

SOSRHINO BORNEO FINAL FIELD REPORT

SOS Rhino, a US-based non-profit foundation provides financial and technical assistance to rhino conservation programs worldwide. This report contains the overall performance, achievements and contributions by SOS Rhino Borneo since first established in Borneo. **CONFIDENTIAL REPORT** – No part of this document can be released by any reader to any other party without specific permission of the main author.



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EXERCUTIVE SUMMARY:

1. Sumatran rhinoceros of Borneo has been reported to be critically endangered, but yet we do not have any reliable and up-to-date information on the species.
2. In the three years of study (2004-2006), the rhinos were distributed only in the northwest, southwest and core area of the reserve.
3. Based on survey from 2004 till 2006- out of the 44 sets of footprints can be concluded that there are 9 known rhinos whereas three sets have been identified as juvenile foot print (15 cm, 16 cm and 18 cm).
4. Two different method of survey were conducted from 2004 to 2006.
 - a. The transect method of survey was conducted during 2004. The survey covered approximately 85% of Tabin wildlife reserve. A North-South transects was established: eight linear transects were made: north and south transects at KM7, KM22, KM32 and KM42. Along these transects, small base camps were established at five km intervals. From each of these base camps, the teams made four temporary transects, one in each compass direction, of approximately five km per transect.
 - b. The second method was conducted during 2005-2006. The survey team followed the rhino possibility area such as river and along the ridges.
5. In 2004, SOS Rhino conducted 40 transect surveys in TWR. From these transect surveys 30 footprints were identified.
6. After the year 2004, SOSRB major focuses were more towards patrolling orientated to protect from encroachment. That is the main reason for lesser number of rhino signs observed in 2005 and 2006 compared to 2004.

7. It is unfeasible to compare the validity of obtained data within each survey. This is mainly due to the disparity in;
 - a. Number of teams members
 - b. Team composition and size,
 - c. Hours spent in tracking
 - d. Location of specific areas
 - e. Different area (soil composition in different area) and tracks

8. Due to the change of the teams from surveyors to patrolling team, noticeable increase was observed in encroachments signs compared to 2004.

9. Encroachment into forest reserve is a common problem and need to be addressed before any rhino poaching in TWR.

10. Enforcement activities have been heightened tremendously, and it is recommended that more forward base camps and guardhouses be constructed around the reserve, with a corresponding increase in enforcement staff.

11. At least one more year rhino survey have to be conducted with the help of Indonesian rhino experts (eg: Arief Rubianto) and to draw up a comprehensive conservation plan for the Sumatran rhinos in Tabin. I feel that following the 15 days routine survey is not an efficient way to gather quality data for population estimate. Personally I would suggest on longer staying period in the jungle on nonstop survey without time frame limitation.

12. From my own experience if we want to find the signs of rhinoceros I would suggest to form a survey team with minimum number of members staying inside the jungle over a long period (minimum 1 month) and conduct the survey continuously rather than repeatedly walking back to base camp. This way the team could utilize maximum time and conserve energy apart from staying focused on the mission.

13. From my observation, the reason for less signs of rhino in the eastern part is may be due to the major expansion of oil palm plantation.
14. Therefore, to gain proper reliable data on the numbers of rhinos in Tabin some standards need to be established. Therefore there is a need to establish;
- a) Reliable survey and data collections using Indonesian rangers atleast one year period.
 - b) Consistent expertise RPU(need leadership who had well experience in rhino survey)
 - c) Establish a SOP (proper tracking procedures).
 - d) Provide a regular framework for training rangers and developing techniques.
 - e) There should be a stimulant meeting among the RPU's.
 - f) Strict monitoring in Tabin.
15. Recommendations:
- a. Better law enforcement especially for hunting, encroachment.
 - b. More education/extension especially for importance of wildlife reserves and myth of medicinal value of rhino horn.
 - c. Intensify cooperation with surrounding land owners and population.
 - d. Intensify monitoring rhino, especially for sign of reproduction and focusing on the mud volcano/saltlicks.
23. To my way of thinking, confining the rhino in a smaller management area could be a better solution to increase its population. Enabling them to meet frequently and breed naturally. I would suggest a 5 year observation period to be implemented.
24. If even this method was not fruitful, final and last option that I would suggest would be the Intensive captive breeding programme or exchanging male or female to Sumatra or Cincinnati.

ABSTRACT

SOS RB studied rhinos in Tabin Wildlife Reserve over the period 2004-2006. Rhinos were found in the northwest, southeast and Core Area only. The study concluded that at least 9 known rhinos were present in TWR during the study period. Day 2004-2006 only 2 rhinos were seen, three sets were juvenile (15cm, 16 cm and 15.8 cm) from out of 44 sets of foot print. Total population estimation based on footprint analysis and consideration of variation in size and area with year of reading obtained-estimation of 12 to 15 rhinos to be present.

1.0 INTRODUCTION

They are now probably less than 30 number of rhinoceros whole of Sabah, and reported to be present only in two fragmented forests in the east coast of Sabah. With such a low population estimate the future of this species continue to be bleaker and bleaker with the ever-changing condition of its natural habitat.

The United Nation Development Program (UNDP) initiated a 3-year rhino conservation project in Malaysia and Indonesia commencing from 1995-1998. The Sabah Wildlife Department allocated nearly a million Ringgit to acquire vehicles and to activate the Rhino Protection Units.

Then SOS Rhino began its operation in Sabah from November 2000 and was seriously and fully engaged with the Sabah Wildlife Department in addressing the conservation of Sumatran rhinos in Sabah, Malaysian Borneo.

A Sumatran rhino workshop conducted on 29th April 2004 in Kota Kinabalu organized by Sabah Wildlife Department and SOS Rhino, SOS Rhino Borneo rightfully addressed the future of the Sumatran rhino especially in Sabah. The crux of the workshop resolution was basically towards the protection of the last remaining of rhino habitats.

The rhino workshop recommended the following:

- i. Undertake surveys to determine presence, distribution and population density of Sumatran rhino
- ii. Consolidate protection of habitats and encourage natural population growth
- iii. Enhance education awareness program
- iv. Proposed to the government of Sabah, Sarawak and Kalimantan to keep aside some 5000 km² of forestland for Sumatran rhinos
- v. Relocation of Sumatran rhino to Sarawak and Kalimantan where traditional habitats exist and when population has increased to over carrying capacity in habitats in Sabah
- vi. Continue to undertake captive breeding program

SOS Rhino, a US-based non-profit foundation provides financial and technical assistance to rhino conservation programs worldwide. Countries that have benefited are Malaysia, Indonesia, India and the United States. SOS Rhino is the invention of Dr. Nan Schaffer, a veterinarian specializing in rhino reproduction. She started the Rhinoceros Reproduction Program (RRP) at the Milwaukee country zoo in 1981 and then formalized the formation of SOS Rhino in 1997. Dr. Nan's main thrust then was on captive breeding and reproduction of rhino. Then, SOS Rhino were involved in *in situ* and *ex situ* conservation, research, education and awareness.

SOS Rhino is affiliated to the Taxonomic Advisory Group for Rhino (TAG), American Zoological Association (AZA), American Association of Zoo Veterinarians (AAZV), American Veterinary Medical Association (AVMA), Conservation Breeding Specialist Group (CGSB) and the Chicago Association of Reproductive Endocrinologist (CARE).

In order to enforce its work and commitment in Sabah, SOS Rhino (Borneo) is formed to provide the local platform for SOS Rhino.

1.1 SOS RHINO BORNEO

SOS Rhino (Borneo), the main goal is to assist the Sabah government in the conservation of the Sumatran rhinoceros of subspecies *Dicerorhinus sumatrensis harrissoni*, which are only found in the island of Borneo. Sumatran rhino is now considered extinct in Sarawak and probably in Kalimantan too. Sabah is the only place where some individuals are found scattered in two distinct rainforest habitats in the east coast of the country. Official estimate place the subspecies as less than 30 individuals and IUCN has placed it in the critically endangered list. From 2001 continuous surveys initiated at TWR by SOSR Rhino Protection Team using a combination of techniques has yield information on the current distribution, population demographics and essential rhino habitat attributes in the area.

Having started and remained until 2007 surveys focused on TWR, the program, to date is accomplishing these goals by combining and following the techniques and the guidelines listed below

1. Linear transects
2. Recent- surveys along paths of least residents along animal trails, rivers, ridges, old logging roads and from pointing along the main transects
3. Point resources evaluation along salt licks, mud volcanoes and water resources

These guide lines are being followed one to two times a month where from 50%- 80% of the reserve will be evaluated each month. Each survey involves 15 days in the forest by 25 rangers divided in to 5 RPU's.

Many conservation exercises failed because the relevant stakeholders are not involved in the process. Community outreach program (COP) is just another approach towards engaging stakeholders in conservation. In the case of SOS Rhino, the relevant stakeholders are the plantations that share boundaries with rhino habitats, logging concessionaires operating close to rhino habitat, tourism players and operators using rhino habitats, schools and villagers located near rhino habitats.

Tabin reserve is practically surrounded by oil palm plantations except areas in the northeastern part, which is mainly swampy Nipah and Mangrove vegetation. Although this area appears hostile, it provides prawns, fish, crabs and shellfish for the villagers. The area is also teeming with Proboscis monkeys and other monkeys, otters, birds, flying foxes and bats, water birds, crocodiles, turtle and snakes.

Tabin Reserve is never free from encroachment. Ground and aerial surveys have detected human presence and activities. The wildlife and forestry departments have dealt these problems. Informative and advisory posters on illegal hunting and intrusion have been distributed to all the plantations around Tabin.

The northern part of Tabin Reserve has been identified as the most porous due to the massive network of rivers. There are few human settlements and difficult to monitor. The decline in prawns and fish has an adverse impact on the fishing village. Many have left to look for jobs in the towns while the more enterprising ones have requested the government to start an eco-tourism project. SOS Rhino's COP was initiated partly due to the request from the government through the Ministry of Tourism, Environment, Science and Technology.

1.2 SOS RHINO BORNEO ORGANISATION MANAGEMENT

A) PROGRAM OFFICER

The Program Officer was responsible for the overall management of SOS Rhino Borneo's Sumatran rhino project, including both field and administrative components. The person in this position oversees the Administrative Manager, Admin/Acct. Assistant, Field Coordinators, Community Outreach and Volunteer Coordinators and also supervises the SOSRB-sponsored UMS Masters Students and coordinates with collaborating researchers. This position is considered an upper level management position and reports directly to the President of SOS Rhino.

B) FIELD COORDINATOR(S)

The Field Coordinator was responsible for supervising and scheduling the field staff's survey work. The person(s) in this position have access to very sensitive scientific information in addition to field staff's personal records. The person(s) in this position are expected to treat such information strictly confidential and perform duties with the utmost professionalism. Community Outreach is a regular duty for the Field Coordinator. This position is considered mid-level management and reports directly to the Program Officer.

C) COMMUNITY OUTREACH COORDINATOR(S)

The Community Outreach Program Coordinator was responsible for raising awareness to and building and maintaining relationships with local communities and businesses surrounding Tabin Wildlife Reserve. Heading the volunteer program and occasional survey work are also components of this job. The person in this position is expected to work as a team with the Field Coordinators, Team Leaders, Deputy Team Leaders and Field Staff. This position is considered mid-level management and reports directly to the Program Officer.

D) ADMINISTRATIVE MANAGER

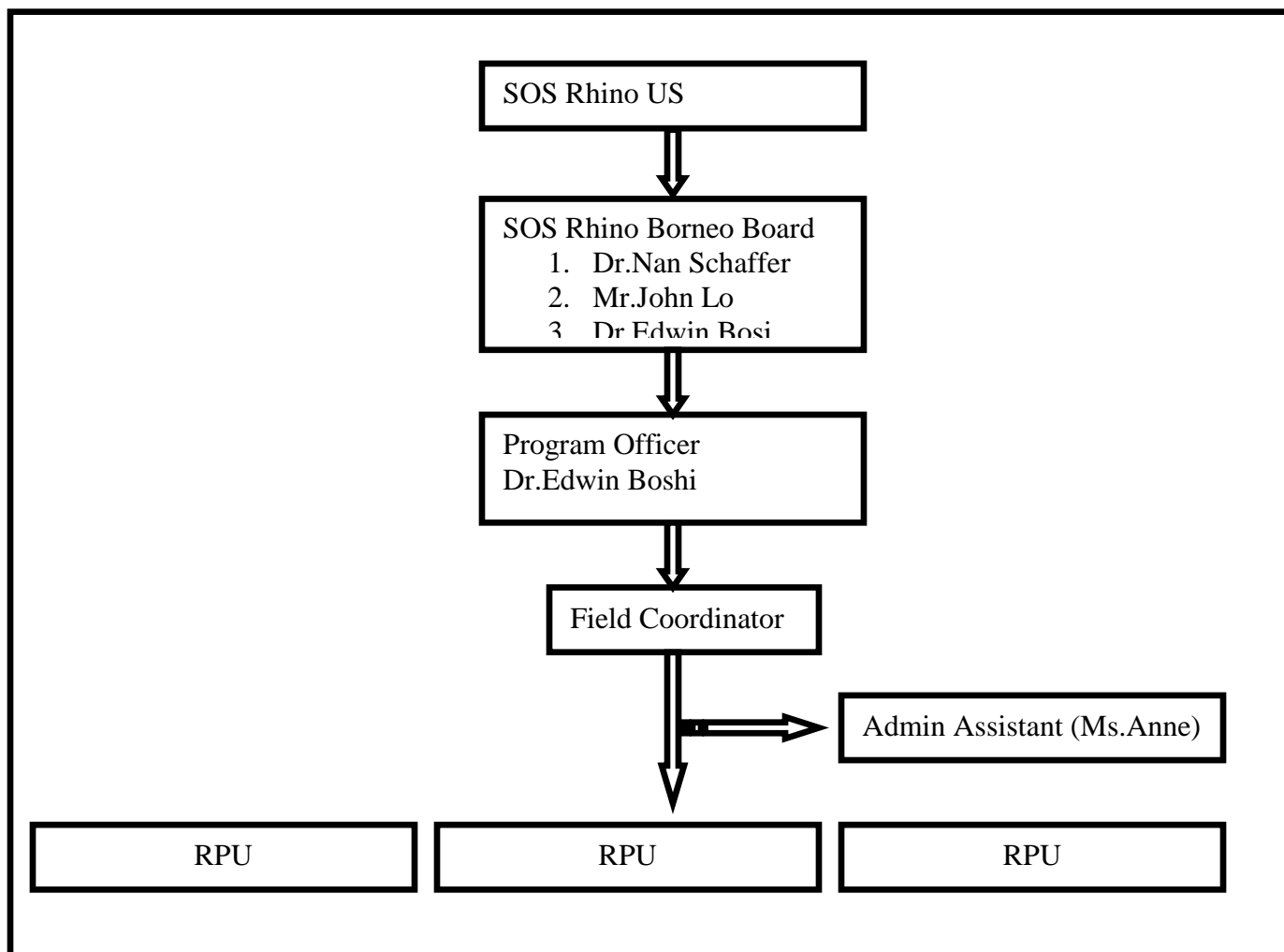
The Administrative Manager was responsible for managing SOSRB office activities and coordinating communication between Field and Community Outreach Coordinators and the Program Officer. This is a high-profile position with many responsibilities including human resources recordkeeping, filing reports, correspondence with Sabah government officials, and assuring accounting records are up to date and organized. Other components of this job consist of fundraising, public relations and marketing as the person in this position is expected to establish collaborations with and obtain sponsorships from local businesses and other stakeholders. This position reports directly to the Program Officer, and corresponds on a regular basis with the SOS Rhino Program Manager in USA.

E) ADMINISTRATIVE/ACCOUNTING ASSISTANT

The Administrative/Accounting Assistant was responsible for assisting the Administrative Manager in the operation of the SOSRB office. Upkeep of electronic accounting records in the UBS accounting system, monthly reporting of banking activities, bill paying, and other accounting duties are major components of this job. This position reports directly to the Administrative Manager, with regular correspondence and updates to the Program Officer.

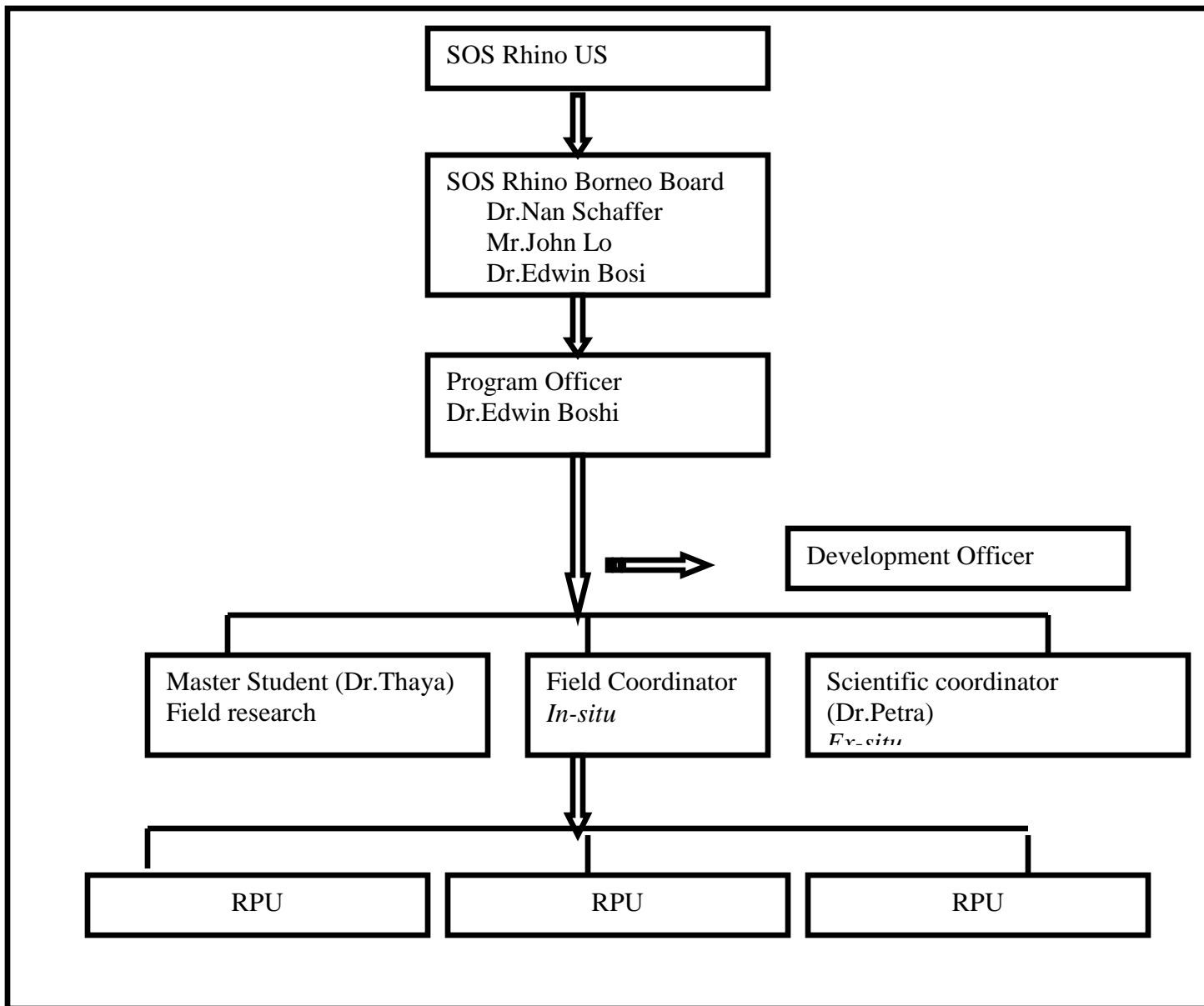
1.2.1 MANAGEMENT OF 2003

SOS Rhino Borneo Management Team 2003



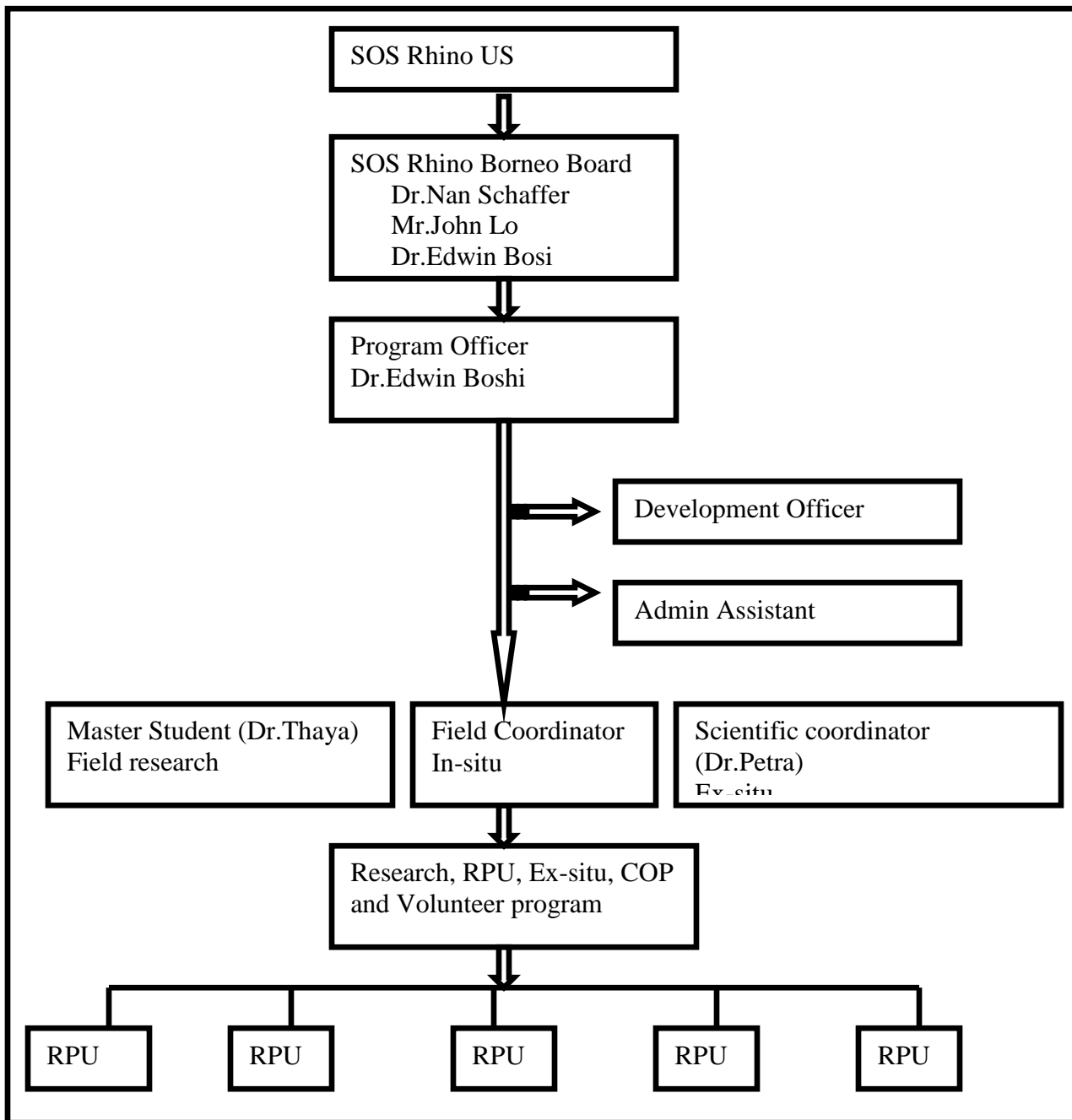
1.2.2 MANAGEMENT OF 2004

SOS Rhino Borneo Management Team 2004



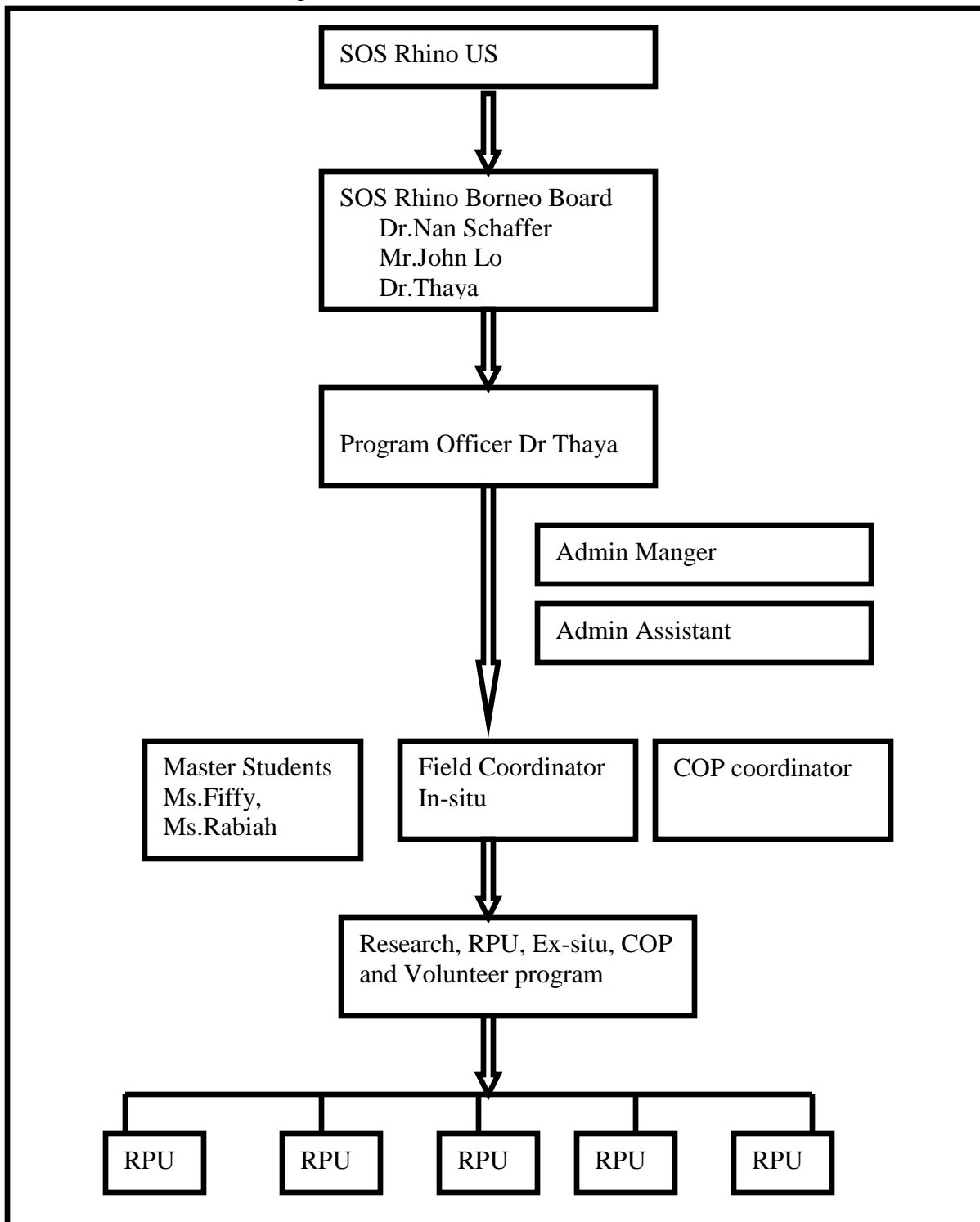
1.2.3 MANAGEMENT OF 2005

SOS Rhino Borneo Management Team 2005



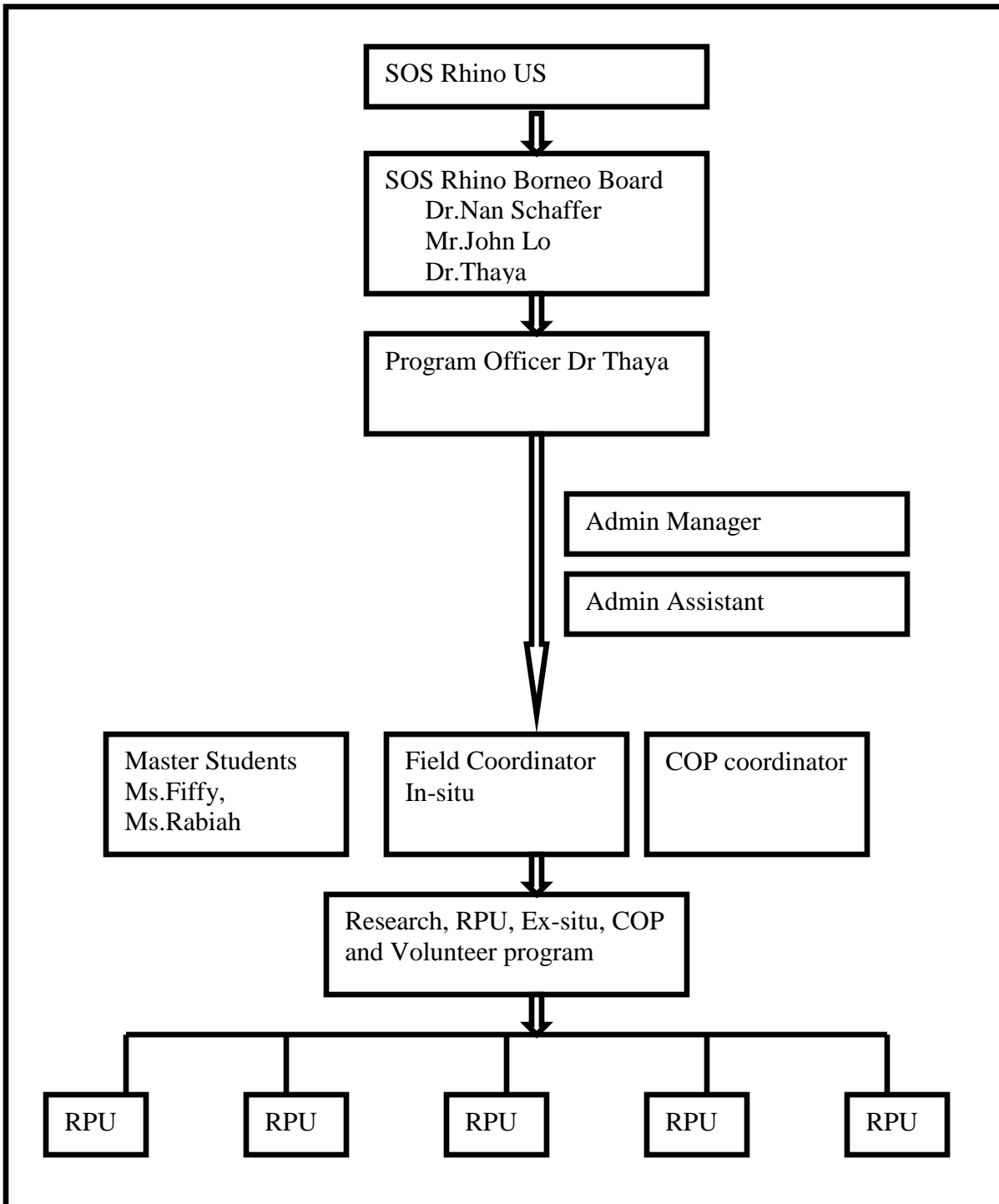
1.2.4 MANAGEMENT OF 2006

SOS Rhino Borneo Management Team 2006



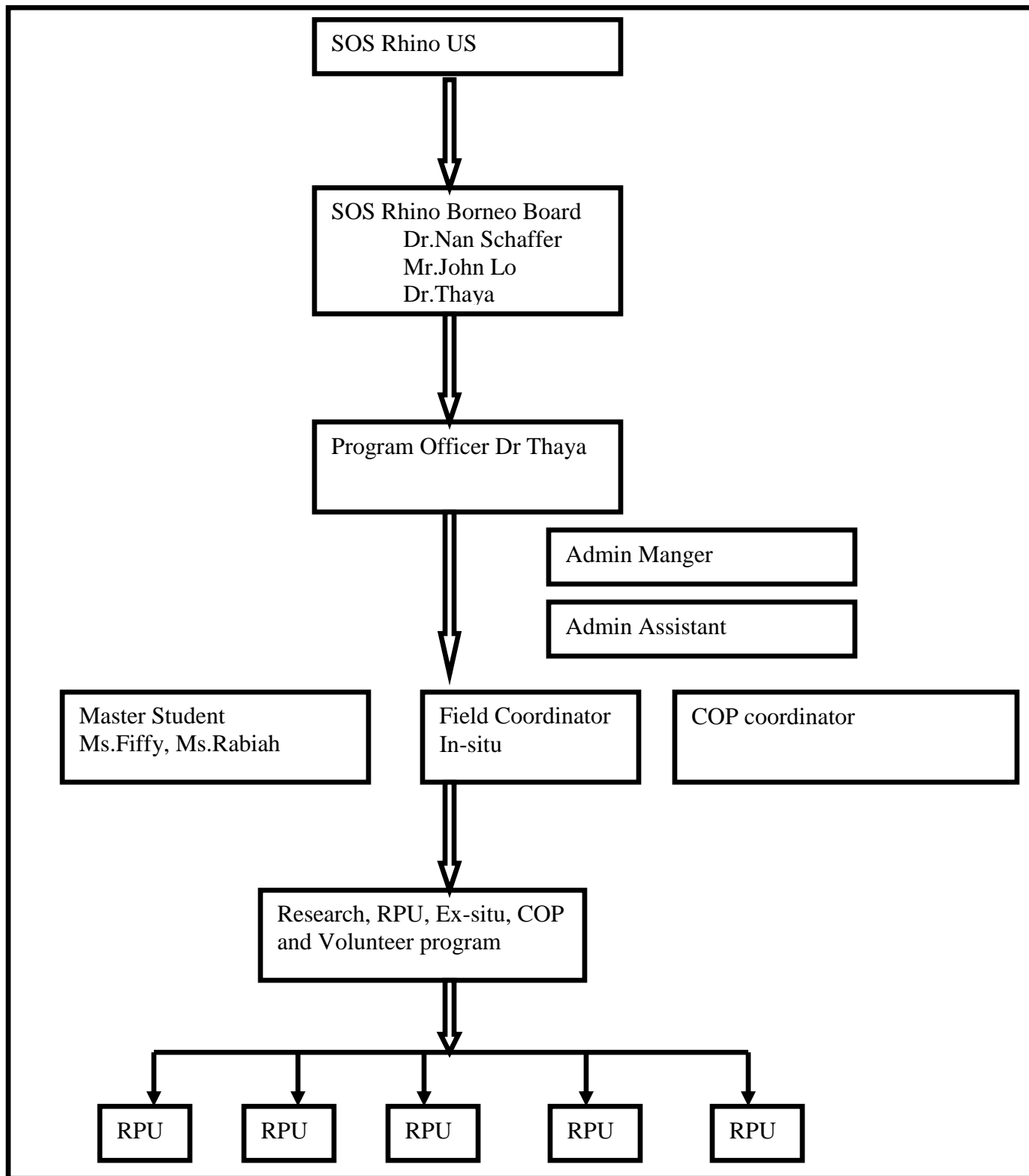
1.2.5 MANAGEMENT OF 2007

SOS Rhino Borneo Management Team 2007

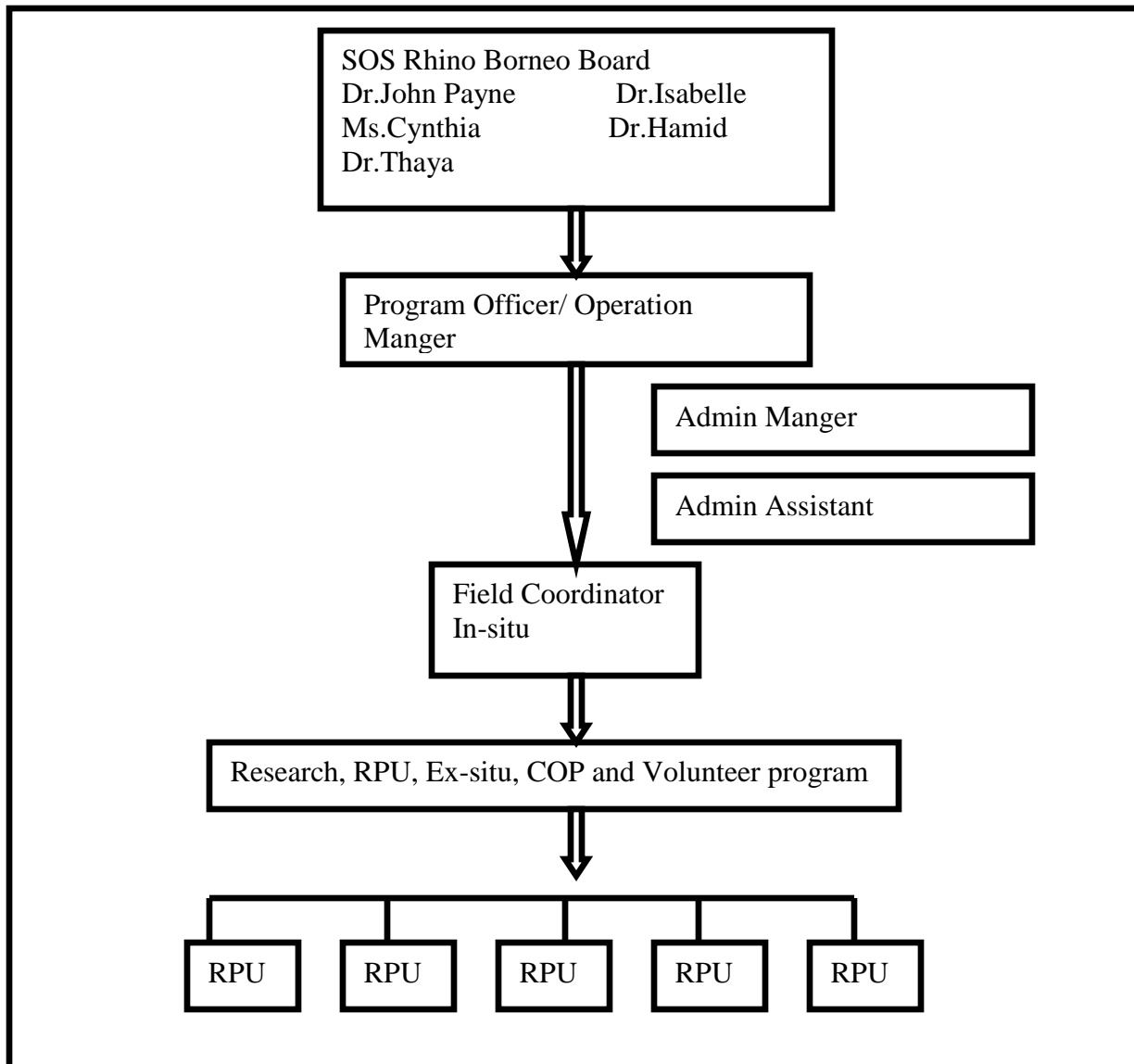


1.2.6 MANAGEMENT OF 2008

SOS Rhino Borneo Management Team 2008



1.2.7 SOS Rhino Borneo Management Team 2008 (After June 2008)



SOS Rhino (Borneo) had the following objectives for conserving the Sumatran rhinoceros.

- i. *In situ* program involving intensive and extensive surveys of rhino habitats to determine its presence, distribution and population density.
- ii. *Ex situ* program involving studying the reproductive integrity of the last pair of Sumatran rhino at Sepilok with the purpose of breeding under captivity. (This report is not included here. Dr.Petra will give in future)
- iii. Community outreach program (COP) involving and educating villagers and oil palm plantation owners around rhino habitats of sustainable conservation and eco-tourism.
- iv. Rhino protection unit (RPU) by participating and assisting the wildlife department enforcement unit in patrolling, monitoring, surveillance and protection around rhino habitats.
- v. Research on Sumatran rhinoceros involving providing research grants for postgraduate students at local university in Sabah.
- vi. Seminars on Sumatran rhino conservation to provide information to the government and the public at large on the progress made in rhino conservation by SOS Rhino. Other NGOs, Oil Palm Association and relevant government agencies are invited not only to participate but also to provide seminar materials about their role in conservation.

1.3 SCOPE OF RESEARCH AND MANAGEMENT PLAN OF SOSRHINO BORNEO

As mentioned earlier SOS Rhino had four major thrusts namely the *in situ* program, *ex situ* program, research program and community outreach program.

A) *In situ* program

SOS Rhino has established itself as a serious organization as far as rhino conservation is concerned in Sabah, in particular. Through its work in Tabin Wildlife Reserve, post-

seminars and workshop publicity, government endorsement and support, and direct engagement by its Program Officer, SOS Rhino is now well respected in Sabah.

In line with the rhino workshop resolutions, SOS Rhino continued to undertake surveys in Tabin reserve and to assist the relevant agencies to conduct rhino surveys in other forest reserves.

SOS Rhino with its trained field staffs will continue to provide assistance to these relevant agencies to conduct rhino surveys. A rhino survey in Danum Valley conservation area and its surrounding area in 2005 was participated by SOS Rhino.

Once the rhino population density and demographics have been established, SOS Rhino submitted this data and information to the Sabah Wildlife Department. The report included the threats faced by the animals in that particular habitat and recommendations on how to mitigate the problems. SOS Rhino Borneo immediately deploys its RPU into the said habitat until a final decision is made by the SWD.

The SWD also organized courses and appointing Honorary Game Wardens (HGW) to assist in the enforcement of the Wildlife Conservation Enactment 1997. All SOS Rhino field staffs should be made HGW to effectively enforce protection of Tabin reserve. SOS Rhino field staffs were worked closely with the other agencies namely the Police, Army and RELA.

B) *Ex situ* program

Captive breeding is one of the options in conservation. This is a well-known fact that successful breeding in captivity has allowed relocation of several species that are extinct locally back its original habitats.

As landscape continues to change there is no guarantee that wildlife habitat can be enlarged. On the contrary, agriculture remains as the nation's priority. Crop such as oil palm has been center-stage providing the revenue that the country requires. While tourism is fast catching as a significant contributor to the country coffer, nature related tourism is in direct competition with agriculture.

Having stated this scenario, it is prudent to consider 'perfecting' captive breeding technique and technology for the Sumatran rhinos. The success in Cincinnati Zoo is encouraging and serves as a guideline. When more land is offered for agriculture development we will be faced with a daunting task of managing the wildlife. It is vital that we are trained and equipped properly and adequately in captive breeding and management so that we can provide a hope for the survival of the species. There is always a moment when relocation will be conducive.

C) Education Awareness Program

It is ironical that many Malaysians do not know about the Sumatran rhinos. Sustainable conservation has been practiced extensively by many native tribes in Malaysia but the younger generation is now taking it for granted. The modernization of a country can undermine conservation when the new generation is not given adequate knowledge about it. We have come across the destruction of the rainforest without giving due consideration to degradation of the environmental. It is a case of destroying the very environment that keeps us alive.

Education and awareness program on Sumatran rhino conservation must be strengthened to all level of society. We need to start them young. Thus, the awareness program must be initiated in schools. All service clubs, societies and associations can be

engaged so that they too can help in disseminating information about the rhinos. The other level of engagement is with the people in public and private sectors. The military, Police and plantations must be incorporated into the awareness program.

SOS Rhino had an exhibition booth at the reception center at Sepilok. Some 100000 visitors pass through Sepilok Orang utan Rehabilitation Center annually. T-shirts on rhino were offered for sale as part of the fund raising effort. Donation box was made available at Sepilok. SOS Rhino guided the visitors to the rhino platform. A short documentary on rhino conservation produced and shown to the visitors

D) COMMUNITY OUTREACH PROGRAM

Basically, the COP is aimed at reaching out to stakeholders around Tabin Wildlife Reserve. They are the oil palm plantations, villagers, saw millers, trawlers and fishermen.

i. COP and Oil Palm Plantation

The oil palm plantation managements are basically law abiding. This is because of their image and reputation. Getting caught in offensive activities will tarnish their companies. They are involved in opening, clearing, planting and maintaining the oil palm for at least a year. It is because of a dateline imposed by the plantation owners that made these sub-contractors uncompromising and disregards for proper agriculture practices. Sub-contractors are known to kill and cause the displacement of wildlife due to their hurried activities imposed by datelines. Sub-contractors are also employing many foreign labors and take the opportunity to fish the rivers and hunt animals to supplement their meager income. Taking logs out of forest reserve deliberately or otherwise is not uncommon especially when land clearing is done at the vicinity of the forest reserve.

The COP must understand and address this situation. The plantations are unlikely to encourage their workers from encroaching into forest reserve if they are properly informed. Oil Palm plantations must not imposed dateline on sub-contractors to complete their job if the area has abundance of wildlife. In this respect, the plantation owners and

sub-contractors must inform the SWD about the presence of wildlife in the area intended for clearing. It is only after the animals are relocated that clearing can be resumed.

COP will engage with plantation owners to ensure that all entry into their properties must be registered and for legitimate purpose. This is important for plantations that have common boundary with Tabin reserve.

ii. COP and villagers

COP had identified the villages and villagers involved with illegal hunting. These villagers must be engaged with tact as they may have been depending on bush meat all this while and that it is part of their tradition. COP needs to study why these villagers are still engaged in hunting and disregard the laws on encroachment and hunting in forest reserve.

COP could engage with the schools in the villages. Try to instill the concept and importance of conservation among the children, also could try to assist the school within our capability and ability.

COP could recruit young villagers into the RPUs. They are relevant as a bridge to reach out to their people. Direct employment opportunity will also provide them with steady income and prestige. COP will also create indirect employment through its volunteer program. Womenfolk can be employed to make 'Nipah' roofs and also leech socks. The men are kept busy by supplying timber materials for construction of COP base camps and boats. When the volunteers are in big numbers, the villagers are requested to cook for them and hire their boats for the survey.

1.4 RESEARCH

Research is the backbone of conservation. Conservation without research is non-sustainable. We need to have reasons to conserve. Research provides the basis and the information for conservation. The research on Sumatran rhino is crucial as we need to

understand the ecology of this species. Their home range, nutrition and demographics are vital components. While undertaking research we also learn about the threats. From all these data and information we formulate a comprehensive management plan for the species. As a flagship species, the conservation and protection of the Sumatran rhino habitat provides the same to other species.

SOS rhino supported several students to do rhino research in Tabin wildlife Research. SOS Rhino also supported other related research within the Lower Segama area.

1.5 Volunteer Program

The SOS Rhino Volunteer Program streamlined to meet the challenges of the future. This program was one of the most active and dynamic components. The program provides an avenue for individuals and organizations to undergo a scientific experience and journey while learning about the environment and conservation. Volunteers can help to promote conservation.

2.0 TABIN WILD LIFE RESERVE (TWR)

The Tabin Wildlife Reserve, covering an area of 120,521 hectares, is the largest forestland for wildlife conservation in Malaysia. It is situated in the middle of the Dent Peninsula on the east coast of Sabah in the northern part of the island of Borneo. The forest has previously been selectively logged. The core area, however, covers an area of about 8000 hectares of virgin jungle

Several rhino surveys have been conducted in Tabin. Despite these efforts, the population of rhinos has never been accurately estimated. The initial surveys, which formally reported the existence of breeding rhinos in the Tabin area, found a male, female and sub-adult present in March 1980 (Payne, 1980). In 1981, a young juvenile rhino died in a noose trap in the same part of the upper Tabin River. Rhino footprints were found

commonly in many of the central parts of what is now TWR during the period 1981-83 while intensive logging operations were proceeding. Six teams (from Sabah Forestry Department, Sabah Parks, Sabah Foundation, PERHILITAN and WWF-Malaysia) surveyed remaining unlogged forest in the central parts of what is now TWR, 8 – 20 August 1982. Together, they found evidence of a minimum of seven rhinos, two of which were immature, along about 250 km of survey routes within in an area of 24,000 ha in and around the present Core Area. Five teams (SFD, SF and WWF-Malaysia) who surveyed within about 18,500 ha of logged forest in the northern and eastern parts of what is now TWR, 27 October – 7 November 1983, found evidence of a minimum of five rhinos in those areas, outside the core area, including one immature individual (Payne, 1983).

There was evidence that at least 11 rhinos were poached in Sabah between 1980-84, with three cases being in what is now TWR (Anon., 1985). In June 1986, about 157 km was covered on the ground by three teams within 11,700 ha of Tabin core area forest (SFD, Sabah Rhino & Wildlife Conservation Committee and WWF-Malaysia). A minimum of six rhinos were using the core area at that time, of which one was immature (Payne, 1986). The survey report noted that this result indicated a higher population density of rhinos in the core area in 1986 than in 1982, but that this was most probably due to the rhinos avoiding surrounding logging operations.

A wildlife survey conducted by the Sabah Wildlife Department (SWD) in 1995 reported the existence of an estimated population between 9-20 rhinoceros in the TWR area (Ambu, 1995). In 1997, rhinoceros survey was conducted to estimate the population in TWR. It covered a nominal area of 21,000 ha (17.5% of the total area of TWR), based on the survey results there were three known, five probable and nine possible rhinoceroses in TWR (Boonratana, 1997). An expedition conducted in 1999 by Universiti Malaysia Sabah in TWR found evidence of at least three rhinoceros residing in the Tabin “Core Area” (8,550 ha; now known as Mount Hatton Protection Forest Reserve) and surrounding forest at that time (Jomitin, 1999). Encroachment into forest reserve is a common problem. The rhinos are mainly concentrated around the core area; a

significant presence was also detected in the mud volcano. The threat against the rhinos is increasing as illegal activities are converging towards the core area.

The forestry department has established a forward base camp on the north-eastern part of Tabin, strategically located and overlooking the major estuary. The wildlife department enforcement unit at Tabin is actively engaged in patrolling and manning roadblocks around the reserve together with staff of SOS Rhino (Borneo). They are also checking on human presence inside the reserve. Enforcement activities have been heightened tremendously, and it is recommended that more forward base camps and guardhouses be constructed around the reserve, with a corresponding increase in enforcement staff. It is also recommended that more rhino research and surveys be conducted to be able to draw up a comprehensive conservation plan for the Sumatran rhinos in Tabin.

Conserving the Sumatran rhino must be one of the most challenging undertakings of the 21st century. The rhinos in Tabin require full protection. Other forests need to be surveyed. Our main priority is to increase the rhino population in the wild.

2.1 POPULATION ESTIMATION METHODS

All methods used to estimate the numbers of Sumatran rhinos in a particular area suffer from the inherent limitations imposed by surveying very small numbers of elusive, scattered and solitary animals in large areas of forest on rough terrain. Evidence of the presence of rhinos has to be based on signs of the rhino, since they are hardly ever seen. Therefore the appropriate detection and processing of rhino signs are the first hurdles in conducting meaningful surveys. The fact that there are so few of these signs compounds the perfecting of processing procedures. Rhinos make vocalizations rarely and the sound does not carry more than a few tens of meters. Feces are often dropped in streams, rather than on dry land, so even the possibility of distinguishing individuals by fecal DNA is problematic due to the tests needed for fresh dry samples. As rhinos do not live in groups and are all similar in appearance and size when mature, distinguishing between individuals on the basis of footprints and any other signs also has limitations.

Nevertheless the use of footprint measurements has always been the mainstay of surveying Sumatran rhinos and estimating their numbers in the rain forests of Malaysia

and Indonesia. Strien (1985) used plaster casts, but that technique takes up enormous amounts of effort and time, as only fresh, clear footprints can be used, and there are practical difficulties associated with transporting, using and drying plaster of Paris in humid rain forests.

Further, the assigning of various rhino signs to numbers of rhinos has been historically subjective. Boonratna, (1997) attempted to address this problem by qualifying sign detection and dividing it into the following categories. This helped maximize the value of any data collected.

- a) Known – Based on minimum number of clearly distinguishable, identifiable tracks.
- b) Probable – Based on number of track sets and recent presence of other types of evidence
- c) Possible – Based on presence and location of others type of evidence.

Problems associated with estimating rhino numbers is that the number of rhinos signs encountered cannot be related to coverage of a specific size of forest area. When using line transects for wild mammal surveys, data (e.g. sightings of monkeys, elephant dung piles or orang-utan nests) can be linked to area in hectares through detection probability and, for signs of the animals, to rate of decay of that sign. This approach is (arguably) not possible with rhinos because footprints are so rare that they have to be found by searching for signs wherever they can be found (not on straight line transects) and because rate of decay of tracks cannot be estimated with sufficient reliability past a few days or if rain fall has been heavy. Records of footprints or signs cannot be reliably linked to actual area surveyed.

However rhino survey reports that provide estimates of numbers of rhinos within the “area surveyed” remain highly subjective assumptions that all rhinos can be detected within an arbitrary distance of the routes walked during the surveys, and not on any probability detection function.

Identifying individuals would alleviate much of the subjective assuming. Plaster casting was an initial option. More recently new techniques FIT and camera trapping, were pursued. Digital photographs taken of footprints and downloaded to a computer for processing for distinguishing details (FIT) is non-invasive to the animal and cost-effective in comparison with many other monitoring methods. But practically it is very difficult to get good footprints of the digital images in the low light and shifting substrate of the rainy forest floor and stopping to take pictures is extremely time consuming.

Camera trapping has improved immensely in functionality since we began using them in 2000. However, several are needed to cover an area sufficiently, which is expensive and some technical expertise is required of the personnel to operate and maintain them in such a wet environment. They are left to function for a period and then retrieved. They are useful for small area revolving surveys. Effectiveness in distinguishing rhinos is still to be determined.

Although we have continued to develop methods that could provide more information on status of rhino in the forest, footprint measurements remain the mainstay of surveying and estimating the numbers Sumatran rhinos due to ease of use.

2.1.1 METHODOLOGY

The measurement of rhinoceros footprint; Foot prints data were the main information used to identify individual rhinoceros. Apart from footprints, rub marks on tree trunks, dung, signs of browsing and wallows were other evidence used to indicate the presence of rhinoceros. When a fresh rhinoceros track was identified, it was followed as far as possible. The locations and sizes of footprints were used in documenting rhinoceros distribution and population size estimation within the TWR. The locations of all fresh signs observed were plotted on a topographic map and given GPS coordinates.

The freshness of rhinoceros tracks was determined using the following principles,

- a) Fresh: The trail was made by rhinoceros within hour leaves its behind. Wet mud smear, fresh browse and clean prints having very few or no leaves in them indicated the freshness.
- b) One week or less: Footprint is still clear but appeared to be dry and the side is always cracked. Foot prints are usually partially seen due to recent fall of dead leaves.
- c) One to two week: Footprints is usually less clear except in certain locations. Often only the impression is seen if dead leaves removed. Most of the time, such print has been washed partly by rainfall.

The maximum width between the lateral and medial toes of these tracks was measured. In each track, the maximum width between the lateral and medial toenails (D1-D3) and the width of the middle toenail (D2) were measured to the nearest millimetre using steel measuring tape and vernier callipers (Figure 2.1). Only prints of the hind feet were recorded because the rhinoceros frequently placed their hind feet on top of the fore foot prints. Digital photo images of the prints were also captured.



Figure: 2.1: A fresh Sumatran rhinoceros footprint on river bank.

2.1.2 FIELD SURVEY

Two different method of survey were conducted from 2004 to 2006. The first method of survey was conducted during 2004 from January to December. The area covered approximately 85% of Tabin wildlife reserve. The survey team was followed the rhino possibilities area such as river and along the ridges.

The second method was conducted during 2005-2006 from January to December. A North-South transects was established starting at KM2 ending at KM52, and at 10 km interval the east west sub transect was established. A base camp will be established at 5 km interval along the north and south transects. Most of the south transects may have less than 5km to qualify for the 5km interval. From the 5km base camp, a 5 km west and east transects was made. There were a northwest, northeast, southwest and southeast transects from base camp.

The sketch below will show transects and base camps, and also the areas were covered.

A) TEAM DISTRIBUTIONS

The reference transect is the existing road from the Tabin wildlife office in the west to the “Core Area”, a distance of 22 km; it is extended to 42 km to the east using a line transect. From this 42-km reference transect, eight linear transects were made: north and south transects at KM7, KM22, KM32 and KM42. Along these transects, small base camps were established at five km intervals. From each of these base camps, the teams made four temporary transects, one in each compass direction, of approximately five km per transect. Each survey day will cover 3-10 km depending on terrain and 6 hours of survey.

2.1.3 DATA ANALYSIS

The data collected were analyzed using descriptive statistics and inferential statistics. The data was processed and analyzed using the SPSS and Excel spreadsheet.

2.1.3.1. Descriptive Statistics

Descriptive statistics is used to summarize numerical descriptions of large bodies of data, most commonly stating the central tendencies and variability of given variables or the relationship between variables (Tabachnick and Fidell, 2001). Descriptive statistics such as maximum, minimum, means, standard deviation values were obtained to describe and summarize the data collected.

The descriptive analysis was also used to determine the age criteria of the rhinoceros in the study area in that study period. All animals with a median track width of left foot hind less than 17.0 cm were considered as dependent young. Other animals were assumed to be either sub-adults or adults (Van Strien, 1986, Flynn & Abdullah, 1983).

2.1.4 INTERPRETATION

The track series data collected during the study period was analysed to determine the minimum number of animals living in the study area. The described statistical analysis method gives the result of a minimum number of rhinoceros in the study area in that study period. The young rhinoceros in the population was determined using track size criteria (Flynn & Abdullah, 1983). All animals with a median track width of less than 17.0 cm were considered as dependent young. Other animals were assumed to be either sub-adults or adults.

3.0 SURVEY RESULTS

The following chapter explains in detail the results and findings obtain in all the conducted surveys from the year 2003 till 2006.

3.1 SURVEYS 2003 MAJOR EVENTS

3.1.1 July 2003

Two field surveys were conducted for the month of July. Team leader Lai ChinSoi led a team of three field assistants and three volunteers (Lien Classen-Belgium, Xavier Vansteelandt-Belgium and Myfanwy Griffith-England). They covered the area southwest of KM21 from 16th to 22nd July 2003. Unfortunately, one of the volunteers returned much earlier to base camp due to health problem. No rhino evidence was observed; only hoof prints of wild pigs, deer, and tembadau (wild cattle) were common in this area. The team sighted a mouse deer, redleaf monkeys and a pair of common palm civet.

Field Coordinator Leni Tupang led another team comprising three field assistants and three volunteers (Rebecca Sylvester, Kirstin Sprissier from Canada and Joanne Kelly-Ireland). They covered the area northwest of the reserve from 16th to 22nd July 2003. No evidence of rhino was found. However, they saw a barking deer, wild pigs, Malay civets and pigtail macaque.

3.1.2 August 2003

Four surveys were conducted during the month of August. Field Coordinator Leni Tupang led a team of four field assistants and two volunteers (Rebecca Wilson-USA and Michael Wong-Malaysia) from 5th to 12th August. They were extending the research transect on the northern part of Tabin reserve. While cutting the transect, a swarm of bee struck and Rebecca had to be evacuated to base camp and later to Kota Kinabalu for further medical check. The team continued their task but did not see any evidence of

rhino. They saw a pair of mouse deer, gibbons, pigtail macaque, spitting cobra, porcupines and a barking deer.

Team Leader Sarinus Aniong led another team comprising of four field assistants from 5th to 14th August. Their task was to complete the research transect at the northeastern part of Tabin reserve. The team entered the forest reserve via Tabin river. The northeastern part of the reserve is basically swamp area. So far no evidence of rhino was seen. The team recorded seeing various species of animals namely black hornbills, proboscis monkeys, a porcupine and a male tembadau (wild cattle).

On 5th to 17th August, team leader Makarius John and three field assistants entered the Tabin reserve via the Tabin river. While one team proceeded eastward, Makarius team proceeded westward. No evidence of rhino was seen except two barking deer, a jungle fowl, five otters and two wild pigs.

Sarinus Aniong led another team comprising three field assistants and one volunteer (Gayle Pedersen – England) to cover southwest of Tabin reserve from 18th to 24th August. Rain hampered the survey. However, the team found old rhino hoof prints, probably two months old in one of the transects. The other transect provided more noticeable rhino prints measuring 20cm diameter.

3.1.3 September 2003

Field Coordinator Leni Tupang, Makarius John and Albert Stawin went to continue the research transect north of Tabin reserve from 10th to 22nd September. No evidence of rhino was seen but encountered two plantation workers fishing in the reserve. Animals seen were Sambar deer, jungle fowls, mouse deer, greyleaf monkeys, banded palm civet, malay civet, monitor lizards and moon rats. The team saw many transect leading northward to the plantation. Thus, the presence of our team in this area will hopefully and gradually reduce the number of illegal encroachment into the reserve.

A team led by Sarinus Aniong and four field assistants covered the area northeast of Tabin reserve from 16th to 25th September. They entered via the Tabin river. While entering the reserve they saw about 12 proboscis monkeys and three monitor lizards.

No evidence of rhino was seen in this area. However, animals such as wild pigs, elephants, tembadau (wild cattle), sambar deer are abundant. Orangutans calls and nests are also common sounds and sightings. The team also reported evidence of elephants, tembadau, wild pigs, sambar deer, jungle fowls, and barking deer.

3.1.4 October 2003

A survey was undertaken from the 4th to the 14th of October 2003. Team Leader Sarinus Aniong led the team, which comprised of 5 field assistants and 2 volunteers. The volunteers were Beau Kittle from Switzerland and Penny Gardner from the UK. After picking up provisions in Lahad Datu town, they stayed for two days at the community outreach program (COP) base camp in Parit to prepare for the excursion. The team took a boat from the Segama river and then into the Tabin river. It took about 3 hours upriver into the reserve to reach the point called 'Sungai Burung', where they disembarked and proceeded on by trekking through the jungle. They moved south towards the target area in KM32.

Along the river they saw some long tail macaques. At Sungai Burung, the team saw some hornbills hovering over their heads and a fair number of hoof prints from elephants, sambar deer and wild pigs. The fourth day, the team found evidence of Sumatran rhinos. Rhino hoof prints about 3 days old were seen but the rain has kept them from trekking the tracks. A camp was built near the prints and the next day, 32 measurements were taken. The rhino was from the east and heading west. While tracking, the team collected plant browsed by the animal. The following day the team went to the east of KM32, and found rhino hoof prints about two weeks old. 12 prints were measured. One of the team members, France Bianus, was the luckier person. While scouting alone in the forest he saw a female rhino about 15 meters away and wallowing

in mud. He said the animal went into the nearby stream and washed of the mud from her body. France collected fresh dung from the animal. The team went to inspect the wallow the next day. The hoof prints were measured while others went to collect plants browsed by the animal.

3.1.5 November 2003

Dr. Petra Kretzschmar a German biologist arrived Sabah on 1st November to learn more about SOS Rhino program here. She went over to Sepilok to see the two captive rhinos and was involved with a survey at Tabin.

The survey was held from 18th to 23rd November. Team Leader Sarinus Aniong led the team comprising of three field assistants, one volunteer and Dr. Petra. The volunteer was Elizabeth Fricker from the UK. The team took the boat from COP base camp and headed for Sungai Burung in Tabin reserve. Evidence of rhino was seen along the Tabin river near Sungai Burung. This was a good finding but raise concern due to the proximity of the animals to Tabin river and the northern boundary. The Tabin river is frequently used by people to enter the Tabin reserve. This information has been provided to the wildlife department Sabah and it is expected that more patrols will be conducted by the wildlife department enforcement unit and SOS Rhino in this area.

3.1.6 December 2003

The northeast monsoon has been bringing heavy rain to the northeastern part of Sabah. The two major rivers, Kinabatangan and Segama are overflowing and this month saw emergency relief work in several villagers along these rivers. The town of Lahad Datu was also under few feet of water, and many flights from Kota Kinabalu have been cancelled. For few days, many commuters are unable to reach their destinations due to the flood. The COP project site at Parit was also hit badly.

The community outreach program or COP began when the Assistant Minister of Tourism, Environment, Science and Technology Sabah Hon. Datuk Hj. Karim Hj. Bujang

visited the village called Parit on the north of Tabin reserve on 31st October 2002. He was accompanied by the Director of Wildlife Department Sabah and SOS Rhino. At the request of the villagers, the Assistant Minister has asked SOS Rhino to help in the establishment of a eco-tourism project in this area.

3.2 SURVEYS 2004

Table 3.1 WORK PLAN OF 2004

Component	Jan – March	April – June	July – September	October – December
<i>In situ</i> program	i. Survey on the northern part of TWR, along the Tabin river	i. Survey on the northern part of TWR, along the Tabin river ii. Survey around the mud volcano at KM22 iii. Assist Sabah Foundation in the Imbak Scientific Expedition	i. Survey in northern part of TWR along Tabin river ii. Survey in eastern part of TWR through Yam Brothers oil palm plantation. iii. Establish a transect along the eastern boundary	i. Survey on the northern part of TWR, along the Tabin river ii. Re-establish transect along the northern boundary of Tabin iii. Intensive training for SOS Rhino field staffs iv. Training for SOS field staffs to be Honorary Game Warden
<i>Ex situ</i> program	None	i. Evaluation of reproductive integrity of rhinos at Sepilok ii. Produce rhino brochures for distribution	i. Evaluation and breeding of rhinos. ii. Present final report to Director of Wildlife Department	i. Continue with education awareness at Sepilok

		iii. Setup rhino exhibition booth at Sepilok	Sabah iii. Continue with education awareness at Sepilok	
Research		i. SOS Rhino cataloguing freshwater fishes in Tabin river	i. Dr. Thaya started his 2-year research on Sumatran rhino nutrition in the core area. ii. Two SOS Rhino field assistants assigned to Thaya. iii. Dr. Taranjit Kaur started her 8-month crocodile research along lower segama river and its tributaries.	Dr. Thaya continues his research and two SOS Rhino field assistants assigned to him
Community Outreach Program	i. Made a boat and named it 'Annelisa'. Made from Timber and plywood for use in survey along the Tabin river.	i. Made a boat and named it as 'Dr. Jey'. This is made from timber and for use to navigate the upper stream of Tabin river ii. Purchased 15HP boat engine sponsored by Rhino Project Australia	i. Took over forestry guardhouse at Dagat, provide rooms and 20 bunk beds. Construct toilet. ii. Purchased 5KVA generator set. Subsidize power to 5 village houses iii. Purchased grass cutter to	i. To make a boat sponsored by Trinity College, Perth Australia ii. To construct Kindergarten at Dagat iii. To start teaching English to SOS Rhino staffs and villagers

			help maintain playing field and compounds in Dagat	
Others		<p>i. Rhino workshop on 29th – 30th April 2004</p> <p>ii. Rhino challenge 2nd – 13th May 2004</p> <p>iii. Imbak Scientific Expedition 17th – 23rd May 2004</p>	<p>i. Forum on Oil Palm Industry and Environment in Sandakan on 10th – 11th July 2004</p> <p>ii. Veterinary Association conference and meeting in KL 23th – 27th August 2004</p>	<p>i. IUCN Congress in Bangkok, Thailand.</p>

3.2.1 DATA OBTAINEDTable 3.2: 2004 RHINOCEORS DETAILS IN TABIN started from March 14th to 16th December

No	Date	Area	GPS Location		Number of measurements made	Average food print measurement (left hind foot)	Remarks/ Observations	
			50N/ Longitude	UTM/Latitude				
1	17/12/2004	Km 32	0671034	0571034		19.33	One day old	
2	20/12/2004	Km 25	0690888	0576792		20.2	2-3 days old	
3	09/11/2004	Km 32 south east	0692978	0584895	17	21.2	7.3	2 days
4	10/11/2004	Km 7 south	0671012	0571354	18	18.8	6.9	5 days old
5	20/11/2004	Km 7 south	0671496	0571145	53	20.2	7.3	Day old
6	22/11/2004	Km 7 south	0671492	0570142				Rhino dung
7	14/10/2004	Km 32-km 42	0699715	0576187	5	19.8	7.5	4-5 days old
8	18/10/2004	Core area	0689635	0576422		21		1-2 days old
9	20/10/2004	Km 32 north	0690018	0577227		19.4		One day old
10	11/09/2004				15	21.02	7.4	
11	16/08/2004	Core area	0693057	0585022		20.5	7.4	One day old
12	21/08/2004	Core area	0695402	0576642		19.2	7	3-5 days old
13	22/08/2004	Core area	0697878	0576079		21.1	7.2	1-2 days old
14	23/08/2004	Core area	0694699	0576863		19.3	8.3	One day old
15	07/09/2004	Core area	0697024	0579047		20.3	7.1	1-2 weeks old
16	09/08/2004		0690664	0595818				

17	26/07/2004		0694253	0588551		21.3	7.4	
18	19/07/2004	Along the Tabin river 3.9 km from Dagat	0693767	0590408		19.9	6.8	1 month
19	21/07/2004		0692478	0590603		19.6	6.5	
20	26/07/2004		0694253	0588551	11	20	7.3	Day old
21	27/07/2004		0694258	0588551	10	20.9	7.4	
22	20/06/2004		0686288	0580603		19	6	
23	21/06/2004		0688580	0580213		18	6	1 month
24	19/06/2004	Tabin river	0686975	0580330		24		Month old
25	20/05/2004	Km22 mud volcano	0685643	0574884		21	6.8	2 months mud volcano
26			“	“		15		Baby foot prints
27	18/05/2004	Imbak canyon Conservation area	N 5o 07' 067”	E 117o 57' 327”		22 cm		
28			N5o 07' 070”	E 117o 57' 292		19 cm		Week old
29	18/03/2004	Km 32 core area	0693704	0577976		18cm		
30	20/02/2004	Tabin River (Sg.Burung)	0691459	0583977		22 cm		2 months old

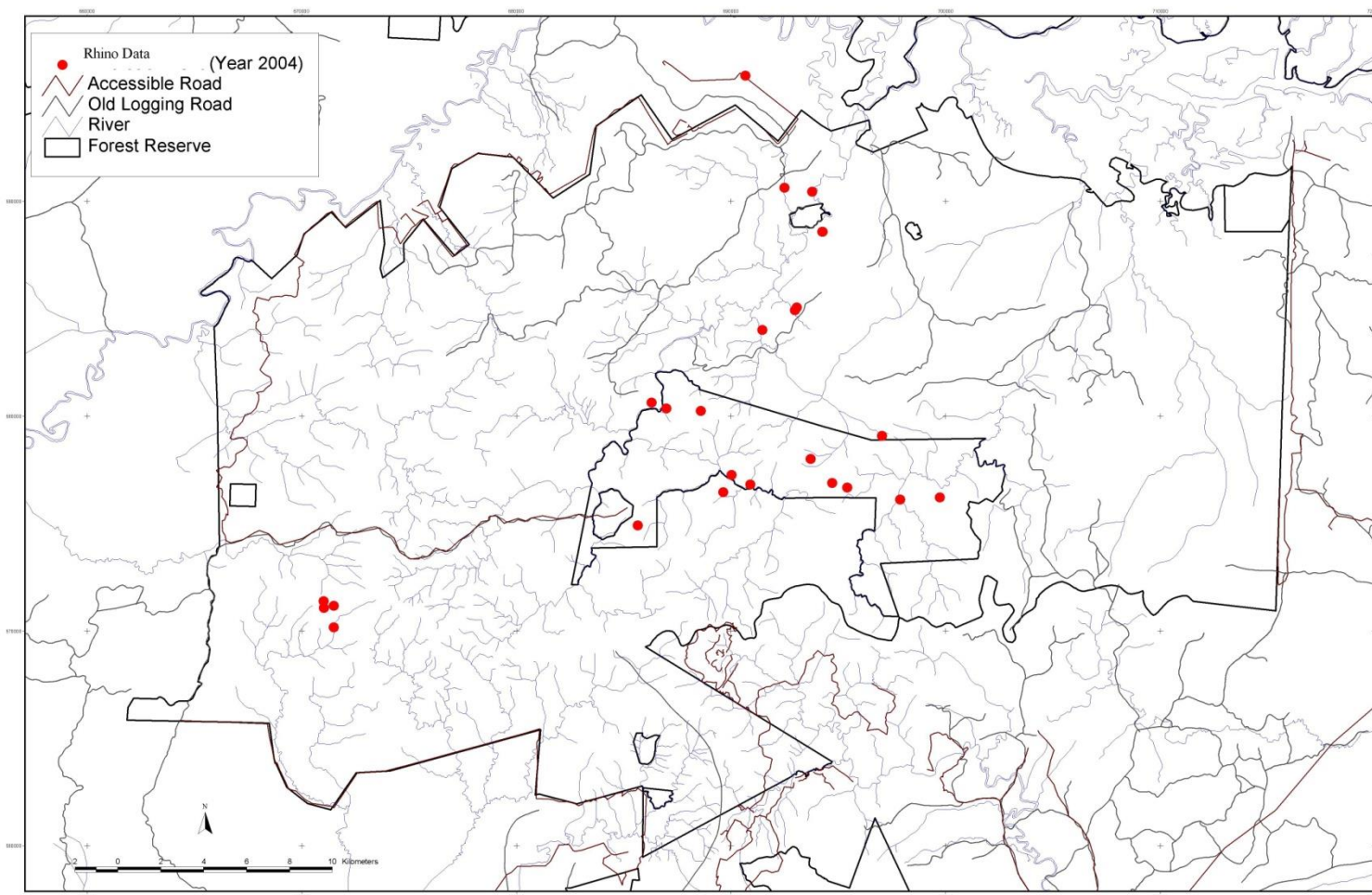


Figure 3.1: Locations of Footprints found

In the one year time period SOS Rhino conducted 40 transect surveys in TWR. From these transect surveys 30 incidents identified rhinoceros footprints in different places. During the transect survey rhino footprints were frequently found at the Core Area (km 32), the valley of the rugged hill and the southern area of km 3-7. The km 3-7 is the area where the RPU consistently find clear tracks of the rhino with other signs such as rhino dung and feeding signs. One of the tracks was believed to be that of a young rhino with adult. Sungai Burung is also recognized as one of the active areas for the rhinos.

3.3 SURVEYS 2005

WORK PLAN FOR 2005

Component	Jan – March	April – June	July – September	October – December
<i>In situ</i> program	<p>i. RPU1 established for northern part of TWR stationed at Dagat</p> <p>ii. Survey and monitoring along transect along northern boundary</p> <p>iii. RPU 2 established for southern part of TWR stationed at Yam Brothers oil palm plantation.</p> <p>iv. Survey and monitoring along transect along eastern boundary</p>	<p>i. RPU 1 doing survey and monitoring along the northern boundary of Tabin</p> <p>ii. RPU 2 doing survey and monitoring along the eastern boundary of Tabin</p> <p>iii. RPU 3 working with JICA-SWD in lower segama</p> <p>iv. Commence engagement with Sawit Borneo, a Sabah Government</p>	<p>i. RPU 1 doing survey and monitoring along the northern boundary of Tabin</p> <p>ii. RPU 2 doing survey and monitoring along the eastern boundary of Tabin</p> <p>iii. RPU 3 working with JICA-SWD in lower segama</p>	<p>i. RPU 1 doing survey and monitoring along the northern boundary of Tabin</p> <p>ii. RPU 2 doing survey and monitoring along the eastern boundary of Tabin</p> <p>iii. RPU 3 working with JICA-SWD in lower segama</p> <p>iv. Establishment of one guard post at Borneo Sawit property,</p>

	<p>v. RPU 3 established and stationed at Tanjung Utik</p> <p>vi. Work closely with JICA-SWD on the promotion of ecotourism in lower Segama river.</p> <p>vii. Joint patrol with SWD along Segama river and its tributaries.</p>	<p>agency planting oil palm on the eastern part of Tabin reserve.</p> <p>v. Commence engagement with FELDA, a Federal government agency planting oil palm on the eastern part of Tabin reserve.</p>		to be constructed by Borneo Sawit.
<i>Ex situ</i> program	i. Rhino education awareness at Sepilok	i. Rhino education awareness at Sepilok	i. Rhino education awareness at Sepilok	i. Rhino education awareness at Sepilok
Research	<p>i. Dr. Thaya continues with his research.</p> <p>ii. Two SOS Rhino field assistants assigned to Thaya</p> <p>iii. SOS Rhino continues to collect fecal samples for</p>	<p>i. Thaya expected to start his laboratory analysis for his samples</p> <p>ii. Fecal sampling for parasitology</p> <p>iii. Cataloguing freshwater fishes continues</p>	<p>i. Thaya continues with laboratory analysis</p> <p>ii. Fecal sampling for parasitology</p> <p>iii. Cataloguing freshwater fishes continues</p>	<p>i. Thaya continues with laboratory work</p> <p>ii. Thaya starts writing his thesis</p> <p>iii. Thaya presenting his findings in seminar</p>

	<p>parasitology</p> <p>iv. Cataloguing freshwater fishes continues</p> <p>v. Advertise and selecting student for Masters program in UMS on Eco-tourism</p>	<p>iv. Eco-tourism research in Lower Segama</p>	<p>iv. Eco-tourism research continues</p>	<p>iv. Fecal sampling for parasitology</p> <p>v. Cataloguing freshwater fishes continues</p> <p>vi. Eco-tourism research continues</p>
COP	<p>i. Assist JICA-SWD and Carlotas Borneo in promoting tourism in lower segama</p> <p>ii. Promote tourism in Selama facility at Tanjung Utik</p> <p>iii. Prepare write up and brochures about Segama</p> <p>iv. Teach English</p>	<p>i. Distribution of brochure to tour agencies</p> <p>ii. Give talks to MNS (Sabah Branch) about the wonders of Segama area</p>	<p>i. Distribution of brochures to Hotels</p>	<p>i. Distribution of brochures to relevant agencies.</p> <p>ii. Talk with oil palm plantations in the south for prospect of establishing another tourism destination</p>
Others	<p>i. Continue to engage with JICA-SWD on habitat conservation in Lower Segama</p>	<p>i. Provide field training for youth in Dagat, Tidung and Parit to be sponsored by JICA</p> <p>ii. Assist in rhino survey in</p>		<p>i. Provide field training for youth in Dagat, Tidung and Parit to be sponsored by JICA</p>

		Danum Valley and surrounding area. iii. Rhino challenge 2005 iv. Rhino seminar 2005		
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3.3.1 DATA OBTAINEDTable 3.3: 2005 RHINOCEORS DETAILS IN TABIN started from February 8th to 15th December

No	Date	Area	GPS Location		Number of measurements made		Average food print measurement (left hind foot)	Remarks/ Observations
			50N/ Longitude	UTM/Latitude				
1	13/11/2005	Sg.Burung Km 32	0692159	0583324	40	20.1	7.6	Fresh approximately 4 days old
2	13/11/2005	Km32	0692586	0576217	2	20.1	7.8	Around 3-4 weeks
3	21/9/2005	Km 32 north sg. Burung	0693086	0584897	15	19.6	7.1	3 days old
4	11/09/2005	KM 12	0675361	0575841	4	20.3	8.4	Week old
5	21/03/2005	Sungai burung	0692966	0583080	23	20.4	7.9	2 weeks

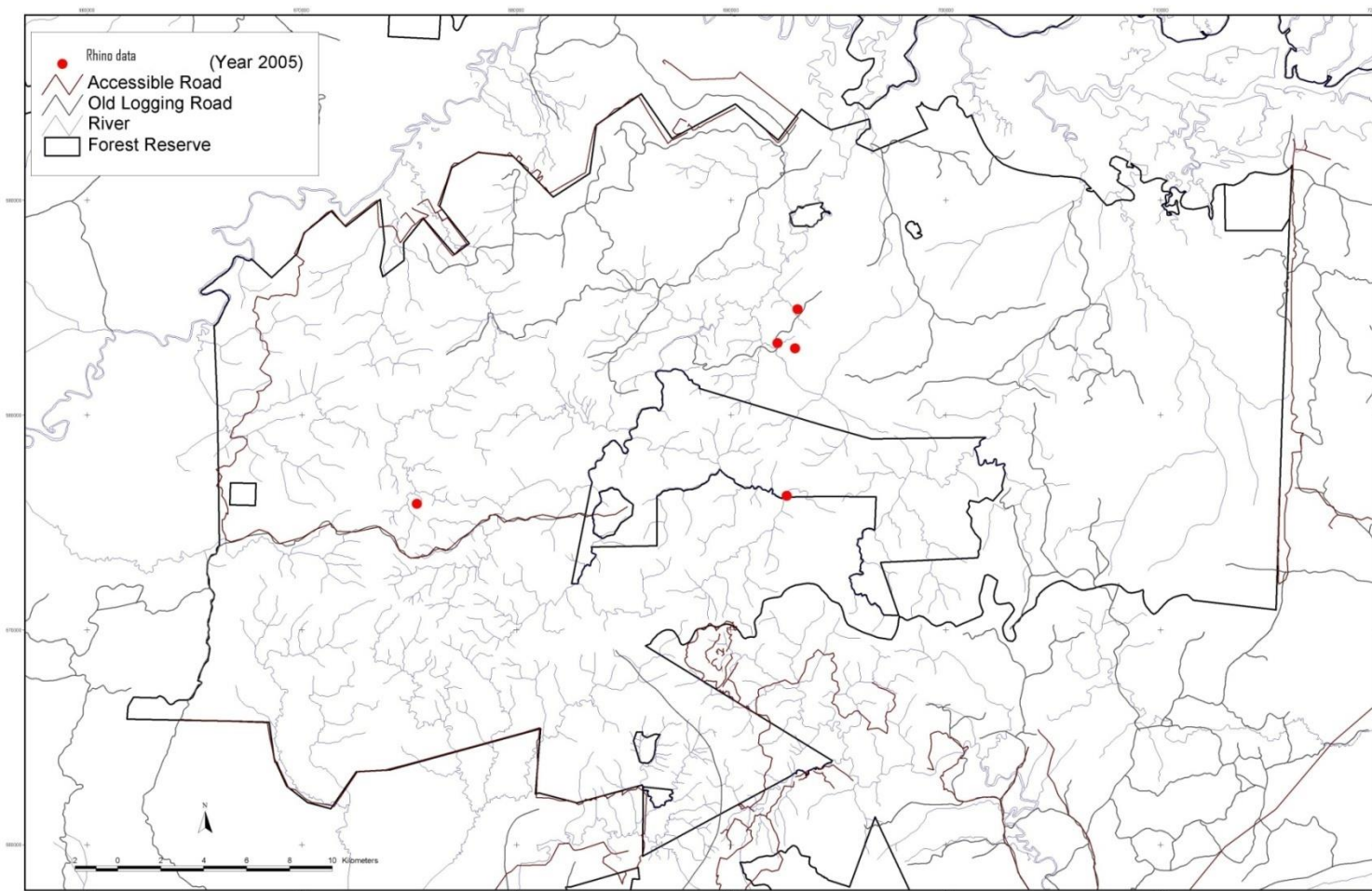


Figure 3.2: Location of Footprints found.

3.4 SURVEYS 2006**Table 3. 4: WORK PLAN OF 2006**

Component	Jan - March	April - June	July September	October December
<i>In situ</i>	<p>i. Establishment of RPU4 based at Lung Richard – southern part of Tabin reserve</p> <p>ii. Establish southern transect linking west-east of reserve</p> <p>iii. Surveys and patrol along southern transect</p>	<p>i. Survey and patrol along southern transect</p> <p>ii. Survey and patrol along eastern transect</p> <p>iii. Survey and patrol along northern transect</p>	-do-	-do-
<i>Ex situ</i>	i. Promote rhino awareness, education and fund raising	-do-	-do-	-do-
Research	i. Eco-tourism research continues	i. Eco-tourism research continues	i. Eco-tourism research continues	i. Eco-tourism research writing thesis and presentation
COP	<p>i. Engage with oil palm plantations on the southern part of reserve</p> <p>ii. Visit and continue to engage with oil palm plantations along the eastern part of reserve</p> <p>iii. Visit and continue to engage with oil palm plantations</p>	-do-	-do-	-do-

	<p>and villagers on the northern part of reserve</p> <p>iv. Continue to engage with JICA and SWD on habitat conservation in Lower Segama</p>			
Others	<p>i. Establish a relationship with the Ministry of Youth and Sports to promote volunteerism among local youths – to provide conservation base training</p>	<p>i. Rhino challenge 2006</p> <p>ii. Rhino seminar 2006</p>	<p>i. Receive MYS volunteers</p>	<p>i. Receive MYS volunteers</p>

3.4.1 DATA OBTAINED**Table 3.5 DATA OBTAINED**

No	Date	Area	GPS Location		Number of measurements made		Average food print measurement	Remarks/ Observations
			50N/ Longitude	UTM/Latitude				
	13 Apr 2006	Km 32 North	0695052	0574970		19.9	8.3	
	21 st May 2006	Km 32 north				21.1	8.2	
	9 May 2006	KM 32-36 (North), Tungku			5	18.1	8.1	
	17-21 June 2006	Sg. Tagas-tagas Besar (North)						RPU found wallows and sighted footprints of possibly three different rhinos, i.e. adult male, adult female and a young rhino
	26-29 June 2006	Tungku Estate-Rimmer Estate (South)						RPU found signs of rhino feeding area and wallows

18-25 July 2006	KM3-7 (South)							RPU sighted footprints of adult and young rhino. They also found rhino dung at the wallow of rhino. Rhino rubbing and feeding signs were noticed in the area.
20-31 July 2006	Kretam							RPU sighted rhino footprints aged 1 day.
1-17 July	Kretam							RPU had two direct sighting
12-19 Aug 2006	KM12 – Lipad Mud Volcano (North)							RPU found one rhino footprint. They also found a wallow during the survey but it is only actively used by the wildboar.
12-21 Aug 2006	KM 8-17 (South)							RPU found rhino rubbing sign on tree bark on 14 th August 2006.
16 Aug – 3 Sept 2006	Kretam							
1-17 Aug	Kretam							

	2006							
	18-27 Sept 2006	KM 12 (North)						Three wallows were found at locations shown below. 1) 20/9/06, 50N: 0684279 UTM: 0575317; Elev: 222 m
	14-23 Sept 2006	KM32 (North), Sg. Burung						16/9/06, rhino footprint aged 1 month was found at 50N: 693321 UTM: 0584964; Elev: 16m. The measurement taken was 20 cm in width and 8 cm in midtoe for right foot
	9-23 Oct 2006	KM 3- 12 (South)						1) 19/10/06, rhino footprint and wallow were found at 50N: 060565 UTM: 0570563 at elevation 339 m. The rhino footprint measured was a right print measuring 21.0 cm in width

								<p>and 7.0 cm in midtoe.</p> <p>2) 22/10/06, rhino footprint, dung and wallow were found at 50N: 0685406 UTM: 0576096 at elevation 90 m. The rhino footprint measured was a right print measuring 21.0 cm in width and 7.0 cm in midtoe.</p>
	9-17 Oct 2006	Silabukan (Sg. Makuau)						<p>1) 11/10/06, rhino footprint aged 3 months was found.</p> <p>2) 12/10/6, rhino footprint aged 3 months was found at N05°03'11.8"; E118°47'18.0". The</p>

								<p>measurement was 24.3 cm in width and 7.3 cm in midtoe. Wallow and rubbing signs on tree bark were also found. Second wallow was found at N05°02'46.4"; E118°47'24.9".</p> <p>3) 13/10/06, rhino footprint and dung aged 3 months were found at N05°02'00.5"; E118°47'52.0". The measurement of the rhino print taken was 24.9 cm in width and 7.3 cm in midtoe. Wallow and rubbing sign on tree bark were</p>
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								<p>also found at N05°01'59.7"; E118°47'57.1". Rhino footprint aged 1 month was found at N05°01'53.6"; E118°47'51.3".</p> <p>4) 15/10/06, wallow and rubbing signs on tree bark were found at N05°01'53.8"; E118°47'36.9".</p>
	7-21 Nov 2006	Silabukan						<p>1) 8/11/06, 2 wallow were found at N05°02'47.4"; E118°44'02.0" and N05°02'34.8"; E118°44'02.4" respectively.</p> <p>2) 9/11/06, hunters trail and 2 animal traps were</p>

								<p>found from west to east at N05°02'25.7"; E118°43'50.8".</p> <p>3) 10/11/06, hunters trail at N05°02'30.7"; E118°44'01.7".</p> <p>4) 13/11/06, wallow at N05°03'04.5"; E118°44'02.2".</p> <p>5) 14/11/06, wallow at N05°03'12.5"; E118°44'34.7".</p> <p>6) 15/11/06, RPU found gravel road in the middle of the reserve forest leading from West to East. GPS reading is N05°03'31.5"; E118°43'08.6".</p>
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								<p>7) 16/11/06, RPU found gravel road in the middle of the reserve forest leading from West to East. GPS reading is N05°03'33.0"; E118°43'43.0".</p> <p>8) 19/11/06, wallow was found.</p>
	7-21 Nov 2006	Silabukan						<p>1) 8/11/06, rhino footprints aged about 1 month was found at N05°01'45.9"; E118°47'29.3". The measurement was 22.2 cm in width and 7.6 cm in midtoe.</p> <p>2) 10/11/06, wallow at N05°02'11.4"; E118°46'30.6".</p>

								<p>3) 12/11/06, wallow at N05°44'34.9"; E118°45'31.4".</p> <p>4) 13/11/06, wallow at N05°02'05.0"; E118°44'56.9".</p>
	7-17 Nov 2006	Silabukan						<p>1) 8/11/06, rhino footprint aged 1 month was sighted at N05°58'32.8"; E118°45'34.3". The measurement taken was 21.0 cm in width and 7.0 cm in midtoe of right foot.</p> <p>2) 10/11/06, 2 wallow were found at N05°58'53.5"; E118°44'59.3" and</p>

								<p>N05°59'21.7"; E118°45'11.6" respectively.</p> <p>3) 11/11/06, rhino footprints aged 1 month were found at N05°25'03.4"; E118°35'38.0". The measurement taken was 22.0 cm in width and 7.0 cm in midtoe for both right and left foot.</p> <p>4) 12/11/06, wallow was found.</p> <p>5) 13/11/06, 2 wallow were found at N05°59'57.4"; E118°46'02.0" and N05°59'43.4"; E118°46'04.9"</p>
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								respectively.
	7-17 Nov 2006	Silabukan						<p>1) 7/11/06, wallow at N05°59'43.9"; E118°43'16.6".</p> <p>2) 8/11/06, wallow was found.</p> <p>3) 12/11/06, wallow at N05°00'44.5"; E118°44'55.8".</p>

3.4.2 DATA ANALYSIS

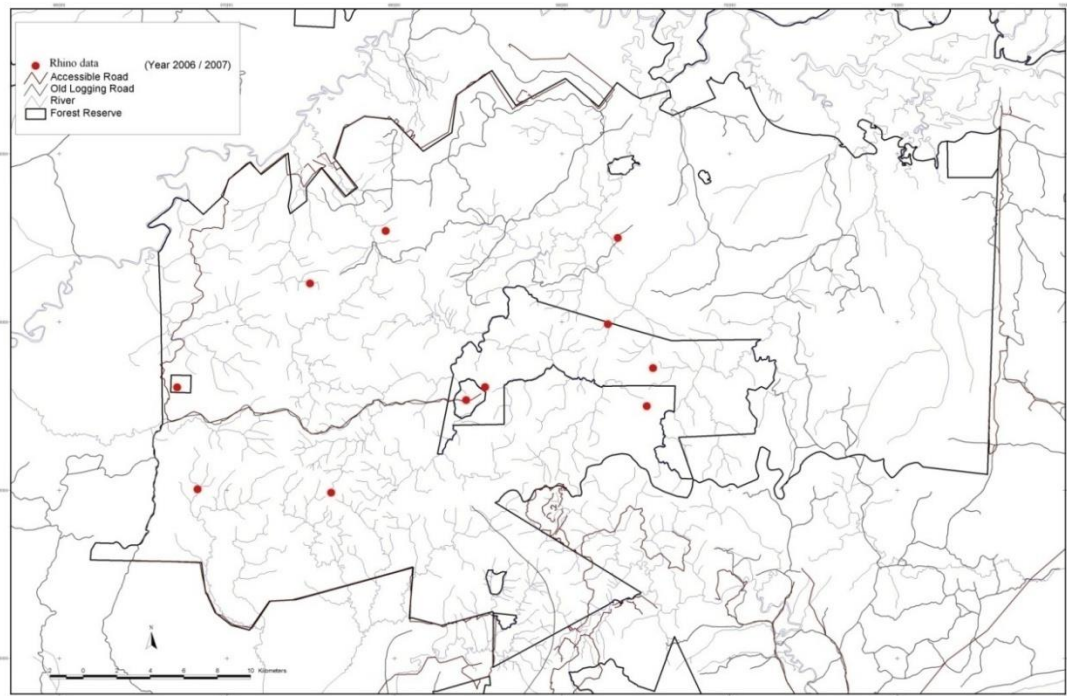


Figure 3.3; Locations of Footprints in 2006 survey

Total of 11 footprints were observed in this survey.

3.5 SURVEYS 2007**Table 3.5 : WORK PLAN OF 2007**

	Jan - March	April - June	July – Sept	Oct – Dec
<i>In situ</i>	i. Intensive surveys for all the transects ii. Monitoring, Patrolling, Surveillance and Protection of Tabin reserve	-do-	-do-	-do-
<i>Ex situ</i>	i. Education and awareness program in Sepilok. ii. Update brochures for distribution	-do-	-do-	-do-
Research	i. Promoting short-term research by SOS Rhino volunteers	-do-	-do-	-do-
COP	i. Assist SWD in managing the lower segama conservation area ii. Work with village JKKK around the reserve iii. Promote conservation in oil palm plantations	-do-	-do-	-do-
Others	i. Establish a volunteer program with	i. Rhino challenge 2007	i. Receive NS volunteers	i. Receive NS volunteers

	National Service program provide conservation base training ii. Receive volunteers from MYS	ii. Rhino seminar 2007	ii. Receive MYS volunteers	ii. Receive MYS volunteers
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3.5.1 MAJOR ACTIVITIES AND PROGRAMS ORGANISED DURING 2007

3.5.1.1 JANUARY/FEBRUARY

Planning for General Survey of Tabin

An organizing committee for the Tabin 2007 rhino survey was formed in 2006 and chaired by SWD, with S.Thaya of SOSRB as secretariat and J. Payne of WWF- Malaysia as coordinator; detailed preparations were done in January and February 2007. Information from previous surveys of Tabin conducted in recent years and those that have been recently conducted in other rhino populated areas in Sabah will help determine whether the rhino population in Tabin is increasing. This information will be used to evaluate and update the recommendations proposed in 2004.

3.5.1.2 MARCH

General Survey of Tabin

The survey took place 1 - 12th March 2007, with the following objectives:

- a) To estimate the current population size of Sumatran rhinos in TWR.
- b) To identify if there are signs of breeding in the Tabin rhino population

Incorporating the knowledge and experience obtained from past surveys, the General Survey conducted in March 2007 utilized experienced, trained trackers that focused on

the rhino and concentrated on areas where animals have been previously reported.

Participants: SWD, SOS Rhino, WWF-Malaysia, Universiti Malaysia Sabah, Sabah Forestry Department (SFD), Sabah Parks, the Danum Valley Conservation Area (DVCA) Department of Wildlife and National Parks (DWNP), Asian Rhino Specialist Group (AsRSG), International Rhino Foundation (IRF) & Indonesian Rhino Foundation (YABI/RFI).

3.5.1.3 APRIL/MAY

A) Football (Soccer) Tournament:

SOS Rhino Borneo's (SOSRB) management team organized a soccer tournament at Kampong Parit during Malaysia's Labor Day celebrations. The tournament opened on April 30th with an all-women's game. A total of 18 teams were formed, made up of villagers from Dagat and Parit, staff of oil palm plantations, and SOS Rhino Borneo's field staff.

SOSRB's field team created exhibits for display during the tournament at Parit Village School where school children and palm oil plantation staff had access to information on the plight of the Sumatran rhino in Sabah, and SOS Rhino Borneo's efforts to save them. By hosting and organizing such events, SOS Rhino Borneo continues to build stronger relationships with the stakeholders who live and work in areas surrounding Tabin Wildlife Reserve.

Below: SOSRB Community Outreach Coordinator, teaching Parit Village School children about conservation of the Sumatran rhino in Sabah.



Below: SOSRB Field Team members describing their work to palm oil plantation staff.



Below: (l) SOSRB Soccer Teams A&B. Team B are wearing white soccer shirts donated by Save the Rhino International, one of SOSRB partners in conservation. (r) SOS Rhino Borneo Team on day one of Soccer Tournament



3.5.1.4 JUNE

A) Planning for 4th Sumatran Rhinoceros Conservation Workshop/Seminar

Planning for the 4th Sumatran Rhinoceros Conservation Workshop 2007 held on July 5 and 6, 2007 was well under way. The workshop was organized by The Sabah Wildlife Department, SOS Rhino and SOS RHINO (BORNEO) BHD, in partnership with Universiti Malaysia Sabah, and WWF-Malaysia. A courtesy call to Yb Datuk Hj. Masidi Manjun, Minister of Tourism, Culture and Environment Sabah was made by the Organizing committee to invite him to participate by giving a speech to show his support of rhinoceros conservation at the Opening Ceremony.

Below: The Organizing Committee, together with YB DATUK HJ. MASIDI MANJUN, From Left: Mr Laurentius N Amdu, Deputy Director, Sabah Wildlife Department; Ms Angel Majanggil, Administrative Manager, SOS Rhino Borneo; Mr. Daniel Scarporolo of Asian Rhino Project; Ms. Cindy Salopek, Program Manager, SOS Rhino; Dr. Thaya, Program Officer, SOS Rhino Borneo; M. Yahya Dunggi, Public Relation Officer (MTCE)



B) Partner Visit

Daniel Scarporolo of Asian Rhino Project (SOSR and SOSRB partner in conservation), made a site visit to Sabah from June 12-25. Daniel spent time with SOS Rhino and SOS Rhino Borneo staff in Kota Kinabalu and in Tabin. Daniel was also able to visit Mt. Kinabalu and Sepilok Orangutan Rehabilitation Center, should Asian Rhino Project decide to create an eco-tourism fundraiser specifically to support Sabah rhino conservation projects.

Below: Daniel Scarporolo of Asian Rhino Project enjoying a meal with SOS Rhino Borneo staff at Tabin Base Camp.



C) Singapore Youth Council/Ereton Base Camp

The Singapore Youth Council spent 10 days with SOS Rhino Borneo staff in June. They raised funds and helped to build an additional enforcement camp along the roadside in the southern area of Tabin Wildlife Reserve. This area has been found to have a high level of encroachment activities, including hunting.

Below: Singapore Youth Council with SOS Rhino Borneo Staff near site of future enforcement camp



Below: Breaking ground for Ereton Enforcement Camp



3.5.1.5 JULY

A) 4th Sumatran Rhinoceros Conservation Workshop/Seminar

“Saving the species was the most urgent message driven home at the workshop”

SOSRhino Borneo and the Sabah Wildlife Department organized the 4th Sumatran Rhino Conservation workshop, in partnership with WWF-Malaysia and Universiti Malaysia Sabah. The two-day workshop was held in Kota Kinabalu and was officially launched by the Minister of Tourism, Culture and Environment YB Datuk Hj. Masidi Manjun. There were 90 participants in attendance from the conservation, environmental, business, and tourism sectors.

Below: Dr. Nan Schaffer, YB Datuk Masidi Manjun, Monica Chai, Patrick Andau at launching of workshop



Day 1 began with a closed Technical Working Group meeting involving the researchers and scientists from SOS Rhino Borneo, Sabah Wildlife Department, WWF-Malaysia and WWF-International, Universiti of Malaysia Sabah, Sabah Forestry Department, Department of Wildlife and National Parks, and University Malaysia Sarawak.

Below: Technical Working Group



The technical working group discussed, evaluated and reviewed the 2004 recommendations for Sumatran rhinoceros conservation and progress achieved to date. The core discussion focused on methodology for the identification of the rhinoceros (via footprints, camera trapping, DNA), and surveys (history, the 2004 recommendations, recent results) for analysis of the population viability of the Sumatran Rhinoceros in Sabah.

Day 2 began as speakers were invited to deliberate a number of issues pertaining to the plight of the Sumatran Rhinoceros and their current programs and activities on Sumatran Rhinoceros Conservation in Malaysia. After the presentations, participants divided into two groups for an open discussions:

Group A: Securing the rhino population in Tabin Wildlife Reserve

Group B: Expanding Sumatran rhino awareness efforts, with focus on Tabin Wildlife Reserve

In the end, participants of Group A were in agreement with a resolution and recommendations to create a Task Force which is to be set up and spearheaded by the Sabah Wildlife Department and for it to take up and implement the many ideas put forth during the workshop.

Below: Group A discussion session



Group B focused on 'Expanding the awareness of the Sumatran Rhino with focus on the Tabin Wildlife. The participants decided that the way to proceed was to identify target groups to educate about the plight of the Sumatran rhinos in Sabah and plan from there. The target groups with the most votes were: Kampongs, Policy/Decision Makers, and Logging and Plantation Companies. The participants chose their top three priority objectives under each target group, and were then asked to brainstorm how best to reach their objectives.

Below: Group B discussion session



Both discussion groups were then reunited for summary of their discussions and closing

remarks were conducted by the Sabah Wildlife Department

Below: Participants at closing remarks session



Volunteer Program

Three groups of volunteers from the UK, and one individual from Germany spent from 2 weeks to one month with SOSRB staff in Tabin (for a total of 23) during the month of July. The volunteers participated in a variety of activities including jungle surveys and base camp renovations.

3.5.1.6 AUGUST

A) Malaysia National Day Exhibition

SOS Rhino Borneo staff were invited by the Sabah Wildlife Department to participate in a 2-day exhibition held in Lahad Datu on August 30 and 31. SOS Rhino Borneo's RPU staff prepared the materials, set up the booths, and introduced the public to their work. The participation of SOS Rhino Borneo staff helped to build and increase knowledge and understanding of the Sumatran rhino and conservation efforts to local Sabahans.

Below: The “star” attraction at exhibition. Sumatran rhino made by SOS Rhino Borneo RPU staff, Justin Segunting



Below: Community Outreach Coordinator, discussing plight of Sumatran rhino of Sabah with locals



3.5.1.7 SEPTEMBER/OCTOBER

A) Rhino Awareness and Education Talk

As part of Community Outreach, SOS Rhino Borneo and Sabah Wildlife Department organized a rhino awareness talk at Permai school in Tabin targeting students aged 9 to 12 years. After presentations by SOSRB and SWD staff, students participated in

activities such as drawing a Sumatran rhino, creating a postcard with a rhinoceros conservation message to send to local government departments and NGOs, and producing a poster on the plight of the Sumatran rhinoceros in Tabin Wildlife Reserve.

Below: Students showing their drawings. September/October volunteer, Cydney Peterson pictured



Below: SOSRB field staff, James Sandiyang teaching student to create a postcard



B) Conservation Presentation at Tabin Wildlife Resort

SOS Rhino Borneo staff presented a talk on their work in the Reserve to Tabin Wildlife Resort staff. They presented information on the natural history of the rhino and

conservation efforts in Tabin Wildlife Reserve. This talk is part of the on-going collaboration and information exchange with the Resort so as to increase the tour guides' knowledge and understanding of the Sumatra rhino. This information is then passed on to their guests through the guides and other staff working at the Resort.

Below: SOSRB Field Coordinator, Alexter Japrin, presenting rhinoceros information to Tabin Wildlife Resort staff



3.5.1.8 NOVEMBER

A) Visit to Kinabatangan Orang Utan Conservation Project (KOCP)

SOS Rhino and SOS Rhino Borneo staff visited this community conservation program to introduce SOS Rhino Borneo work to KOCP staff, brainstorm on ideas to build a stronger partnership between the two organizations, and to share conservation information. The staff of SOSR and SOSRB met with heads of the KOCP's orangutan, elephant, gibbon, education, and enforcement units and the Sukau Youth Association Coordinator. In addition, they participated in a boat trip with the primate monitoring team, night cruise with a guide from Red Ape Encounters, and trekked to one of their research sites, and visited a tree planting project. SOSRB and KOCP will jointly participate in community outreach and awareness projects in the future.

Below: SOSR, SOSRB and KOCP staff sharing information and ideas



B) Courtesy Call and Conservation Talk at KLK Plantations Bhd.

SOS Rhino Borneo's Field Program Manager and Community Outreach Coordinator paid a courtesy visit to KLK Plantation Bhd., as part of SOS Rhino Borneo's community outreach program. The purpose of the visit was to introduce SOS Rhino Borneo's work and explain the plight of the Sumatran rhino in Tabin to the management of the plantation and to accompany them on a site visit to the Ereton Enforcement Camp.

C) International Conference on Nature Conservation in Sabah and Expo

The Sabah Forestry Department hosted a conference and exhibition on nature conservation in Sabah. Local NGOs were asked to participate by exhibiting their information and providing interpreters to help make the public aware of wildlife and environmental issues in Sabah. The exhibit was displayed for two days during the conference and an additional four days at a local mall. PARTICIPANTS: SOS Rhino Borneo, WWF-Malaysia, Malaysian Nature Society, HUTAN, Partners in Community Organizations, Sabah Environmental Protection Association.

D) Sumatran Rhino Footage and Data Collection

SOS Rhino Borneo's Rhino Protection Units (RPU) sighted a female rhino lying in a mud wallow, and recorded her behavior by hand-held video camera. The team followed the rhino for several hours. During the 4th Sumatran Rhinoceros Conservation Workshop held in July 2007, rhino experts made suggestions for better data-gathering techniques in the field. SOS Rhino Borneo adopted the suggestions and deployed survey teams. The video was captured during one of those surveys.

In addition to an accumulation of 22.5 minutes of raw video footage captured on two different occasions, the team sighted a different adult rhino. Footprints of around 17 cm indicating a much smaller rhino – for a total of 3 individuals in an area of approximately 20 square kilometers in size.

In less than five months SOS Rhino Borneo RPUs have collected 14 samples of fresh dung and three groups of hair samples for DNA analysis. The teams also positively identified the sex of two of the adult animals. Although the younger rhino was not observed moving together with the adult female, evidence shows that it was using the same trails and wallows.

3.5.1.9 DECEMBER

A) Education and Awareness Program/ RCC Rhino Expedition

SOS Rhino Borneo together with Rhino Conservation Club (RCC), University Malaysia Sabah (UMS) organized a Sumatran Rhinoceros Education and Awareness Program at Kg.Tungku, Lahad Datu on the 9th December 2007.

The program was designed to reach out to the kampong people of Tungku that live near the southern border of Tabin Wildlife Reserve about the plight to save one of the last remaining populations of Sumatran rhinoceros in Borneo in Tabin Wildlife Reserve.

Rhino Conservation Club (RCC) members who participated in this particular program consisted of nine Second Year students from UMS have completed their first rhino expedition in 2006 at Kg. Dagat (northern part of Tabin Wildlife Reserve).

During this particular program, several activities were carried out with the purpose of collecting views of villagers on rhino conservation as well as their participation in rhino conservation efforts carried out by local Governments and NGOs.

Below: A series of six posters on Sumatran rhino presented to the kampong people. Four members of RCC namely, Abdul Hamid Bin Kimar, Radzi Bin Abdul Kadir, Loke Wai Yeen and Hiew Lee Fong together with SOSRB field team lead by Alexter Japrin, Yusri Bin Madiun, Wilfred Yuya and Suhairin Putra worked together on the poster presentation.



Below: Adults were divided into two separate discussion groups: the men's group and the ladies' group. The grouping is as such, so as to ensure that everyone will have the chance to give their opinions on the issues discussed. In addition, this is one way to empower the women on their roles in rhino conservation. For the group discussion, the facilitators are those who were in charge of the poster presentation.



Below: A small corner for fun and learning was created for children. RCC members in-charge of the children corner include, Goh Hian Chui, Loon Wai Cheng, Tseu Siau Chin, Leong Ann Ying and Lim Man Kee, whilst the SOSRB field team lead by Fiffy Hanisdah Saikim, Lusry Basri, Andrew Ginsos, James Sandiyang and Bindis At



Below: Mini Exhibition



Below: Friendly soccer match to strengthen relations between SOSRB and villages
Women's team pictured.



B) Borneo Species Workshop

SOS Rhino and SOS Rhino Borneo staff participated in the Borneo Species Workshop organized by WWF-Malaysia and Sabah Wildlife Department. Dr. Nan Schaffer presented a paper on SOS Rhino's transition; Dr. Thayaparan presented a paper on status of Sumatran rhino in Tabin Wildlife Reserve; Fiffy Hanisdah Saikim presented on Rhino Tourism in Tabin Wildlife Reserve.

3.5.2 SURVEY OUTCOME

The following section highlights the survey findings and the significance contribution from the SOS Rhino Borneo towards the rhino population estimation and providing a better management plan to ensure the safety of these species. The survey conducted from January to December 2004 managed to cover 85% of the total reserve area and identified evidence for minimum of nine rhinos (Figure 3.4). From the nine identified rhino footprints

1. 24 cm,(Only one set produced this size suggesting the existence of a matured rhino)
2. 22 cm, (there were 4 sets of footprint measurements with this reading in couple each in 2004 and 2006 suggesting more then one or more than one rhino-possible 4 rhino (interpretation based on location and year)
3. 21 ± 0.5 cm,(11 set is footprints representing in this group this might be represent more than one rhino- i would say this may indicate the existence of 5 rhino based on the year and location/movement)
4. 20 ± 0.5 cm, (12 sets of footprints representing under this group-5 rhino, mostly these readings were found very close to the 21 ± 0.5 cm readings. There might be overlap in the population estimation)
5. 19 ± 0.5 cm), (10 sets representing in this group which might belong from 5 possible rhino(taking into consideration that some of the rhino reading were very close to 20cm and close are might suggest to originate by the same individual)

Three of it was from juvenile footprints (based from location and time frame interpretation.

6. 18 cm (three sets of prints)
7. 15 cm, (Found with mother foot print 21 cm in km 22 on 20th may 2004)
8. 16 cm (found with mother 22 cm on 20th July 2006)
9. 15.8 cm (Found with mother 21 cm on 20th June 2006)

Based on the rhino foot print analysis and taking into consideration of;

- a) Possibilities of similar size in similar area-indication the movement of same rhino
- b) Close reading in particular area in the same year

- c) Same readings but it different location
- d) Same readings and close readings (± 1 cm) in the same area
- e) Same reading , close reading in the same area and year

Upon considering all the mentioned possibilities can be estimated there are 12 to 15 rhinos.

It is unfeasible to compare the validity of obtained data within each survey. This is mainly due to the disparity in;

- b) Number of teams members (influences in the dispersion level to cover more/less area in single survey)
- c) Team composition and size,
- d) Hours spent tracking rhino footprints (influenced by the frequency of rain fall)
- e) location of specific areas covered (type of soil and vegetation influences in the viability to recover rhino traces) ,
- f) Different route (soil composition in different area) and tracks

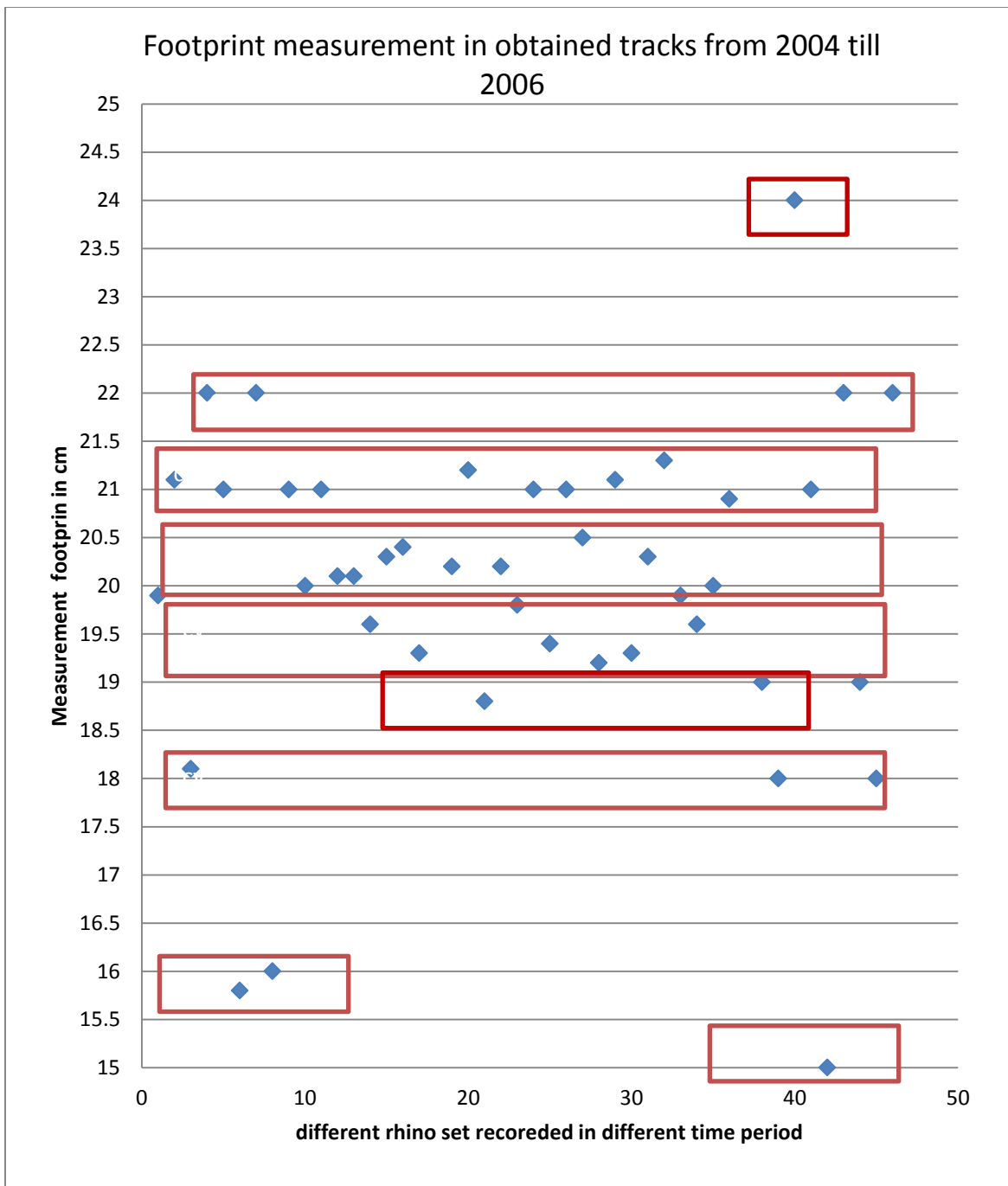


Figure 3.4: The summary of the footprint measurements in scattered plot

In the year 2004, there were lesser amount of man hours (approximately 6865 hours) spend compared to the year 2005 (approximately 8558 hours) and 2006 (approximately 14956 hours) as referred in Figure 3.5.

3.5.2.1 The man hours spend during the 2004, 2005 and 2006

The man hours = The number of staffs X The number of days they spend in jungle X the hours spend per day (6 hours/Day)

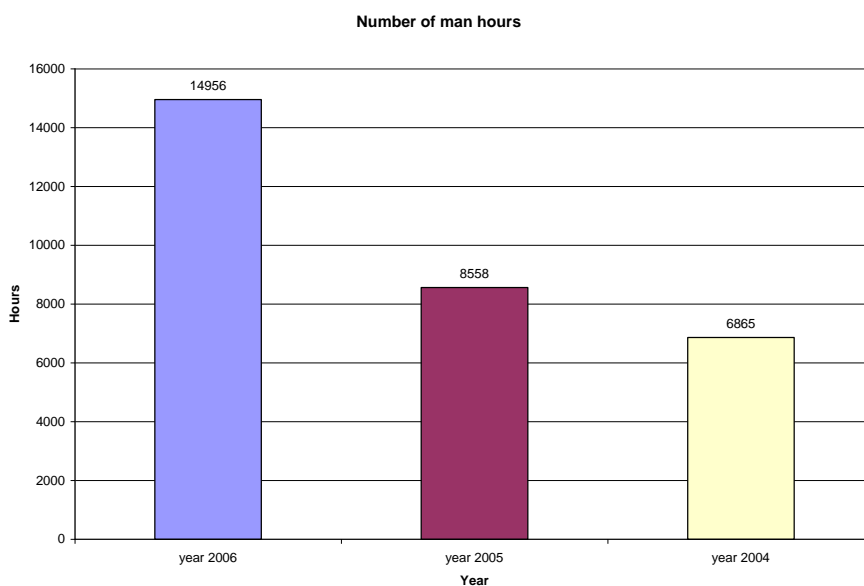


Figure 3.5 ; Man Hours Spend During The 2004, 2005 and 2006

However, maximum number of the footprints were identified in 2004 (29 sets) compared to 5 sets in 2005 and 11 sets in 2006 (Figure 3.6).

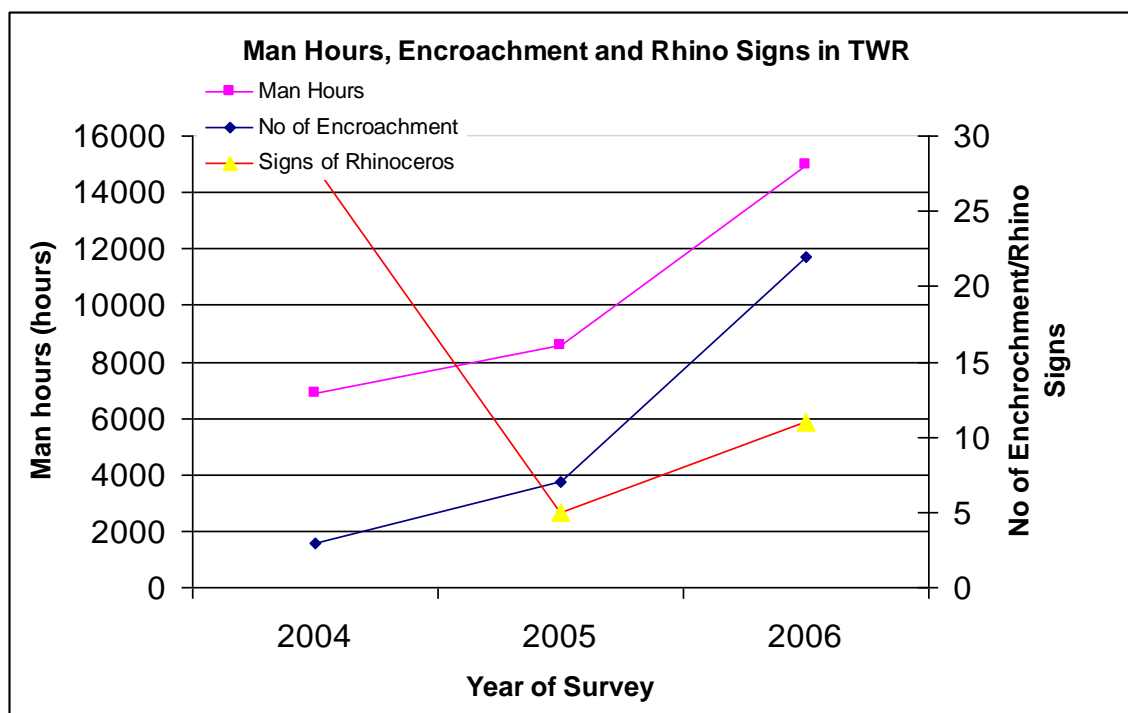


Figure 3.6: The man hours spend, rhino signs and encroachment signs in TWR

After the year 2004, SOSRB major focuses were more towards patrolling orientated to protect from encroachment. That is the main reason for lesser number of rhino signs observed in 2005 and 2006. Due to the conversion of the teams of surveyors to patrolling team, noticeable increase was observed in encroachments signs compared to 2004. From my own experience if we want to find the signs of rhinoceros I would suggest to form a survey team with minimum number of members staying inside the jungle over a long period (minimum 1 month) and conduct the survey continuously rather than repeatedly walking back to base camp. This way the team could utilize maximum time and conserve energy apart from staying focused on the mission. In 2004, 2 RPU members and I stayed in the jungle continuously for 3 months, focused extensively only on the survey. As a result, we manage to track maximum amount of footprint sets compared to daily survey teams. On the other hand, patrolling and protection operation team needs more staffs as their aim is to cover as much area as possible in a shorter time length as they have to monitor the 1200 sq km area of the reserve.

3. In 2005 and 2006 SOSRB decided to focus on the patrolling and protection in Tabin Wildlife Reserve and SOSRB also initiated the rhino surveys in other areas as well (eg Silabukan and Kertam).

From the overall survey of 2004 till 2006, most of the signs were within the Core area (15 signs) which covers the undisturbed area of the forest. On the other hand, the observed signs were more towards the border of the Core Area (closer towards the secondary forest reserve); this might be influenced by the abundance of food availability in the secondary forest. In 2004; eastern part of the reserve area had less number of rhinoceros signs while no traces were found in the north eastern swamp area. From my observation, the reason for less signs of rhino in the eastern part is may be due to the major expansion of oil palm plantation. Most of the eastern side where the survey was conducted, heavy vehicles and machinery sound were heard, this might scare off the rhino to move to different area where it is more peaceful and undisturbed.

Nevertheless, even with consistent survey methodology, significant random variation occurs due to very small numbers of elusive, scattered and solitary animals in large areas like Tabin. As indicated by Strien (1985), without extended survey periods, surveys of rhinos tend to yield only a rough estimate of the minimum number of rhinos present, and may significantly under-estimate the actual number of rhinos.

From the survey results of close monitoring and data analysis can be concluded that there are nine confirmed different size of the foot print readings obtained (Figure 3.4)

3.5.2.2 Implication/Restriction of Estimating Rhino Population in TWR

All methods used to estimate the numbers of Sumatran rhinos in a particular area suffer from the inherent limitations surveying very small numbers of vague, spread and solitary animals in large areas of forest on rough terrain. Evidence of the presence of rhinos has to be based on signs of the rhino, since they are hardly ever seen. Therefore the appropriate detection and interpretation of rhino signs is the first obstacle in conducting meaningful surveys.

As rhinos do not live in groups and are all similar in appearance and size when mature, distinguishing between individuals on the basis of footprints and any other signs is yet another challenge. Even so, the use of footprint measurements has always been the basis of surveying Sumatran rhinos and estimating their numbers in the rain forests. Strien (1985) used plaster casts, but that technique consumes enormous effort and time. As only fresh, clear footprints can be used, and there are difficulties associated with transporting, using and drying plaster of Paris in humid rain forests.

A further significant problem associated with the estimation of rhino numbers is that the number of rhinos signs encountered cannot be related to coverage of a specific size of forest area. When using line transects for wild mammal surveys, data (e.g. sightings of monkeys, elephant dung piles or orang-utan nests) can be linked to the size of the area. This approach is (arguably) not possible with rhinos because finding fresh footprints are rare and searching for any other signs (faeces, urine and mud marks) are inevitably difficult with high frequency of rainfall. Therefore, records of footprints or signs can't be directly linked to actual area surveyed.

However, rhino survey reports which provide estimated numbers of rhinos within the "area surveyed" remain highly subjective with assumptions that all rhinos can be detected within an arbitrary distance of the routes walked during the surveys, and not on any probability detection function.

Although we have continued to develop methods that could provide more information on status of rhino in the forest, footprint measurements remain as the basic method of surveying and estimating the numbers Sumatran rhinos. Continuous survey in the same area repeatedly or sighting the rhino would be the best proposed method for individual identification.

No consistent logistics or methodologies were adopted in the conducted surveys for the long run; therefore, the upcoming surveys continued to be contradictory, and irreproducible. Different areas were surveyed in different time length. Various surveys were separated by long periods of time and used different measures for evidence of rhino. Some areas were never covered. Therefore, to gain proper reliable data on the numbers of rhinos in Tabin some standards need to be established. Therefore;

- g) Reliable survey and data collections should be gathered
- h) Consistent expertise RPU need to be developed to conduct the survey.
- i) Personnel need to be trained on up to date identification technologies as well as proper tracking procedures.
- j) The transect survey method instituted to provide a regular framework for training rangers and developing techniques. It should also provide information on the occurrence of rhinos in unexplored areas as well as areas known to have rhinos.
- k) There should be a stimulant meeting among the RPU's in regular interval (ie; monthly meeting) to exchange experience and to up to date each other with the latest significant findings and techniques.

4. FUTURE WORKPLANS**A) 2009**

	Jan - March	April - June	July - Sept	Oct – Dec
<i>In situ</i>	i. Extensive survey for Tabin. Invite other agencies to participate	i. Preparation and completion of survey report for SWD	i. Protection around Tabin	i. Protection around Tabin
<i>Ex situ</i>	i. Awareness continues with exhibition, video, and sales of t-shirts ii. Request from SWD to build a small office at Sepilok for SOS Rhino	i. Construction of building for SOS Rhino	i. Establish a library for rhino ii. Establish an exhibition booth iii. Sales of souvenirs	-do-
Research	i. Short-term research by SOS Rhino volunteers/UMS students	-do-	-do-	-do-
COP	i. Continue to engage with stakeholders ii. Seek new partners in conservation	-do-	-do-	-do-
Others		i. Rhino challenge 2009 ii. Rhino Conference		

B) 2010

	Jan - March	April - June	July - Sept	Oct – Dec
<i>In situ</i>	i. Protection of Tabin reserve with deployment of 9 RPUs	i. Review of the program	i. Review of program and preparation of report	i. Submit report to partners SWD, SFD, UMS, WWF-Sabah and all partners in conservation
<i>Ex situ</i>	i. Continue to promote awareness captive rhino (Tam)	i. Review the program	i. Review of program and preparation of report	i. Submit report to SWD, SFD, UMS, WWF-Sabah and all partners in conservation
Research	i. Continue to encourage short-term research	i. Review the program	i. Review of program and preparation of report	i. Submit report as per above
COP	i. Continue to engage with stakeholders	i. Review the program	i. Review of program and preparation of report	i. Submit report as per above
Others	i. Promote volunteer program among the schools	i. Rhino conference	i. Review the volunteer program and preparation of report	i. Submit report as per above

5.0. RECOMMENDATIONS FOR IN-SITU CONSERVATION OF THE BORNEAN RHINO - *Dicerorhinus sumatrensis harrissoni* in Tabin Wildlife Reserve

1. Preserve the current rhino populations and their habitat and create conditions for increase in population.

The numbers and breeding success of rhinos in TWR remains unclear; however, it is clear that a safe environment for rhinos must be created. Regarding conservation measures for the TWR rhinos, better information must be acquired and assessed within the next year as decisions are made about creating semi captive breeding program.

2. Better law enforcement especially for hunting, encroachment.

High frequency and nature (use of guns) of unauthorized human entry into TWR poses a major threat to the continued existence and future presence of this species in Tabin. The population can be presently effected significantly by a single incident of poaching. Tabin has been under the Forests Enactment 1968, Wildlife Conservation Enactment 1997 and Firearms (Increased Penalties) Act 1971, but these laws have not adequately reduced the threat. This indicates that more effective approaches are needed. My recommendation that laws are strengthened and attitudes of the judicial community and public be changed. A strongly supported campaign of commitment and a statement must be delivered from the ministry to create a sense of extreme risk if encroachment into Tabin occurs. This deterrence must be pursued or protection of Tabin will remain a costly endeavor

- 3. More education/extension especially for importance of wildlife reserves and myth of medicinal value of rhino horn.**
- 4. Intensify cooperation with surrounding land owners and population.**
- 5. Intensify monitoring rhino, especially for sign of reproduction and focusing on the mud volcanos/saltlicks.**

In spite of intensive protection measures and suitable habitat, the TWR rhino population has not increased over past years, but may have declined in numbers. These trends

posses a great concern among conservationist. What might be the reason for TWR rhino population to be stagnated or decline? One contributory factor might be due to stress from human encroachment and undetected poaching incidences. However, factors at this point that put this particular population at risk are:

- (a) The number of potentially breeding individuals is extremely small
- (b) They are so scattered that even fertile individuals may not get to meet.

Analysing the outcome of the conservation and protection plan to save the rhino in its natural habitat over the past 25 years, there has not been any positive turnover. To my way of thinking, I would like to suggest that confining the rhino in a smaller management area could be a better solution to increase its population. By this method, it enables them to meet frequently and breed naturally. I would suggest a 5 year observation period to be implemented. If even this method was not fruitful, final and last option that I would suggest would be the captive breeding programme.

6.0 SOS RHINO TRANSITION

SOS Rhino announced to SOS Rhino Borneo staff and local partners that it has achieved its goals and will transition its rhinoceros conservation efforts to the Government of Sabah, effective June 30, 2008. SOS Rhino is working with local partners to insure a smooth transition.

6.1 SOS Rhino Position Statement:

We are very pleased with all the attention that is finally coming to bear on the Borneo rhino and rhino conservation. We believe the additional 3 years and \$600,000 we've spent beyond our original 5-year, US\$1 Million dollar commitment were critical to the success of our efforts and as a result, local and international NGOs and corporations are now actively involved and the Government has called on rhino conservation experts to develop an Action Plan for this rhino. We are pleased that the Sabah government will be continuing our work with such renewed enthusiasm.

7.0 STRATEGIES TO MEET THE CHALLENGES AHEAD

The **strategies** for the rhino program are:

1. To enhance the management, coordination and training structure
 - i. To send the management to attend seminars, workshop, conferences and training
 - ii. Recruitment of qualified personals
 - iii. Send field staffs for training
 - iv. Invite experts to train field staffs in the field
 - v. Provide on-the-job training

2. To counter poacher activity in order to reduce to the point of elimination
 - i. To understand land use around the reserve
 - ii. Identify stakeholders
 - iii. Engage with stakeholders – oil palm plantations, villagers, trawlers etc
 - iv. Provide information on posters to all the stakeholders
 - v. To appoint SOS Rhino field staffs as Honorary Game Wardens
 - vi. To make arrest and persecute offenders
 - vii. To establish and manning guard houses in strategy locations
 - viii. To work closely with the Police and RELA

3. To produce more accurate and reliable information on rhino distribution and population density linked to a geographic data base
 - i. To seek other census technique/system
 - ii. To keep and store all relevant information and data
 - iii. To upgrade photo trap camera
 - iv. To develop DNA fingerprinting using rhino dung and hairs
 - v. To undertake train dogs to track rhinos

4. To capture rhinos from doomed areas and relocate to Tabin reserve
 - i. To support the experience capture team from the SWD
 - ii. To collect relevant samples for future scientific tests
 - iii. To assist in post-release study

5. To protect the habitat in order to stabilize the rhino population in areas of operation
 - i. Establishment of more RPUs
 - ii. Establishment of more guard houses around the reserve
 - iii. Improve communications between the RPUs and SWD including Forestry Department

6. To engage with stakeholders- oil palm plantations and villages
 - i. To make introductory visits to stakeholders
 - ii. To make frequent visits and engagement with stakeholders
 - iii. To assist stakeholders where appropriate
 - iv. To request for assistance from stakeholders to prevent encroachment and poaching into reserve
 - v. To solicit support in terms of finance and materials
 - vi. To recruit villagers into the RPUs

7. To identify and undertake more research on Sumatran rhino and related disciplines
 - i. To work closely with the higher institutions
 - ii. To identify research subject of importance
 - iii. To provide field supervisions
8. To undertake fund raising by writing appeal letters to major corporations, companies and individuals.
 - i. To prepare appeal letters
 - ii. To prepare brochures
 - iii. To meet with potential donors
 - iv. To promote volunteerism
9. To prepare and send workshop resolution to all the relevant agencies
 - i. To send resolution to the participants of the workshop
 - ii. To send resolution to the Police and Military
 - iii. To send resolution to the government of Sarawak, Sabah and Kalimantan, Indonesia
10. To organize more workshop, seminar and conference on Sumatran rhino
 - i. To invite more participants from overseas
 - ii. To invite more Corporate figures to attend
 - iii. To organize post-seminar visits to Tabin reserve and other rhino habitat

8.0 IMPLEMENTATION AND EXPECTED RESULTS

Objective (1)

To enhance the capability of the Sabah Wildlife Department

Implementation

1. Letter of collaboration between SOS Rhino Borneo and Sabah Wildlife Department
2. Appointment of Wildlife Officer as Collaboration Officer
3. Establishment of secretariat for rhino conservation project in Tabin wildlife department office.
4. Appointment of Operation Manager for SOS Rhino Borneo
5. Appointment of Field Scientist for SOS Rhino Borneo
6. Recruitment of More Field staffs for SOS Rhino Borneo in the RPUs
7. Procurement of operational equipment and development of operational facilities (guard posts)
8. Training of SOS Rhino Borneo RPUs in field surveys, wildlife inventory, community outreach program and also appointment as Honorary Game Wardens
9. Deployment of RPUs – field surveys, monitoring, surveillance through patrol, detection and destruction of traps, and intelligence operations.
10. Establishment of Permanent rhino capture and relocation team
11. Organize rhino workshop and seminar every year
12. Special and monthly reports submissions to SOS Rhino Borneo and SWD offices
13. Quarterly brain storming session for RPUs

Expected results

1. The SWD rhino conservation plan is formulated and implemented effective by the SWD with the cooperation of SOS Rhino
2. Official sanction and recognition for SOS Rhino at the highest level
3. Understanding and cooperation between SWD and SOS Rhino Borneo in implementing the concept of a smart partnership
4. Additional manpower for SWD in enforcement of Wildlife Conservation Enactment 1997
5. Improve security for wildlife and its habitat leading to recovery of population and habitat
6. Involved local, national and international efforts through forum, seminars and conferences on rhino

Objective (2)

Involvement of local and international communities

Implementation

1. Recruitment of local communities in the RPUs
2. Establish and promote eco-tourism that will be managed by the local community
3. Encourage village hunting license
4. Promote volunteer program overseas via website

Expected results

1. Provide direct and indirect employment opportunities

2. Develop appreciation of and pride in the rhino, its ecosystem and their conservation
3. Commitment of local community will be demonstrated by their provision of information about poachers activity
4. Standard of living will be enhanced by improved protection and management of the environment and forest resources
5. SOS Rhino volunteers will understand the efforts and will promote among friends
6. To make Tabin reserve known because of the Sumatran rhino

Objective (3)

To develop a comprehensive and sustainable funding

Implementation

1. SOS Rhino Borneo will continue to provide services in terms of financial and technical support to SWD in its rhino conservation program in Sabah
2. More funds are required in recruiting, training and equipping more RPUs to effectively protect Tabin reserve, undertake relocation exercise and surveys.
3. SOS Rhino (Borneo) a local NGO will be embarking on fund raising through large corporations, oil palm plantations, companies and individuals through its tax relief incentives and appeals
4. SOS Rhino Borneo need to encourage more volunteers
5. SOS Rhino Borneo is involved in fund raising through sales of souvenirs

Expected results

1. At least 9 SOS Rhino RPUs will be established within the next 2 years
2. SOS Rhino will have at least 9 guard posts around Tabin reserve
3. SOS Rhino will have four 4WD vehicles
4. SOS Rhino will have 4 satellite phones
5. SOS Rhino will have 3 boats and 3 boat engines
6. SOS Rhino field staffs will be provided with uniform
7. SOS Rhino field staffs will be properly equipped with GPS, compasses, maps, camping gears

Objective (4)

To increase collaboration among experts

Implementation

1. Recommend for rhino experts to visit Sabah
2. Recommend Operation manager and SWD Rhino Officer to visit USA rhino breeding center and Way Kambas, Indonesia
3. Organize rhino workshop, seminar and conference
4. Organize post-seminar visits to Tabin reserve and other rhino habitat

Expected results

1. Improvement of ties between the countries concerned
2. Sharing of knowledge and know-how
3. Become more familiar with situations and conditions on the ground

Objective (5)

To undertake captive breeding and management

Implementation

1. Recommend that rhino breeding experts are incorporated into the program
2. To make available ultrasounds and all necessary equipment for checking the reproductive integrity of the rhinos
3. To undertake all necessary examination and tests
4. To prepare rhino exhibit and brochures at Lokawi wildlife park and Tabin Captive rhino place.
5. Expected results
6. Make comprehensive reports on reproductive integrity of the two rhinos to be presented to the Director of Sabah Wildlife Department
7. Breeding of the rhinos
8. Public awareness and education
9. Fund raising

Objective (6)

To promote and support research on rhino and related disciplines.

Implementation

1. To make available a student grant for rhino research and related discipline
2. To collaborate with the Institute of Tropical Biology and Conservation, Universiti Malaysia Sabah, Forestry Department Sabah and Sabah Wildlife Department.
3. To recommend research field of study
4. To appoint SOS Rhino Field Scientist as Research Associate in ITBC, UMS
5. To provide field supervision for postgraduate student sponsored by SOS Rhino
6. To write scientific papers

Expected results

1. Selection and enrolment of student with UMS for postgraduate study
2. Appointment of SOS Rhino Field Scientist as Research Associate with ITBC, UMS
3. Presentation of research finding in seminars by student
4. Publication of scientific papers in journals
5. Application of research into the Sumatran rhino management plan by SWD

Objective (7)

To increase rhino funding locally and internationally

Implementation

2. To get a tax relief status for SOS Rhino (Borneo)
3. To find a souvenir shop as partner in conservation and help with production of souvenirs for sale
4. To find partners in conservation who will help with selling souvenirs
5. To meet and/or send information brochures and appeals to big corporations, companies and individuals for donation
6. To organize seminars and fund raising activities

Expected results

1. Donors will enjoy tax exemption
2. Donors will get their names into the donor list in the website

3. Donors will be tagged as partners in conservation
4. Consistent production and sales of souvenir

Appendix

1. Location of rhinoceros tracks

The freshness of the footprints found was determined initially before the tracks were being trailed. The locations of each track are shown below

From 2006 survey

Track No	Date	GPS Location	
		50N/ Longitude	UTM/Latitude
1.	13 Apr 2006	0695052	0574970
2.	21 st May 2006	0692729	0579834
3.	9 May 2006	0695426	0577227
4.	20 June 2006	0679466	0585380
5.	20 June 2006	0679466	0585380
6.	20 June 2006	0679466	0585380
7.	20 July 2006	0668250	0570026
8.	20 July 2006	0668250	0570026
9.	15 Aug 2006	0667032	0576087
10.	16 Sept 2006	0693321	0584964
11.	19 Oct 2006	060565	0570563

From 2005 survey

Track No	Date	GPS Location	
		50N/ Longitude	UTM/Latitude
1	13/11/2005	0692159	0583324
2	13/11/2005	0692586	0576217
3	21/9/2005	0693086	0584897
4	11/09/2005	0675361	0575841
5	21/03/2005	0692966	0583080

From 2004 Survey

Track No	Date	GPS Location	
		50N/ Longitude	UTM/Latitude
1.	17/12/2004	0671034	0571034
2.	20/12/2004	0690888	0576792
3.	09/11/2004	0692978	0584895
4.	10/11/2004	0671012	0571354
5.	20/11/2004	0671496	0571145
6.	14/10/2004	0699715	0576187
7.	18/10/2004	0689635	0576422

8.	20/10/2004	0690018	0577227
9.	11/09/2004		
10.	16/08/2004	0693057	0585022
11.	21/08/2004	0695402	0576642
12.	22/08/2004	0697878	0576079
13.	23/08/2004	0694699	0576863
14.	07/09/2004	0697024	0579047
15.	26/07/2004	0694253	0588551
16.	19/07/2004	0693767	0590408
17.	21/07/2004	0692478	0590603
18.	26/07/2004	0694253	0588551
19.	27/07/2004	0694258	0588551
20.	20/06/2004	0686288	0580603
21.	21/06/2004	0688580	0580213
22.	19/06/2004	0686975	0580330
23.	20/05/2004	0685643	0574884
24.	20/05/2004	0685643	0574884
25.	18/05/2004	N 5° 07' 067''	E 117° 57' 327''
26.		N5° 07' 070''	E 117° 57' 292
27.	18/03/2004	0693704	0577976
28.	20/02/2004	0691459	0583977

The Track number and the average foot print size
From 2006 survey

Track No	Average hind foot middle toe (cm)
1)	19.9
2)	21.1
3)	18.1
4)	22
5)	21
6)	15.8
7)	22
8)	16
9)	21
10)	20
11)	21

From 2005 survey

Track no	Average hind foot middle toe (cm)
1)	20.1
2)	20.1
3)	19.6
4)	20.3
5)	20.4

From 2004 survey

Track no	Average hind foot middle toe (cm)
1.	19.33
2.	20.2
3.	21.2
4.	18.8
5.	20.2
6.	19.8
7.	21
8.	19.4
9.	21.02
10.	20.5
11.	19.2
12.	21.1
13.	19.3
14.	20.3
15.	21.3
16.	19.9
17.	19.6
18.	20
19.	20.9
20.	19
21.	18
22.	24
23.	21
24.	15
25.	22
26.	19
27.	18
28.	22

ATTACHMENT 1**1. POLICY HANDBOOK****SOS Rhino Borneo, Bhd.**

SOS Rhino Borneo is an affiliate of SOS Rhino, a US-based non-profit, international foundation dedicated to preserving the five rhinoceros species in their natural habitats. Our field programs apply methods that directly build on the capacity of countries to conserve by raising local awareness and assisting protection of habitat and animals. This foundation creates conservation programs that combine research, education, marketing and advocacy, all working collectively to achieve sustainable results.

Introduction

An interesting and challenging experience awaits you as an employee of SOS Rhino Borneo. To answer some of the questions you may have concerning SOS Rhino Borneo and its policies, we have written this handbook. Please read it thoroughly and keep it for future reference. If you have questions that are not addressed in this handbook, contact the Program Officer or Administrative Office in Kota Kinabalu. The policies and benefits set out in this manual may be supplemented, modified or otherwise changed at the discretion of the Board of Directors. We hope that your employment with us will be long term. Please understand that no supervisor, manager, or representative of SOS Rhino Borneo other than a member of the Board of Directors has the authority to enter into any agreement with you for any specified period or to make promises or commitments contrary to the foregoing. Further, any employment agreement entered into by the Board of Directors shall not be enforceable unless it is in writing.

Organizational Chart

An organizational chart is included in this manual and outlines the chain of command. It is recommended that all employees use their chain of command to report problems or concerns whenever possible.

It is the policy of SOSRB to provide equal employment opportunities for qualified applicants and employees in all aspects of personnel administration without regard to age, race, color, religion, national origin, gender, or sexual orientation.

SOSRB, in accordance with applicable laws and regulations, prohibits discrimination in hiring, promotion, discharge, pay, job training, fringe benefits, classification, referral and other aspects of employment, on the basis of age, race, color, religion, national origin, gender, sexual orientation. SOSRB also prohibits retaliation against an employee who in good faith reports actions he or she believes to be discriminatory.

Any employee who believes that he or she has not been treated in accordance with this policy should immediately supply a written report of the incident to their supervisor or manager. SOSRB upper management will initiate a prompt and thorough

investigation and, in concert with the Board of Directors, will take appropriate remedial measure promptly in order to prevent recurrence of the incident.

Pay Plan

A comprehensive wage scale has been established for each job description. All SOSRB employees are paid in accordance with the rate pay set forth for the job classification in which they are employed. New employees are generally hired at the entry-level of the pay grade established for the position.

Merit pay increases are granted annually but are not automatic and will be granted based upon standards of performance as indicated by performance evaluations and other relevant data.

Special merit pay may be awarded for outstanding job performance or unusual employment conditions, at the discretion of the Board of Directors.

Contracts, Letters of Offer and Employment Extension Letters

Contracts or Letters of Offer are presented to employees for their signature upon hire. Employment extension letters are presented to employees at the time their probation period ends, which is either three months or six months depending on their original contract or letter of offer. Contracts are renewed annually, and extension letters are presented after the end of the employee's probation period.

Benefits

Food:

Basic food items purchased in bulk are provided for staff and management who are based at Tabin Base Camp (TBC) and/or Dagat Base Camp (DBC).

Allowance:

- Field Management (Field Coordinator(s), Community Outreach Coordinator(s)) who are based in TBC and DBC are awarded monthly allowance for personal use such as foods not supplied at TBC or DBC, personal care items, or for any other personal use.
 - Field Staff (field assistants, team leaders, deputy team leaders) are awarded monthly allowance based on their time patrolling and conducting surveys in the field.
- Allowance
- Drivers are awarded daily allowance under special circumstances which require them to drive outside of Tabin Wildlife Reserve, exceeding six hours.

Staff Travel Expense & Reimbursement:

Management and staff are awarded expense reimbursement when SOSRB business requires their travel outside of their base office or camp.

Reimbursements & Travel Expenses are limited to:

- Fuel expenses when using personal vehicle
- Meals
- Transportation

- Accommodation
- Conference registration

Insurance:

All staffs are covered under the Group Insurance Plan.

Paid Leave:

Paid leave is granted under the following conditions, and requires that a signed, written request is submitted to your supervisor and/or the Administrative Office in Kota Kinabalu, to include name, days away from duty, date of return. Field management staff and Team Leaders are required to make arrangements for their duties to be covered while they are away.

•Monthly Leave: Field staff are granted 4 days paid leave per month. It is recommended that field staff take their paid leave each month, as those days cannot be forwarded to the next month.

•Bereavement: staff will be granted three paid days of leave in the event of the death of an immediate family member.

•Sick Leave: staff will be granted paid leave in the event of an illness, but must produce a medical certificate from a registered medical practitioner to their supervisor within one week of their return to work.

•Annual Leave: Management staff are awarded 14 days annual paid leave after one year of service, and is based on

Grants/Scholarships:

SOS Rhino will present the opportunity for an employee to continue their 2-year graduate studies at the Universiti Malaysia, Sabah. The grants are awarded in the amount of USD 5,000 per year (total for two years: USD10,000), after two years of service, and/or based on extension letter or contract.

SOS Rhino reserves the right to offer the opportunity to those not employed by SOS Rhino Borneo, under the advisement of the Director of the Universiti Malaysia Sabah, Institute of Tropical Biology Conservation.

Employee Performance Evaluations

To ensure that you perform your job to best of your abilities, it is important that you be recognized for good performance and that you receive appropriate suggestions for improvement when necessary. Consistent with this goal, your performance will be evaluated by your supervisor on an on-going basis. During review and/or contract renewal the employee has an opportunity to talk with the supervisor and discuss areas of concern. The intention is to open communication between the supervisor and employee, reinforce positive work habits and performance, and correct poor performance.

All written performance evaluations will be based on your overall performance in relation to your job responsibilities including your conduct, demeanor, and record of attendance.

Newly hired employees will be formally evaluated at the end of three months or six months (depending on their contract and/or employment offer letter), and annually on the anniversary of their hire date. Employees who are promoted or demoted will be evaluated after three months or six months and annually on the anniversary of promotion or demotion.

In addition to the regular performance evaluations described above, your supervisor may conduct special written performance evaluation at any time to advise you of the existence of performance or disciplinary problems.

Grievances

Any employee who has a grievance may file a formal grievance using the following procedures:

Step one: You shall first present the grievance orally to the supervisor within seven days of the first occurrence on which the grievance is based. Discussing the problem with your immediate supervisor is encouraged as the first step. If, however, you do not believe a discussion with your supervisor is appropriate; you may proceed to Step two.

Step two: If your problem is not resolved after discussion with your supervisor, you may present the grievance in writing to the manager of your supervisor. The manager will render the decision, in writing within 10 days. If he or she does not render his/her decision within 10 days, the grievance shall be deemed automatically denied.

Step three: If the grievance is denied under Step two above, the employee must present the written grievance to the Program Manager within 7 days. The Program Manager will render a written decision within 10 days.

Alcohol and Drug-free Workplace

It is the policy of SOSRB to create and maintain an alcohol and drug-free workplace. This policy applies to employees, volunteers, and students of SOSRB. The use or abuse of alcohol, controlled substances, illegal drugs, or inhalants can impair performance, jeopardize safety and expose SOSRB and employees to the risk of injury, property loss or damage.

No degree or type of alcohol consumption or drug use during working hours will be tolerated, and first offense may result in termination. The only exception to this policy will be when the employee is clearly considered not to be in a working role or will not be expected to return to a working role immediately following.

The possession, consumption, manufacture, distribution, exchange, delivery, dispensation, sale, or use of alcohol, controlled substances, illegal drugs, or inhalants

by employees, volunteers, students is prohibited on SOSRB property, in vehicles owned or operated by SOSRB employees, or while on SOSRB business. Employees are also prohibited from reporting to work or working while impaired by these substances.

Violation of this policy will result in disciplinary action, up to and including dismissal for the first offense. Employees must, as a condition of employment, abide by the terms of the above policy.

On the Job Conduct

Employees are expected to exercise self-discipline in the performance of their duties and responsibilities on the job. Conduct that serves to injure harmonious working relationships, degrade or embarrass a volunteer, student, or fellow employee, obstruct SOSRB operations, endanger a volunteer, student or fellow employee, or debase SOSRB in the eye of the public will be regarded as serious misconduct and may result in termination. Proper instructions from supervisors must be respected and insubordination will not be tolerated. When corrective action must be taken, each case will be evaluated with regard to its particular circumstances and corrective measure adapted to the individual situation.

To provide a proper professional work environment use fairness, honesty and lawfulness in all relationships with SOSRB employees, volunteers, students, partners in conservation, and anyone else with whom we do business.

Disciplinary Procedures

Member of management administer disciplinary action. Disciplinary action may take the form of verbal or written counseling, suspension with or without pay, and/or termination. It is within the discretion of management to determine which form of corrective action is appropriate.

Some of the actions for which employees are subject to immediate termination include:

- Violation of SOS Rhino Borneo's policy on use of drugs or alcohol
- Disorderly conduct. Contributing to or being part of any activity, which would discredit SOS Rhino or SOS Rhino Borneo and the good reputation it has in the local, national and international community.
- Threatening, harassing, or intimidating another employee, volunteer, student
- Insubordination or inflammatory words or conduct toward a supervisor, manager, other employee, volunteer, or student.
- Fighting or violence of any kind involving fellow workers, volunteers, students
- Unauthorized carrying or possessing weapons or explosives on the job or on SOSRB property.
- Theft from SOSRB, fellow employee, volunteer, student or willful abuse of property thereof. Failure to account for SOSRB property or funds entrusted to you. Dishonesty of any kind.
- Unauthorized use of SOSRB vehicles and equipment

- Unauthorized alteration of any employee time record.
- Creating or contributing to unsafe or unsanitary conditions.
- Willful abuse of SOSRB vehicles or equipment, including ignoring obvious mechanical defects.
- Unauthorized absence from work while on duty. The supervisors will determine if the employee will be considered to be on SOSRB time during absence, as supervisors may authorize such absence.
- Willfully supplying false or erroneous information upon applying for work with SOSRB or after being employed with SOSRB.
- Abuse of flora or fauna in Tabin Wildlife Reserve in any form.
- Unexcused habitual absenteeism.

This list is not complete, nor is it intended to be. It is only a listing of the types of conduct deserving disciplinary action. Any other type of conduct that an employee in the exercise of good judgment should know is improper will be reason for disciplinary action. These standards of conduct are for guidance only and do not limit SOSRB right to take whatever action seems to be appropriate in any particular situation.

Sexual Harassment Policy

SOS Rhino and SOS Rhino Borneo seeks to maintain an environment free from harassment for employees, volunteers, and students. Employees, volunteers or other individuals providing services to SOS Rhino or SOS Rhino Borneo, as well as students, are prohibited from engaging in unwelcome verbal, visual, or physical conduct that could create a hostile, intimidating, or offensive work environment. Such harassment is not acceptable and will result in appropriate discipline or dismissal. Anyone who feels that they are being harassed should request without delay that the offending behavior be stopped.

Sexual harassment includes:

- making unwelcome sexual advances or requests for sexual favors
- making unwelcome verbal or physical contact of a sexual nature
- making submission to or rejections of sexual conduct the basis for employment decisions affecting the employee
- creating an intimidating, hostile, or offensive work environment by such conduct

Any employee who believes that he or she has been the subject of sexual harassment should immediately report the offense to the Administrative Office or any supervisor or manager. Supervisors, managers, and officers are responsible for conducting a prompt and thorough investigation into allegations or complaints of harassment. SOSRB will take appropriate action to protect employees and visitors from being subjected to harassment of any kind.

Non-Fraternization Policy

To promote professionalism and the efficient and fair operation of SOS Rhino and SOS Rhino Borneo, and to avoid misunderstandings, complaints of favoritism,

problems with supervision, security or morale, questions regarding possible claims of sexual harassment, managers and supervisors are prohibited from inappropriate fraternizing with employees, volunteers, or students including but not limited to dating, pursuing to date, and pursuing or having romantic or sexual relationships with employees, volunteers or students of SOS Rhino and SOS Rhino Borneo.

ATTACHMENT 2

SPECIAL SURVEY REPORTS

Apart from scheduled surveys SOSRhino Borneo also organized several special surveys according to the time of need.

2.1 SPECIAL REPORT IN TABIN

The surveys were organized by using the rhino records previously identified. The main aim of the surveys was concentrating the survey efforts in the same area for a longer period of time to find out the home range of individual rhinoceros. The surveys were carried by following ridges, river, animal tracks and flat areas.

2.1.1 DIRECT SIGHTING

During the survey, the RPU sighted a male adult rhino on 17th August 2007. The rangers followed the rhino for about the 15 minutes. Before the rhino ran away from the rangers, he had stopped for about one minute and stared at the rangers. Both rangers were quite apart from each other. One ranger brought a digital camera and the other one brought a disposable camera. The ranger that bringing the disposable camera was nearer to the rhino. Due to the distance, he could not take the digital camera. He managed to capture a photo using the disposable camera. Result from the vegetation of the area itself that is really dense, the photo taken was not clear.

Details of Rhino sighting

Date	:	17 th August 2007
Time	:	1150
GPS Location		
Elev	:	412m
50N	:	0671449
UTM	:	0570413
Sex	:	Male
Age	:	Adult

The rhino sighted was an adult, healthy male rhino. The weight of the rhino was estimated to be around 600 to 650kg and 4'6" to 5' of height.

Defected Footprints Rhinoceros in the Tabin Wildlife reserve

During the survey, the rangers found a rhino with one foot affected with their toes. They found on the 15th, 16th, 19th and 20th August 2007. All the signs found in different days and different areas when the rangers tried to follow the track of the rhinos. The tracks also found around the wallows.

All four foot exist but the left front/hind foot does not have any toe. This foot might be caused by an injury. The signs found by the ranger shown the possibility of the foot has already recovered if it is cause of injury.

This is the adult female rhino with the calf that found by the rangers. This was estimated from the size of the footprints found and the tracks in the area as there were two tracks with two different set of measurement.

In the previous rhino survey in the southern of Tabin Wildlife Reserve also indicated the presence of an adult rhino with its calf, but the adult female rhino does not have the same foot criteria that found recently. The adult female that was found before was normal. Result from that, more research and survey is needed to identify the individuals rhino present in the area.

2.1.3 ADULT AND CALF FOOTPRINT MEASUREMENTS

TABLE 2.1: Measurement of the adult female (Feet defected rhino)

	Left foot (cm)		Right foot (cm)	
1.	7.8	23.5	8.1	23.1
2.	7.4	23.8	7.8	22.9
3.	7.6	23.8	7.6	23.5

TABLE 2.2: Measurement of the calf

	Left foot (cm)	Right foot (cm)
--	----------------	-----------------

1.	6.0	16.7	6.5	17.0
2.	6.0	16.7	6.5	16.0
3.	6.6	17.4	6.3	16.5
4.	6.4	16.8	6.3	16.7
5.	6.8	18.6	6.3	17.8

The rhino footprints were found mostly around the wallows. The identified footprints and the situation of the rhino are confirming there are three different rhinoceros in the area. The footprint of the calf in the area is indicating success breeding of rhino in the wild.

2.1.4: WALLOWS

Several wallows found in the area. Some of the wallows are still use by the rhino.

TABLE 2.3: Below are the GPS locations of the wallow found in the area.

	GPS location		
	Elev	50N	UTM
Wallow 1	364m	0671184	0571231
Wallow 2	246m	0671858	0571108
Wallow 3	412m	0671449	0570413
Wallow 4	386m	0672375	0570640
Wallow 5	172m	0671667	0570157
Wallow 6	363m	0671164	0569827

2.1.5: OTHER RHINO SIGNS FOUND DURING THE SURVEY

Other signs found in the area are as follows:

- A) Feeding signs
- B) Twist sapling
- C) Rubbing signs
- D) Urine
- E) Dung

Dung sample has been sent to UMS genetics lab for further analysis

RECOMMENDATION

Intensive survey need to done for individual identification, health status and cause of the injury. Currently SOS Rhino rangers are tracking the same rhino trial continuously for further clarification.

PHOTOGRAPH 2.1 : The photograph of the abnormal footprint



The photo indicates the impression on of the foot prints on the soils does not reveal any toe nails. The particular affected footprint impression on the soils making more depression (depth) into the soils compare to other footprints. It's clearly indicating the rhino is walking with the difficulty. The urgent measures at the moment are

- 1) The cause of the injury to protect the rhinoceros in the future
- 2) The health condition of the rhinoceros

Attachment 3

**TABIN WILDLIFE RESERVE SUMATRAN RHINOCEROS
GENERAL SURVEY-2007**

**Organized by
SABAH WILDLIFE DEPARTMENT AND SOSRHINO
JOINTLY WITH
WWF-MALAYSIA AND UMS**

**REPORT BY
THAYAPARAN.S, JOHN PAYNE, ABDUL HAMID AHMAD,
NAN SCHAFFER AND AUGUESTINE TUNGA**



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GLOSSARY

Cm	centimeters
ha	hectares
km	kilometers
PERHILITAN	Department of Wildlife and National Parks, Peninsular Malaysia
SF	Sabah Foundation (= Yayasan Sabah)
SFD	Sabah Forestry Department
SOSR	Save Our Sumatran Rhinoceros (SOS Rhino)
SOSRB	Save Our Sumatran Rhinoceros Borneo (SOS Rhino Borneo)
SWD	Sabah Wildlife Department
TWR	Tabin Wildlife Reserve
UMS	Universiti Malaysia Sabah
WWF	World Wildlife Fund

1. INTRODUCTION

1.1 Background to this survey

The presence of Sumatran rhinoceros (*Dicerorhinus sumatrensis*) in and around the Tabin River catchments, eastern Sabah, has been known formally within Sabah government and conservation circles since 1980. The 120,000 ha Tabin Wildlife Reserve (TWR) was established in 1984.

Since 2000, the Save Our Sumatran Rhinoceros organization (SOSR) has spent a considerable amount on sponsoring activities for the conservation of the Sumatran rhinoceros in Sabah, with emphasis on TWR. Among others, conservation activities were done to promote stronger protection of TWR including education, research and surveys and increasing public awareness. Although awareness of the endangered status of the Sumatran rhino amongst the Sabah public has improved significantly over last few years, some parties express doubts about the viability of the Tabin rhino population. Evidence of a viable population is a critical component of SOSR's assessment of the success of this investment and for setting future goals.

Results of surveys in TWR over a twenty-five year period since the early 1980s do not provide any indication that the Tabin rhinoceros population has increased in size or extent over the years. The various surveys are not truly comparable, however, because of variation in survey parameters and effort including the number of people and teams; team composition and size; periods of time spent seeking rhinos; and extent and location of specific areas covered. However even with consistent survey methodology, significant random variation occurs due to very small numbers of elusive, scattered and solitary animals in large areas, the size of Tabin.

To gain a more comprehensive assessment of Tabin's rhino population, we have conducted two different methods in a period of three years starting from 2005 and ending 2007, covering similar areas within TWR. One involving transects helped to identify the location of possible rhino areas and numbers and additionally to produce experienced rangers that could conduct reliable surveys. This method overstates numbers due to problems with overlapping. The other survey method "simultaneous teams" determined numbers of rhinos simultaneously in the areas designated which reduced the chance of overlap and thus over estimation, but incurs problems with underestimation of numbers since chances of finding signs with such brief inspections is reduced

The "simultaneous teams" survey of this report was conducted in TWR covering as much of the area as possible using experienced rhino trackers. The survey involved many government agencies and organizations particularly the Sabah Wildlife Department (SWD), The Worldwide Fund for Nature Malaysia (WWF), Universiti Malaysia Sabah (UMS) and other invited national and international agencies. This survey's goal was to determine a minimum number of rhinos in Tabin.

The surveys constitute a major investment and focus on the estimation of rhino numbers in Tabin. This effort provides the most thorough assessment to date on this population, which can be used to determine appropriate recommendations for the conservation of this rhino in Tabin.

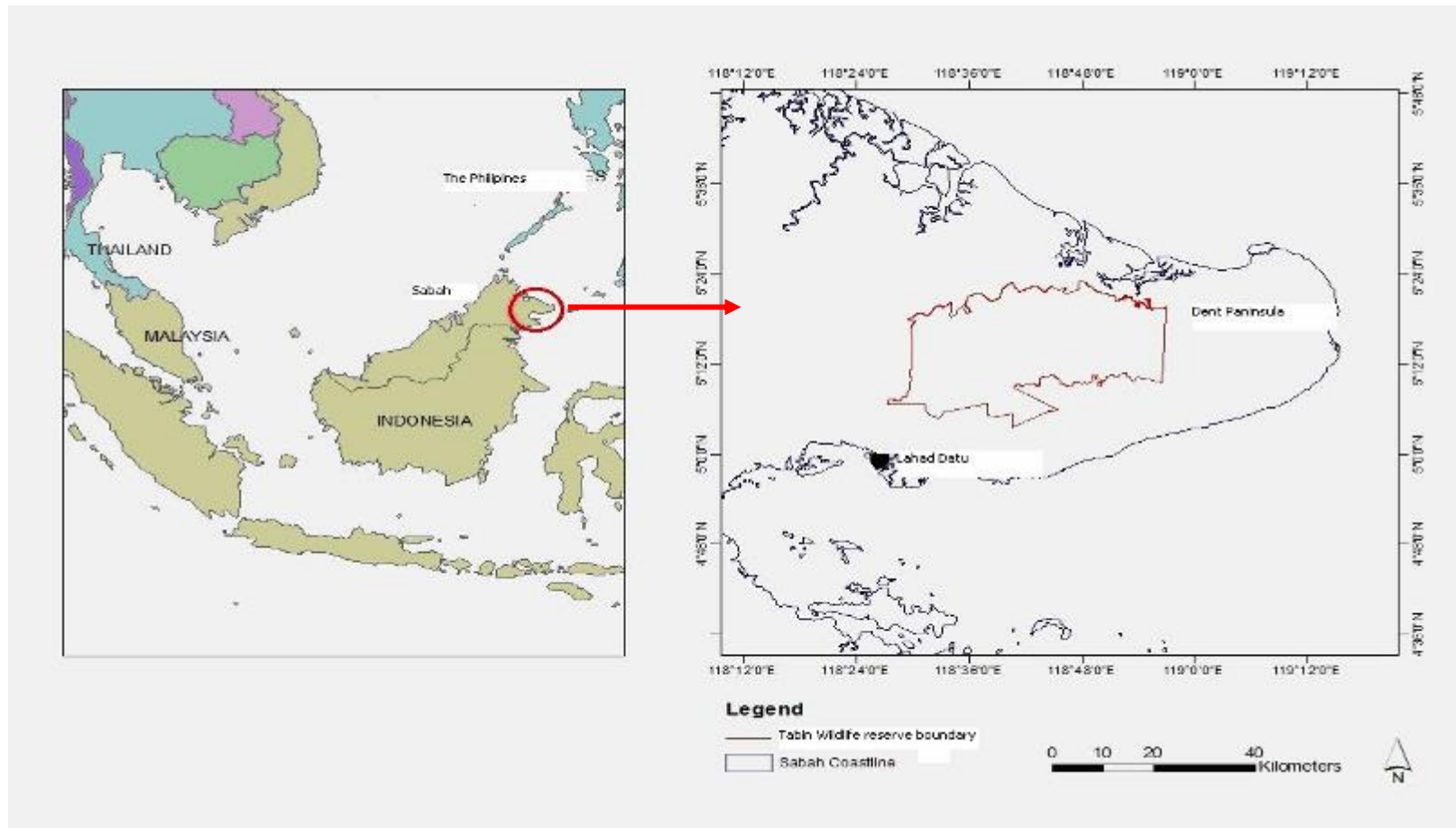


Figure 1: Location of Tabin Wildlife Reserve

1.2 Tabin Wildlife Reserve

Tabin Wildlife Reserve (TWR) is located in the centre of the Dent Peninsula, eastern Sabah, to the south of the lower reaches of the Segama River (Figure 1), about 50 km to the north-east of Lahad Datu town. Tabin, previously parts of Silabukan and Lumerau Commercial Forest Reserves, was gazetted as a Wildlife Reserve in March 1984 (Maryati *et al.*, 1999), for the main purpose of securing habitat for a Sumatran rhino population. Currently, the size of TWR is 111,971 ha, but this forest is contiguous with and encloses Mount Hatton Protection Forest Reserve (8,550 ha; formerly known as the “core area” of Tabin), as well as Dagat Virgin Jungle Reserve (VJR; 169 ha), Tabin VJRs (394 ha) and two of the 8 Silabukan VJRs (about 200 ha). Thus, the total area of forest in the Tabin block is about 121,284 ha. Details can be found at www.forest.sabah.gov.my/caims. In this report, the term TWR is used to refer to the entire Tabin forest block of 121,284 ha.

TWR is legislated under the Forests (Amendment) Enactment, 1984, and Sabah Forestry Department (SFD) has ultimate legal authority over TWR. Tabin Wildlife Management Committee, chaired by the Director of SFD, was established to obtain advice from the main relevant stakeholders. Sabah Wildlife Department (SWD) is authorised to manage wildlife in TWR.

Most of the forest in TWR comprises logged Dipterocarp forest, with some unlogged forest, secondary forest, riverine forest, freshwater swamp forest and nipah swamp forest (Malim & Maryati, 1999). Apart from Tabin, main rivers within TWR include Tagas-tagas Besar, Lipad, Urit, Maruap, Lumerau and Lumpungan. There are seven known “mud volcanoes” in Tabin forest block (Dalimin & Ahmad, 1999; mud volcanoes consist of outpourings of kaolin-rich, grey-coloured mud. As the water in the mud is highly saline, many wild animals frequent these sites).

The mean daily temperature recorded in TWR is in the range 28°C- 32°C (Payne, 1987). In general, there is a rainfall gradient from northeast to southwest, whereby the north receives around 2,500 mm, the central part 2,000 mm, and the southern portions 1,500 mm rainfall per year (Sale, 1994). The wettest time of the year is usually from late November to early January and relatively dry from August to November.

1.3 Problems of estimating Sumatran rhinoceros numbers

All methods used to estimate the numbers of Sumatran rhinos in a particular area suffer from the inherent limitations imposed by surveying very small numbers of elusive, scattered and solitary animals in large areas of forest on rough terrain. Evidence of the presence of rhinos has to be based on signs of the rhino, since they are hardly ever seen. Therefore the appropriate detection and processing of rhino signs are the first hurdles in conducting meaningful surveys. The fact that there are so few of these signs compounds the perfecting of processing procedures. Rhinos make vocalizations rarely and the sound does not carry more than a few tens of meters. Faeces are often dropped in streams, rather than on dry land, so even the possibility of distinguishing individuals by faecal DNA is problematic due to the tests needed for fresh dry samples. As rhinos do not live in groups and are all similar in appearance

and size when mature, distinguishing between individuals on the basis of footprints and any other signs also has limitations. Nevertheless, use of footprint measurements has always been the mainstay of surveying Sumatran rhinos and estimating their numbers in the rain forests of Malaysia and Indonesia. Strien (1985) used plaster casts, but that technique takes up enormous amounts of effort and time, as only fresh, clear footprints can be used, and there are practical difficulties associated with transporting, using and drying plaster of Paris in humid rain forests.

Further, the assigning of various rhino signs to numbers of rhinos has been historically subjective. Boonratna, (1997) attempted to address this problem by qualifying sign detection and dividing it into the following categories. This helped maximize the value of any data collected.

- d) Known – Based on minimum number of clearly distinguishable, identifiable tracks.
- e) Probable – Based on number of track sets and recent presence of other types of evidence
- f) Possible – Based on presence and location of others type of evidence.

A further significant problem associated with estimating rhino numbers is that the number of rhinos signs encountered cannot be related to coverage of a specific size of forest area. When using line transects for wild mammal surveys, data (e.g. sightings of monkeys, elephant dung piles or orang-utan nests) can be linked to area in hectares through detection probability and, for signs of the animals, to rate of decay of that sign. This approach is (arguably) not possible with rhinos because footprints are so rare that they have to be found by searching for signs wherever they can be found (not on straight line transects) and because rate of decay of tracks cannot be estimated with sufficient reliability past a few days or if rain fall has been heavy. Currently, therefore, records of footprints or signs cannot be reliably linked to actual area surveyed.

However rhino survey reports that provide estimates of numbers of rhinos within the “area surveyed” remain highly subjective assumptions that all rhinos can be detected within an arbitrary distance of the routes walked during the surveys, and not on any probability detection function.

Identifying individuals would alleviate much of the subjective assuming. Plaster casting was an initial option. More recently new techniques, FIT and camera trapping, were pursued. Digital photographs taken of footprints and downloaded to a computer for processing for distinguishing details (FIT) is non-invasive to the animal and cost-effective in comparison with many other monitoring methods. But practically it is very difficult to get good footprints of the digital images in the low light and shifting substrate of the rainy forest floor and stopping to take pictures is extremely time consuming.

Camera trapping has improved immensely in functionality since we began using them in 2000. However, several are needed to cover an area sufficiently, which is expensive and some technical expertise is required of the personnel to operate and maintain them in such a wet environment. They are left to function for a period and then retrieved. They are useful for small area revolving surveys. Effectiveness in distinguishing rhinos is still to be determined.

Although we have continued to develop methods that could provide more information on status of rhino in the forest, footprint measurements remain the mainstay of surveying and estimating the numbers Sumatran rhinos due to ease of use.

1.4 Previous surveys on Sumatran rhinoceros in TWR 1980- 2000

The difficulty in successfully processing rhino signs has been coupled with a lack of systematic record keeping of survey routes, time and data collected. Surveys, where based on impressions of certain areas. The initial surveys, which formally reported the existence of breeding rhinos in the Tabin area, found a male, female and sub-adult present in March 1980 (Payne, 1980). In 1981, a young juvenile rhino died in a noose trap in the same part of the upper Tabin River. Rhino footprints were found commonly in many of the central parts of what is now TWR during the period 1981-83 while intensive logging operations were proceeding (J. Payne, pers. comm.). Six teams (from Sabah Forestry Department, Sabah Parks, Sabah Foundation, PERHILITAN and WWF-Malaysia) surveyed remaining unlogged forest in the central parts of what is now TWR, 8 – 20 August 1982. Together, they found evidence of a minimum of seven rhinos, two of which were immature, along about 250 km of survey routes within in an area of 24,000 ha in and around the present Core Area. Additional evidence from *ad hoc* field work conducted prior to this survey suggested the presence of about 14 rhinos in the same area, with an additional four rhinos in surrounding logged forest (Payne, 1982). Five teams (SFD, SF and WWF-Malaysia) who surveyed within about 18,500 ha of logged forest in the northern and eastern parts of what is now TWR, 27 October – 7 November 1983, found evidence of a minimum of five rhinos in those areas, outside the core area, including one immature individual (Payne, 1983).

There was evidence that at least 11 rhinos were poached in Sabah between 1980-84, with three cases being in what is now TWR (Anon., 1985). In June 1986, about 157 km was covered on the ground by three teams within 11,700 ha of Tabin core area forest (SFD, Sabah Rhino & Wildlife Conservation Committee and WWF-Malaysia). A minimum of six rhinos were using the core area at that time, of which one was immature (Payne, 1986). The survey report noted that this result indicated a higher population density of rhinos in the core area in 1986 than in 1982, but that this was most probably due to the rhinos avoiding surrounding logging operations.

A wildlife survey conducted by the Sabah Wildlife Department (SWD) in 1995 reported the existence of an estimated population between 9-20 rhinoceros in the TWR area (Ambu, 1995). In 1997, rhinoceros survey was conducted to estimate the population in TWR. It covered a nominal area of 21,000 ha (17.5% of the total area of TWR), based on the survey results there were three known, five probable and nine possible rhinoceroses in TWR (Boonratana, 1997). An expedition conducted in 1999 by Universiti Malaysia Sabah in TWR found evidence of at least three rhinoceros residing in the Tabin “Core Area” (8,550 ha; now known as Mount Hatton Protection Forest Reserve) and surrounding forest at that time (Jomitin, 1999).

No consistent logistics or methodologies were developed out of these surveys for continued use; therefore, future surveys continued to be inconsistent, presumptive and irreproducible. Different areas were surveyed for different numbers of days. Various surveys were separated by long periods of time and used different measures for

evidence of rhino and different expertise. Some areas were never covered. Therefore, to gain any useful impression of the numbers of rhinos in Tabin some standards had to be established.

1.5 TWR rhinoceros survey SOSRB -2000 - 2004

Starting in 2000, SOSRB began to develop more systematic surveys of Tabin. Consistent surveying and data collection performed by consistent expertise had to be developed. Personnel had been trained on identification technologies as well as tracking procedures. The transect survey method was instituted to provide a regular framework for training rangers and developing techniques. It also provided information on the occurrence of rhinos in unexplored areas as well as areas known to have rhinos.

Transect Survey periods encompass the completion of the survey of the 8 established transects within TWR. An earlier transect period conducted between 2001-2002 established protocols and experience among rangers. Two periods were completed in one and half years between 2005 and 2007. The reference transect is the existing road from the Tabin wildlife office in the west to the “Core Area”, a distance of 22 km; it is extended to 42 km to the east using a line transect. From this 42-km reference transect, eight linear transects were made: north and south transects at KM7, KM22, KM32 and KM42. Along these transects, small base camps were established at five km intervals. From each of these base camps, the teams made four temporary transects, one in each compass direction, of approximately five km per transect. The survey results are attached in Appendix-5. In the one and half year time period SOS Rhino conducted 30 random transect surveys in TWR. From these transect surveys 16 incidents identified rhinoceros footprints in different places. During the transect survey rhino footprints were frequently found at the Core Area (km 32), the valley of the rugged hill and the southern area of km 3-7. The km 3-7 is the area where the RPU consistently find clear tracks of the rhino with other signs such as rhino dung and feeding signs. One of the tracks was believed to be that of a young rhino with adult. Sungai Burung is also recognized as one of the active areas for the rhinos.

Bosi *et al.*, (2005), analysis of results from 2001 to 2002 transect surveys of an area of 55,000 ha of TWR estimated the presence of 6 rhinos, with 16 probable and 32 possible individuals. Similar surveys conducted from 2004 to 2006 revealed that there were 12 known rhinos present in TWR.

A more focused transect study covering 48 sq km during June 2004 to January 2005 (Thayaparan.s, 2006) found nine sets of fresh (less than two weeks) rhinoceros footprints. This study on footprint evidence combined with other signs indicated a possibility of 15-25 rhinos in TWR.

These transect surveys covered areas of Tabin repeatedly, which provided evidence for rhino areas assuming they maintain their territorial locations. However, the long periods of time in which they were conducted resulted in increasing the chance of counting rhinos in overlapping territories and thus the chance of recounting of animals. This problem was addressed by surveying for rhinos using “many people in the forest at once ” and surveying as much of an area as possible presumably far

enough apart to avoid recounting of animals. SOSRB conducted two of this type of surveys after 2000 one in 2002 and the other in March 2007.

1.6 TWR rhinoceros survey SOSRB - 2007

We had planned to perform this survey in October 2006 to have it occur as close to the other surveys of 2006, but early occurrence of the rainy season postponed the effort. The survey was rescheduled to take place 1 - 12th March 2007, with the following objectives:

- a) To estimate the current population size of Sumatran rhinos in TWR.
- b) To identify if there are signs of breeding in the Tabin rhino population

2. SURVEY METHODS

2.1 Organization and Teams

An organizing committee for the Tabin 2007 rhino survey was formed in 2006 and chaired by SWD, with S.Thaya of SOSRB as secretariat and J. Payne of WWF-Malaysia as coordinator; detailed preparations were done in February 2007 (Appendix 1). TWR was divided into 12 survey blocks, chosen to cover all areas where rhino signs had been found in the past, as well as parts of TWR where rhinos have not been previously located. The block one, two, three, four, five, eight, and nine had been identified as previous rhino areas and the blocks six, 10 and 11 had never been identified with rhinos previously. One team of five persons was assigned at random to cover each of the blocks (Appendix 2). Forest entry and exit points were determined in advance for each block. The survey was conducted 1 - 12th March 2007, including time for arrival of all teams to the SOSRB headquarters, training, survey days, return to headquarters, and debriefing. The dates were chosen based on the expectation of suitable weather conditions (moderate rainfall) and to allow participation of the all interested individuals and institutions.

2.2 Training

In view of the large numbers of participants of differing experience and institutions, two forms of training were held prior to the survey.

1. Rhinoceros survey briefing
2. Protocols : a. Data sheet recording, b. GPS recording training, c. Foot print identification technique, and d. First Aid training

2.3 Rhino Survey Briefing

Participants with prior experience of rhinoceros field work gave briefings to all survey participants on 1st March at Tabin SOSRB HQ. Issues covered included:

Identification of signs of rhinos (footprints, rub marks on tree trunks, faeces, signs of browsing, and wallows); the need to follow any fresh rhinoceros tracks was emphasized; protocols for recording locations and sizes of footprints

The freshness of rhinoceros tracks was to be recorded using the following principles:

- d) Fresh: a few hours old; wet mud smears, fresh browse and clean prints having very few or no leaves in them.
- e) One week or less: Footprint is still clear but dry, and the sides cracked. Foot prints are usually partially seen due to recent fall of dead leaves.

The maximum width between inner and outer toe varies between about 16 cm (juvenile rhino) to 19 cm (roughly one to two years old) to 21-23 cm (mature rhino). All animals with a median track width of left hind foot less than 17.0 cm are to be considered as dependent young. Other animals were assumed to be either sub-adults or adults (Van Strien, 1986, Flynn & Abdullah, 1983).

2.4 Data recording

Standard sheets were provided for recording data on rhinoceros signs, illegal hunting activities and other wildlife signs (Appendix 3). In addition, routes walked in the forest were drawn daily onto photocopies of 1:50,000 scale topographical maps and descriptive notes written in notebooks.

3. RESULTS

3.1 Estimate of minimum number of rhinos and evidence of breeding

Based on the data (Table 1 and 2), the following assumptions can be made : minimum of two rhinos in block 12; minimum of one rhino in block 3; minimum of one rhino in block 5; minimum of one rhino in block 1. These are all considered to be different rhinos, based on the wide spacing between the records. The twisted sapling found in block 7 was very old and may have been made by a rhino from a different block. This gives a minimum of five rhinos in Tabin Wildlife Reserve. Footprints of rhinos in blocks 12 and 3 were rather small, suggesting an immature rhino at each site.

Table 1. Summary of records of rhinoceros foot prints in Tabin Wildlife Reserve, 2 – 9 March 2007

Block No.	Date	Rhino footprint width (cm)	GPS location	Team No.	Conclusion and notes
3	3/03	17-18	E 118° 39' 07.1'' N 05° 20' 07.6''	5	3 locations of foot-prints found; 1 -2 weeks-old & 2 day- old prints, probably a single rhinoceros; signs of feeding on <i>Aglaia</i> and <i>Ficus</i> , and urine spray; based on footprint width measurements, possibly
		19-20	E 118° 39' 25.1'' N 05° 19' 25.3''		
		19-21	50 m away from the previous location		

					immature rhino
5	9/03	20.6		E 118° 46' 54.4" N 05° 19' 25.5"	12 No age estimate, but presumed more than 1 week
12	3/03	20.5, 18.4, 20.0, 20.8, 22.5, 19.5, 18.8, 19.0, 21.4		1 hour's walk before camp at E 118° 32' 976" N 05° 09' 646"	2 Ridge top at 1,200 feet above sea level; estimated age not recorded, but presumed more than 1 week; based on footprint width measurements, possibly mother and immature rhino
12	4/03	21		E 118° 34' 177" N 05° 08' 464"	2 Estimated age not recorded, but presumed more than 1 week

Table 2. Other rhino signs of rhinoceros in Tabin Wildlife Reserve, 2 – 9 March 2007

Block	Date	GPS location	Team	Rhino signs
1	4/03	E 118° 33' 33.0" N 05° 16' 38.7"	10	Feeding signs and twisted saplings; age not estimated, but old
7	9/03	E 118° 42' 08" N 05° 11' 28"	6	2.5 m tall <i>Pternandra</i> treelet, snapped over and twisted at 1.5 m, between stream and old road; many months old, no other rhino signs
12	4/03	E 118° 32' 673" N 05° 09' 901"	2	"Twisted" (no other details)

3.2 Human encroachment

Clear signs of human encroachment were reported in six blocks (Table 3). Together, they suggest continuing, frequent encroachment in many parts of TWR.

Table 3. Signs of unauthorized human activities in Tabin Wildlife Reserve, 2-9 March 2007

Block No.	Team No.	Forms of activity/ encroachment
2	1	4 March : cut trails, about 2 weeks old along upper Urit river. 7 March : fresh human footprints; gun shot heard at night, to the

		east, inside TWR 8 March : cut trails, judged to be frequently used, along Tagas-Tagas River
4	4	3 March : abandoned camp containing cooking utensils and uncooked rice stock (E 118° 42' 50" N 05° 19' 52") 4 March : fresh carcass of sambar deer killed by humans (E 118° 42' 45 N 05° 19' 32") 8 March : fresh human foot prints at E118° 40' 19" N 05° 18' 03"
6	8	2 March : signs of poachers (discarded batteries, plastic bags) along stream bed 5 March : poachers tents and abandoned camp near Tabin river (photo) 7 March : signs of poachers
8	11	2 March : boundary stone, marked 659/753, uprooted and moved (E 118o 44' 01.5 N 05o 10' 19.1"; photo) 3 March : fresh prints of "Adidas kampong" shoes (E 118o 43' 37.7") 4 March : many new and old shoes prints (E 118o 43' 7" N 05o 11' 19.7")
10	9	Date: 4 March : "villagers" three men with fishing lines and bags of fish (2-3 kg). 5 km from TWR boundary; claimed they "came in to do fishing" 5 march : 6 old gun cartridges, 2 old batteries (D size) 6 March : heard gun shot at 03.17 hours, location inside TWR, about 5 km from the TWR boundary
11	7	4 March : Signs of about 2-4 persons present two days ago (E 118° 53' 28.3" N 05° 11' 58.1")

3.3 Mineral sources

A salt water spring was found in block 2 at E 118° 36' 4.1" N 5° 15' 37.8". The location suggests that this is the same one visited in February 1980 by J. Payne, Saimon Ambi, Rashid Saburi and Pirian Mat Salleh; at that time no signs of large mammals were found nearby (J. Payne, pers. comm.).

3.4 Other wildlife records

Records of large mammal species obtained during the survey 2-9 March, are summarized in Appendix 3.

4. DISCUSSION

4.1 Rhinoceros

The results show a minimum number of five rhinos in TWR in March 2007 that are widely scattered. Two of these in blocks 3 and 12 appear to be immature. Surveys conducted in TWR by SOS-Rhino during the preceding year suggested the presence of 16 rhinos. The rhinoceros GPS location map attached in Appendix-5 for 2005 and

2006 survey conducted for rhino estimation. The small number and old age of the rhino signs found during the March 2007 survey do not permit a truly fair estimate to be made of the minimum number of rhinos remaining in TWR (See Discussion below).

When compared to survey efforts and results from TWR during the 1980s, however, the March 2007 results suggest that rhino numbers are lower than existed 20-25 years ago in the same area.

As noted above (Previous surveys on Sumatran rhinoceros in TWR), “rhino footprints were found commonly in many of the central parts of what is now TWR during the period 1981-83”; “a survey similar to that conducted in March 2007, done in August 1982 by only six teams within a total area of 24,000 ha, found evidence of a minimum of seven rhinos, two of which were immature, along about 250 km of survey routes in and around the present core area. Additional evidence from *ad hoc* field work conducted prior to this survey suggested the presence of about 14 rhinos in the same area, with an additional four rhinos in surrounding logged forest”; “five teams who surveyed within about 18,500 ha of logged forest in the northern and eastern parts of what is now TWR, 27 October – 7 November 1983, found evidence of a minimum of five rhinos outside the Core Area, including one immature individual”; “in June 1986, about 157 km was covered on the ground by three teams within 11,700 ha of Tabin core area forest a minimum of six rhinos were using the core area at that time, of which one was immature”. All this was in spite of the fact that “there was evidence that at least 11 rhinos were poached in Sabah between 1980-84, with three cases being in what is now TWR”. In contrast, the greater survey effort in March 2007, by more teams over a wider area found evidence of only five rhinos.

There have been no reports of poaching of rhinos in TWR over the past fifteen years and since 2000, SOS-Rhino has continuously assisted the government authorities in monitoring and protecting of TWR and its rhino population. These observations suggest that, despite the evidence of illegal human activities in TWR, major incidences of poaching have probably not occurred since the 1980s, but numbers are so low and the area so large that individuals could be missed. Their loss would represent a significant drain on the TWR rhino population

Breeding success of Sumatran rhinos in Cincinnati Zoo, USA, with three births since 2001, indicates a birth interval of about 22 months. This rate is higher than observed in the wild for Asian elephants and orang-utans. The elephant population in lower Kinabatangan, for example, appears to have increased from around 100 to over 150 over the past decade (unpublished observations by Kinabatangan Orang-utan Conservation Project/HUTAN and WWF-Malaysia), despite increased habitat fragmentation and an overall decline in the size of habitat.

In contrast, the amount of habitat available in TWR has been stable since the 1980s. Perhaps habitat quality has declined. To date, there is no evidence that primary old growth forest is a better habitat for Sumatran rhinos than is logged forest. Although many parts of TWR were heavily logged during the 1980s and early 90s, and regeneration is very poor in terms of timber trees, there seems to be an abundance of rhino food plants throughout most of TWR. It would seem highly unlikely that food is in any way a limiting factor for rhinos in TWR. An observation by many observers

over many decades suggests that the Sumatran rhino is a species of closed canopy forest, rarely venturing into open spaces. It is likely that this is linked to the rhino's need to behave in ways that allow it to remain as cool as possible at all times (e.g. wallowing, resting on ridges and in shady gullies, staying away from direct exposure to the sun), rather than to a preference for closed canopy forest plants.

The implications are that, in spite of protection measures and adequate habitat, the TWR rhino population has not increased over the past 25 years, and may have declined in numbers. These observations pose a great concern. Why might the TWR rhino population have stagnated or declined? One contributory factor might be stress from human encroachment and undetected poaching incidences (see below). However, factors at this point that put this particular population at risk are: (a) the number of potentially breeding individuals is very, very small, and (b) they are so scattered that even fertile individuals may not get to meet.

4.2 Survey methods

It is not clear that the type of survey done in March 2007 (similar to those done in the same area in the 1980s, 90s and 2002) is really an optimum method to obtain an estimate of the minimum number of rhinos present. Findings from this type of survey, "many teams walking through simultaneously", approach depend a great deal on luck, since chances of missing rhinos with a one line pass, particularly in large areas, are great. For instance, a similarly – arranged survey in 2002 found no evidence of rhinos in Tabin at all. In fact, surveys that spend more time in the forest pick up more rhinos such as the SOSRB transect surveys (2005-2006) and survey by (Thayaparan.s,2006) in a smaller area in Tabin. As indicated by Strien (1985), without extended survey periods, surveys of rhinos tend to yield only a rough estimate of the minimum number of rhinos present, and may significantly under-estimate the actual number of rhinos.

Despite the training done immediately prior to these surveys, and the fact that experienced people were chosen to be involved in the March 2007 survey, few teams provided a clear and detailed map of their entire survey route, with annotations of camp sites, rhino records and human encroachment records. There was too much reliance on data sheets and on GPS sets as a means to capture data, and insufficient descriptive and analytical narrative in notebooks. Team leaders were expected to be responsible for writing a short summary in their field notebook of what their data means in terms of rhinos. The variability in the quality of reports and data sheets compromised interpretation of the results of the survey.

4.3 Human encroachment

The signs found in blocks two and four indicate access by poachers from the Tomanggong oil palm plantations; similarly, the signs in block six, eight, 10 and 11 indicate access from several oil palm plantations on the south side of TWR. The fact that gunshots were heard within blocks two and 10 during the survey period, several

kilometers inside TWR should be cause for concern. It is clear that there is minimal control of human access into TWR.

The claim by persons found in rhino survey block 10, several kilometers inside TWR, to be “fishing” is implausible. The occurrence of gun shots in that block and in block two, far in from the Reserve boundary, suggests that groups enter TWR to seek and kill rhinos. It would seem highly unlikely that people would travel so far just to obtain meat. Most likely, these groups have mixed motivations, a combination of recreation, fishing, and hunting for meat and the added thrill and potential lucrative bonus of bagging a rhino.

Although it has been argued (above) that poaching of rhinos in TWR may have been very rare in recent years, this observation may be relative to the small population of rhinos in such a large area. Loss of a single rhino at this point would be a major drain on the population. The extent and boldness of human entry into TWR, with guns, is alarming. Minimizing such entry must be considered as a high and permanent priority if there is to be any hope that a healthy rhino population will return to Tabin

The efforts of SWD assisted by SOSRB with significant financial outlay are evidently insufficient to have adequate impact on levels of human encroachment. Presently the rhinos in Tabin cannot be secured. TWR is a Forest Reserve, in which access is governed by the Forest Enactment 1968, yet efforts to control access and unlawful use are being overwhelmed. Additional or new measures will have to be considered if there is to be hope for the Tabin animals. Two possible unexplored opportunities may be: (a) armed guards (e.g. from the Malaysian armed forces) charged with the job of keeping people out of the forest and/or (b) close and constant liaison with *all* plantation managers operating around the entire TWR perimeter, seeking their help to keep people using the plantations as a means of access into TWR, combined with a need to find legal means to penalize the managers or plantation owners if their workers are found inside TWR. Continuing with the present system would be financially and logistically pointless.

4.4 The key issue

The most endangered wildlife species in Sabah is the Sumatran rhinoceros. There is a high risk that it may become extinct within just a few more years. It is far more endangered than the elephant, orang-utan, sun bear, clouded leopard or tembdau, all of which, barring unexpected natural disasters, can be expected to survive for at least another few centuries.

The Borneo rhino must become and remain the highest species conservation priority for the Government of Sabah. All possible threats must be reduced, and all possible means to boost the species' chance of survival must be considered, decided by the relevant authorities, and the decisions acted upon.

The Borneo rhino is the only genetic resource left to the world population of Sumatran rhino. Sabah must make contributions to the gene pool their highest priority. Sabah must secure this rhino's future as well as the species as a whole.

5. CONCLUSIONS

The March 2007 survey shows a minimum number of five rhinos in TWR, widely scattered, with the possibility that two of those five individuals are not fully grown adults.

The actual number of rhinos remaining in TWR is believed to be significantly higher from the records of SOSRB's previous surveys.

There is doubt as to whether the "many teams walking through simultaneously" approach to estimate numbers of rhinos is the best approach. Information from this survey suggested that luck, as well as the composition of teams, and differences in survey methods used between teams, combined to yield variable and unreliable results. Reviewing information from all surveys suggests deployment of a small number of the same, highly dedicated people moving from one site to another over a period of weeks or months may produce better results.

Comparison of recent surveys and the March 2007 survey with results from TWR during the 1980s, reveal that rhino numbers are lower than existed 20-25 years ago in the same area.

The amount of habitat available in TWR has been stable since the 1980s. Habitat quality probably has not declined for rhinos. These observations suggest that the apparent stagnation in breeding amongst the TWR rhinos may in large part be due to the simple fact that the number of potentially breeding rhinos in TWR is so very small, and that they are so scattered, that even fertile individuals may not get to meet. Because we can not sex them there may not be enough fertile individuals

Despite effort by SWD and SOSRB, human encroachment is still significant and out of control. Such frequent human disturbance is likely to cause further stress to the rhinos. Even if that is not the case, the more unauthorized people there are in TWR, the greater the risk is that one of them will succeed in killing a rhino. Poaching incidents have not been reported since the 80s; however, poaching of a single animal with numbers this low could be over looked and would be a significant drain on the population. Reducing such entry must be considered as a high and permanent priority in order to help ensure the survival of the present and future TWR rhino population.

6. RECOMMENDATIONS

6.1 Status of Rhino in Tabin

Overall, despite the differences in exact survey routes, distances covered and personnel involved, there is no evidence that the number of rhinos in Tabin has increased and some indication that the numbers are declining, particularly with respect to surveys initially done 15-20 years ago. Given the population is not growing and in consideration of the life span of this species, this population could be crashing. More

information on the status of the animal would be helpful and securing the animal would be vital, but both of these conditions would have to be instituted immediately and take considerable more time and expense than even the significant amount of effort that has already been spent. Finding a way to secure these animals is paramount. The fate of the Tabin rhinos will be decided in the next few years. Inaction should not be an option for this population.

6.2 Rhino survey work

The numbers and breeding success of rhinos in TWR remains unclear. Before any decisions are taken regarding conservation measures for the TWR rhinos, better information must be acquired and assessed within the next year or rhinos must be removed to a safe environment.

Out of the surveys performed to date in TWR, the following methods and guidelines for performing surveys have been compiled. These should be used for future surveys for rhinos in Sabah.

- Divide a 1:50,000 scale topographical maps of TWR into blocks, the main criterion for choosing block boundaries being areas where signs of rhinos had been found in the past and where they have never or very rarely ever been found (based on all available data collected since 1980). The alignment of blocks should not be that chosen for the March 2007 survey, which was based on the convenience of teams and access routes for a short survey period.
- Employ a small team of highly competent and dedicated people to diligently inspect TWR for rhino signs, block by block, repeatedly. This should be a full-time team, with proven competence and interest in the job, whose sole job is to look for rhino signs. Part of the competence must include the ability to truly understand topographical maps, so that the team always knows where it is within about 150 meters of error, whether or not they have a functioning GPS set.
- The team should repeatedly survey blocks where rhinos are known to occur, and not waste time looking in other blocks where rhinos never or very seldom have been found. The team should always look for rhino signs where they think such signs might be found, and not waste time on pseudo-objective or pseudo-systematic designs.
- After years of recording precise measurements of rhino footprints, the value of such data remains unclear. The possible use of faecal DNA for determining individual rhinos must now be explored. This means that survey efforts must be directed to seeking fresh rhino faeces, and collecting good samples of all faeces found.
- The team should cease relying too much on GPS sets, and ensure that every single rhino sign is marked and described, using a pen, onto photocopies of 1:50,000 topographical maps as and when the signs are found. Rain and other factors cannot be an excuse for not employing this method. This will help stop the unfortunate trend observed since the introduction of GPS sets, whereby no-one knows or can remember the location and details of rhino signs after the team has left the forest, unless someone

has kept an annotated GPS record. GPS must be used as an aid in survey work, not an excuse for failure to record useful data.

These methods and guidelines are also recommended for units conducting translocation efforts.

6.3 Reduction of unauthorized human entry and encroachment into TWR

As mentioned above the high frequency and nature (use of guns) of unauthorized human entry into TWR poses a major threat to the continued existence or future presence of this species in Tabin. The population can be presently effected significantly by a single incident of poaching. Given that Tabin has been under the Forests Enactment 1968, Wildlife Conservation Enactment 1997, Firearms (Increased Penalties) Act 1971, but they have not helped to adequately reduce the threat indicates that more effective approaches are needed. An experienced consultant should conduct a special study, to provide clear and specific recommendations, making full use of the provisions of all relevant laws and any others that might pertain. A part of the study should assess which agency should take the lead role in protecting TWR from unauthorized human access and use. This will be vital if the rhino is to have a future in TWR or Sabah.

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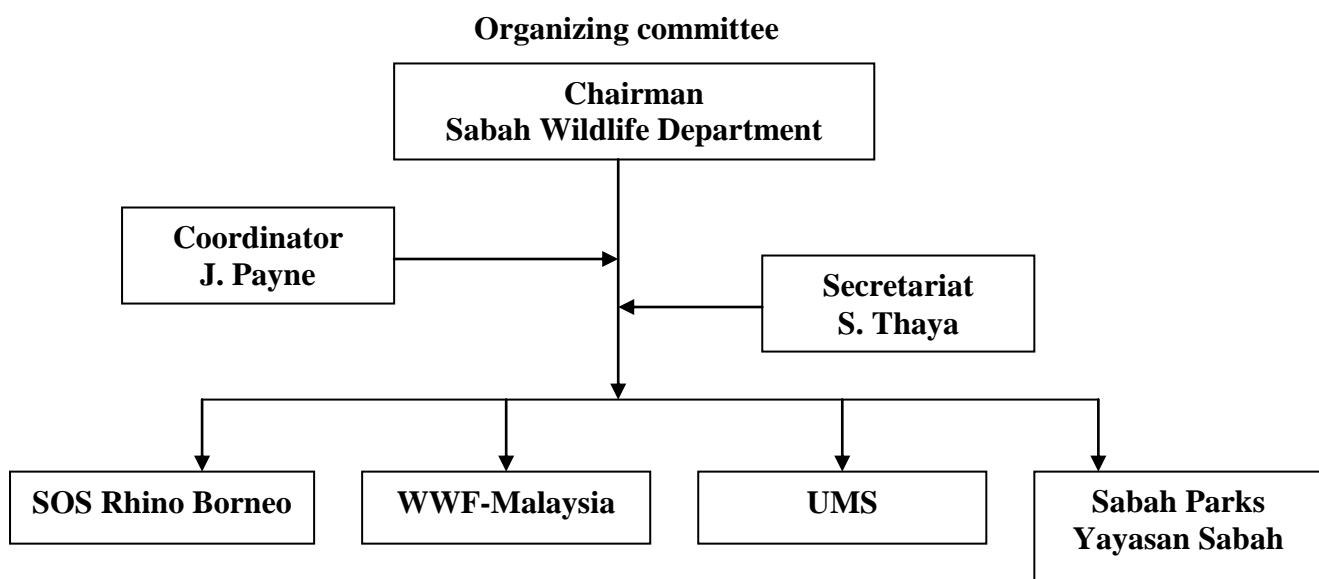
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8. APPENDIX

Appendix 1.

Tabin 2007 rhino survey organization chart and timeline



Activity	Place	Dates
First detailed planning meeting	WWF-Malaysia office	1/02/2007
Letter of invitation to all participants through SWD prepared by SOSRB	SWD and SOS HQ	5/02/2007
Final Meeting with all organizers	SWD HQ	12/02/2007
Meeting all team leaders final discussion	SWD HQ	21/02/2007
Establishment of Tabin camp in Tabin SOSRB HQ	TWR SOS HQ	25/02/2007
Purchasing of field supplies and Packing	Lahad Datu and Kota Kinabalu	25/02/2007
Rhino expedition	TWR	1-12/ 03/2007

Appendix 2.

Tabin 2007 rhino survey team composition & block

	Dept/Org	NAMES	MAIN RESPONSIBILITIES	Survey Block
Team 10				1
1	WWF	Rayner Bili	Team Leader	
2	SWD	Zulkifly Asiman	Assistant/ Data recorder	
3	SOSRB	James Sandiyang	Photographer	
4	SFD	Nelson Lintikan	GPS Recorder	
5	Sarawak FD	Sundai Silang	First Aid	
Team 1				2
1	SWD	Augustine Tuuga	Team Leader	
2	YS	Welly Frederik Tukin	Assistant/ Data recorder	
3	SOSRB	Dexvan Nuvin	Photographer	
4	SWD	Joseph Fabian Sipaut	GPS Recorder	
5	WWF	Jaini Impin	First Aid	
Team 5				3
1	SOSRB	Dr.Thayaparan	Team Leader	
2	SOSRB	France Bianus	Assistant/ Data recorder	
3	WWF	John Japil	Photographer	
4	SOSRB	Sarinos Anyong	GPS Recorder	
5	SP	Safrie Hatimin	First Aid	
Team 4				4
1	IRP	Arief Rubianto	Team Leader	
2	SWD	Muin Anson	Assistant/ Data recorder	
3	WWF	William Joseph	Photographer	
4	SOSRB	Marikus Suyat	GPS Recorder	

5	YS	Jamil Kasmin	First Aid	
Team 12				5
1	SOSRB	Amit Pilik	Team Leader	
2	SOSRB	Wilfred Yuya	Assistant/ Data recorder	
3	SWD	Remicks Jenner Meek Ron Hakim	Photographer	
4	SWD	Aidee Jamali	GPS Recorder	
5	SOSRB	Tinrus Tindok	First Aid	
Team 8				6
1	WWF	Joseph Gasis	Team Leader	
2	SWD	Madius Balandi	Assistant/ Data recorder	
3	SOSRB	Justine Segunting	Photographer	
4	SWD	Jaikim Kubis	GPS Recorder	
5	SOSRB	Medrus Kandor Suyat	First Aid	
Team 6				7
1	WWF	Junaidi Payne	Team Leader	
2	SWD	Mohd Aznandy Mohd Yakub	Assistant/ Data recorder	
3	SOSRB	Andrew Ginsos	Photographer	
4	WWF	Middle Seen Kapis	GPS Recorder	
5	SWD	Ibrahim Awang Ali	First Aid	
Team 11				8
1	YS	Jikos Gidiman	Team Leader	
2	SWD	Zul Azhan Awang	Assistant/ Data recorder	
3	YS	Mohd. Jusman Tarman	Photographer	
4	SOSRB	Erman Tara	GPS Recorder	
5	WWF	Richard Sanggul	First Aid	
Team 3				
1	SWD	Mohd. Soffian Abu Bakar	Team Leader	9
2	SOSRB	Yusri Madiun	Assistant/ Data recorder	
3	WWF	Gudil Gihud	Photographer	
4	SWD	Jefri Ebrahim	GPS Recorder	
5	SOSRB	Lukas Julius	First Aid	
Team 9				10
1	UMS	Dr. Abdul Hamid Ahmad	Team Leader	
2	SWD	Beddy Tuin	Assistant/ Data recorder	
3	SWD	Zulkarnian Hashim	Photographer	
4	SOSRB	Lusry Basri	GPS Recorder	
5	WWF	Patrick Sading	First Aid	
Team 7				11
1	IRP	Miskun	Team Leader	
2	SOSRB	Suhairin Putrah	Assistant/ Data recorder	
3	SOSRB	Milton Sat	Photographer	
4	SWD	Joe Fred Lansau	GPS Recorder	
5	YS	Edward Alimin	First Aid	

Team 2				12
1	SWD	Herman Stawin	Team Leader	
2	SOSRB	Suzali Jaya	Assistant/ Data recorder	
3	SFD	Geungnong Ah Jing	Photographer	
4	WWF	Albert Stawin	GPS Recorder	
5	YS	Ng Han Lee	First Aid	

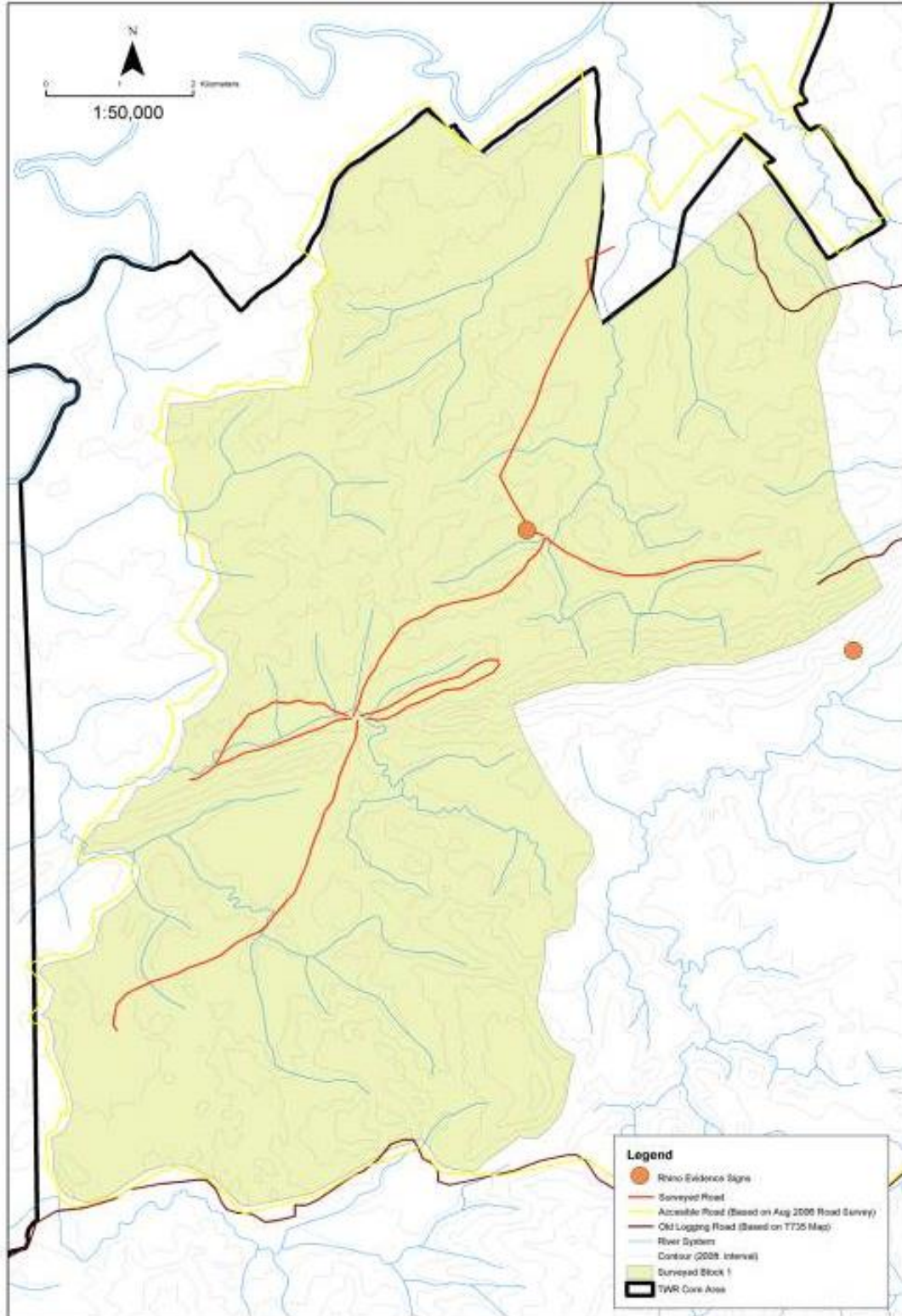
Appendix 3.

Mammals species recorded during the 2007 TWR rhino survey

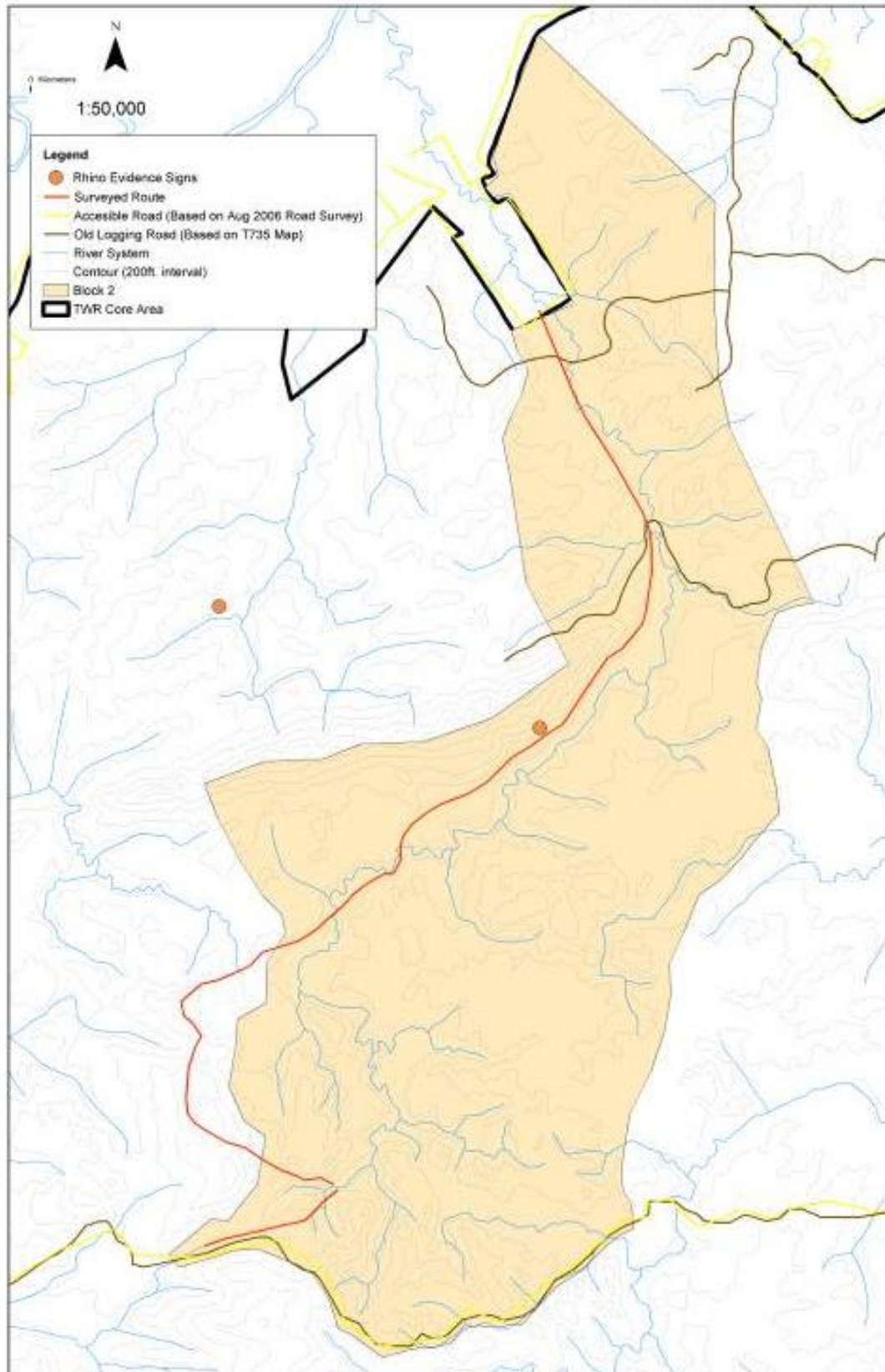
Species	Block No.											
	1	2	3	4	5	6	7	8	9	10	11	12
Asian Elephant <i>Elephas maximus</i>	X	X	X	X	X	X	X	X		X	X	X
Sumatran rhinoceros <i>Dicerorhinus sumatrensis</i>	X		X		X		X					X
Bearded pig <i>Sus barbatus</i>	X	X	X	X	X	X	X				X	X
Banteng <i>Bos javanicus</i>	X	X	X	X	X	X					X	X
Sun bear <i>Helarctos malayanus</i>			X				X	X				X
Clouded Leopard <i>Neofelis nebulosa</i>	X											
Sambar Deer <i>Cervus unicolor</i>	X	X	X	X		X	X			X	X	X
Muntjac <i>Muntiacus species</i>	X		X									
Lesser Mouse Deer <i>Tragulus javanicus</i>	X		X									X
Greater Mouse Deer <i>Tragulus napu</i>	X		X									X
Orang-utan <i>Pongo pygmaeus</i>					X	X	X	X		X	X	X
Borneon Gibbon <i>Hylobates muelleri</i>		X										
Pig Tailed Macaque <i>Macaca nemestrina</i>												X
Grey Leaf Monkey <i>Presbytis rubicunda</i>							X			X		
Red Leaf Monkey <i>Presbytis hosei</i>			X	X			X					

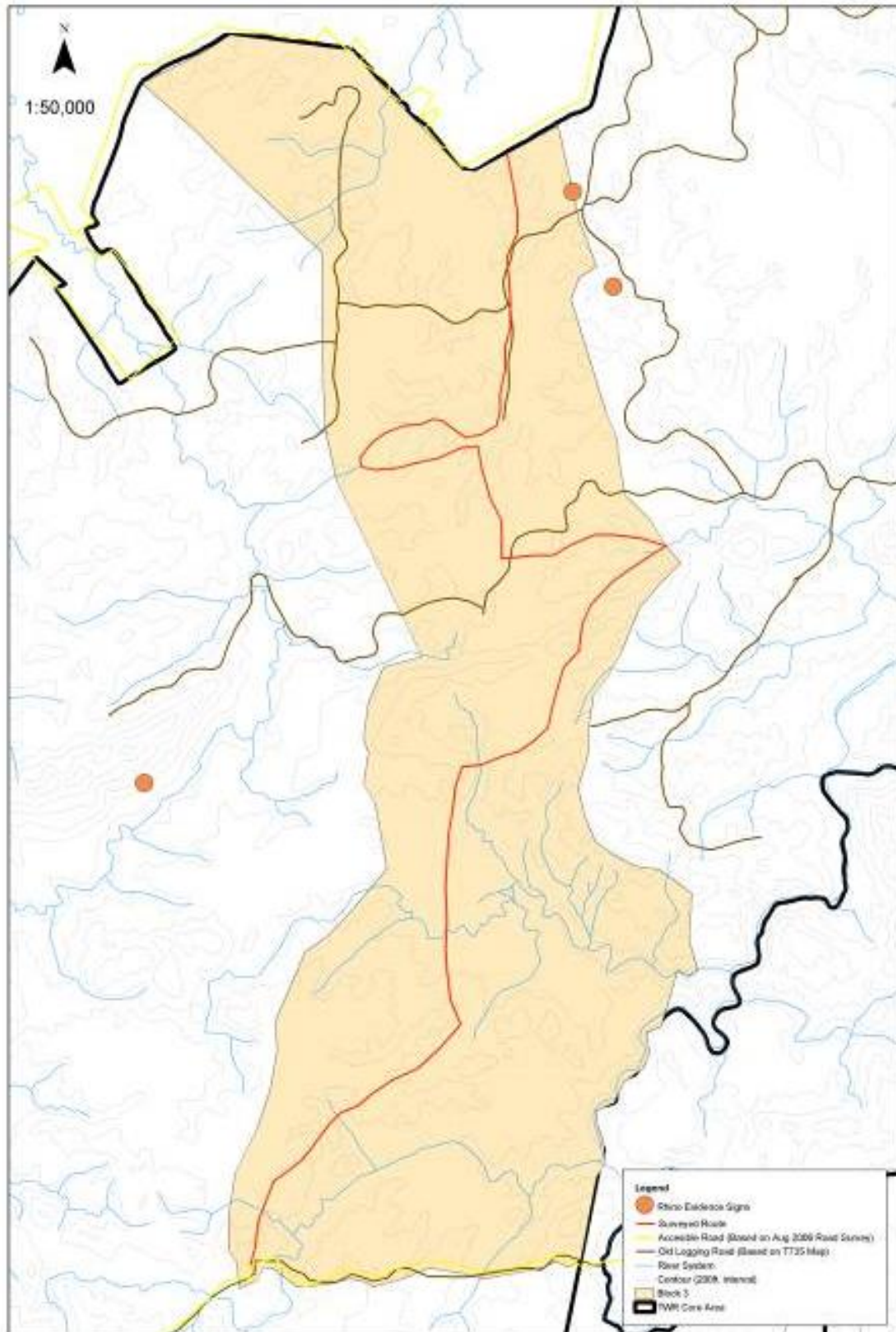
APPENDIX-4

MAPS OF RHINOCEROS SURVEY- MARCH 2007

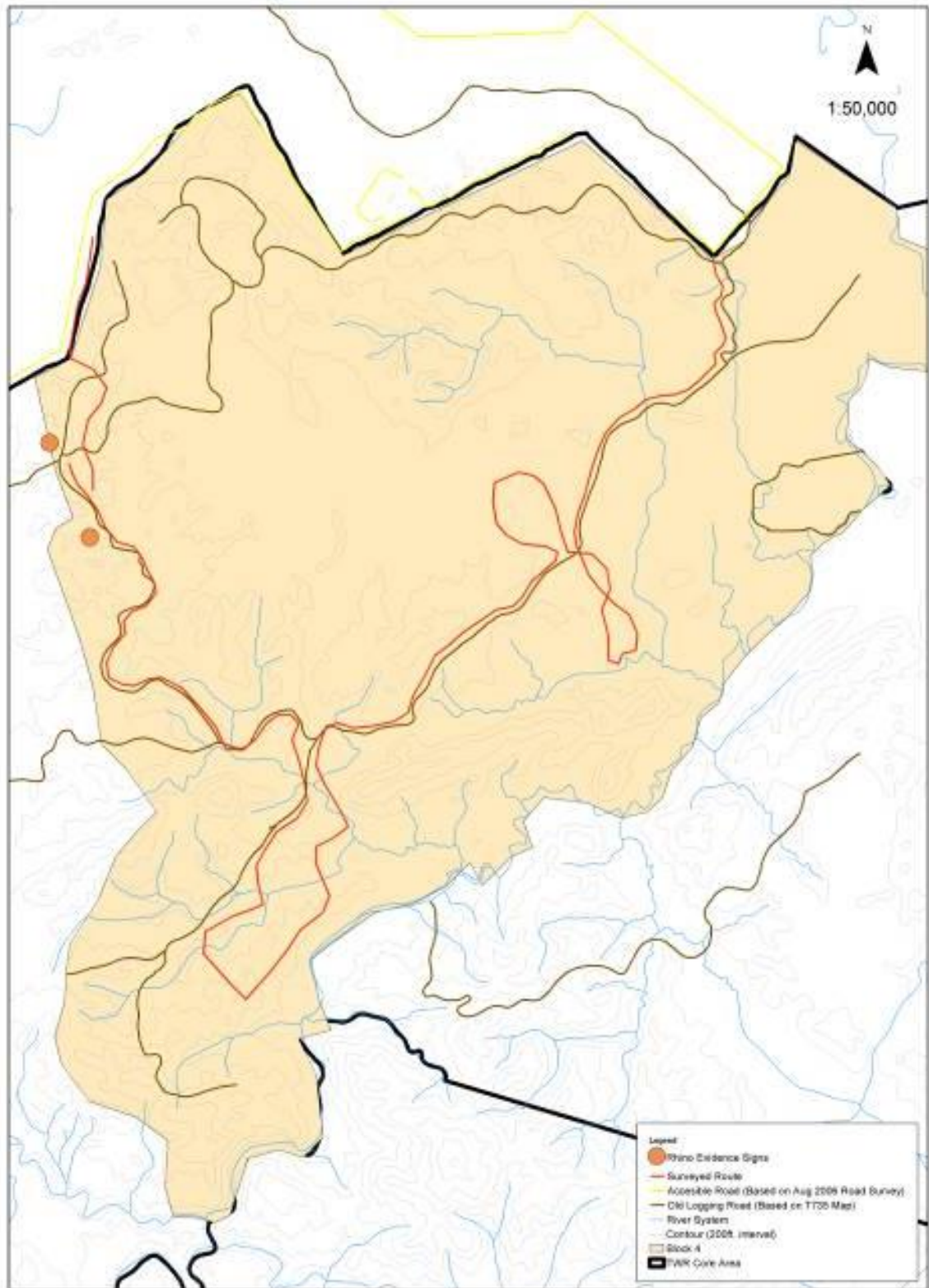


BLOCK - 1

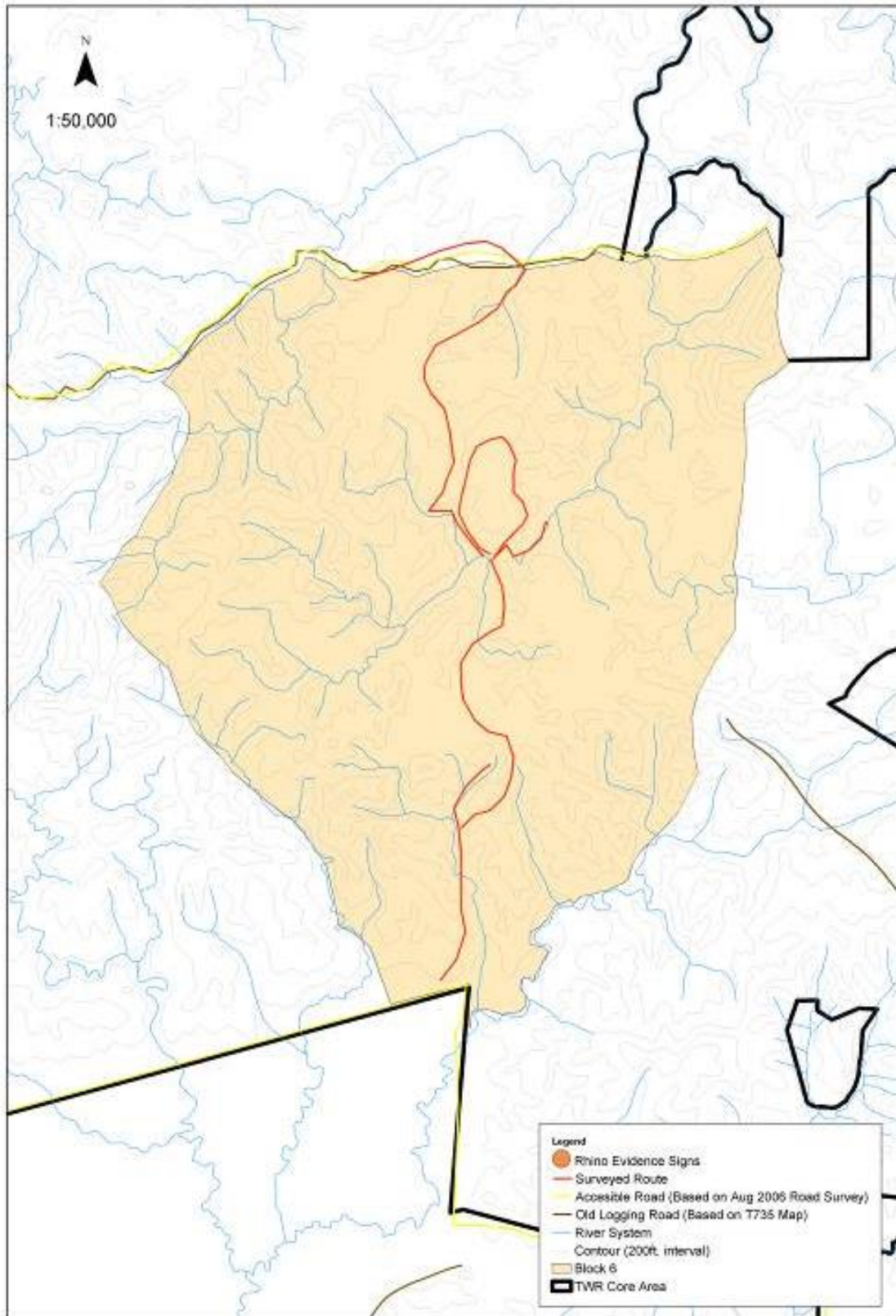
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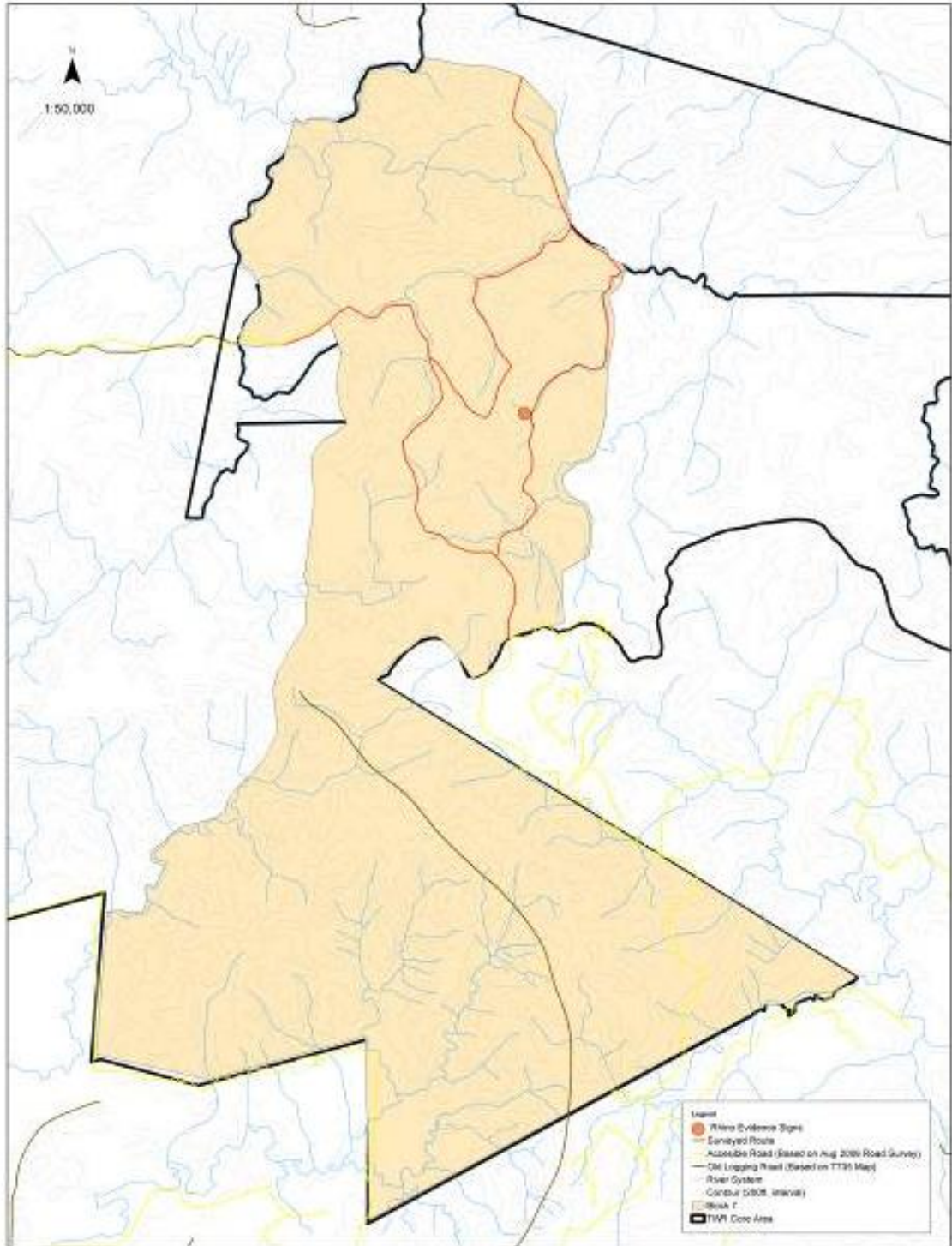
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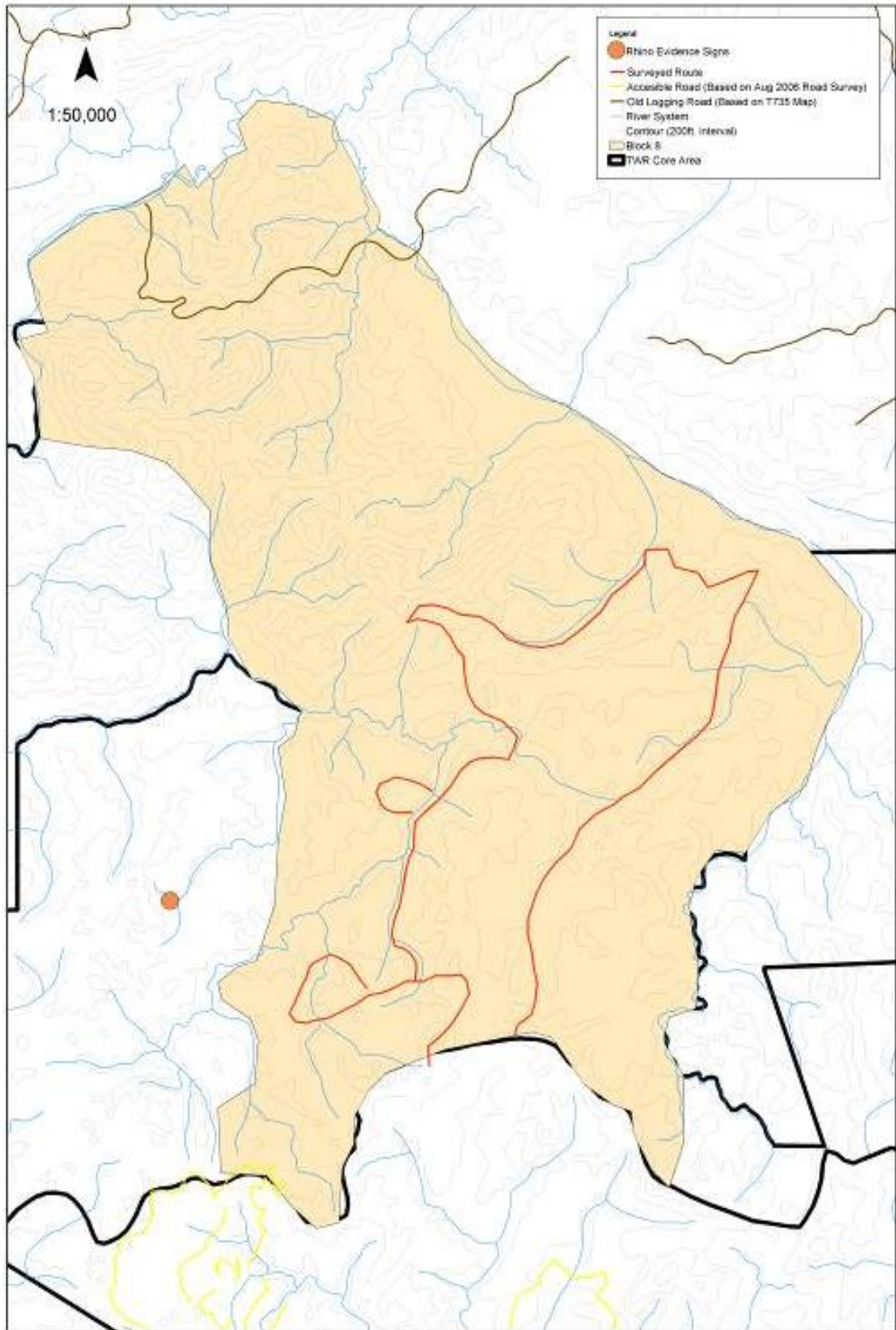
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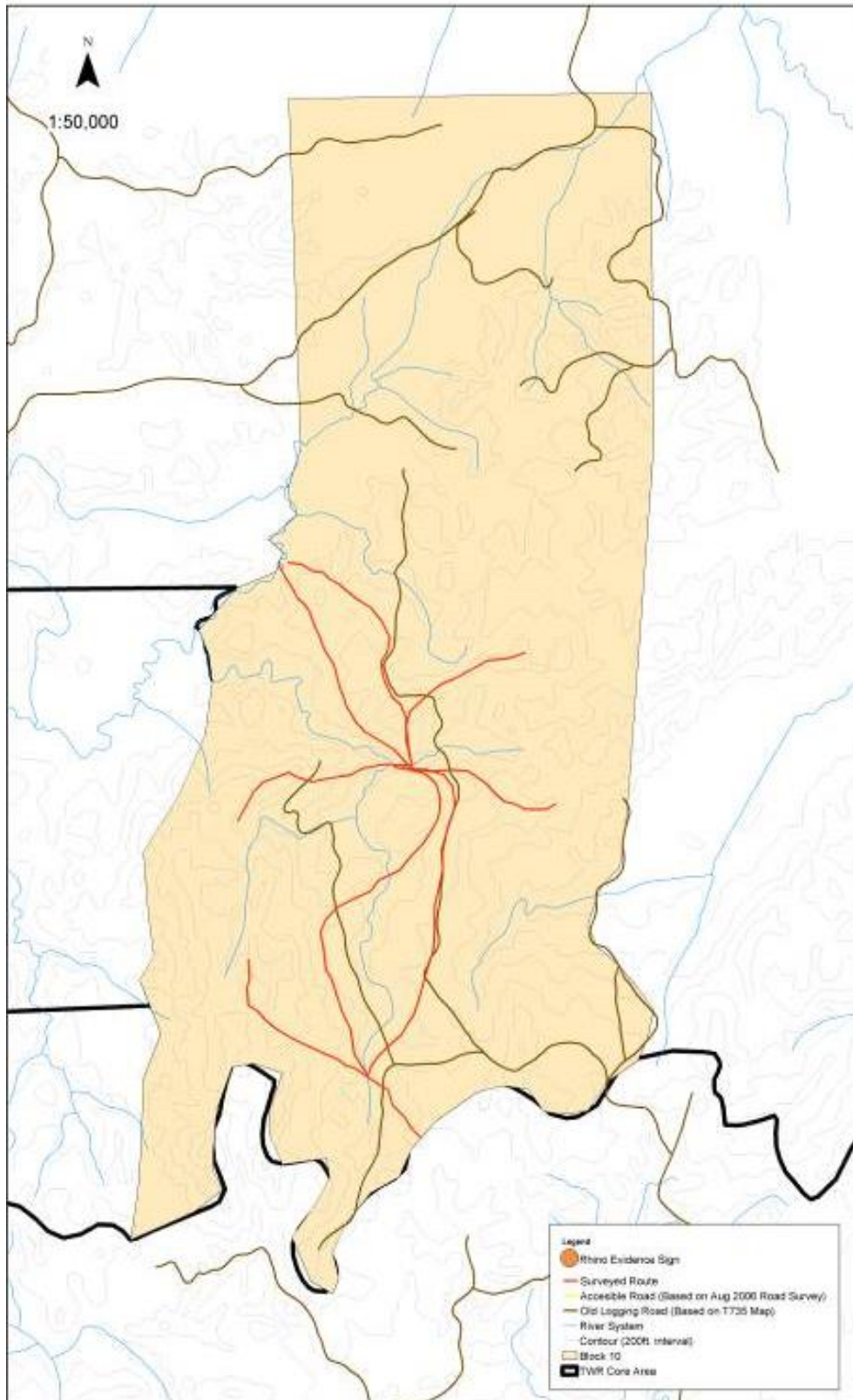
BLOCK - 6



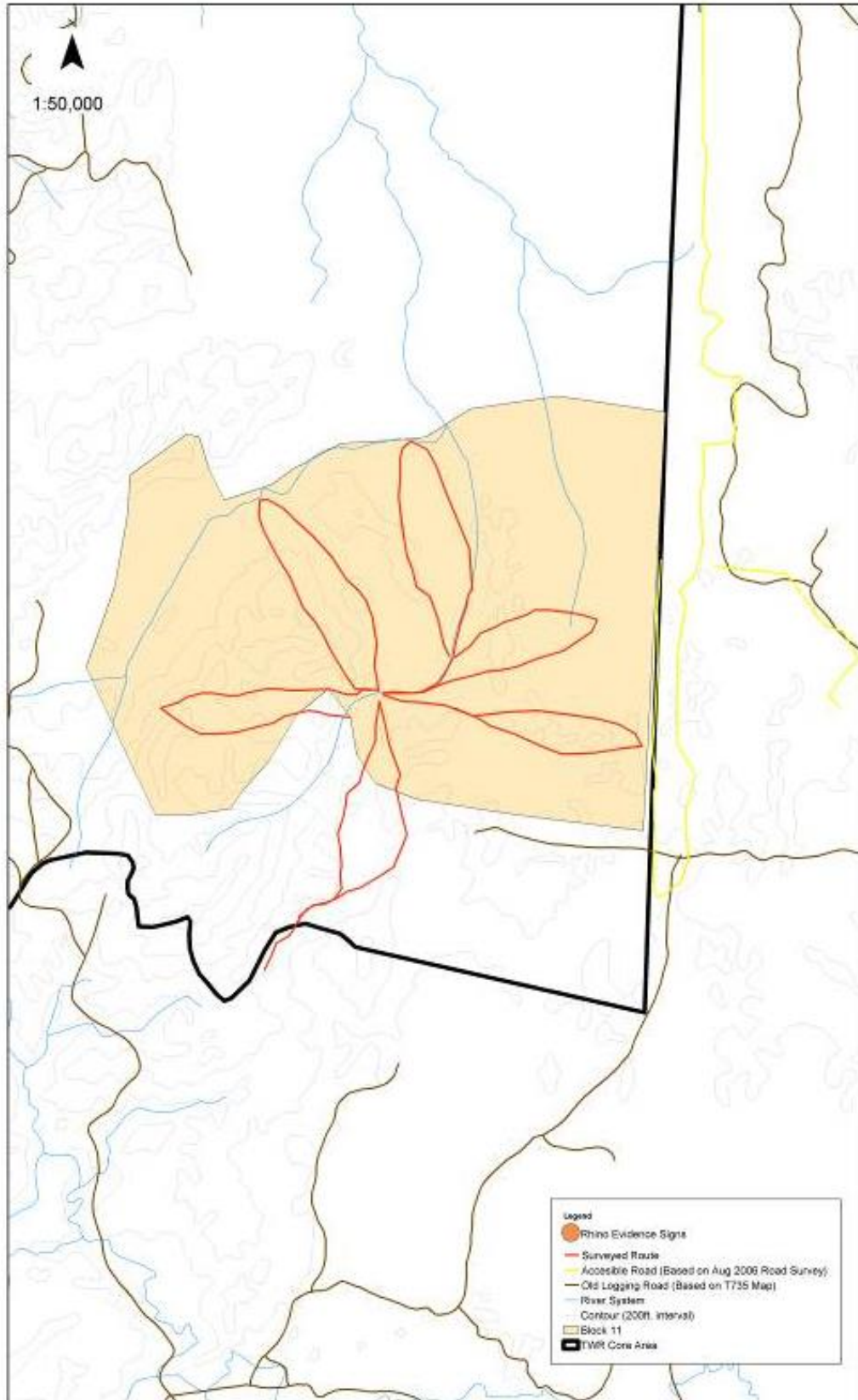
BLOCK - 7



BLOCK - 8



BLOCK - 10



BLOCK – 11

APPENDIX-6

PHOTOGRAPHS OF RHINOCEROS SIGNS AND ENCORACHEMNT SIGNS



Photo illustrating the first set of rhino foot print discovered in Area -12



Fresh active wallow used by rhino in Area-12



Horn marks made by rhinoceros in area-12



Second set of rhino footprint in Area-12



Twisted and broken tree eaten by rhinoceros in Area-12



Abandoned materials left behind the intruders in Area-4



Empty gun cartridge and cigarette in Area-4



Fresh Tembadau dung in Area-4



Empty cartridge found in Area-4



The first set of rhinoceros footprint found in Area-3



The second set of rhinoceros footprint found in Area-3



The active wallow used by rhinoceros in Area-3



Broken tree trunk by Sumatran rhinoceros in Area-3



Rhinoceros urine splashes on the leaves in Area-3



Abandoned camp by intruders in Area-6