

TAXONOMIC STATUS OF THE VIETNAMESE RHINOCEROS

The footprints of the rhinos in Cat Loc are very small compared to those of the Javan Rhinos in Ujung Kulon. The width of the hindfoot in rhinos from Ujung Kulon is 25-28 cm, while those measured in Cat Loc were 20-23 cm. Rhinos with footprints less than 23 cm wide would be considered subadults in Ujung Kulon. It is incomprehensible that there would be subadults only in Cat Loc, especially as the same small sizes were found during the 1993 survey. From the form of the footprints (comparatively wide front hoof and short side hoofs), there is no doubt that all footprint casts from Cat Loc represent *Rhinoceros sondaicus*.

The small size of the footprints of the Cat Loc rhino population, about 75-80 % of those from Ujung Kulon, indicates that the other dimensions of the body must be similarly smaller. The shoulder heights of rhinos in Ujung Kulon are about 135 cm in females and 150 cm in males. The Cat Loc rhinos then should be 110-120 cm high, and weigh 50-60 % of the weight of the rhinos in Ujung Kulon. The skeleton of the Cat Loc rhino preserved in the collection at the Institute of Ecology and Biological Resources in Hanoi lacks the feet, but judging from the size of the mounted specimen it was probably about 120-130 cm high at the shoulder.

The previously established morphological differences and the diminutive size of the rhinos in Cat Loc are sufficient grounds to treat the two remaining species as clearly distinct gene pools, each uniquely adapted

to the particular habitat that they are occupying. The climate, topography and vegetation in Cat Loc and in Ujung Kulon are clearly distinct.

AsRSG proposes that it is preferable to use the vernacular **Vietnamese Rhinoceros** for the Cat Loc population, and no longer call them "Javan Rhinoceros in Vietnam." They belong to the subspecies called *Rhinoceros sondaicus annamiticus* Heude, 1892. (Dr. Nico van Strien and Dr. Nguyen Xuan Dang).

FIRST PHOTOS OF THE VIETNAMESE RHINOCEROS

In April 1999, a team of WWF Specialists collaborated with the staff of Cat Tien National Park and, guided by information from local people, placed ten infrared-triggered cameras at various locations throughout the park. This resulted in a unique set of color pictures, first released on 15 July 1999 and afterwards widely distributed through press and internet. Some of the pictures can be found on websites of rhino organizations like IRF and SOS Rhino. These photos remove any doubt that the rhinos at Cat Tien are in fact specimens of *Rhinoceros sondaicus*, confirmed by the clearly visible special skin-fold pattern on the nape of the neck characteristic of this species. We are thankful to WWF for permission to reproduce two of the photos in this newsletter.

CAPTIVE PROGRAMS

MANAGED BREEDING (CAPTIVE) PROGRAMS FOR SUMATRAN RHINO

Since the mid-1980's, there has been a diversified and integrated strategy to conserve the Sumatran rhino. The strategy comprises two major components (1) to protect the species in the wild using anti-poaching teams known as rhino protection units (RPU's) and (2) to breed the species in captivity or at least under managed conditions. Further discussion of these programs is provided by Foose and van Strien (1998).

The best place to conserve the Sumatran rhino or any species is in its natural habitat. However, many factors render *in situ* conservation of this species

very difficult and uncertain. Therefore, it was decided in the early 1980s to develop captive breeding as a second component in the conservation strategy for Sumatran rhino. Three other species of rhino (the Indian, the black and the white) do reproduce reasonably well in captivity, as well as do many other endangered species, including large tropical forest mammals (like the okapi and the gorilla). Moreover, Sumatran rhino had been in captivity sporadically from the early days of zoos. Indeed, the second rhino known to be born in captivity was a Sumatran at the Calcutta Zoo in 1889. Were they just lucky or has the art been lost?

At the time the recent concerted captive program commenced in the 1980s, there were probably 800-1,000 Sumatran rhino still in the wild and at least

25% of them were "doomed", i.e. could not be protected in the wild because their habitat was being destroyed or they could not be protected from poachers with feasible resources. Hence, it was decided that there should be an attempt to rescue and breed these rhino while trying to conserve in the wild the rhino that were protectable there.

Capture programs commenced in Peninsula Malaysia, Sumatra, and Sabah. From 1984 to 1994, over 40 rhino were captured in Indonesia and Malaysia. Rhinos were placed in zoos in countries of origin as well as England, and the United States because these two places had been so successful with breeding other rhino species (Foose 1999).

However, the captive programs have not prospered (*Captive Table 1*). Many (23) of the rhinos have died from a variety of causes, many of them suspected to be nutritional. None of the captive rhino have fully reproduced in captivity, although one female that had been captured pregnant did deliver a calf at the Malacca Zoo. Of the 40 captured plus the calf born to the female pregnant at capture, only 17 survive today. Zoos have intensified their efforts to keep rhinos alive and get them to breed, for example, by transporting browse over great distances at considerable expense. Moreover, the research that has been conducted in zoos has provided information and insight into why this species is so difficult.

Captive Table 1

Summary of Captive (Managed Breeding) Programs for Sumatran Rhino - 1984-1999

Country	Captured (♂/♀)	Born	Imported	Exported	Released/ Escaped	Died	Alive
Peninsula Malaysia	3/9	0/1	1/0	0/2	0/0	2/2	2/6
Sabah	8/2	0/0	0/0	0/0	1/0	6/0	1/2
Indonesia	7/11	0/0	1/1	4/7	0/0	3/3	1/2
Thailand	0/0	0/0	0/1	0/0	0/0	0/1	0/0
U.K.	0/0	0/0	1/2	1/0	0/0	0/2	0/0
U.S.A.	0/0	0/0	2/5	0/0	0/0	1/3	1/2
Total	18/22 = 40	0	5/9	5/9	36/59	12/11 = 23	5/12 = 17

The reproductive biology of the species causes it to be one of the most difficult that captive managers have ever tried to reproduce. For one thing, males are very, sometimes fatally, aggressive to females, except when the females are in estrus (heat). So there is reluctance to place males with females until the female is in heat. But it is difficult to know when the female is receptive without placing her with a males. Thus, there is a real dilemma. Moreover, recently it has been revealed that females may be induced ovulators, that is they won't produce eggs that can be fertilized by male sperm until or unless copulation occurs (Roth et al, 1998). But then, if the female becomes pregnant, there is speculation that it is important to immediately separate her from the male or she may loose her pregnancy. as occurred 5 known times at Cincinnati Zoo and perhaps another half dozen times at other locations in captivity (Jakarta Zoo, Sepilok, maybe Port Lympne).

A major conclusion from the trials and tribulations of the traditional captive program is that the species needs more space and natural conditions. Hence, there has been an attempt to adaptively modify the captive program by moving most of the 17 rhinos that survive in captivity from zoos back to larger managed breeding centers in native habitat at Way Kambas in Sumatra, Indonesia; Sungai Dusun in Peninsula Malaysia; and Sepilok in Sabah on the island of Borneo. These Sumatran Rhino sanctuaries have been developed by partnerships:

- In Indonesia involving the Directorate General of Nature Conservation (PKA), Taman Safari Indonesia, the International Rhino Foundation (IRF - the major funder through donations from its members Howard Gilman Foundation/White Oak Conservation Center, Disney Wildlife Awards, and Zoological Parks Board of New South Wales), the USFWS Rhino & Tiger Conservation Fund, the Adelaide Zoo, the Melbourne and Werribee Zoos of the Zoological Board of Victoria, and AsRSG

- In Peninsula Malaysia involving Dept. of Wildlife and National Parks (DWLNP), IRF, AsRSG, SOS-Rhino, and the Cincinnati Zoo;
- In Sabah involving the Wildlife Dept., SOS-Rhino, IRF, and AsRSG.

The Suaka Rhino Sumatera (SRS) in Way Kambas was completed in 1997. The SRS is the largest of the sanctuaries encompassing 100 hectares (250 acres) of native habitat enclosed by electric fence. Rhino were repatriated from zoos in January 1998. These rhino have readapted well to the native environment and mountings and partial intromissions have occurred. The Sumatran Rhino Conservation Center Sungai Dusun originated in 1987 but initially was a rather traditional captive facility, albeit at the edge of a Wildlife Reserve comprising native habitat. The expanded enclosures in native habitat were not occupied until 1997 and do seem to be stimulating more matings. Sepilok Rhino Center also originated in the late 1980s but was not expanded into native habitat until the mid 1990s when matings commenced (Bosi 1996). However, there has been a hiatus due to the death of one of their males and the debilitation for a period of the other male. The hope expectation are that more matings will occur soon.

All parties interested in saving the Sumatran rhino are now coordinating and collaborating more closely and intensely than ever. Managers and scientists from all facilities and countries with the rhino are visiting one another, exchanging information, and assisting each other as much as they can. AsRSG and IRF organized and funded a meeting in February 1999 at Sungai Dusun of managers from the four facilities with Sumatran rhino in managed breeding situations: Sungai Dusun (Peninsula Malaysia), the SRS at Way Kambas (Indonesia), Sepilok Rhino Breeding Center (Sabah), and the Cincinnati Zoo (USA). In conjunction with this session, a team of reproductive specialists from the United States, Canada, Malaysia, and Indonesia conducted an assessment of the programs and an examination of many individual rhino at the Sumatran rhino managed breeding centers at Way Kambas and Sungai Dusun. Participants in the meetings and assessments were: Mohd Khan Momin Khan (AsRSG Chairman); Dr. Tom Foose and Dr. Nico van Strien (AsRSG program Officers and IRF); Musa Nordin (Dir. Gen. DWLNP), Dr. Zainal Zahari Zainuddin (Sungai Dusun), Dr. Aidi Mohd (Sungai Dusun); Dr. Terri Roth and Steve Romo (Cincinnati Zoo); Dr. Edwin Bosi (Sepilok). Subsequently, during the assessments in Indonesia, Dr. Mohd Agil and Dr. Bambang (Bogor Agricultural University), and Mr. Tony Sumampau (Taman Safari

Indonesia) also participated.

Based on the collective information and knowledge available, the group that convened at Sungai Dusun summarized the status and formulated new recommendation for each of the 17 Sumatran rhino (5 males and 12 females) in managed breeding situations in an effort to maximize the probability of reproduction. **Captive Table 2** presents a summary of the status and the recommendations based on the work of all who participated. Published work on the reproductive biology of the Sumatran rhino is provided by Bosi (1996), Heistermann et al (1998), Roth et al. (1998), and Schaffer et al (1994). Reproductive research and management continues and includes work by Dr. Terri Roth et al at the Cincinnati Zoo (funded by IRF), work by Dr. Mohd Agil and Keith Hodges on rhino in Indonesia and Sabah (funded by IRF and SOS-Rhino), and by Dr. Aidi Mohd, Dr. Wahid, and Dr. Zainal in Peninsula Malaysia (funded by IRF).

Seven of the 12 females in captivity are copulating. Unfortunately, many individuals in the captive population appear to be reproductively compromised. Dr. Nan Schaffer, President of SOS-Rhino and a member of AsRSG, has been the leader in diagnosing reproductive pathologies in the Sumatran rhino. Dr. Schaffer first demonstrated the effectiveness of ultrasonography in this species in the early 90's, but it was not used extensively until recently (Schaffer, et al. 1994). She has observed through direct ultrasonography or through reports from postmortems that of 15 of the 22 animals entering captivity since 1984, at least 50% exhibited uterine pathology. Dr. Schaffer reports that such pathology appears to begin after 10 years of age, and becomes quite prevalent in animals over 15 years. Distressingly, most remaining captive animals are representatives of this older age group. Only three of the females which are copulating appear to have no pathology; the other four have mild to significant pathology. Dr. Schaffer believes these animals will have increased difficulty conceiving though they are still cycling. Another female, who did copulate in the early 1990s but not thereafter, seems to be chronically lactating for reasons yet undetermined although nothing seems lodged in her uterus. Treating these apparently chronic conditions will be challenging. It is encouraging to note that female domestic horses that continue to cycle are able to tolerate mild uterine pathology and still reproduce if other conditions are optimal .

Dr. Schaffer has also been very involved in reproductive assessment of males. Only one of four breeding males has produced pregnancies, four of the five captive males examined by Dr. Schaffer are all producing sperm. One male is experiencing

problems with intromission, probably due to capture at a young age. Another male is persistently violent toward female rhino, which may also be due to age at capture. These problems may be resolved by enhancing breeding opportunities.

Captive Table 2

REPRODUCTIVE STATUS OF SUMATRAN RHINOS IN BREEDING CENTRES

Facility	Sex	Name	Captured(born)	Estimated age	Cycling	Pathology	Copulation	Pregnancy NOW	Pregnancy PAST	RECOMMENDATIONS
<i>Dicerorhinus sumatrensis sumatrensis</i> - Malaysia										
Sungei Dusun & Melaka, MALAYSIA										
	♀	MINAH (Born in facility)	1987	12	Y	N	Y _(12/98)	?	N	For all females start faecal hormone analysis, and vaginal smear analysis if trial successful.
	♀	PANJANG	1987	17	Y	?	N	N	?	All animals X-ray dentition for age assessment. Cincinn. to develop.
	♀	SEPUTIH	1988	20	Y	Y	Y _(2/99)	?	?	Confirm pregnancy Bloodplasma-April. Isolate from male when confirmed
	♀	MAS MERAH	1987	20	Y	Y	N	N	?	Introduce to male soonest.
	♀	RIMA	1986	20+	Y	?Y	Y _(9/98)	?	Y	With male, continue till copulation.
	♀	JERAM (Melaka)	1984	25+	N	Y	N	N	?	Evaluate estrous state for 3 months before pairing with Shah. Ultrasound.
	♂	ARA	1994	10+			Y		?	Confirm pregnancy. Bloodplasma-Feb.
	♂	SHAH	1988	14			N		N	Keep for exhibit
										Evaluate sperm if pregnancies do not occur
										Evaluate sperm
<i>Dicerorhinus sumatrensis sumatrensis</i> - Indonesia										
SRS -Way Kambas, INDONESIA										
	♀	BINA	1991	15+	Y	N	?	?	?	Continue current protocol till pregnant. Ultrasound Feb.
	♀	DUSUN (from Malaysia)	1986	17+	?	Y	N	N	?	Ultrasound Feb. Possibly develop hormonal stimulation strategy
	♂	TORGAMBA	1985	20			?		?	Evaluate sperm
Cincinnati Zoo, USA										
	♀	EMI	1991	8	Y	N	Y	N	Y	Continue current protocol. Move male after conception. Progesteron suppl.
	♀	RAPUNZEL	1989	20+	N	Y	N	N	?	Biopsy on uterine 'mass'. Possibly hormonal stimulation.
	♂	IPUH	1990	20+			Y		Y	
<i>Dicerorhinus sumatrensis harrissoni</i> - Borneo										
Sepilok & Tabin, SABAH										
	♀	LUNPARAI (Tabin)	1989	13	Y	Y	Y	N	?	Move to breeding situation as soon as possible
	♀	GOLOGOB	1994	18	Y	Y	Y	N	?	Resume breeding as soon as male healthy
	♂	TANJUNG	1993	15			Y		?	Evaluate sperm

AsRSG will continue with the assistance of the IRF, SOS-Rhino, and other organizations to facilitate and optimize conditions for managed breeding of Sumatran rhino. Toward this end, another expanded meeting of Sumatran rhino managers and researchers will convene under AsRSG auspices in Indonesia and Malaysia in March 2000. Hopefully, in the new millennium successful reproduction of Sumatran rhino under managed conditions will be achieved and this tool can truly be added to the options available to conserve this precariously endangered species.

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NEW STUDBOOK FOR RHINOCEROS UNICORNIS

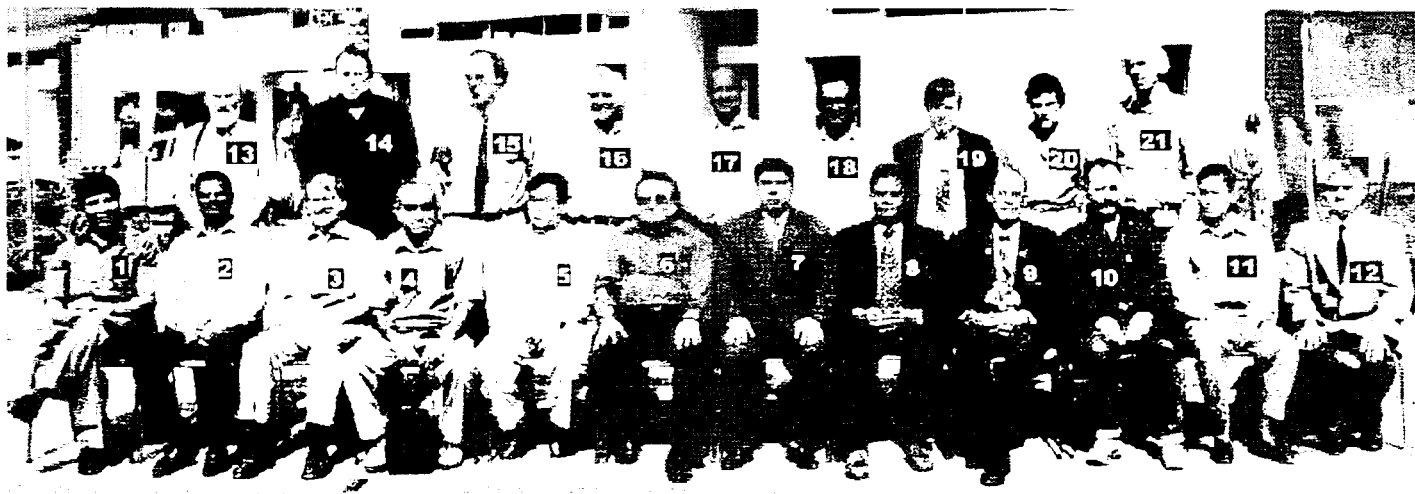
The tenth edition of the *International Studbook for the Greater One-Horned Rhinoceros*, with records updated to 31 December 1998, was issued in 1999 under the auspices of the Zoo in Basel, Switzerland, and edited by Dr. Gabriele Wirz-Hlavacek (International Studbook Keeper), Dr. Samuel Zschokke (Scientific Adviser) and Dr. Peter Studer

(EEP Species Coordinator). At the end of 1998, the studbook recorded 136 (73/63) Indian rhinos in 51 collections in Asia, North America and Europe. Out of these, 92 (53/39) or 68% were born in captivity. There are 40 (26/14) Indian rhinos kept in 14 zoos in India. The age structure of the captive population is reasonably healthy. Two animals were captured in Nepal in 1998 and transported to Whipsnade Wild Animal Park (UK).

LATEST STUDBOOK FOR *DICERORHINUS SUMATRENSIS*

A new edition of the *International Studbook for the Sumatran Rhino* was published in October 1999. It documents the history of this species in captivity or under intensive management since the modern captive program was initiated in 1984. Copies are available from the International Studbook Keeper, Dr. Tom Foose.

AsRSG Members and Officials at the Regional Meeting for India and Nepal in Kaziranga National Park, 22-25 February 1999.



- 1 B.S. Bonal
- 2 A.K. Raha
- 3 Tom Foose, *Program Officer*.
- 4 S. Deb Roy
- 5 H. Sonowol
- 6 P.K. Bora
- 7 Aminul Islam

- 8 Mohd Khan, *Chair*
- 9 S.C. Dey, *Deputy Chair*
- 10 P. Lahan
- 11 S. Doley
- 12 Narayan Poudel
- 13 Mike Dee
- 14 Nico van Strien, *Program Officer*

- 15 Richard Emslie, *AfRSG*
- 16 Fred Bagley
- 17 S.P. Sinha
- 18 S.K. Sen
- 19 Hemanta Mishra
- 20 Nan Schaffer
- 21 Esmond B. Martin