected, result was that the discussion indicated that there is not yet a consensus on what a subspecies is, what role subspecies research should play in determining conservation strategy, and whether there are different goals for ex situ and in situ programs. We believe it is accurate to say that more questions were raised then answered. As stated earlier, this result was not unexpected to those of us who have conducted basic research in evolutionary biology and population genetics given the fact that within these fields there is not even a consensus as to what a species is.

While these discussions may be frustrating to managers and others in the conservation field, it is important to recognize the value of the primary data in developing our strategies. Additionally, it argues for the necessity of tackling these basic questions of what a subspecies is and what are our goals in terms of preserving evolutionary novelty (especially in captive populations). Articulating goals and methods to resolve these important questions has been a useful outcome of CBSG activities. Consideration of basic theoretical issues as well as definition of goals allows the logical development of more useful applied approaches for conservation.

In this context we would like to address some general and specific points of "near" consensus:

First, it is important to emphasize the value of comparative data sets in the resolution of these questions. The more information we have on morphological, behavioral, ecological, and genetic data, the better. Concordance (or the lack of concordance) would indicate which questions are in most need of further research. We do recognize that recent developments in molecular genetics allow us to survey for many more characters then in the past, and at a far greater level of resolution. Since morphology, behavior, etc. is coded in the genome, it is likely that if differences exist between populations, that differences in rapidly evolving areas of the genome will easily be detected. However, other aspects of genome structure and organization

will only be revealed by cytogenetics studies. While chromosomal studies have been utilized in systematic and evolutionary biology studies for decades, the necessity of undertaking chromosomal investigations for assessing genetic divergence of species and subspecies remains, in spite of the spectacular advances in molecular genetics analytical capabilities.

Karyotypic distinction of populations is strong evidence for restricted gene flow, reproductive isolation and speciation. However, karyotypic similarity of identity of populations does not indicate that no significant divergence has occurred. In these instances, molecular genetics studies are indicated. Whenever possible we should analyze the same data sets for both chromosomal information and DNA sequence data.

Beyond collecting these data sets we need to tackle the following issues:

1. What is a subspecies/E.S.U./conservation unit (i.e. any population diagnosably distinct, or if minimally diagnosable should we characterize the levels of genetic differentiation?)?

2. Should our strategy for determining conservation units in captive propagation programs reflect exactly, largely, or not at all our strategy for in situ programs. There is much disagreement about this; and it is unclear what role practical considerations (e.g. space limitations, financial limitations) should play in these discussions. Additionally, arguments about what sorts of captive populations are most wanted--or likely to be successful for reintroductions will need to be considered. These issues will need to be discussed with managers as well as among conservation geneticists.

Where does all of this leave us with respect to the original questions about black rhinos, as well as other rhino subspecies questions?

The closest we come to a consensus is as follows:

1. In situ programs should be most concerned with preserving existing local populations. In spite of the dramatic decline of rhinos in the wild, there are still sufficient numbers of individuals of recognized "subspecies" to avoid the possible problems from mixing populations that may have subtle adaptive differences. In the future we may have a problem with too few Northern white rhinos, or problems with this population having passed through too small a "bottleneck".

2. Chromosomal studies of white rhinos require expansion. While a large number of C. s. simum have been karyotyped, relatively few C. s. cottoni have been investigated. Importantly, one individual in the captive population appears to have a different diploid number, possibly the result of a chromosome fusion. This animal has sired offspring and fathered an aborted fetus. Confirmation of the karyotypic status of this male with a chromosomal rearrangement through newly collected samples is an urgent priority. Investigation of chromosomal and DNA sequence data of the remaining ex situ and in situ populations remains a high

priority. This is especially urgent if population reinforcement from the captive population is to be considered.

3. Eastern and Southern black rhinos appear to fall into the category of "minimally distinct". The results of molecular genetics analyses of black rhinos suggest that diagnostic differences may exist between eastern and southern forms, although the number of animals sampled to produce these findings is small. Additional data (including considerable DNA sequence data) exist but are not yet published. Low levels of genetic variation in isoenzyme loci and in mitochondrial DNA (mtDNA) have been observed in Diceros bicornis. While the available data are consistent with the hypothesis that the eastern and southern populations represent distinct historical lineages, the extent of divergence of these lineages is relatively small. The molecular data has been sited to both support the notion of clinal variation as well as the possibility of historical lineages. Due to the fragmentation of the populations, it may be impossible to resolve which of these hypotheses is accurate.

The results of chromosomal studies suggest that a genetic discontinuity may exist between the eastern rhinos in Kenya and the southern rhinos in Zimbabwe. Additional heterochromatic arms are observed in a small sample of black rhinos from Kenya. Whether these differences would result in decreased fertility has not been tested, nor would it be likely to be tested experimentally. Additional karyotype data is a high priority.

The significance of the observed genetic differences between the eastern and southern populations in terms of physiology, reproductive potential, ecological adaptations and disease is not known.

There is no reason to change our in situ strategy at present, but whether we could justify mixing our captive populations needs to be addressed when the context of our captive propagation goals. At this time, the weight of opinion argues for maintaining the Eastern and Southern populations as separate management units in our ex situ program.

4. Preliminary DNA sequence data on Sumatran rhinos indicates that three populations (peninsular Malaysia, Sumatra, and Borneo) are diagnosably distinct. Chromosomal studies on a few individuals have not revealed differences in chromosome number. It is recommended that in situ and ex situ programs should treat these as separate units at this time. Further data on the level of differentiation will be considered, once again, after we resolve our general goals.

5. At this time, there is not an indication of a subspecific question for the Indian/Nepali rhino.

6. If a viable population of Javan rhinos is found in Viet Nam, then the subspecies issue will need to be investigated for this taxon.

In summary, we have made specific recommendations on subspecies of rhinos while recognizing that it is more important then ever to reexamine the "dilemma of subspecies" for

conservation. Zoo geneticists, acting as conduits between academic researchers (in evolutionary biology, systematics, and population genetics) and conservation managers should address these general issues. This group, as a subcommittee of CBSG would have the best chance of articulating a useful statement of goals, methods, and analyses to make further progress in the application of rigorous science to these important conservation questions.

We recognize that other factors in addition to genetic differences among subspecies are involved when making decisions concerning conservation of populations within the larger context of species conservation.

Conservation efforts for in situ populations should be structured to retain the full range of local genetic variation. Whenever feasible, ex situ programs should reflect the zoogeographical and phylogenetic structure of wild populations. Although divergence of ex situ populations will inevitably occur, captive management techniques can minimize the extent and rate of divergence of captive and wild populations. Furthermore, regular genetic inputs from wild populations, if possible, can further reduce divergence of ex situ populations relative to their wild source populations.

Carefully managed captive populations that reflect natural zoogeographical and phylogenetic population substructure, whether corresponding to subspecies designations or not, are a valid source for reintroduction and ex situ - in situ metapopulation management.

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SECTION 8

IN SITU SUPPORT

IN SITU WORKING GROUP

Working Group: *(Chair) R. Tilson, M. Khan, N. Van Strien, J. Manansang, M. Hutchins, P. Wells, M. Kock, M. Brooks, V. Wilson*

The recommendations of the *In Situ* support (Adopt a Park Program) are outlined below. Africa and Asia are considered as distinct areas. The areas considered suitable are: distinct areas were funding is required, the funding will not necessarily be large but will provide a significant benefit to the park as a supplement to existing or proposed funding from other sources, and the areas are distinct so allowing tangible 'adoption'.

ASIAN RHINOS AND PROTECTED AREAS

Indian Rhino

There are two parks in Nepal; Chitwan and Bardia. There are 6 parks in India; Kairanga, Manas, Orang, Pobitora, Jaldapara and Dudwa.

There are 42 World Zoos holding Indian Rhinos. 25 in 'Hard Currency' Countries; 14 in Europe, and 11 in North America.

Programmes for these protected areas are suggested in the report from the Global Rhino Workshop Report 'Indian Rhino Section'.

Javan Rhino

There are no Javan Rhinos in captivity.

There are two protected areas for Javan Rhinos, the Southern Form in UK on Java, and the Northern Form in Nam Cat Tien in Vietnam. There is already a programme in place in UK, supported by The Minnesota Zoo, New Zealand Nature Conservation, and WWF.

The Northern form in Vietnam should have a programme for assessing the status, distribution, and development of a management strategy.

Sumatran Rhino

There are currently 28 Sumatran rhinos in captivity. There are 6 in North America and 2 in Europe and 18 in Asia.

There are four 'Forms' recognized. The 'Burma Form' is too poorly known to produce any recommendations. The Sumatran form has two parks that are considered of high priority, Gunung Leuser and Kerici Seblat. Programmes that include; park infrastructure support, Community Education, Survey, and anti-poaching support are recommended.

The P. Malaysian form has two parks of priority Endau Rompin and Taman Negara but only the former is in need of support. In Endau Rompin Infrastructure Support and Community Education is most needed.

There is the Borneo form and there is one park Tabin Wildlife Reserve that is considered of high priority. The requirements are as for Endau Rompin.

FUNDING

The recommended cost of 'Adopt A Park Programme' for the ten parks above is $250,000. This will not pay for all the expenses of these parks but will provide a significant support. We recommend the approximate 25 'Hard Currency' Zoos contribute $10,000 per year for a minimum of three years to initiate the programmes.

We also recommend the Zoos support the annual cost fore the IUCN/SSC Asian Rhino Specialist Group, as set out below:

	$
Chairman Travel (2 trips)	2,000
Group Travel (10 people, 1 trip)	10,000
Correspondence	500
Annual News Letter	1,200
	14,000

We recommend these costs be proportioned accordingly; $7,000 from 11 N. American Zoos, $3,500 from Australian Zoos, and $3,500 from 15 European Zoos.

AFRICAN RHINOS AND PARKS

Black Rhino

Some recommendations for the 'Adopt a Park Programme' were made by the African Rhino Specialist Group as outlined below by country. This is not an exhaustive list.

Cameroon

There are a number of areas in the Cameroon that are protected areas which contain 30 to 50 Western Black rhinos.

The requirements are; surveys to assess status and distribution of rhinos, development and implementation of a management plan.

Tanzania

The Selous N.P. that contains an unknown breeding population of Southern Black rhinos.

Infrastructure support for key sanctuary areas within the Selous N.P. is required.

Zimbabwe

Four areas are considered of importance; Manapool Mutuzadonna, Chizaria, and Hwange. They contain Southern Black and Southern White rhinos.

The requirement are infrastructure support, management strategy development, conservancy support, and community education for example Camp Fire Programmes.

Mozambique

The important areas are not defined but there is a need for a relocation project of relic populations of Southern Black to sanctuaries elsewhere in Southern Africa. This needs to be confirmed from Government Authorities.

Botswana

The areas are not defined containing Southern Black but there is a need to create the Khama Rhino Sanctuary, for Chobe rhino.

Namibia

The important area is Damaraland containing South West Black. There is a need for a population monitoring programme.

Zaire

The area of importance is Garamba for the Northern White. There is a need for a population monitoring programme.

FUNDING

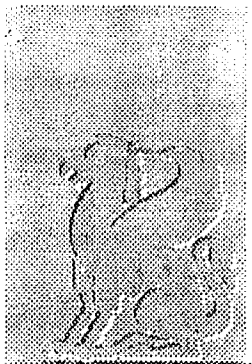
The recommended cost of 'The Adopt A Park Programme' for the ten programmes is $250,000. We recommend the approximate 100 suitable Hard Currency Zoos with African Rhinos contribute $2,500 per year for a minimum of three years to initiate the programmes.

We also recommend the Zoos support the annual cost for the IUCN/SSC African Rhino Group, as set out below:

	$
Chairman Travel (2 Trips)	2,000
Group Travel (10 people, 1 trip)	10,000
Preparation of Action Plan & Management Guidelines	10,000
Establish African Rhino Data Base	5,000
	27,000

We recommend these costs be proportioned accordingly; $11,000 from N. American Zoos, $11,000 from European Zoos, and $5,000 from Australian Zoos.

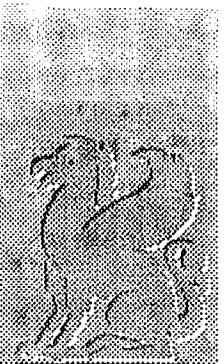
Slide: 1870#01 Opid: MN Zoo Job #: 11870 DDS:6000 size: 5292 Mon May 4 13:47:52 1992



ADOPT-A-PARK GUIDELINES FOR SUCCESSFUL PARTNERSHIP

- Establish a Commonality of Interest Between Zoo's Interest and Park Needs to Sustain the Effort
- Commit to a Long-Term Relationship on Both Sides
- Emphasize a "Grass-Roots" Approach to Place Financial Support Directly into Park Programs
- Select Programs of Modest Costs and Visible Benefits to Sustain Continued Investment
- Develop Marketing and Communication Programs on Both Sides to Sustain Good Will (G. Rabb, IUCN/SSC)

Slide: 1870#04 Opid: MN Zoo Job #: 11870 DDS:6000 size: 5354 Mon May 4 21:08:51 1992



ADOPT-A-PARK BENEFITS TO INSTITUTION

- Creates a Direct Relationship Between *Ex Situ* and *In Situ* Conservation Activities
- Demonstrates Zoo's Resolve to Conserve Biodiversity on an Ecosystem Level, Not Just Species Level
- Provides Focus and Fund Raising Opportunities for Zoo's Conservation Exhibit
- Collectively, Zoos Evolve from Being "Zoological Parks" to "Conservation Centers" (G. Rabb, IUCN/SSC)

Slide: 1870#05 Opid: MN Zoo Job #: 11870 DDS:6000 size: 5338 Mon May 4 21:16:35 1992

ADOPT-A-PARK
STARTING YOUR OWN PROGRAM

- Draft a Zoo Conservation Policy That Pledges "To Support the Preservation and Restoration of Endangered Species' Natural Habitats" (Minnesota Zoo 1990)
- Identify an "Umbrella Species" That Symbolizes This Commitment
- Locate a Priority Protected Area That Meets This Requirement
- Commit Financially to 3 Years of Infrastructure Support (US $25,000 per Year or Less) and a Long-Term Presence as Funds Permit
- Formalize "Points of Agreement" Between Zoo and Host Country Wildlife Authority

Slide: 1870#03 Opid: MN ZOO Job #: 11870 DDS:6000 size: 5134 Wed Sep 30 16:58:02 1992

ADOPT-A-PARK
A RHINO OVERVIEW

- There are 5 Rhino Species; 2 African and 3 Asian
- They Live in 37 Major Protected Areas; 18 African and 19 Asian
- Costs to Adopt (US $25,000) Total US $925,000
- There are 290 Zoos Worldwide with Rhinos; 266 with African and 52 with Asian
- Costs per the 200 'Hard Currency' Zoos to Adopt Major Protected Rhino Populations is US $4,625/Yr.

Slide: 1870#06 Opid: MN Zoo Job #: 11870 DDS:6000 size: 2060 Mon May 4 21:26:51 1992

Priority Sanctuaries for Rhino

Africa	Sanctuary
Kenya	Aberdare, Masai Masa, Nairobi, Nakuru, Tsavo, Solio, Laikipia
Tanzania	Selous
Zaire	Garamba
Zimbabwe	Hwange/Matetsi, Sebungwe, Zambezi, Central Highlands
Nambia	Etosha, Kaokoland
South Africa	Hluhluwe/Umfolozi, Kruger, Mkuzi

Minnesota Zoo

Slide: 1870#07 Opid: MN Zoo Job #: 11870 DDS:6000 size: 2302 Mon May 4 21:30:25 1992

Priority Sanctuaries for Rhino

Asia	Sanctuary
Indonesia	
Sumatra	Kerinci Seblat, Gunung Leuser, Barisan Selatan, Way Kambas
Java	Ujung Kulon
Kalimantan	Kayan Mentarang
Malaysia	
Peninsular	Taman Negara, Endau Rompin
Sabah	Tabin, Danum Valley
Sarawak	Ulu Limbang
Vietnam	Nam Cat Tien, Bugiamap
India	Dudhwa, Kaziranga, Manas, Orang
Nepal	Chitawan, Bardia

Minnesota Zoo

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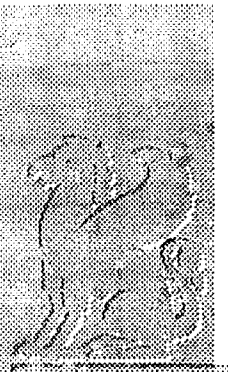

ADOPT-A-PARK
KERINCI SEBLAT NATIONAL PARK
CENTRAL SUMATRA, INDONESIA

- 14,000 Sq. Km of Evergreen and Montane Forest Next to Mt. Kerinci
- Largest Conservation Area in Sumatra, Protects Watershed of 10 Million Ha.
- Contains Largest Population of Sumatran Rhino (500), Stronghold of Sumatran Tiger, 6 Species of Primates and 130 Species of Birds

The Javan Rhino as a Flagship Species

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

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

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

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

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

How You Can Help

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

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

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

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

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

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

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Ujung Kulon

Last Refuge of the Javan Rhino

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

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

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

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

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

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

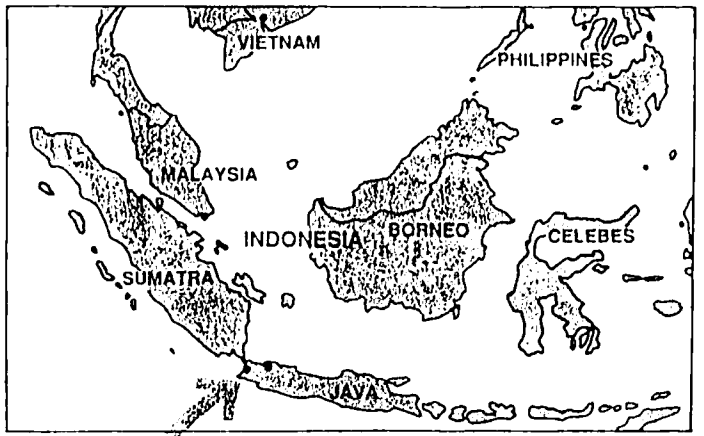
The Javan Rhino

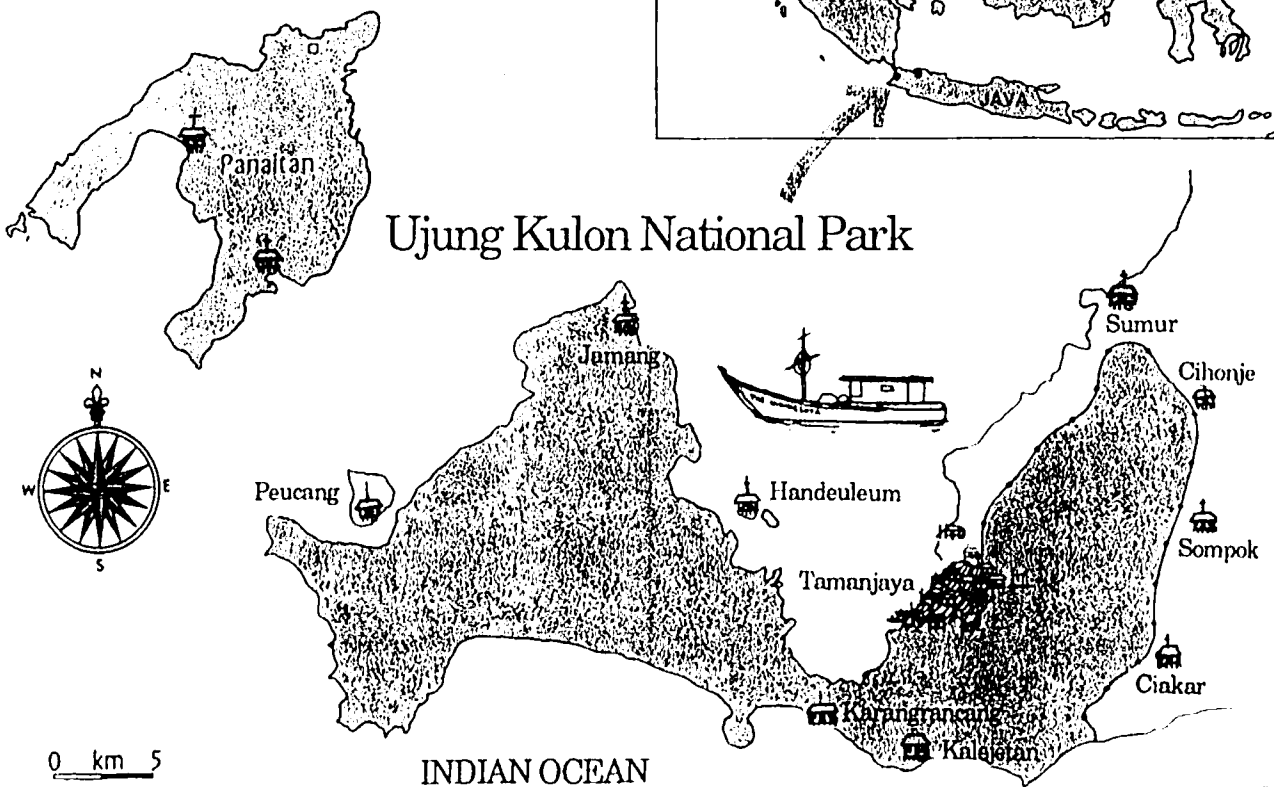
Once ranging from Assam in northern India through much of Indochina, the Javan rhino had already disappeared from all but Java's Ujung Kulon peninsula by the turn of the last century. Less than 60 Javan rhinos are believed to exist in the world today, all in the swampy lowland forests of this small wilderness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

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

Unfortunately, not even this last remote island population of the Javan rhino can be considered safe from extinction. Beyond the risks of natural disaster, genetic problems and disease that all small, isolated populations must face (five Javan rhinos succumbed to an unknown disease in 1982), the threat of poaching still looms large in Ujung Kulon. Poachers killed two rhinos in the Park as recently as 1985 and 1987.

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





A Model Program

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

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

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