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**RHINO SURVEY EXPEDITION
ROYAL BELUM STATE PARK,
PERAK
9 – 17 July 2007**

Ahmad Zafir Abdul Wahab



**Organised by: WWF-Malaysia, Perak State Parks Corporation
& Department of Wildlife and National Parks**

Rhino Survey Expedition, Royal Belum State Park, Perak, 9 – 17 July 2007

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- Pejabat Penerangan Gerik

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Table of Content

Acknowledgements	i
List of Tables	iii
List of Figures	iii
List of Acronyms and Abbreviations	iv
Executive Summary	1
Ringkasan Eksekutif	3
1.0 Introduction	5
1.1 Biology, ecology and populations	5
1.2 The Royal Belum State Park	7
1.3 Workshops, meetings and Action Plans	7
1.4 WWF-Malaysia Rhino Rescue Project	8
1.5 Aims of the Rhino survey expedition	10
2.0 Methods	12
2.1 Site selection	12
2.2 Participants	17
2.3 Survey	18
2.4 Recording of rhino presence and other wildlife data	19
3.0 Results	19
3.1 Human activity	28
4.0 Conclusion and Recommendations	30
5.0 Future Plans and Follow-ups	32
References	35
Appendices	

List of Tables

Table 1: Population estimates and distribution of wild Sumatran rhinos in 1997 in Peninsular Malaysia.....	6
Table 2: List of team leaders and number of team members.....	17
Table 3: Areas covered in each survey block	19
Table 4: Encounter rate for selected large mammals in RBSP	28

List of Figures

Figure 1: General location of Royal Belum State Park.....	11
Figure 2: Location of previous rhino records in RBSP	13
Figure 3: Elevation map for RBSP	14
Figure 4: Slope classes for RBSP.....	15
Figure 5: Selected survey blocks for the survey in RBSP	16
Figure 6: Overall survey routes in RBSP	20
Figure 7: Trekking route for Block 1	21
Figure 8: Trekking route for Block 2	22
Figure 9: Trekking route for Block 3	23
Figure 10: Trekking route for Block 4	24
Figure 11: Trekking route for Block 5.....	25
Figure 12: Trekking route for Block 6.....	26
Figure 13: Trekking route for Block 7	27
Figure 14: Map showing location of abandoned camps (excluding army and Orang Asli camps) and snares/traps found during the survey.	29
Figure 15: Map showing areas surveyed in RBSP.....	33
Figure 16: Map showing areas to be surveyed in RBSP.....	34

List of Acronyms and Abbreviations

4WD	Four-wheel drive
AsRSG	Asian Rhino Specialist Group
CITES	Convention on the International Trade in Endangered Species
DWNP	Department of Wildlife and National Parks
IRCP	International Rhino Conservation Programme
IRF	International Rhino Foundation
IUCN	World Conservation Union
MNS	Malaysian Nature Society
PSPC	Perak State Parks Corporation
RBSP	Royal Belum State Park
RPV	Rhino Protection Unit

Executive Summary

Listed as 'Critically Endangered' by the IUCN, the Sumatran rhinoceros (*Dicerorhinus sumatrensis*) is internationally recognised as the most endangered rhino species. Throughout their current range, the species persists in mainly small and isolated sub-populations. Poaching and habitat loss are both major factors that have been attributed to their population decline.

Royal Belum State Park (RBSP) is one of the areas in Peninsular Malaysia where the Sumatran rhinos may still survive. With an acreage of 1175km², this park is the second largest protected area in Peninsular Malaysia, after Taman Negara (4343 km²).

Given the general paucity in knowledge on rhinos and their dramatic decline in numbers, the Sumatran Rhino Rescue Project, a five-year collaboration between WWF-Malaysia and Honda Malaysia was initiated. This project will try to increase efforts in protecting the near-extinct species in Malaysia.

As part of the project, this rhino survey expedition was organised in RBSP from 9th to 17th July 2007 to investigate the presence and distribution of Sumatran rhinos within the park. The survey was jointly organised by WWF-Malaysia, Perak State Parks Corporation (PSPC) and Department of Wildlife and National Parks (DWNP). Seven areas (survey blocks) were chosen to be surveyed for the presence of rhinos based on previous records of rhino presence by DWNP, slope and elevation mapping, and aerial surveys.

A total of 61 people were involved in this survey with representatives from:

- DWNP
- Indonesia Rhino Conservation Programme
- Malaysian Nature Society
- Perak State Forestry Department
- PSPC
- Sabah Foundation
- SOS Rhino
- WWF-Indonesia
- WWF-Malaysia

This survey also included included Orang Asli inhabiting the surrounding area as forest guides. Divided into 11 teams, the survey teams covered areas along rivers and valleys and along main ridges in each survey block. Besides documenting possible evidence indicating the presence of rhinos, the presence of other wildlife was also recorded.

With a total trekking route of 229.3km, none of the teams recorded any direct evidence indicating the presence of rhinos in the RBSP. Only old wallows were recorded in Block 1, 3 and 7. Other possible rhino signs include:

- i) Possible rhino feeding sign in Block 1. However, no rhino tracks were found, hence it could not be confirmed as rhino evidence.

- ii) Two wallows in Block 6 that appear to be still active although the identification of the animal using them remains undetermined.

Even though no rhinos were recorded, the presence of key species such as the Asian elephant (*Elephas maximus*), Malayan tiger (*Panthera tigris*), Malayan tapir (*Tapirus indicus*) and seladang (*Bos gaurus*) was confirmed.

Most of the survey teams found numerous signs indicating encroachment in RBSP. It is believed that the main reason for encroachment into RBSP is for agar wood (*Aquilaria spp.*) extraction, but there was also evidence of poaching on large mammals.

If there are still rhino individuals left in the RBSP, population densities might be very low and this is most likely a direct result of human activities, including poaching. Strategies must be developed to prevent poaching and encroachment in RBSP. Further steps must also be taken to ensure that the natural features of RBSP are protected. This should be done by PSPC, which is the management authority of the park, in collaboration with the Army and DWNP to strengthen enforcement activities in this area.

Since there is a high possibility that the rhino population in RBSP is very low, this project should strongly consider other areas (e.g., Titiwangsa range and Temengor) that might contain viable populations of rhinos. These other areas should be carefully monitored and the rhinos found must be protected from poachers and other illegal activities.

To protect the future of rhinos and other wildlife species in Peninsular Malaysia all related stakeholders should work together to conserve and protect Malaysia's remaining natural heritage.

Ringkasan Eksekutif

Badak Sumatera (*Dicerorhinus sumatrensis*) dikategorikan sebagai 'Sangat Terancam' oleh IUCN dan diperakui merupakan badak yang paling terancam di seluruh dunia. Badak Sumatera kini hanya wujud dalam populasi-populasi kecil dan sub-populasi yang terasing. Aktiviti perburuan dan kehilangan habitat merupakan faktor utama yang menyebabkan pengurangan populasi badak.

Taman Negeri Royal Belum (TNRB) merupakan salah satu kawasan di Semenanjung Malaysia yang masih mungkin mempunyai harapan untuk pemuliharaan badak Sumatera. Dengan keluasan 1175km², taman ini merupakan kawasan perlindungan kedua terbesar selepas Taman Negara (4343 km²).

Menyedari kekurangan pengetahuan berkenaan badak dan pengurangan populasinya yang mendadak, satu usahasama selama lima tahun antara WWF-Malaysia dan Honda Malaysia telah dimulakan dan dinamakan Projek *Sumatran Rhino Rescue*. Projek ini akan cuba meningkatkan usaha melindungi spesies yang hampir pupus ini di Malaysia.

Sebagai sebahagian daripada projek ini, ekspedisi survei badak telah dijalankan dari 9 ke 18 Julai 2007 untuk menyiasat kewujudan dan taburan badak Sumatera di Taman Negeri ini. Survei ini di anjurkan bersama oleh WWF-Malaysia, Perbadanan Taman Negeri Perak (PSPC) dan Jabatan Perlindungan Hidupan Liar dan Taman Negara (PERHILITAN). Tujuh kawasan (Blok survei) telah dipilih untuk kajian kehadiran badak berdasarkan:

- Rekod-rekod oleh PERHILITAN
- Pemetaan kecuraman dan aras ketinggian
- Survei udara

Seramai 61 orang peserta telah terlibat dalam survei ini dari organisasi-organisasi berikut:

- PERHILITAN
- Program Konservasi Badak Sumatera (IRCP)
- Persatuan Pencinta Alam Malaysia (MNS)
- Jabatan Perhutanan Negeri Perak
- Perbadanan Taman Negeri Perak
- Yayasan Sabah
- SOS Rhino
- WWF-Indonesia
- WWF-Malaysia

Survei ini turut melibatkan Orang Asli dari kawasan sekitar sebagai penunjuk arah di dalam hutan. Kesemua peserta telah dibahagikan kepada 11 pasukan. Setiap pasukan menjalankan survei di sepanjang sungai dan lembah serta sepanjang permatang-permatang utama di setiap blok survei. Selain dari data badak, setiap pasukan juga dikehendaki merekodkan data kewujudan hidupan liar yang lain.

Dengan jumlah laluan 229.3km, tiada data berkenaan badak direkodkan oleh mana-mana pasukan sewaktu survei ini. Hanya bekas kubang-kubang lama direkodkan di Blok 1, 3 dan 7.

Terdapat juga kemungkinan kesan-kesan badak yang lain iaitu:

- i) Kesan makanan yang mungkin ditinggalkan oleh badak di Blok 1. Walaubagaimanapun, tiada bekas tapak badak yang ditemui di kawasan berkenaan yang membolehkan kesan berkenaan dipastikan telah dibuat oleh badak.
- ii) Dua kubang yang masih aktif ditemui di Blok 6, tetapi tidak dapat dipastikan haiwan yang menggunakan kubang-kubang tersebut.

Walaupun tiada badak yang direkodkan, haiwan-haiwan penting seperti gajah Asia (*Elephas maximus*), harimau Malaya (*Panthera tigris*), tapir Malaya (*Tapirus indicus*) dan seladang (*Bos gaurus*) telah direkodkan.

Hampir kesemua pasukan survei menjumpai banyak kesan-kesan yang menunjukkan bahawa terdapat aktiviti pencerobohan di kawasan TNRB. Dipercayai bahawa tujuan utama pencerobohan ini adalah untuk mendapatkan kayu gaharu (*Aquilaria spp.*). Tetapi, terdapat juga kes-kes pemburuan dilaporkan dijalankan oleh penceroboh.

Sekiranya masih terdapat badak di TNRB, populasinya dijangkakan amat kecil dan kemungkinan besar disebabkan oleh aktiviti-aktiviti manusia termasuk pemburuan. Strategi-strategi perlu dibangunkan bagi menghentikan pemburuan dan pencerobohan di TNRB. Langkah-langkah perlu diambil bagi memastikan khazanah semulajadi di kawasan ini di lindungi. Sebagai pihak yang bertanggungjawab dalam pengurusan taman ini, Perbadanan Taman Negeri Perak seharusnya menjalankan langkah-langkah yang dikenal pasti bersama-sama pihak-pihak berkepentingan yang lain seperti pihak tentera dan PERHILITAN bagi meningkatkan usaha-usaha penguatkuasaan untuk menangani isu-isu yang dihadapi di kawasan ini.

Oleh kerana terdapat kemungkinan besar bahawa populasi badak di TNRB adalah sangat kecil, projek ini seharusnya kini menumpukan perhatian ke kawasan-kawasan lain (contohnya Banjaran Titiwangsa dan Temengor) yang masih mempunyai badak Sumatera yang berdaya hidup. Kawasan-kawasan ini harus dipantau dan dilindungi daripada aktiviti pemburuan dan aktiviti-aktiviti haram yang lain.

Bagi memastikan badak-badak di Semenanjung Malaysia mempunyai masa depan yang cerah, kesemua pihak berkepentingan yang berkaitan harus bekerjasama bagi memulihara dan melindungi khazanah Malaysia yang tidak ternilai ini.

1.0 Introduction

1.1 *Biology, ecology and populations*

The Sumatran rhinoceros (*Dicerorhinus sumatrensis*) is the smallest of the three species of Asian rhinos. There are three recognized sub-species; *Dicerorhinus sumatrensis sumatrensis* is the sub-species that can be found in Peninsular Malaysia (Foose and Van Strien, 1997). Fully grown adults, usually dark grey-brown in colour, stand at around 1.5m at the shoulder with a body length of around 2-3m and a weight of between 600 and 950kg (WWF, 2007). It is the only Asian rhino with two horns, though the rear horn is typically much smaller than the front, often appearing as nothing more than a bump. The calves are born with a dense covering of reddish-brown hair, which is typically retained into young adulthood. However, in natural conditions, most of the hair is lost as the animal pushes its way through dense forest.

Female Sumatran rhinos become mature at 6-7 years, and males at 10 years. Females have a very long gestation period of more than 450 days, only one calf is born at intervals of 3-5 years (IRF, 2002). Females accompany their young for up to 18 months. Adults are mostly solitary and encounters between males and females usually happen during the breeding season.

Though their biology is fairly well known through captive studies, details of the ecology and population dynamics are poorly understood. The Sumatran rhino is notoriously difficult to study in natural conditions as it is primarily solitary in nature and, as a result, occurs in naturally low densities (Van Strien, 1985). They are found in various habitats, ranging from swamps and lowland forest to montane forests, but are usually found in areas typified by thick understory vegetation. Befitting its forested habitat, it is a browser, feeding on a wide variety of vegetation including leaves, shoots, bark of young saplings, shrubs and fallen fruits.

Despite this general paucity in knowledge, the recent decline in their numbers has been dramatic enough to alarm conservation scientists. As such, it is listed as 'Critically Endangered' by the IUCN and in Appendix I by CITES. The Sumatran Rhino is internationally recognised as the most endangered of the three Asian species. In Malaysia, it is protected under the Protection of Wildlife Act of 1972.

Historically, the Sumatran rhino was found from the foothills of the Himalayas, through Burma, Thailand, and the Malay Peninsula (Mohd. Khan, 1989). Healthy island populations were also present on the islands of Sumatra and Borneo. The present-day global population is thought to be around 300 animals whilst in Malaysia, the species persists in mainly small and isolated sub-populations (Table 1). Only six of these were considered to be even reasonably viable for long-term action: Tabin and Danum Valley in Sabah, Ulu Selama, Taman Negara, Endau Rompin and Belum in Peninsular Malaysia.

In 1987, it was estimated that there were 109 individuals in 16 sites in Peninsular Malaysia, with two of the largest populations in Taman Negara National Park and Endau-Rompin forest (part of which is now Endau-Rompin National Park) (Mohd Khan, 1987). Subsequent estimates, made under the auspices of the IUCN/SSC

Asian Rhino Specialist Group (AsRSG), showed a disturbing trend with the estimated rhino population in Peninsular Malaysia, which fell from 85-126 in 1993 to around 79 in 1995 (Table 1).

Two major factors have been attributed to the population decline over the past few decades: i) poaching for the horn (used in traditional Chinese medicine); and ii) habitat loss due to logging, conversion to agriculture, human settlement and shifting cultivation (WWF, 2002).

Table 1: Population estimates and distribution of wild Sumatran rhinos in 1997 in Peninsular Malaysia

Location	Estimated population		Habitat available (km ²)	Protection status	Potential carrying capacity
	AsRSG 1993	AsRSG 1995 Known/Probable			
Endau-Rompin	20-25	5/4	1,000+	State park	110-160
Taman Negara	22-36	15/29	4,400	National Park	220+
Selama	10-15	6/1	1,200	Primary & Secondary forest	?
Belum	10+	10/0	2,400	State Park	?
Sungai Dusun	1-2	1/0	40	Game Reserve	15
Gunung Belulut	3-4	1/0	230	Forest land	23
Mersing coast	3-5	1/0	?	Secondary forest	0
Sungai Depak	2-3	?	?	Secondary forest	0
Sungai Yong	3-5	?	?	Secondary forest	0
Kuala Balah	2-4	0/0	?	Secondary forest	0
Bukit Gebok	1-2	0/0	?	Secondary forest	0
Krau	1-2	0/0	500	Game Reserve	50
Gunung Inas	2-4	??	-		?
Bubu forest	2-3	0/0	-		?
Besut	3-5	1/0	-	Secondary forest	?
Total	85-125+	41/34	7370+		418-468+

Source: adapted from Foose and Van Strien (1997)

In terms of research, very few studies have been carried out on the Sumatran rhino. Due to this, and as alluded to earlier, there is very little known about its preferred habitat, biology and ecology. There is, however, some literature that deals with general information on the Sumatran rhino (Borner, 1979; Flynn and

Tajuddin, 1984; Strickland, 1967;). Data on Sumatran rhinos in the Royal Belum State Park (RBSP) and elsewhere in Peninsular Malaysia are generally limited to biodiversity inventories carried out by DWNP. However, brief notes on rhino observations were mentioned in these wildlife inventories.

In a report on the study of wildlife reserves in West Malaysia from 1966-1968, Stevens (1968) noted that the upper Sungai Perak had at least two Sumatran rhinos. In 1984, there were an estimated 3-5 rhinos in the area (Flynn and Tajuddin 1984). In 1993, the estimated number was more than 10 rhinos, but after surveys in 1994-1995, this was revised to five rhinos. The patrolling surveys carried out by DWNP from 1996-1998 estimated a population of 5-8 for the Belum and Temengor area (Zainuddin, 1999).

1.2 The Royal Belum State Park

The Royal Belum State Park (RBSP) is located in the state of Perak Darul Ridzuan, in northern Peninsular Malaysia (Figure 1). Stretching over 1175km² of lush tropical forests, RBSP is the second largest protected area in Peninsular Malaysia, after Taman Negara (4343km²). It is connected to the Hala-Bala Wildlife Sanctuary and Bang Lang National Park in Thailand, forming a wildlife corridor that enables animals to cross over borders.

RBSP is home to some of the rarest plant species, including the Rafflesia flower (*Rafflesia* spp.) and a species of cycad, which is a palm-like plant that has existed since the age of dinosaurs. This area is the only place where all 10 species of hornbills that are resident to Malaysia can be found (Sukswan and Kumaran, 2003). RBSP is also a breeding ground for at least 14 globally-threatened wildlife species, including the Malayan tiger (*Panthera tigris jacksoni*), the Asiatic elephant (*Elephas maximus*), the Malayan tapir (*Tapirus indicus*) and the white-handed gibbon (*Hylobates lar*).

In March 2001, the Perak State Legislative Executive Assembly passed the *Perak State Parks Corporation Enactment 2001*, which allows the State government to gazette state parks. In July 2003, the Sultan of Perak declared the Belum State Park as the Royal Belum and on 13 April 2007, the Royal Belum State Park was officially gazetted.

RBSP is bordered by Kelantan state to the east, Sungai Gadong in the west and by Thailand in the north. The southern border of the park is demarcated 1.5km to the north of the East-West highway. It is one part of the largest contiguous forest block in Peninsular Malaysia, consisting of the Ulu Muda forests in Kedah, the Bintang Range forests, the Temengor Forest Reserve in Perak, and extends all the way down the Titiwangsa Range.

1.3 Workshops, meetings and Action Plans

In 1987, the "Status Survey and Conservation Action Plan" was produced by the AsRSG. In 1996, a Population Viability Analysis concluded that, without increased protection, the Sumatran rhino could become extinct in Malaysia by the year 2020.

The Action Plan was summarily updated in 1997 with the following recommendations for the Malaysian populations:

- i) Protect and manage the rhino and its habitat.
- ii) Gather information on population viability and habitat requirements.
- iii) Promote scientific research and dissemination of data on captive individuals.
- iv) Increase “sanctuary” populations as sources for reintroduction.

In 1993, the Malaysia Rhino Conservation Action Plan was produced by the three responsible government agencies, namely the Department of Wildlife and National Parks (DWNP) which is in-charge of conservation work in Peninsular Malaysia, the Sabah Wildlife Department and the Sarawak Forestry Department. This document, based on the IUCN Action Plan, identified four main objectives:

- i) Provide *in situ* protection and management to key populations and habitat.
- ii) Develop target population numbers and distribution.
- iii) Experiment with a gene pool sanctuary as a means for propagation.
- iv) Continue to participate in a global propagation and research programme for supporting *in situ* efforts.

In 1995 Malaysia received through AsRSG and the International Rhino Fund (IRF), half of a USD2 mil Global Environment Facility grant to form and deploy, over a three year period, Rhino Patrolling Units (RPU). Since the end of that funding period (1998), RPU related activities have been funded by AsRSG and IRF along with a number of recruited donors such as the US Fish and Wildlife Service and WWF-International. The RPUs are engaged in anti-poaching patrols and community outreach programmes, and are generally considered to be the best method for effective rhino protection. In Indonesia, reports are that this system is working very well with the remit of the units extended to tiger protection. In Malaysia, however, the system appears to be suffering from a lack of resources, capacity and political will.

Acknowledging the need for collaborative efforts in the conservation of the species, a DWNP/WWF-Malaysia workshop, entitled “Working Together for the Conservation of Rhinos and Other Wildlife” was held in 2006. The main objective of the workshop was to discuss the implementation of the current project and the potential role of each agency in carrying out specific activities identified. Points of particular concern included law enforcement and policy, protected areas and ecotourism, research and conservation and awareness and training. Other important matters raised during the workshop included ways in which the project could support and enhance DWNP’s RPU system and how to ensure sustainability of rhino conservation in Malaysia.

1.4 WWF-Malaysia Rhino Rescue Project

The Rhino Rescue Project is a five-year collaboration between WWF-Malaysia and Honda Malaysia to raise efforts in protecting the near-extinct Sumatran rhino in Malaysia. WWF-Malaysia works closely with its main partners, the Perak State Park Corporation (PSPC) and the Department of Wildlife and National Parks (DWNP) and, through its sister project in Sabah, with the Sabah Wildlife

Department, Sabah Forestry Department, and Sabah Foundation to further strengthen Sumatran rhino conservation in Malaysia. The current project site for this project in Peninsular Malaysia is the Royal Belum State Park.

In choosing RBSP as the initial focal site for the project, several criteria were considered. Primarily, the site needed to be recognised as a priority area in both Action Plans (see 1.3) and to have a relatively stable status in terms of protection. Apart from that, the condition of the surrounding forest cover was also considered; and the current level of work being carried out by WWF-Malaysia and partner organisations in the area was also factored in.

The conservation activities in this project are designed to achieve the main outputs which include increasing efforts to maintain and protect the rhino's habitat, supporting relevant bodies in their efforts to eradicate poaching, ensuring maximum outreach to local communities on the need to save rhinos, and increasing research efforts to better understand the ecological and spatial needs of the rhinos.

The overall goal of the project in Peninsular Malaysia is:

“To determine population status of the Sumatran rhino in Peninsular Malaysia and, where applicable, implement measures for their protection towards the recovery, to AsRSG recommended levels and maintenance of stable Sumatran rhino populations”

In order to achieve this goal, the following objectives and activities have been identified:

Objective 1: By 2010, sufficient data on the distribution, density and threats to the Sumatran rhinos, in the Peninsular Malaysia, are obtained and steps for their effective conservation are taken

Currently, population estimates for Peninsula Malaysia rely on those made in the 1993 Malaysian Action Plan. One of the first activities of the Peninsular Malaysia project will be to carry out extensive population surveys of key forest sites. This will be carried out by dedicated WWF-Malaysia teams carrying out regular and directed surveys. Large-scale, multi-agency surveys may also be employed by the project as and when such an approach is deemed practical.

Objective 2: By 2009, there exists an effective and sustainable mechanism for the protection of the Sumatran rhino, from poaching and habitat loss, within Peninsular Malaysia

With poaching still being a major threat to Sumatran rhinos in Malaysia, a key factor to the success of the project will be the implementation of an effective and consistent on-the-ground presence. Those tasked with this responsibility will carry out regular patrols at the focal sites with the overall objective of deterring poachers from the area. In Peninsular Malaysia, this will take the form of an RPU and will draw on the methods employed by similar units in other parts of the world, particularly Indonesia. Primarily, this will involve implementing an anti-poaching patrol team that, through the project, will receive training in monitoring and enforcement and basic patrol equipment. Of particular importance is that RPUs become self-reliant after project completion. To this end, the project will work with

its partners to ensure that sustainable funding mechanisms are in place before the end of the project. Once established, the RPU will report directly to the project, as well as the host partner, to allow project monitoring and evaluation processes to take place. A system for this will be put in place at the beginning of the project.

As a complement to both the anti-poaching patrols and the community engagement activities (below), TRAFFIC-SEA, an important partner to the project, will carry out wildlife trade surveys in Perak and southern Thailand area. This baseline data will be used to identify further areas where intervention, by the project, can help to eliminate the poaching threat.

Objective 3: By 2010 there is effective habitat protection and land use planning in selected sites

Due to its potential role as a major gateway for illegal activities in the northern part of the country, RBSP requires a management plan to ensure effective management of the park. It is expected that a timeframe of about 2-3 years will be needed to prepare this plan. The preparation of the plan could be packaged into different components, including resource management, tourism development and management, human resource development and management, and socio-economical and business plans. Data on the distribution and ecology of rhinos collected by the project's field survey team will be incorporated into a rhino specific conservation strategy that will form part of the RBSP management plan.

1.5 Aims of the Rhino survey expedition

The primary objective of this survey was to investigate the presence and distribution of Sumatran rhinos within the RBSP.

The secondary objectives were:

- To identify breeding signs by giving strict emphasis on footprint measurements and complemented by other possible observation (e.g., direct sightings).
- To identify the possibility of a jointly-coordinated long-term monitoring programme for rhino presence and distribution within the park by WWF-Malaysia, PSPC and DWNP.
- To look for signs of illegal hunting, encroachment and other human intrusions within the RBSP.

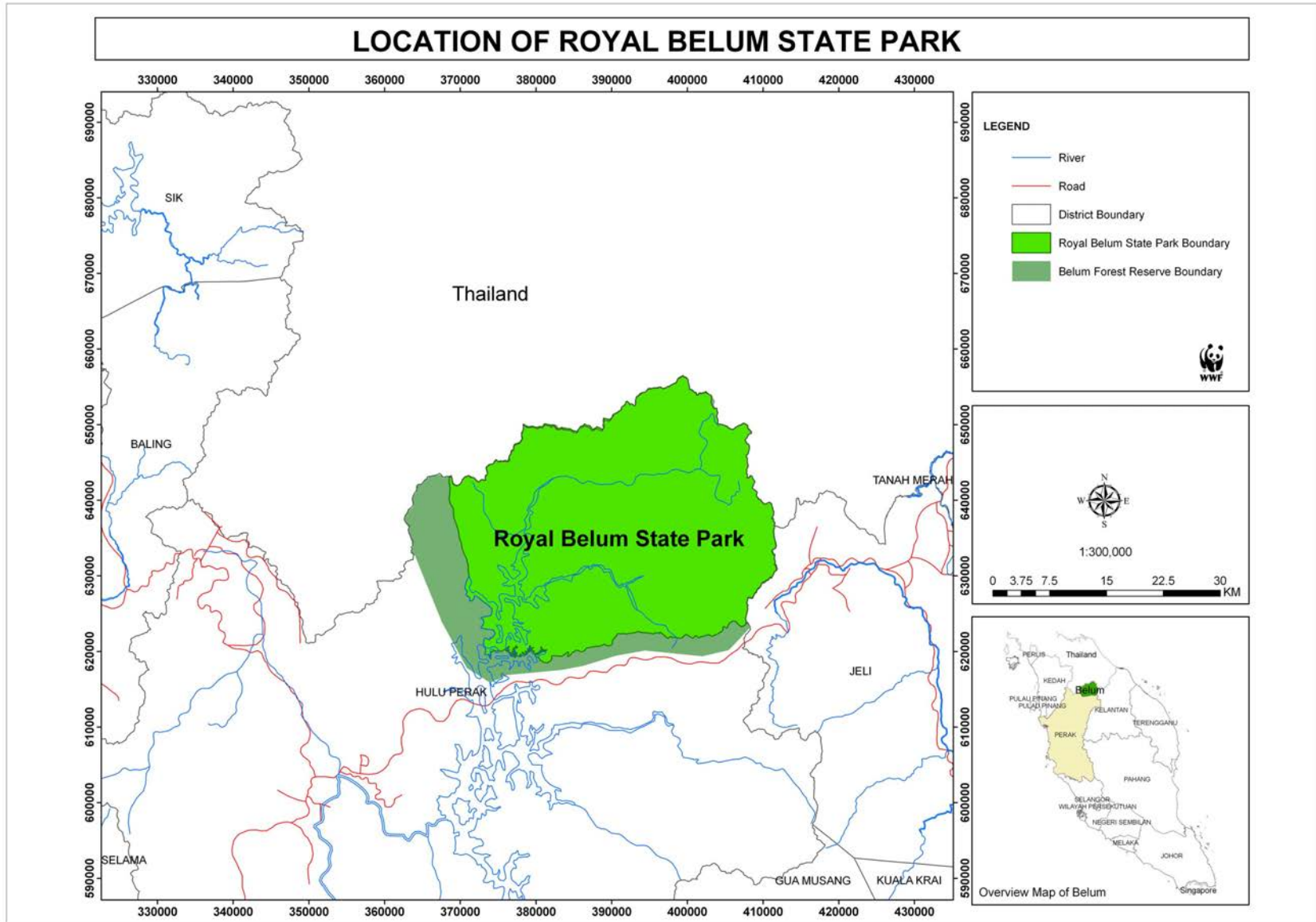


Figure 1: General location of Royal Belum State Park

2.0 Methods

2.1 Site selection

Seven areas were chosen to be surveyed for the presence of rhinos in RBSP. Based on experience from the previous WWF-Malaysia rhino surveys in Danum Valley, discussions among the project team members and opinions of wildlife experts, three criteria were used to select these survey areas.

i) Previous records of rhino presence by DWNP

Locations of previous records of rhino presence were identified based on maps available in inventory reports by DWNP in the Belum area from 1992 to 2001 (Figure 2).

ii) Slope and elevation mapping

Elevation and slope maps were derived from 20m contour interval maps by using ARCGIS 9.2 software (3D analyst extension) (Figures 3 and 4). The maps enabled the research team to identify areas like mountain ridges and floodplains where rhinos are likely to occur. These maps also helped the project team to identify areas that are not easily accessible due to the difficult terrain.

iii) Aerial survey

An aerial survey was carried out on 27 July 2007. The target of the survey was to assess the general condition of the study area and to identify areas that are suitable for rhino habitat from an aerial view. Several aerial photographs taken during the survey are shown in Appendix 1.

Based on all the information gathered, survey blocks of approximately 100km² each were selected (Figure 5). Some of the blocks were identified as key areas (Block 1, Block 3, Block 4 and Block 5) as these blocks were previously reported by DWNP to contain rhinos (DWNP, 2002).

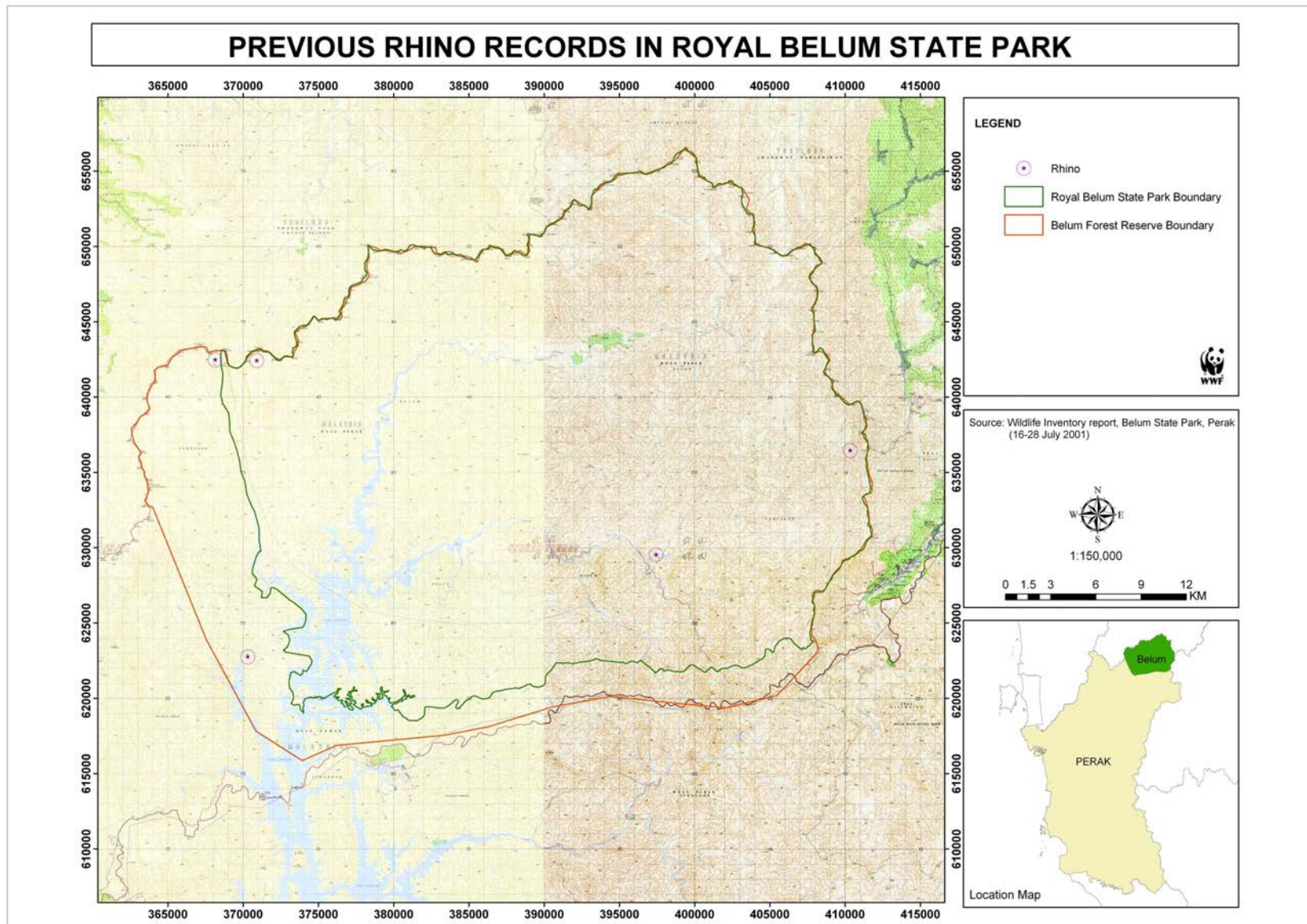


Figure 2: Location of previous rhino records in RBSP

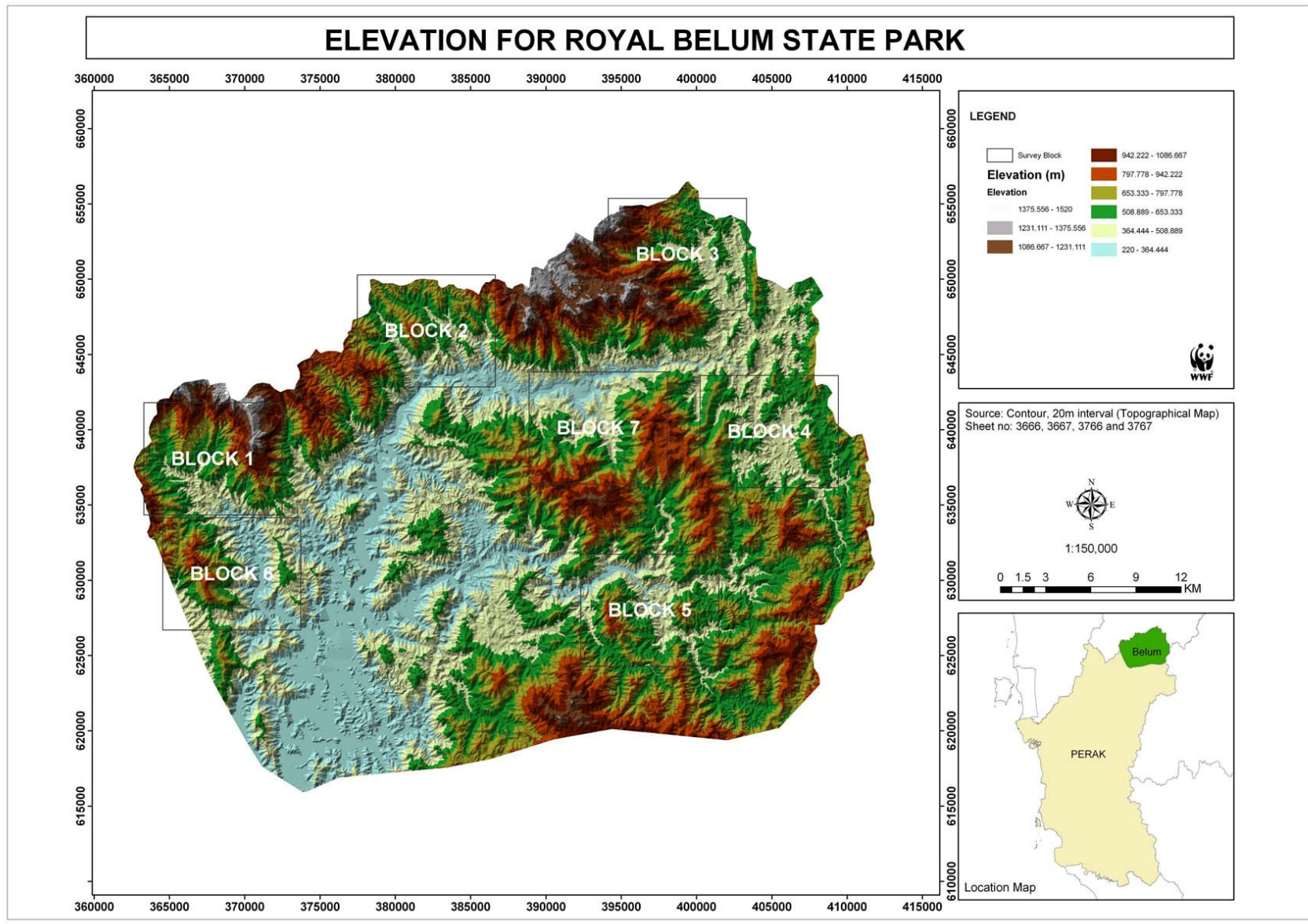


Figure 3: Elevation map for RBSP

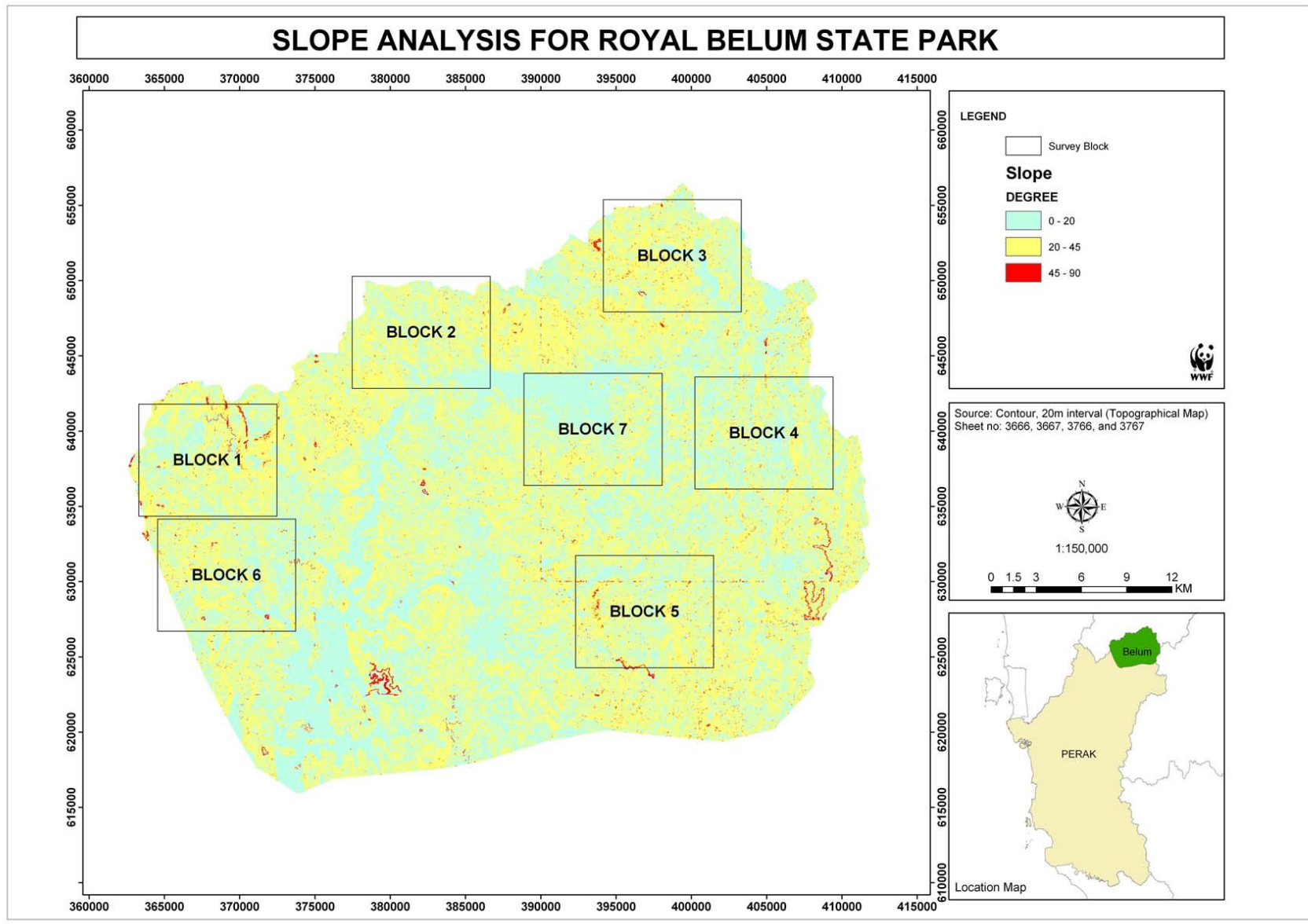


Figure 4: Slope classes for RBSP

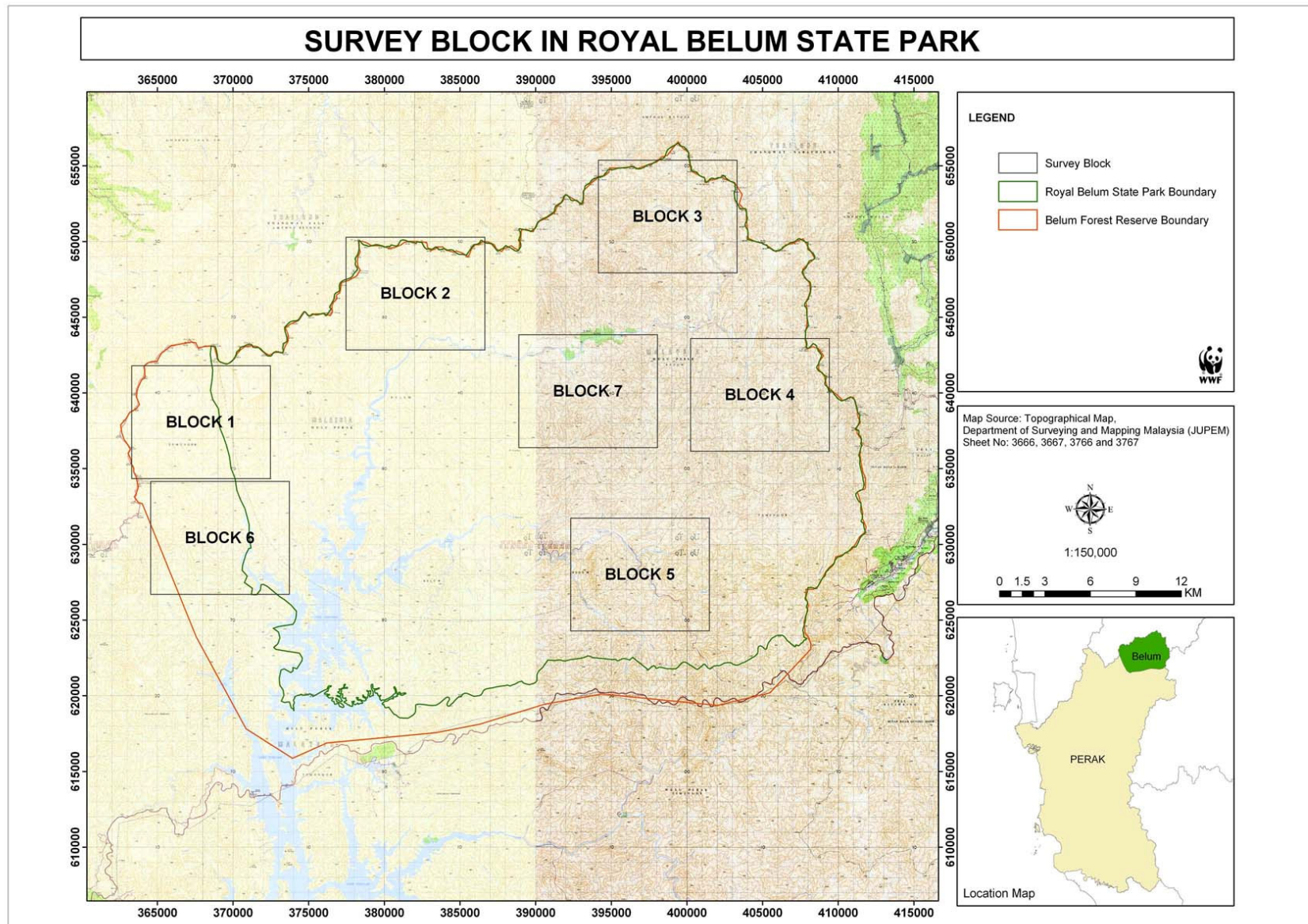


Figure 5: Selected survey blocks for the survey in RBSP

2.2 Participants

A total of 61 people were involved in this survey with representatives from:

- DWNP
- IRCP
- MNS
- Perak State Forestry Department
- PSPC
- Sabah Foundation
- SOS Rhino
- WWF-Indonesia
- WWF-Malaysia

In addition to these organisations, eight people from the local Orang Asli communities were also involved as part of the survey teams, playing effective roles as forest guides. The list of participants involved in the survey and their affiliations is presented in Appendix 2.

The survey participants were divided into 11 teams; each team consisted of 5-6 people with a leader and an assistant team leader (Table 2). Two survey teams were assigned to each key area. Where feasible, sub-teams were formed in order to cover larger areas. Team leaders were allocated to each team based on their experience in the field and in rhino surveys.

Table 2: List of team leaders and number of team members

Team	Survey area	Team leader	Assistant team leader	Number of team members
1a	Block 1	Jabanus Muin	Suzali Bin Jaya	6
1b	Block 1	Maman Suherman	Edward Inggog	6
2	Block 2	Mark Rayan	David James	5
3a	Block 3	Rayner Bili	Marino	6
3b	Block 3	Saharuddin bin Ramli	Arief Rubianto	6
4a	Block 4	Azlan Mohamed	Ridwan Setiawan	6
4b	Block 4	John Bin Japil	Jorry Jakiwa	6
5a	Block 5	Richard Sanggul	Erman Tara	5
5b	Block 5	Dr.Sivapiragasam Thayaparan	Zen Afrial	5
6	Block 6	Francis Jessius	Mohamed Ariff b Yunus	5
7	Block 7	Ahamed bin Hamid	Gudil Porimon Gihud	5

Teams were transported to the designated survey area either by helicopter, 4WD vehicles, or by boats. Six main teams were deployed by helicopter (Block 1, Block 3, Block 4), three teams (Block 2, Block 6 and Block 7) were deployed by boats, and the remaining teams (Block 5) were deployed by 4WD vehicles and had to walk on foot to the sub-base camps. Each team was given basic camping equipment and food rations for nine days in the forest.

2.3 Survey

Before the survey, a briefing session was conducted for all participants regarding the techniques to be employed in a general wildlife survey and data recording with a special emphasis on rhinoceros.

Issues that were highlighted during the briefing session included:

- Usage of datasheets

Each team was given a set of datasheets to record their daily trekking routes, encounters of rhino signs and other big mammals, poaching signs and summary of their trekking effort (Appendix 3a, 3b, 3c and 3d). All the participants were briefed on the purpose of each datasheet and data recording protocols.

- Differences between tapir and rhino footprints

This had to be discussed to ensure precise rhino data collection, especially since participants with little experience in field surveying techniques for rhino and tapir may not be able to distinguish the tracks of both species.

- Recording of other wildlife data

Apart from looking out for the presence of rhinos, the participants were briefed about the need to record data of other large mammals.

Rabinowitz (1992) emphasised that rhino surveys using the transect survey method had uncovered very little rhino sign due to the species' low density, secretive habitat, and the low probability of encountering the animal's signs. Therefore, in this survey, it was decided not to conduct the normal transect survey, and instead of walking on pre-determined transects or trails, all the survey teams were recommended to concentrate their surveys where rhinos were known to be present (i.e., based on the species behaviour pattern and current knowledge of their distribution from literature).

The survey methods followed the previous rhinoceros survey technique that was carried-out by WWF-Malaysia in Danum Valley Sabah, which was based on Borner (1979) and Van Strien (1986). Following this method, the survey team trekked from their base camps each day for a continuous period of eight days. Survey routes for each team covered areas (i) along rivers and valleys; and (ii) along main ridges in each survey block. The survey teams also searched for saltlicks and other areas where rhinos are likely to be found such as near hill slopes and big-fallen trees where wallows are usually made by rhinos.

Wherever feasible, sub-base camps were shifted to another area during the latter phase of the survey period. This enabled the team to cover as wide an area as possible. The detailed schedule of the survey is given in Appendix 4.

2.4 Recording of rhino presence and other wildlife data

A set of standardised data sheets were prepared, as shown in Appendix 3a - 3d. Efforts were focused not only on searching for and recording rhino spoor, direct evidence such as tracks, wallows and dung, but also indirect evidence such as broken or twisted saplings damaged during feeding, and mud marks on trees left by animals as they proceed through the dense undergrowth after visiting a mud wallow.

Apart from that, presence of other species of wildlife present in the survey areas was also recorded, with teams specifically asked to look-out for signs of Asian elephant, tiger and other large mammals.

3.0 Results

The survey teams walked trekking routes spanning a total of 229.3km (Table 3). Total trekking routes for each block are shown in Figure 6 to Figure 13. During the survey, none of the teams recorded any direct evidence indicating the presence of rhino in the RBSP. The only possible rhino signs found were what appeared to be abandoned wallows of 4-5 years old in block 1, 3 and 7 (Ariff and Maman pers. comm.). Besides that, the teams from Block 1 and Block 6 recorded other possible rhino signs which are:

1. Possible rhino feeding signs in Block 1. However, no rhino tracks were found and, hence it could not be confirmed as rhino evidence.
2. Two wallows in Block 6 that appear to be active, although the identification of the species using them is, as yet, undetermined.

All these findings demonstrate one of two possible scenarios: either the resident rhino population is extremely small and is restricted to a few areas that have not been overly encroached by people; or there are no longer Sumatran rhinos in these surveyed areas.

Table 3: Areas covered in each survey block

Block	Distance of survey (km)
1	25.1
2	27.3
3	45.2
4	42.4
5	35.9
6	26.4
7	27.0
Total	229.3

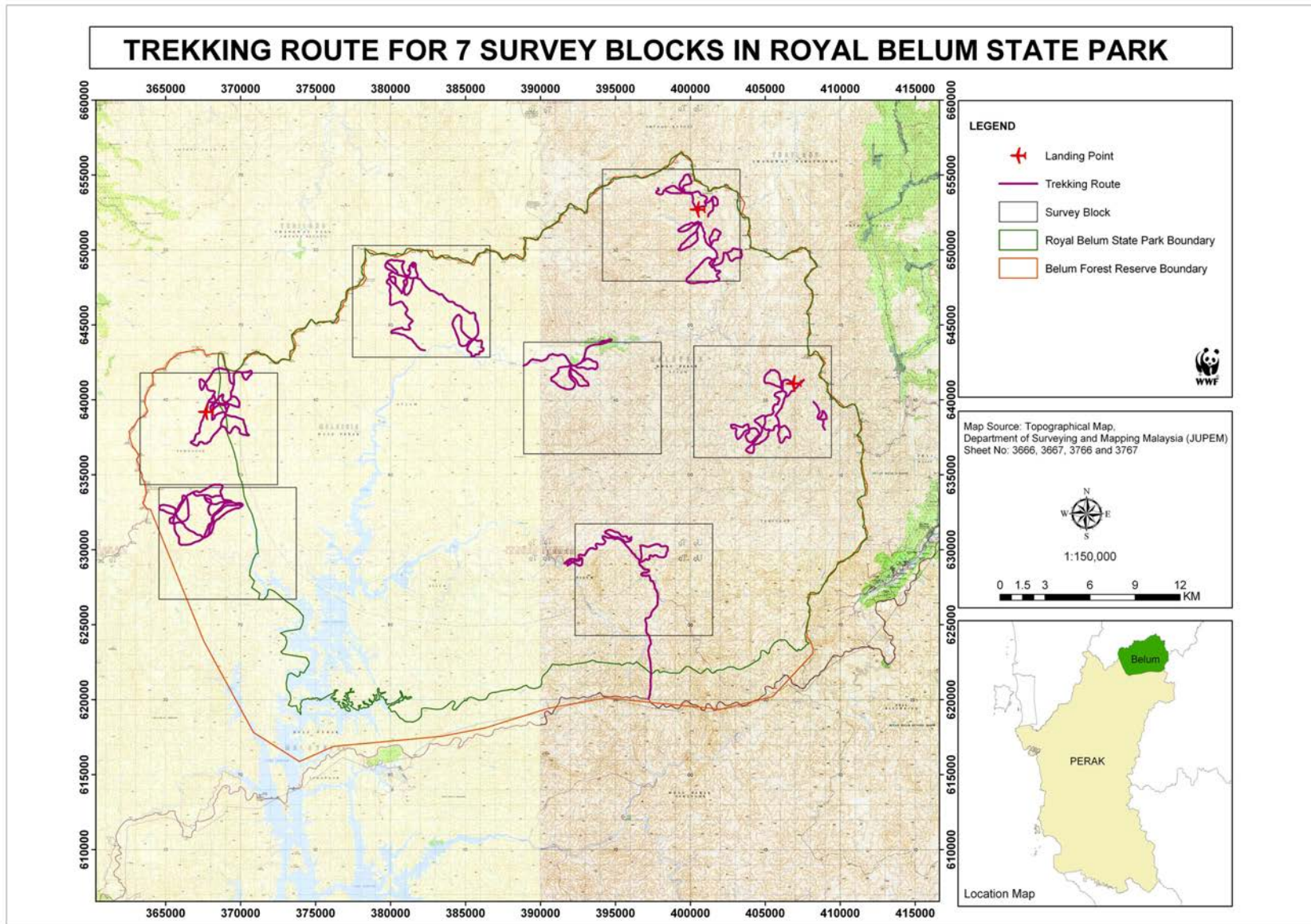


Figure 6: Overall survey routes in RBSP

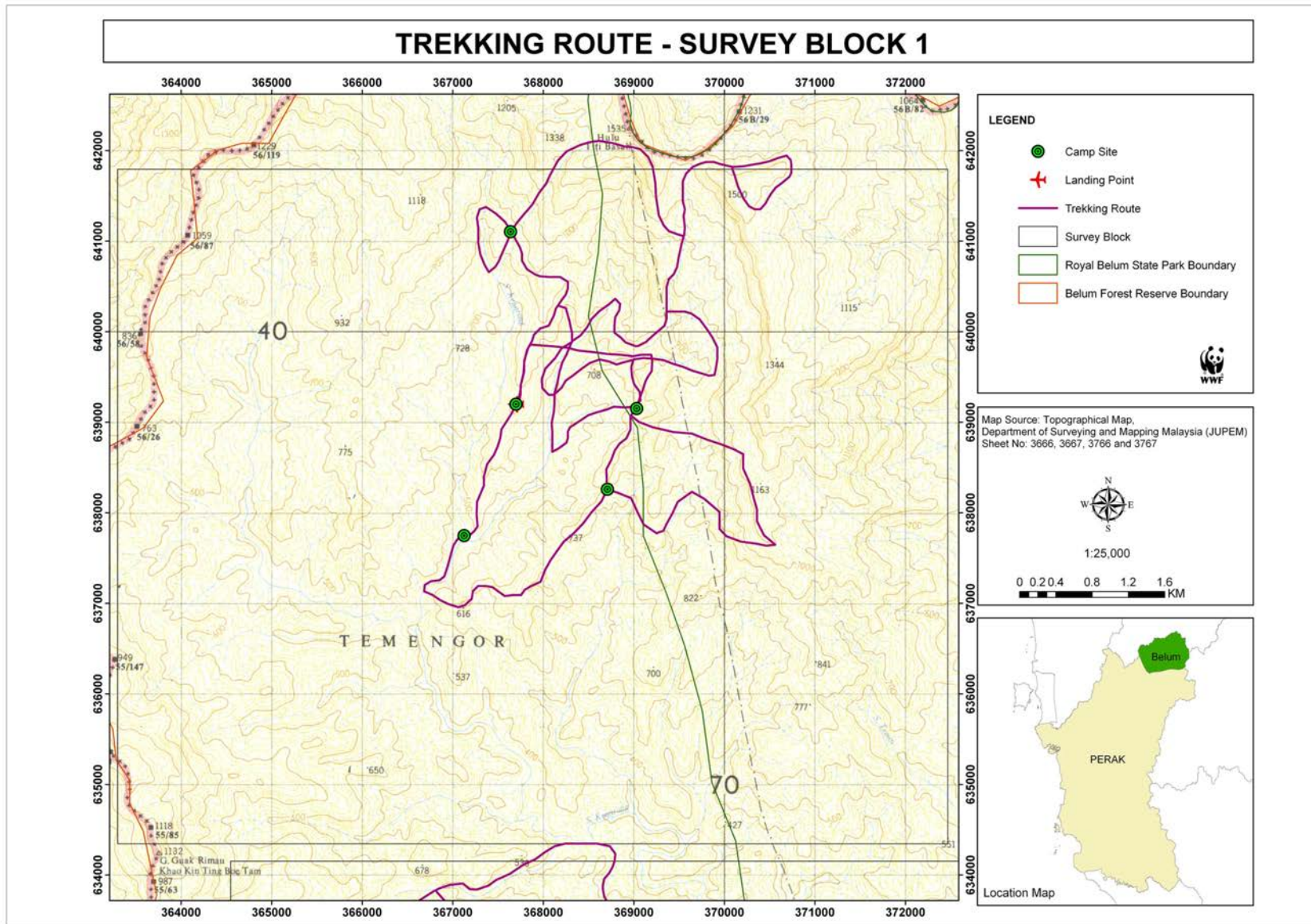


Figure 7: Trekking route for Block 1

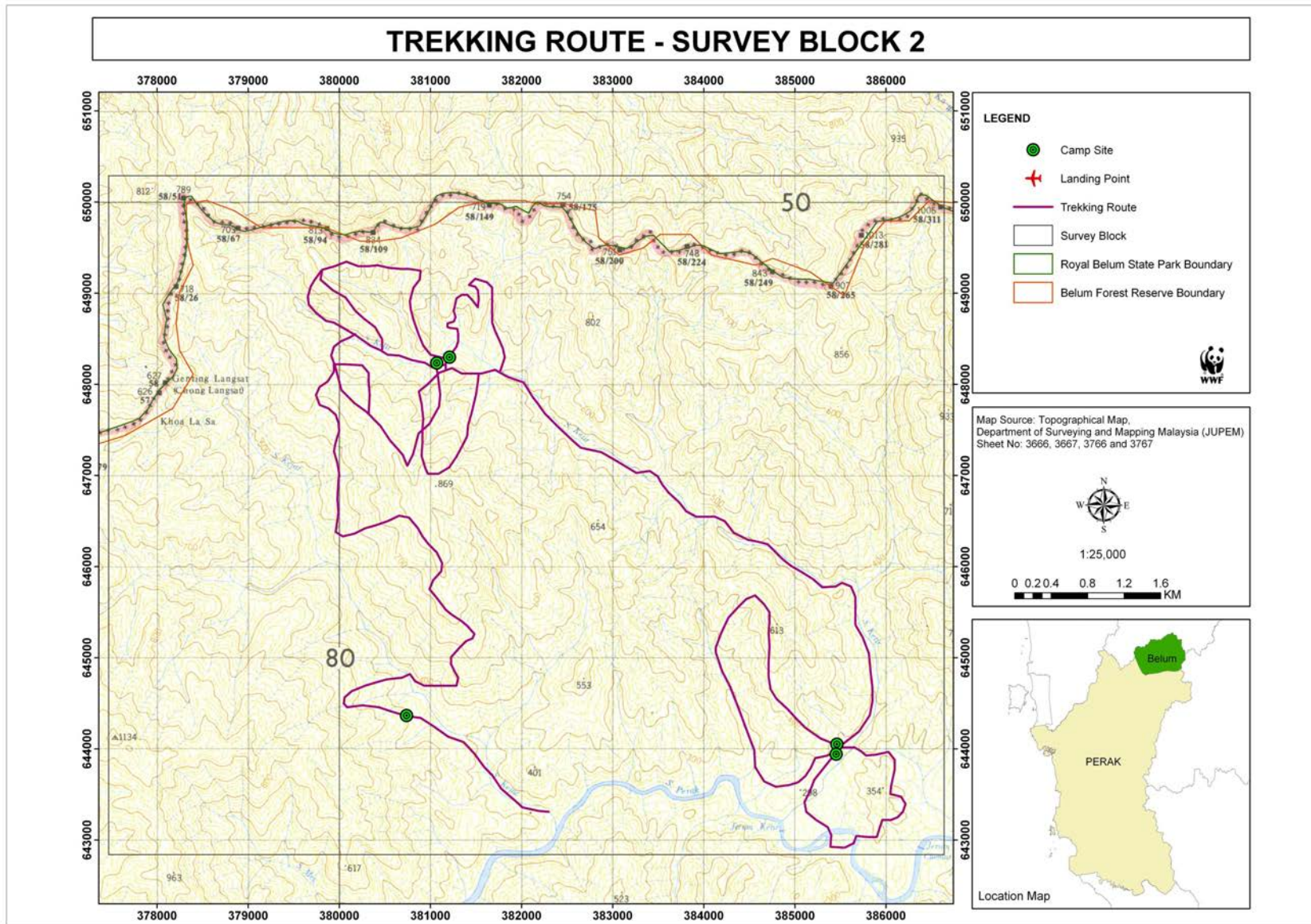


Figure 8: Trekking route for Block 2

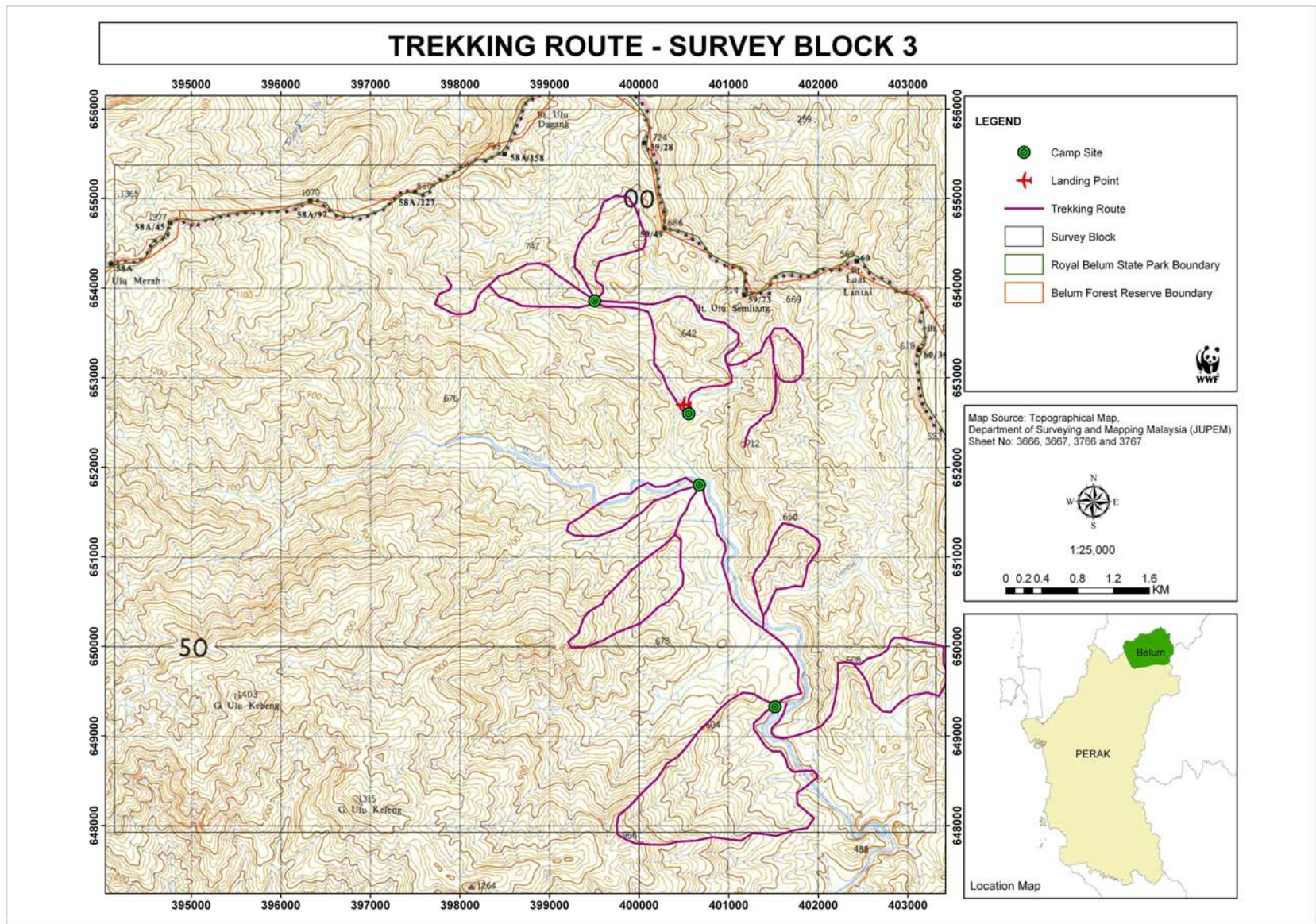


Figure 9: Trekking route for Block 3

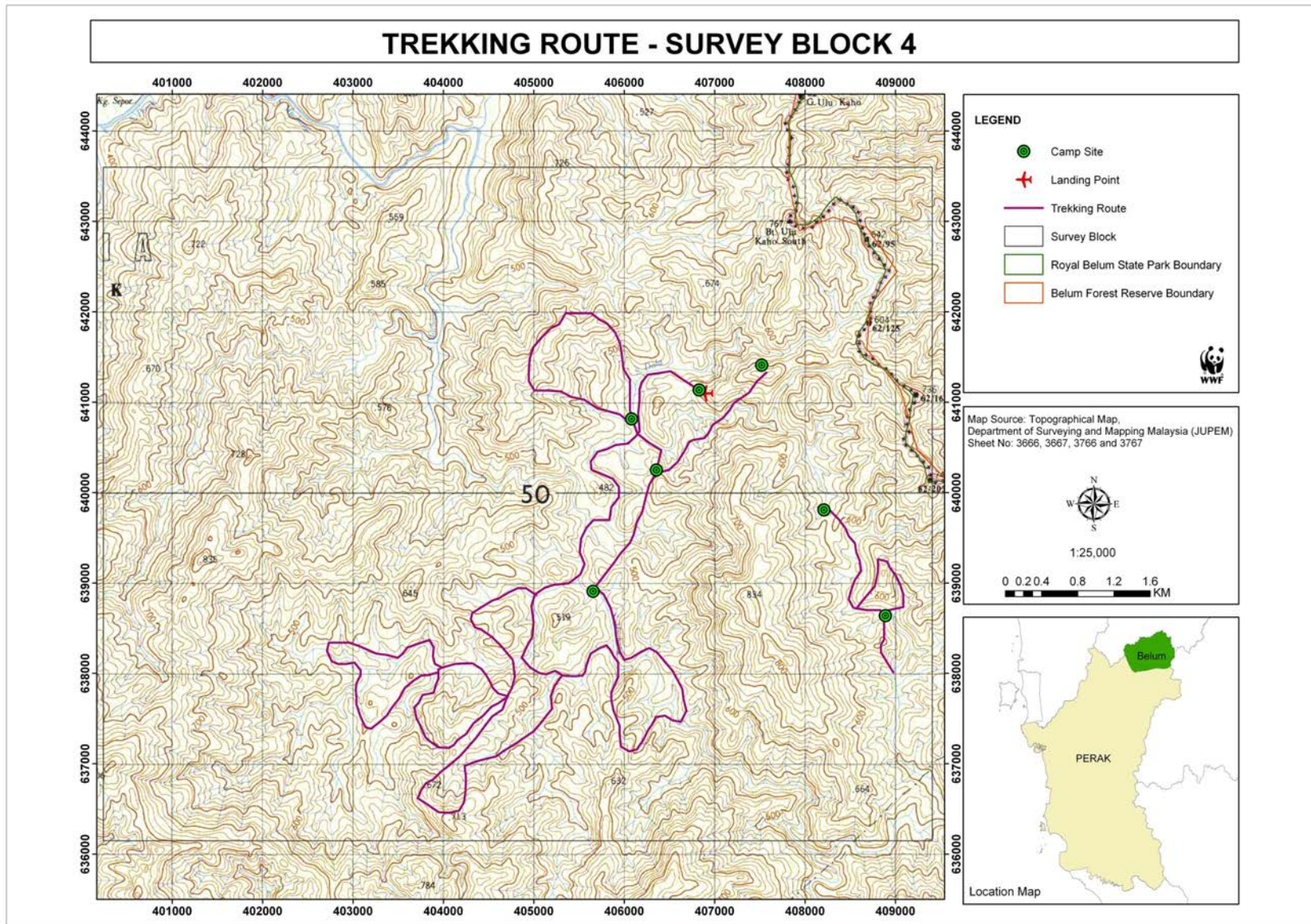


Figure 10: Trekking route for Block 4

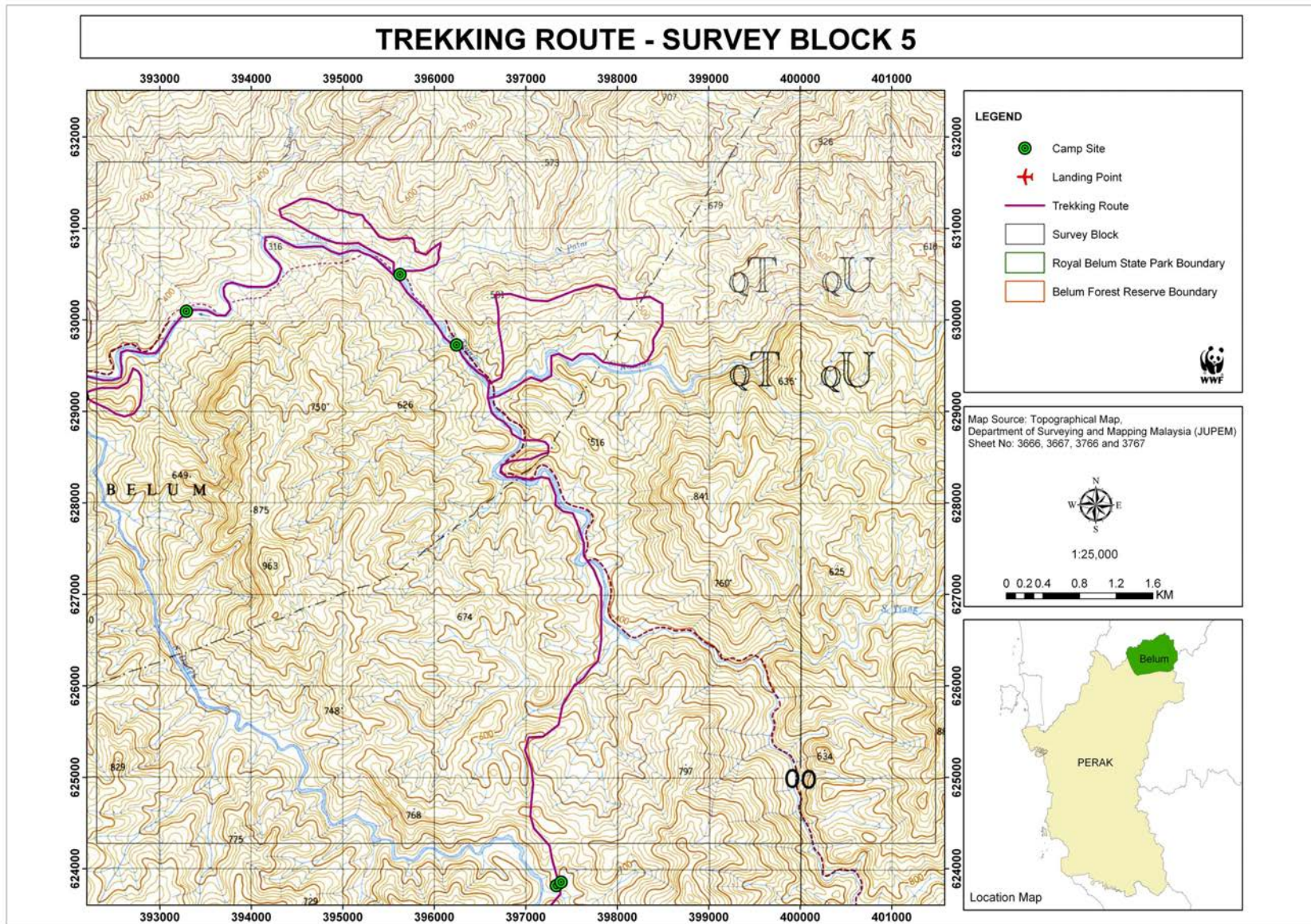


Figure 11: Trekking route for Block 5

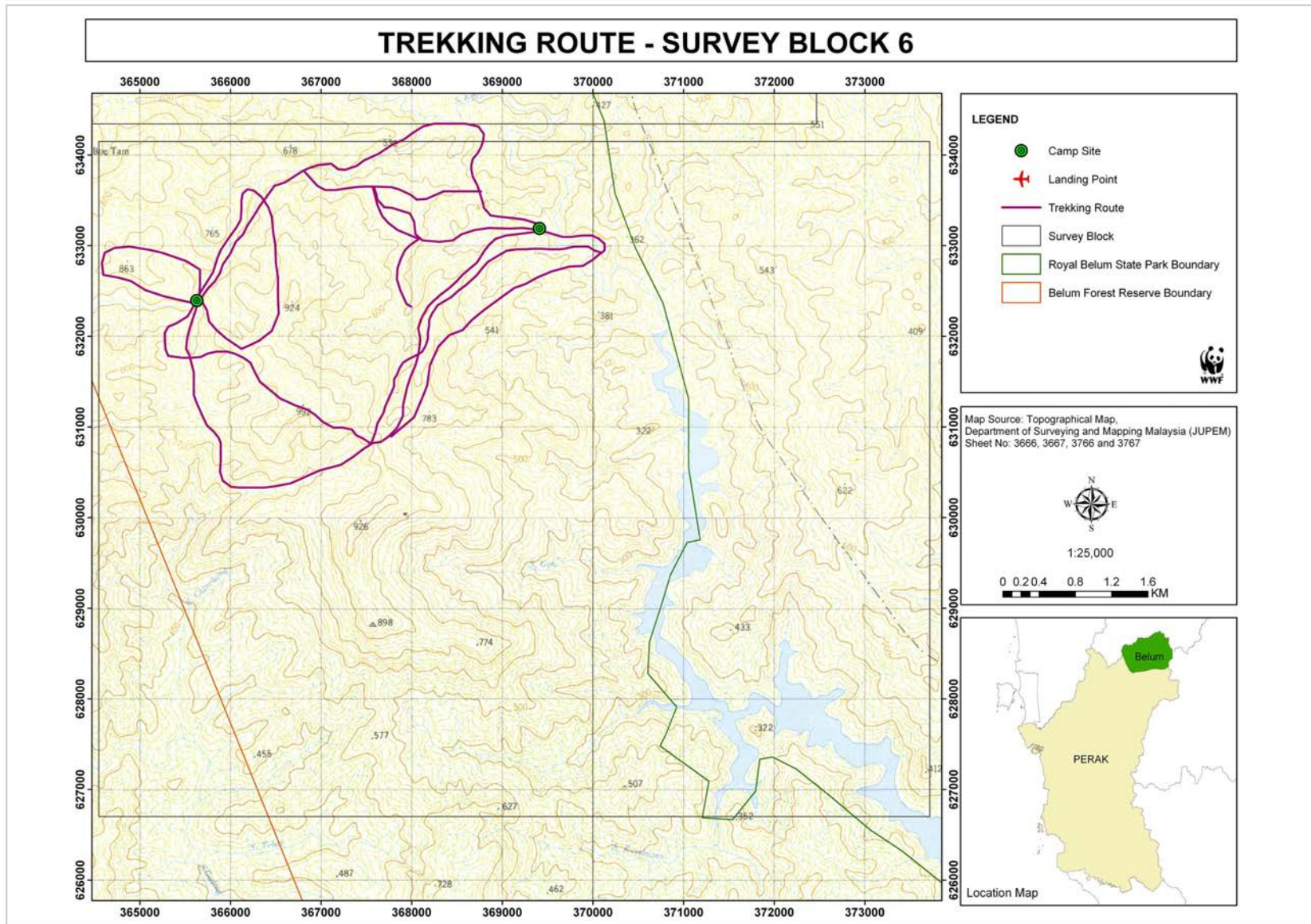


Figure 12: Trekking route for Block 6

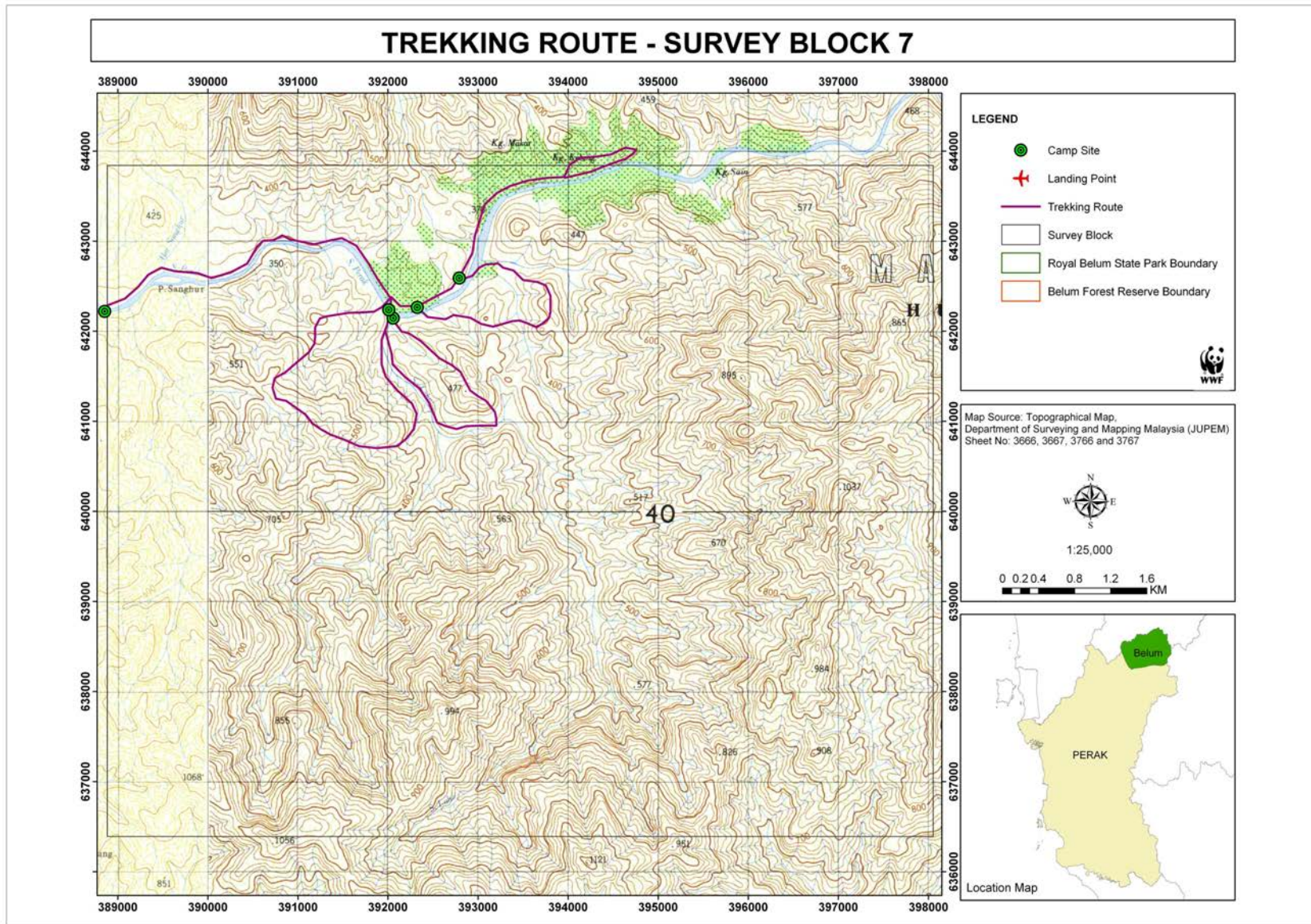


Figure 13: Trekking route for Block 7

Even though there were no rhinos recorded, the presence of other key species such as the Asian elephant, Malayan tiger, Malayan tapir, and seladang was confirmed in the area. All these species were recorded by almost all the survey teams during the survey. Tracks and signs of these animals are shown in Appendix 5. This shows that the RBSP is still an important area for wildlife and efforts should be taken to conserve them here. The encounter rates for these animals for each block are shown in Table 4. This encounter rate is calculated by dividing the total number of record/presence for each animal over the total distance walked by each survey team.

Table 4: Encounter rate for selected large mammals in RBSP

Block	Total walked distance (km)	Wildlife encounter rate (no. of records/km)			
		Tiger	Elephant	Tapir	Seladang
1	25.1	0.199	0.796	0.996	0.199
2	27.3	0.073	0.329	0.036	0
3	45.2	0.044	0.951	0.464	0.022
4	42.4	0.07	0.849	0.165	0
5	35.9	0.278	0.334	0.055	0.306
6	26.4	0	0.416	0.075	0
7	27	0.111	0.444	0.222	0.296
Total	229.3	0.109	0.623	0.279	0.109

Other than mammals, one of the teams recorded the presence of a population of *Rafflesia* (*Rafflesia* sp.) in Block 3. At the time of recording, some of these flowers were still budding and reaching a diameter of 20-25cm (Appendix 6).

3.1 Human activity

All teams found numerous old and new signs indicating human activity in the RBSP area. Some teams also found abandoned camps, built by the army, Orang Asli and/or foreign poachers. These camps were easily identified as there were usually food wrappings left behind, indicating the campers; and for foreign poachers, they usually leave markings on trees in foreign language. Besides that, there were also differences in the design of these camps. Photographs showing evidence of these activities are shown in Appendix 7.

It is believed that the main reason for encroachment by foreigners into RBSP is for Agar wood (*Aquilaria spp.*) extraction. However, there was also poaching on large mammals by these people (Set, pers. comm.). A local reported that a tiger was poached in RBSP in December 2006. Figure 6 shows the location of abandoned camps (excluding army and Orang Asli camps) and traps/snares found during the survey.

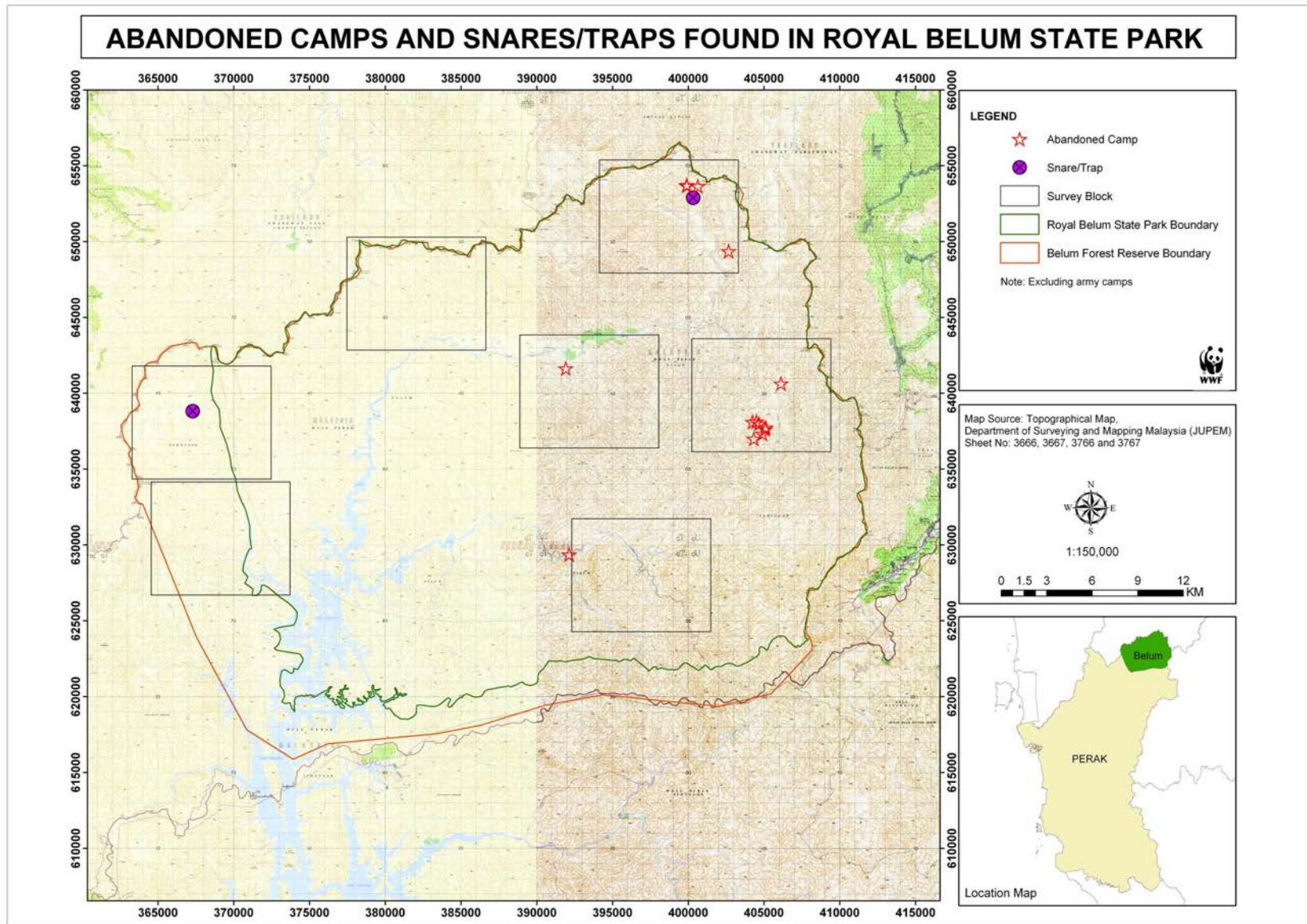


Figure 14: Map showing location of abandoned camps (excluding army and Orang Asli camps) and snares/traps found during the survey.

4.0 Conclusion and Recommendations

The survey methods used or adapted in this survey worked well, given the time constraints. Most of the teams managed to cover important identified areas in their respective blocks. It is suggested that using a well defined survey area, repeated patrols within key habitats should be performed during future rhino monitoring and survey in RBSP.

As for rhino conservation efforts, two important issues need to be addressed:

i) Rhino population viability in RBSP

If there are still rhinos left in the RBSP, the population appears to be very low and this is most likely as a direct result of human activities disturbances, including such as poaching. Assuming that there is a small and fragmented population, there is a risk that the members of that population will not be readily available as mates to each other due to:

- (a) reproductive isolation resulting from insular topographical features such as mountains and large bodies of water.
- (b) a relatively high incidence of encroachment and other human activities such as the collection of non-timber forest products by the Orang Asli, army patrols, and poaching.

ii) Protection of rhino habitat

From the survey, it is obvious that foreigners have been extracting Agarwood and possibly other wildlife. Other recent surveys by WWF-Malaysia found an abandoned Thai camp with cable snares. Since the northern boundary of RBSP is also the Thailand-Malaysia border, it is easily accessed by Thai nationals. According to locals and military personnel in the area, most of the Thais are believed to carry weapons to defend themselves when they are in RBSP.

The first step to combat illegal activities in RBSP, especially poaching, is to gain a better understanding of the prevailing socio-economic issues. For that purpose, WWF-Malaysia will be carrying out a comprehensive wildlife poaching and trade assessment for RBSP and the surrounding areas. After collecting all the relevant information, mitigation measures can be carried out more effectively.

Strategies aimed at reducing encroachment into RBSP need to be developed. These include the possibility of setting up an informant network in southern Thailand. The foreign encroachers seem to be very skilled in searching for Agarwood and possibly other valuable animal species in RBSP. If these encroachers have already succeeded in wiping out the rhino population within RBSP, tigers may be their next target.

As the management authority of the park, PSPC would have to work together with the army and DWNP to strengthen enforcement activities in RBSP to prevent poaching and extraction of wildlife. If these illegal activities continue, the future of rhinos and other key species in the forest complex is quite bleak. PSPC should manage this park more effectively with the cooperation of other stakeholders in order to mitigate the issues faced in RBSP to ensure better protection of rhinos and other wildlife.

As eco-tourism is one of the important components of RBSP, the state government through PSPC should also look into the impact of illegal border crossing and poaching on tourism in RBSP. Apart from impacting the natural heritage, illegal border crossings would also risk the safety of tourists.

There is a need to integrate existing army activities in RBSP into a new patrolling mechanism to strengthen the security of the area. Effective protection and enforcement steps need to be taken to ensure a more secure future for rhinos and other wildlife in the RBSP. This also includes the safety of humans (survey teams, patrolling unit, researchers and tourist) in the forest complex.

Since there is a high probability that the rhino population in RBSP is very low, the Rhino Project should explore other possible areas that may have viable populations of rhinos. Areas that are still likely to have a good rhino population should be monitored and protected from poachers. Areas that were identified as important in the Rhino Conservation Action Plan (1993) should be looked into. Concerted measures must be implemented to assess the current situation of rhino populations in each area and conservation initiatives should be implemented immediately to save the remaining rhino populations in Peninsular Malaysia.

All the recommendations will only work if there is sufficient political will and strong cooperation among stakeholders involved in the conservation of rhinos in Malaysia.

5.0 Future Plans and Follow-ups

As shown in Figure 15, the total trekking route for the expedition covered a majority of the areas where rhinos could be present based on DWNP's reports. It is recommended that rhino survey activities continue in RBSP for another eight months to a year. Should there be no evidence of rhino presence detected by then, an alternative plan for rhino surveys at other localities should be drawn up.

As an immediate step, follow-up surveys will be carried out in areas where possible rhino presence was recorded during the survey (Block 1 and Block 6). In addition, surveys will also be carried out in other areas that were excluded during the last survey (Figure 16) due to logistical and time constraints.

Besides trekking on foot, the project will set up camera-traps at saltlicks in RBSP. As rhinos regularly visit saltlicks for their mineral and dietary needs, it is hoped that their presence could be detected during these visits.

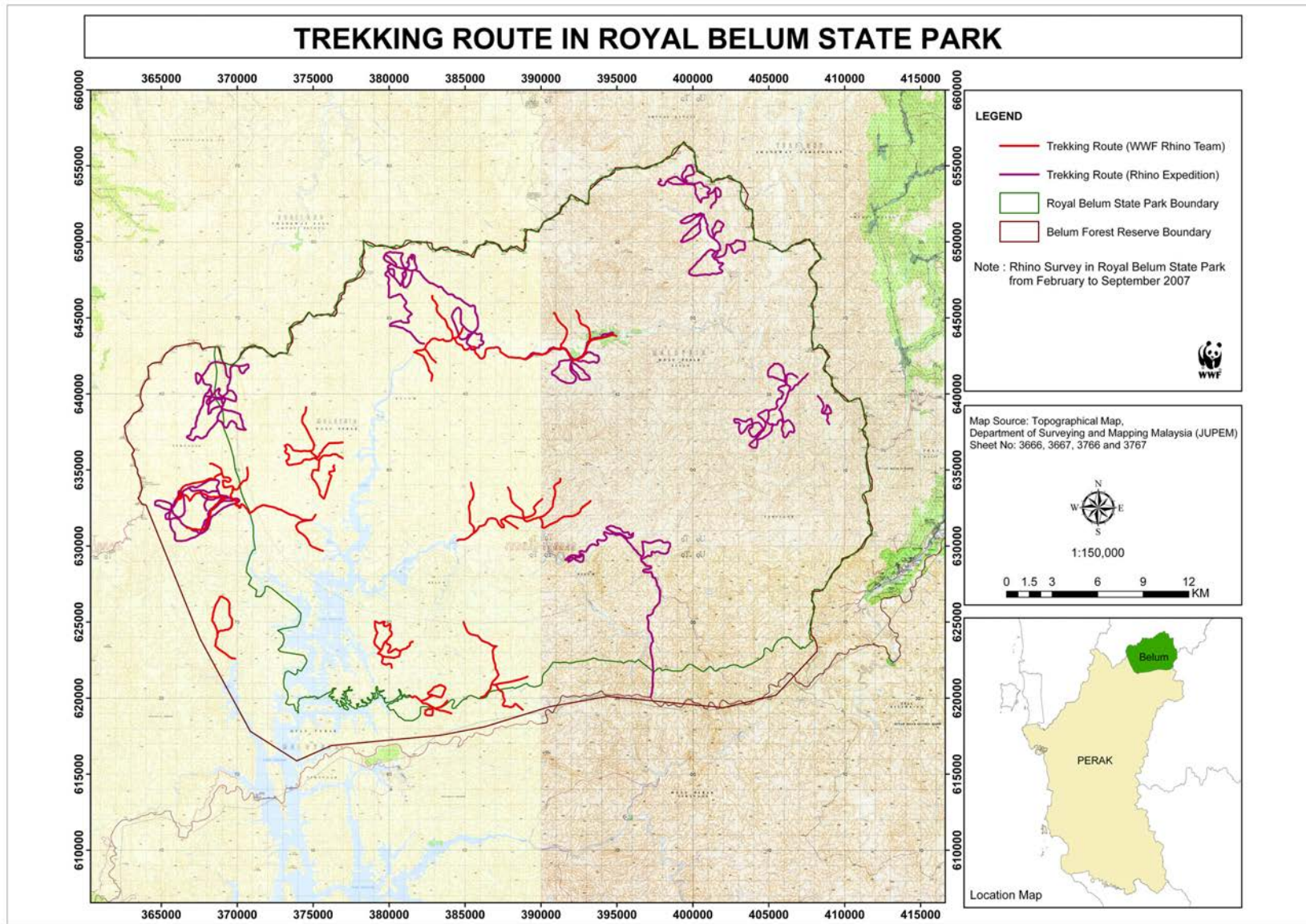


Figure 15: Map showing areas surveyed in RBSP

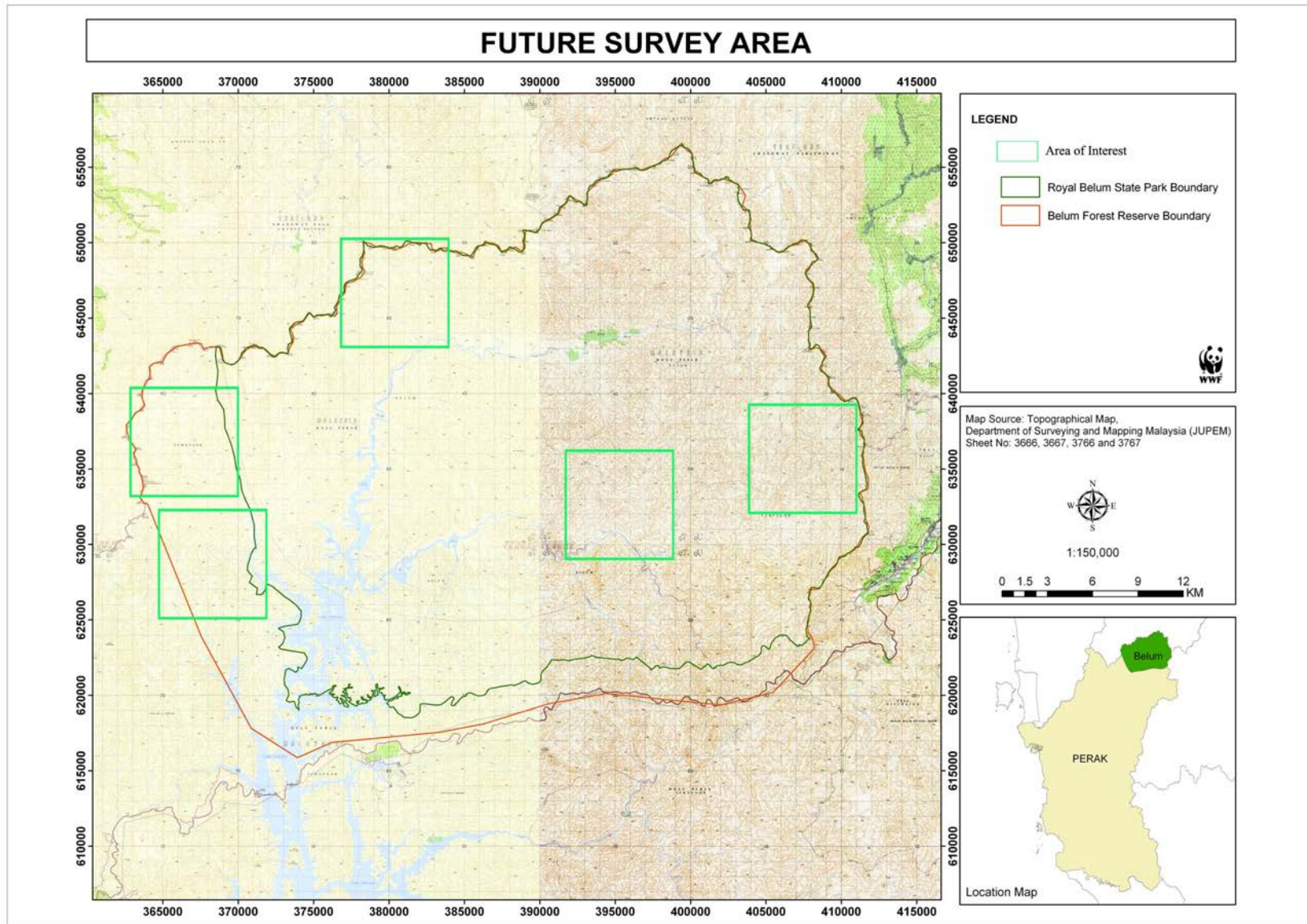


Figure 16: Map showing areas to be surveyed in RBSP

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Appendix 1
Aerial survey photographs



RBSP aerial photo 1



RBSP aerial photo 2



RBSP aerial photo 3



RBSP aerial photo 4

* Photo credits © WWF-Malaysia

Appendix 2
Participants involved in the survey

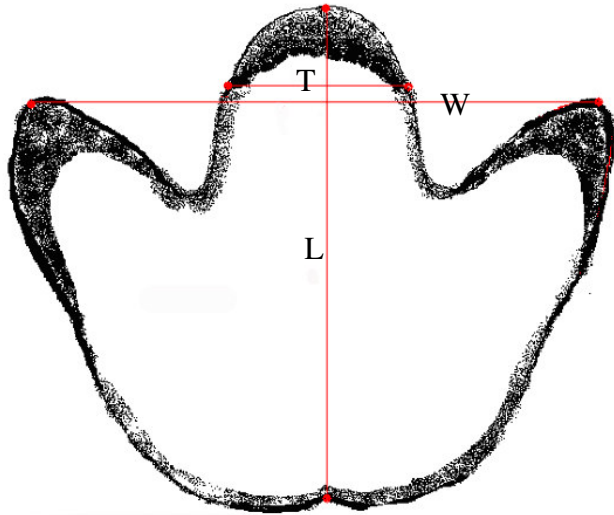
No	Name	Organization
1	Che Wan Zulkifli bin Che Wan Yusuf	DWNP
2	Mohamed Ariff bin Yunus	DWNP
3	Mohd Afezal bin Ibrahim	DWNP
4	Agus Sulaeman	IRCP
5	Arief Rubianto	IRCP
6	Maman Suherman	IRCP
7	Zen Afrial	IRCP
8	Abd Moen bin Ahmad	Perak State Forestry Department
9	Saharuddin bin Ramli	Perak State Forestry Department
10	Ravinder Kaur a/p Kirpal Singh	MNS
11	Ahamed bin Hamid	PSPC
12	Azman bin Belahoi	PSPC
13	Jorrye bin Jakiwa	PSPC
14	Saad bin Omar	PSPC
15	Yakkob bin Dahawa	PSPC
16	Amit bin Pilik	SOS Rhino
17	Andrew bin Ginsos	SOS Rhino
18	Dexven Nuvin	SOS Rhino
19	Dr.Sivapiragasam Thayaparan	SOS Rhino
20	Erman Tara	SOS Rhino
21	France Bianus	SOS Rhino
22	James bin Sandiyang	SOS Rhino
23	Lusry bin Basri	SOS Rhino
24	Suzali bin Jaya	SOS Rhino
25	Marino	WWF-Indonesia
26	Ridwan Setiawan	WWF-Indonesia
27	Ahmad Zafir bin Abdul Wahab	WWF-Malaysia
28	Albert Sitawin	WWF-Malaysia
29	Azlan bin Mohamed	WWF-Malaysia
30	David James	WWF-Malaysia
31	Dominic Ampingan	WWF-Malaysia
32	Edward bin Inggog	WWF-Malaysia
33	Edwin Matulin	WWF-Malaysia
34	Engelbert Dausip	WWF-Malaysia
35	Farizal Atras bin Roslan	WWF-Malaysia
36	Francis Jessius	WWF-Malaysia
37	Gudil Porimon Gihud	WWF-Malaysia
38	Hamid bin Ahong	WWF-Malaysia
39	Herman Francis @Tating Kongoi	WWF-Malaysia
40	Jabanus Miun	WWF-Malaysia
41	Jaini Impin	WWF-Malaysia
42	Jamak bin Mening	WWF-Malaysia
43	John bin Japil	WWF-Malaysia
44	Kerusi bin Manchang	WWF-Malaysia

45	Mark Rayan Darmaraj	WWF-Malaysia
46	Middle Sen Kapis	WWF-Malaysia
47	Mohd Ali Yaacob @ Mat Zain	WWF-Malaysia
48	Mohd Kamal bin Jalaluddin	WWF-Malaysia
49	Padan bin Nehek (Kuong)	WWF-Malaysia
50	Ralak bin Chelang	WWF-Malaysia
51	Rayner Bili	WWF-Malaysia
52	Richard Sanggul	WWF-Malaysia
53	Riduan bin Rasib	WWF-Malaysia
54	River Foo Siang Choon	WWF-Malaysia
55	Ronny bin Madius	WWF-Malaysia
56	Set bin Karak	WWF-Malaysia
57	Shariff bin Wan Mohamad	WWF-Malaysia
58	William bin Joseph Dausip	WWF-Malaysia
59	Alin Chen Hong	Yayasan Sabah
60	Henry Baidang	Yayasan Sabah
61	Mohd Jusman Tarman	Yayasan Sabah

Appendix 3c

Rhino Footprint Measurements Form

Survey Number/ID: _____ Record Number: _____
 Freshness of the Foot Print: _____



No	Soil ¹	Slope ²	Toe(T)	Footprints (cm)		Habitat Type ³	Cast No	Remarks
				Width1(W1)	Length(L)			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Soil Type¹: 1- Hard, 2- Medium, 3- Soft, 4- Mud, 5- Sand
Slope²: 1- Level (< 5 Degrees), 2- Moderate (5-15 degrees), 3- Steep (> 15 Degrees)
Habitat Type¹: 1-Riverside Forest, 2-Lowland Primary Dipterocarp Forest, 3-Disturbed Dipt. Forest/ Secondary Forest, 4-Hill Dipterocarp Forest, 6-Others (Describe)

Appendix 3d

Report Cover Sheet and Summary Daily Report

Month:

Team No:

Date	Patrol Area (GPS Point)	Total Distance of Survey/patrol	No of Rhino's signs / Type	No of Encroachment	Rhino's Signs Index	Encroachment Index

Summary Output:

Rhino's Sign Index :

Estimated Individual Rhino based on Foot Print:

Encroachment Index :

Remarks / Comments

Recommendations

Prepared by:

Date:

Appendix 4

Itinerary and Survey Schedule

Rhino Survey Expedition: 8th to 18th July, 2007

Date/ 2007	Activities and Survey Schedule
080707	<p>- Participants of survey assembled at Banding Island Resort, Gerik, Perak (Expedition coordination base).</p> <p>20.00hrs -Briefing to all participants on methodology and main priority and focus of survey.</p> <p>21:00 hrs -Meeting for all Team Leaders at the resort meeting room, Banding Island Resort. - Distribution of rations and equipment to survey teams.</p>
090707	<p>- Official Launch of Rhino Survey Expedition - Survey teams sent to pre-designated survey areas by helicopter, boats or by 4WD vehicles.</p>
100707	Rhino survey at Royal Belum
110707	Rhino survey at Royal Belum
120707	Rhino survey at Royal Belum
130707	Rhino survey at Royal Belum
140707	Rhino survey at Royal Belum
150707	Rhino survey at Royal Belum
160707	Rhino survey at Royal Belum
170707	<p>-All teams returned from survey areas and assembled at Banding Island Resort, Pulau Banding for rest and debriefing.</p> <p>18:00 hrs -Debriefing session and updates, meeting of all Team Leaders and collection of data sheets. -Wrap up and closing of Rhino Survey Expedition.</p>
180707	- Departure of participants from Banding Island Resort

Appendix 5
Signs of key species during the survey



Elephant track



Tiger track



Tapir track



Seladang track

* Photo credits © WWF-Malaysia

Appendix 6

Rafflesia flower that was recorded during the survey in RBSP



Measuring the Rafflesia



Budding Rafflesias



Taking the GPS location of the Rafflesia population

*Photo credits © WWF-Malaysia

**Appendix 7
Evidence of encroachment in RBSP**



Abandoned camp by foreign encroachers 1



Abandoned camp by foreign encroachers 2



Instant noodle packaging 1



Instant noodle packaging 2



Rope snare



Snare 1

* Photo credits © WWF-Malaysia



Snare 2



Snare 3



Wildlife trap



Agarwood tree chopped down

* Photo credits © WWF-Malaysia



Marking on trees 1



Marking on trees 2



Marking on trees 3



Marking on trees 4



Marking on trees 5

* Photo credits © WWF-Malaysia

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WWF-Malaysia is able to leverage upon conservation expertise world wide as part of WWF, the global conservation organisation that has almost 5 million supporters and activities in more than 90 countries.

WWF's Mission is to stop the degradation of the natural environment and to build a future in which humans live in harmony with nature by:

- conserving the world's biological diversity
- ensuring that the use of renewable natural resources is sustainable
- promoting the reduction of pollution and wasteful exploitation consumption



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