

**Field Report on Sumatran Rhinos (*Dicerorhinus sumatrensis*)
in Way Kambas National Park, Indonesia
October 1995 - December 1996**

By the Sumatran Tiger Project

Submitted to:

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Introduction

The Sumatran Tiger Project, located in Way Kambas National Park, is a collaborative research effort among the IUCN/SSC CBSG *Tiger Global Conservation Strategy* (GCS), the Indonesian Directorate Jenderal Perlindungan Hutan dan Pelestarian Alam (PHPA), and the CBSG Indonesia Program at Taman Safari Indonesia (TSI). Our research permits are provided by Lembaga Ilmu Pengatahuan Indonesia (LIPI) and we are assisted by students from the Universitas Lampung (UNILA). The project is administered through the Conservation Office of the Minnesota Zoo, USA. Field operations began in October 1995.

The Tiger Field Ecology Program of the Sumatran Tiger Project is based upon recommendations set forth in the *Indonesian Sumatran Tiger Conservation Strategy* published in 1994 by the Indonesian Directorate General of Forest Protection and Nature Conservation (PHPA), Ministry of Forestry. This strategy formally outlines the steps necessary to develop and sustain a conservation program that will ensure the long-term viability of wild Sumatran tigers. The field ecology program addresses the need for information about the conservation needs of wild Sumatran tigers and is one of three in progress programs which comprise the *in situ* component of the Sumatran Tiger Project (the others are the Community-based Conservation program and the Tiger Rapid Evaluation Team). A fourth program, concerned with training PHPA staff on tiger field census methodology, is being developed with PHPA.

Over a 15 month period (October 1995 to December 1996), during the project's intensive monitoring of the tiger study site, 43 photographs of wild Sumatran rhinos were obtained, and numerous secondary signs of rhinos were observed in the field. Basic information relating to the Sumatran rhino's current distribution, status and potential for conservation, is considered the highest priority of the Indonesian Ministry of Forestry's Rhino Conservation Strategy (PHPA, 1994), and prioritized within the IUCN/SSC Asian Rhino Specialist Group's own recommendations. This data is published in its present form with the justification that to facilitate PHPA forest guard operations in Way Kambas, and to assist the Department of Forestry's UNDP Global Environment Fund Rhino Project to plan for insertion and operation of their rhino protection teams.

We request that information in this report be kept confidential and not duplicated until we have had sufficient time to complete the field study and write a final report accompanied with analyzed data and its interpretation.

Sumatran Rhinos in Way Kambas

Observations of rhino dung have been reported from Way Kambas National Park during the 1980s (Ramono, pers. comm.), though the continued importance of lowland habitat only really came to light in 1991. On this occasion a rhino was briefly sighted, and subsequently a set of prints discovered, by forest rangers on the banks of the Way Kanan River. The casts of these prints, though morphologically identical to those produced by Sumatran rhino (van Strien, pers. comm.), were thought by some to suggest the continued existence of the Javan rhino (WWF Project report, 1991) - an inference primarily based on the similarity of the habitat to that of the Javan rhino in Ujung Kulon, and the documented record of a Javan rhino being shot on the park's perimeter in 1961.

This surprising rediscovery of rhino tracks in Way Kambas National Park was followed up by a UK University team censusing Asian elephants in the park from 1993 to 1995 who, based on a limited number of dung piles and eight rhino tracks, suggested that there were a minimum of four rhino individuals living within the park (Reilly et al., 1997).

The continued existence of the Sumatran rhino in the secondary lowland rain forests of the park was finally confirmed in November 1995, with the first photograph of an adult female Sumatran rhino obtained by an infrared activated remote camera (Siswomartono et al., 1996). This device was a component of a system of remote cameras (see below), set-up to evaluate and monitor the park's Sumatran tiger population over an extensive study site in the center of the park by the Sumatran Tiger Project in cooperation with the Indonesian Department of Forestry.

Way Kambas National Park

The 1,300 square kilometers of Way Kambas was initially gazetted as a game reserve by the Dutch administration in 1937. From this time it has been subject to various degrees of legislature and simultaneous exploitation, reaching a peak with three intense logging operations during the period 1968 to 1974. For eight further years local villagers continued the logging of the present park area on a smaller scale. Areas of the park became settled by transmigrants, reaching a total of 12 villages (total population of 4,100 people) in 1984 before the villagers were resettled in areas outside of the park boundary (Way Kambas Management Plan - Ministry of Forestry, 1995).

The park is coastal and lowland forest, possessing a sea-front boundary of approximately 65 kilometers. To the north, west and northwest the park is naturally bounded by the Seputih (29 km), the Sukadana (20 km) and the Pagadangan (90 km) rivers respectively. In the south the Penet River (30 km) limits the extent of the park. At the highest point the park reaches an altitude of no more than 16 meters a.s.l. (Santiapillai and Suprahman, 1985). Way Kambas is subject to a variable wet season between November and March (average rainfall of 2000 mm) and a slightly longer dry season between May and October when rainfall averages less than 100 mm per month.

There is a composite of lowland and coastal habitats represented in Way Kambas, including the largest freshwater (non-peat) swamp forest of any Sumatran reserve. These coastal habitats represent some of the only undisturbed areas within Way Kambas, with practically all of the dryland primary forest being affected by the logging operations of the 1970's. The remaining secondary forest varies considerably in its species composition and age, the upper canopy often not completely closed, and a characteristically dense understory. Only the areas in the center of the park, particularly in the wet regions of the river watersheds, are well represented by a large number and abundance of mature tree species. Alang-alang grasslands now account for over 50% of the park's total area. The periodic fires, both a result of indiscriminate burning of rice stubble on the forest edge and those set by fishermen or villagers within the park, maintain and extend the vast areas of alang-alang.

Remote Camera System

Information on the distribution of Sumatran rhinos in Way Kambas National Park originates from data derived from a remote camera system placed throughout the park, but mainly north of the PHPA resort

located on the Way Kanan River. Several cameras were also placed south of the river in order to investigate if it represented a significant barrier to tiger movement and territory holding capacity. The initial field site near Way Kanan Resort was selected as the most appropriate site for the long-term monitoring of wild tigers in Way Kambas. This site is referenced as the Tiger Intensive Monitoring Area (TIMA). Cameras operating within this site range from 12 to 28, with an average of 25 cameras operating daily. Field teams check the cameras every seven days, camera batteries are changed every two weeks, and logger batteries changed every month.

Over the 15 months the TIMA was systematically surveyed and mapped for vegetation types, trails, rivers, topographic features, fauna distribution and other points of interest. Average patrol group size is three, though as many as 15 PHPA personnel have been used during certain phases of the development.

Important base camps were constructed in two locations, both high in the tree canopy to minimize disturbance to passing wildlife. These camps are equipped with solar power and VHF radio antennas, allowing field teams to stay in contact with the project's headquarters at Way Kanan (approximately 14 km distance from the remote camps). These two main patrol camps, and several additional sites in other strategic areas, allow the patrolling teams to safely move and overnight in the TIMA. In a six-day period it is possible for a single field team to patrol through the TIMA monitoring and controlling all cameras. Usually, however, it has been found desirable to split the group into two independent teams, allowing the TIMA's cameras to be monitored in just over three days.

In order to facilitate the collection and notation of rhino signs, the patrol routes through the TIMA have been sectioned off into census transects. These transects correspond to discrete vegetation types found within the study area, and have been mapped using GPS. Patrol teams travelling through the TIMA are able to observe rhino secondary signs and record them in field notebooks according to the transect in which they are found. This permits analysis of rhino signs by vegetation type, and facilitates the ease and speed with which teams can monitor the region.

Field Observations of Rhinos

The regular patrolling of the Tiger Intensive Monitoring Area (TIMA) between October 1995 and December 1996 has revealed some information about the activity and distribution of rhino within the park. This is primarily based on the encountering of secondary signs indicating rhino presence, which includes characteristic twisting of tree saplings, feeding signs, dung piles, urine sprays, and scrape marks on the ground.

Rhino tracks were also found, but their consistency and quality is affected by the ground substrate, and by the dampness due to recent rainfall. As a result tracks are less commonly encountered during the dry season when even the body weight of an adult rhino will leave nothing more than a faint impression of the front hoof rim. All secondary signs, including tracks, were mapped by field teams using hand-held global positioning systems (GPS), and the data points imported into the GIS base map of the study site.

During the dry season there is an abundance of rhino secondary signs near to the major river of Way Kanan (see Fig. 1); during the wet season the rhino population appears to limit its activity to a region some distance from this busier recreational area of the park. In fact, this remoter, northern area (locally called Wako) probably provides more ideal habitat for the rhino, representing some of the most mature and dense secondary forest of the park, with the lowest rates of disturbance by humans. It is thus possible that there are other factors operating that force the rhino to move out of this preferred region during the

dry season. During the dry season, rhino activity is more frequently observed along the Way Kanan access road into the park's interior. This surprising location, often quite busy with people and vehicles, was found to have been traversed by rhino several times during the 1995 dry season, with rhino tracks along considerable stretches of the road discovered on a regular basis. Direct observations of a rhino on two occasions have also been made on this road by the field team.

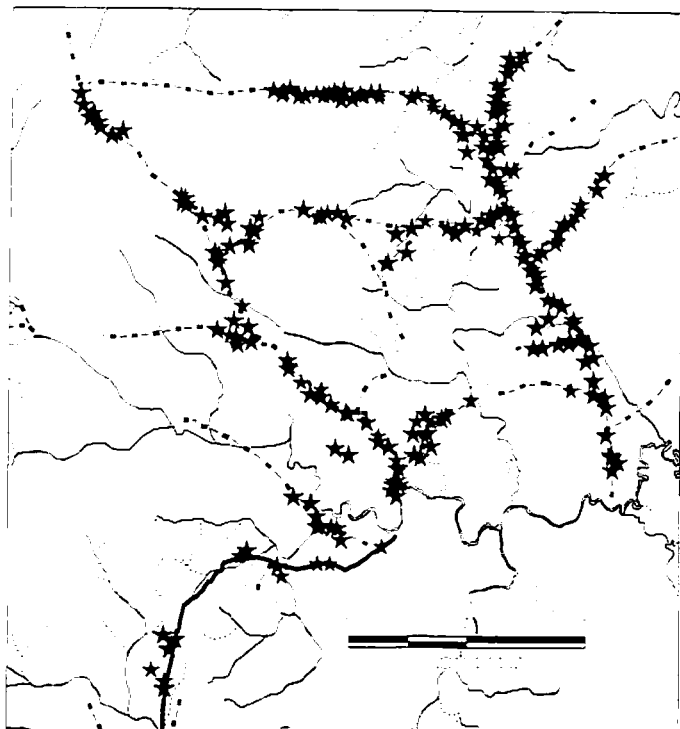


Fig. 1. Observations of rhino secondary sign during the dry season.

The majority of secondary signs were encountered in the regions of mature secondary forest of Way Kambas (see Fig. 1), even though the abundance of larger dipterocarps has been significantly reduced by past logging operations. The canopy is low, but relatively closed. Saplings are numerous, and localized areas of thick understory are also common, particularly on the edges of swamps and animals trails. However, rhinos were also noted to pass across expansive areas of mixed grass/secondary forest, as well as through alang-alang grasslands. The remote camera system captured rhinos passing through such habitat on two occasions during the heat of the day, though associated tracks suggested the individuals were making a detour in order to cross from one area of thicker forest to another. On another occasion obvious rhino signs were encountered in the center of alang-alang grassland, almost 2 km from the nearest adjacent forest.

Rhino secondary signs were most commonly encountered along main trails, as opposed to being found in the denser, unmarked forest. The main trails are common in Way Kambas, being the remains of the roads previously used to remove timber from the area by truck. Although logging operations ended in 1981, these trails have been maintained as a result of the compacted nature of the underlying soil (inhibiting colonization by vegetation) and the regular utilization of the trails by the park's wildlife. Remote camera traps show that the frequency of use of these trails is much greater than that found in surrounding forest for most mammals, particularly wild pig, elephant and tiger (see Fig. 2). Rhinos were regularly noted to have traveled along considerable stretches of these trails, and during the patrols of the field teams the tracks of several individuals were followed. Rhinos were seen to make few deviations from the main trail, apart from short episodes of feeding on side paths, suggesting some motivation for these journeys. Often it was clear that the individual was travelling to, or returning from, a bathing or wallowing site. Rhinos have been followed along such trails for distances of up to 6 km.

There has been some concern that the presence of field teams regularly patrolling the study site (approximately three days in the field out of every ten in this site, with cameras visited on an 11-day cycle) may have a negative impact on the activity of the rhino population. The Sumatran rhino has been recognized as a sensitive species and that the presence of people in its environment can cause disturbance to its natural activity patterns. If the rhino does have an acute sensitivity to humans then it would be natural to assume that rhinos would avoid an area recently visited by the field teams. In Figure 3 the time

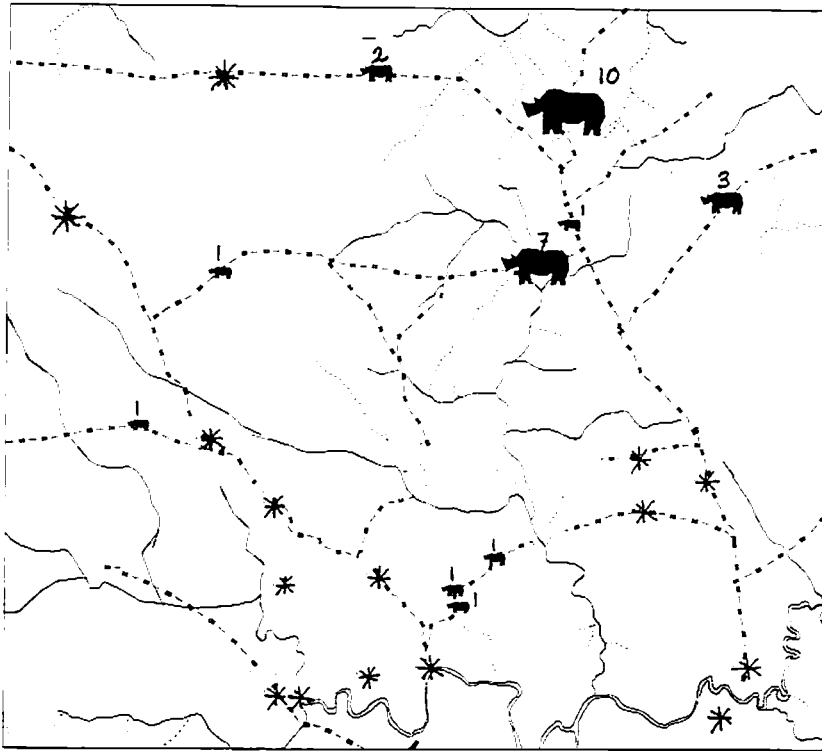


Fig. 2. Locations and relative frequency of rhino photo events in Way Kambas; cameras not recording rhino passes over same period are denoted by *.

calmly passing by the system, stopping, occasionally feeding, and even urine spraying, in front of the camera as it flashes and advances to the next frame.

delay between the last camera check (films and batteries changed) and the first rhino event is plotted. The graph suggests that there is no discernible avoidance of the camera sites following visitation by the field teams, with 17 out of 25 rhino photo events occurring within three days of site disturbance. Rhino photo events occurred within six hours of the last camera check on three occasions. The closest rhino event following the passage of a field team was recorded by the camera data logger as 3 hours and 42 minutes. Further evidence of the low disturbance impact of the camera systems is supported by the regular multiple photograph series of rhino, clearly showing the individual

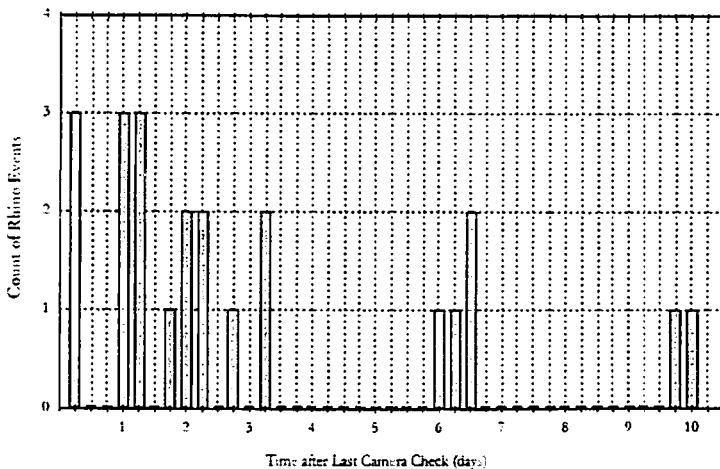


Fig. 3. Time delay to first Sumatran rhino photograph after last camera check.

analysis, and a single rhino event defined as the moment of arrival of a rhino individual at a remote camera location.

Rhino Identification

Between October 1995 and December 1996 photographs of Sumatran rhinos were recorded on 43 occasions within the region known as the Tiger Intensive Monitoring Area (TIMA) situated north of the Way Kanan guard post (towards Wako). These events occurred at ten camera locations; the most active site recording ten independent rhino passes over the shorter period of April 1996 to December 1996. These multiple photographs are excluded from the

Individual identification of the rhinos photographed by the remote cameras is difficult. It has not been possible to rely on a single morphological feature of the rhino in the distinguishing of individual identity. Rather, it is necessary to consider an assemblage of body characteristics, with the hope of finding one or two features that are specific and peculiar to a particular individual. Identification of an individual from a single photograph presents particular difficulties, though as photographs accumulate the grouping of photos, into sets representing individuals becomes easier. In the analysis of the 43 rhino photographs from the study site, body features of particular importance included the following: horn length and shape (both anterior and posterior horns), sex (obvious when the animal is viewed either from the side or back), the hoof pigmentation (white skin blemishes are often found around the hooves), tail length and shape (one individual has a broken tail), skin folds (particularly under the throat and between the legs and body of the animal), wrinkles and skin folds under the eyes and around the snout, ear shape (particularly the existence of nicks or tears), and the basic body shape and size of the individual.

For this report seven individual rhinos have been tentatively identified based on the photographs from the remote camera systems (see Appendix 1). Of these individuals five are recognized as male, and two as female. The remaining photographs (accounting for ten rhino photo events) can be grouped with less certainty either because of an incomplete photographic record of the individual, or because the rhino possesses no visible, diagnostic body marking or outstanding morphological feature. We believe, but cannot confirm, the ten photo events (representing rhinos as yet unidentified) indicate a possible maximum of three additional individual rhinos (see Table 1).

Table 1. Minimum and maximum numbers of Sumatran rhino observed in the study site.

	Minimum	Maximum
Rhinos identified from remote camera system by photograph	7	10
Rhinos identified from secondary signs or direct observation	5	7
TOTAL	12	17

Rhino secondary signs and direct observations in other areas of the park suggest that there are other rhino individuals that have not yet been photographed. One is a rhino observed by team members in April 1996, a female with unusually thick body hair, and characteristic horns. This rhino has not yet been photographed. In another region rhino prints have been found along a 2-km stretch of the road, and these have been measured and photographed. These prints represent a sub-adult, an age class of rhino that has not been recorded by the remote cameras to date. In a third remote location of the park (approximately 18.5 km from the site of the sub-adult described above) a further set of sub-adult prints was recorded in February 1996. The geographic separation of these sub-adult print sets suggests that they represent separate individuals. On two other occasions print sets of mother and calf have been found at sites of considerable distance from each other in December 1995. These mothers may have been recorded by remote cameras, and thus can not be assumed to be additional individuals. Calves, however, have not yet been photographed and thus may be assumed to represent two additional individuals.

To date there has been insufficient coverage of all potential rhino habitat, and insufficient time available, to make inferences regarding the rhinos' home range size and extent of overlap with other conspecifics. Thus, it is not possible to make broad extrapolations on population density, or to estimate the park's total rhino population. As more information becomes available, the STP will report according.

Sponsors

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APPENDIX I. Photographs of seven identified rhinos and one unidentified rhino.



Photograph 1. Adult male (photo id #1) taken at Jalan Kety on 05 November 1995. This was the first photograph of a Sumatran rhino taken.



Photograph 2. Adult male (photo id #6) taken at Wako Benteng on 10 May 1996.



Photograph 3. Adult female (photo id #7) taken at Jalan Tarzan on 25 April 1996.



Photograph 4. Adult female (photo id #9) taken at Jalan Tarzan on 05 June 1996.



Photograph 5. Adult male (photo id #18) taken at Central Wako on 27 July 1996 at 19:08 hrs.



Photograph 6. Adult female (photo id #21) taken at Central Wako on 10 September 1996 at 1:22 hrs.



Photograph 7. Adult male (photo id #30) taken at Jalan Purbolinggo II on 28 September 1996.



Photograph 8. Unidentified adult male (photo id #12) taken at Kolam I on 19 June 1996.