

POPULATION AND DISTRIBUTION OF JAVAN RHINOCEROS

(*Rhinoceros sondaicus*, Desmarest, 1822)

**BASED on the CALCULATION
Of FEACES COLLECTION and FOOTPRINT
In UJUNG KULON NATIONAL PARK**

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And

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Directorate General Of Forest Protection and Nature Conservancy



PREFACE

This report has been written as the finishing survey activity of Population Composition and Distribution of Javan Rhinoceros in Ujung Kulon National Park based on the collection and inventory of faeces and footprint.

All of the survey activity made possible because of the continued support and participation of many involved institutions and people. We would like to express our appreciation to US Fish And Wildlife Services (USFWS) and WWF UK (Project ID0091.07) who provided funding for the whole project. We also thank Nazir Foead – the Leader of Ujung Kulon Project at the time this survey taken place. And of course, this survey is a result of cooperation with WWF Indonesia's partner Ujung Kulon National Park Authority from whom we receive many helpful contributions in ensuring this survey progression. In relation to the matter, we would like to thank Ir. Tri Wibowo – the Head of Ujung Kulon National Park Body at the time this survey taken place, and all officials and field staffs.

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Finally, we realize that this report is far from perfect; therefore, we really appreciate every helpful comments, suggestions, and criticisms, which encourage changes and improvements on the report.

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I. INTRODUCTION

1.1 Background

As a flagship species in Ujung Kulon National Park, Javan Rhinoceros (*Rhinoceros sondaicus* Desmarest 1822), one of the most endangered species in the world, is at the high priority to be saved from extinction. Since the year of 1978, IUCN (*International Union For Conservation of Nature and Natural Resources*) registered the species in the Red Data Book with Appendix I category – critically endangered.

Javan Rhinoceros population is found in limited number in Ujung Kulon National Park, west of Java – since 2001 became Banten Province – and one very small population in Cat Tien National Park - Vietnam. The estimation of Javan Rhinoceros population based on the 1999 census result was 43 as the minimum and 57 as the maximum number of Javan Rhinoceros, or the average number was 50 (TNUK, 1999). In the same time, in Vietnam there were 15 individuals (Santiapillai *et al.*, 1991 in Griffith, 1993). Between the two habitats of Javan Rhinoceros population, it may be concluded that Ujung Kulon is a very good habitat and is important to save this species from extinction.

Monitoring of Javan Rhinoceros population growth in Ujung Kulon is crucial to manage the animals in the future. With the regularly updated information we can also study the population changes of the animal. Population increase of one species is not only affected by internal factor (eg. Birth rate and mortality rate), but also strongly influenced by the environment

condition of their habitat, whether it is the availability of their food, competition with other animals, or conservation and pressure by human.

In Ujung Kulon, the Javan Rhinoceros population can be found in certain locations, especially in the lowland area where Javan Rhinoceros can easily move to find their favourite food. Javan Rhinoceros have home ranges in which they travel on a daily basis to find food, shelter, and probably mate. In addition, Javan Rhinoceros also need wallows, shallow calm creeks to dip, and shady forest to avoid the sunlight (Schenkel & Schenkel, 1969; Hoogerwerf, 1970).

Several surveys on Javan Rhinoceros population indicate that the population of these one-horned animals experienced a high growth between 1970s and 1980s, before they went through a decline tendency since 1982 (Table 1). The good level of birth was in conjunction with the age composition dominated by adolescent and adult female. This situation was proven by Sajuddin, *et al.* (1983). He reported at least 7 (seven) findings of calves, which were still with their mother.

Data from 1989 indicated that the population was unstable and declining. It was suspected that there were large numbers of deaths in early age especially in female (Sujono, 1989). As stated by Amman (1985), the difficulties frequently faced in finding the Javan Rhinoceros or their footprints created the possibility that the census result is actually lower compared to the actual condition. The good condition of Javan Rhinoceros population in Ujung Kulon National Park also has been confirmed by the last several reports, where there have been findings of Javan Rhinoceros productive females indicated by calves' presence along with their mothers. Even so, until this

moment it is not yet revealed exactly what the condition of sex ratio of the population is (Muntasib, 1999).

There are numerous obstacles in observing Javan Rhinoceros in Ujung Kulon directly and thus counting them is difficult. According Schenkel & Schenkel (1969); and Hoogerwerf (1970), the survey difficulty is related with the characters of Javan Rhinoceros that live in remote forest with dense vegetation, solitary, and always avoid human every time they smell the presence. Several problems in studying a wild animal in forest as their habitat are encountered frequently. The most important constraints in the study are the condition of the dense vegetation, topography types variety, limited appearances, strong olfactory sense of the rhinoceros, and the fact that a large number of them conduct their activity at night (*nocturnal*).

Table 1. Javan Rhinoceros Population Condition between 1967 and 1999

Year	Population	Range	Source
1967	25	21 – 28	Schenkel & Schenkel (1969)
1968	25	20 – 29	Schenkel & Schenkel (1969)
1969	28	22 – 34	PPA
1970	-	-	-
1971	38	33 – 42	PPA
1972	44	40 – 48	PPA
1973	42	38 – 46	PPA
1974	47	41 – 52	PPA
1975	50	45 – 54	PPA
1976	48	44 – 52	PPA
1977	48	44 – 52	PPA
1978	52	47 – 57	PPA
	51	46 – 55	Amman (1980)
1979	-	-	-
1980	58	54 – 62	PPA
	62	57 – 66	Amman (1980)

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1981	64	51 – 57	PPA
	57	54 – 61	Sadjudin, et al. (1981)
1982	56	53 – 59	PPA
1983	64	58 – 69	PPA
1984	52	50 – 54	Sadjudin & PPHA (1984)
1985	52	-	Amman (1985)
1990	57	-	Santiapillai, et. al.
1993	47	35 – 59	Griffith (1993)
1995	57	54 – 61	Sriyanto, et al. (1995)
1996	61	51 – 67	TNUK (1996)
1999	50	43 - 57	TNUK (1999)

1.2 Survey Objectives

The objective of this survey is to uncover the population condition and distribution of Javan Rhinoceros, thus obtaining precise baseline data for identifying future management steps. The mission supported by:

- Faeces collection for DNA analysis (Deoxyribonucleic Acid)
- Density calculation utilizing faeces counting and footprint finding
- Javan Rhinoceros habitat distribution.

II. SURVEY AREA

2.1 Location of Survey Area

Almost all parts of Ujung Kulon National Park are secluded natural areas with 120,551 ha wide, covering (76,214 ha) land area and (44,337 ha) sea area. Ujung Kulon National Park is administratively included in Regency of Pandeglang, Banten Province, which is located in the southwestern tip of Java Island. Terrestrial area covers Ujung Kulon Peninsula (30,000 ha), Honje mountain range (10,000 ha), Panaitan Island (12,000 ha), and several other small islands such as Peucang Island and Handeleum Island (**Figure 1**). At this moment Ujung Kulon Peninsula is the only place with viable habitat in the world for Javan Rhinoceros, which provides all the living essentials of the species (Muntasib, 1999).

In Ujung Kulon Peninsula, there are different flow patterns of river. In area with hills in west area there are a lot of creeks with fast water streams that never dry out all year round. These streams originate from Mount Payung, Cikuya dan Ciujungkulon Rivers that flow North, and Cibunar River that flows from Telanca area to South. The eastern side of Ujung Kulon Peninsula does not have good patterns river flow, and generally the rivers flow North, East and South of Telanca area and empty to river mouth with sandy floor that formed seasonal swamp area. In this area there are rivers such as Cigenter, Cikarang, Citadahan, Cibandawoh and Cikeusik. In the North there are also Nyawaan, Nyiur, Jamang and Citelang rivers that formed several wide freshwater swamp area (TNUK, 1999).

2.2 Climate of the Survey Location

Ujung Kulon National Park's climate is ocean tropic with an annual average precipitation of as much as 3,249 mm and 25-30⁰ C temperature with 80-90% humidity. Rainy season is in months of October through April at the same time as the North West cool season. Dry season starts in the months of May, which is often characterized with trees falling down. The east/south wind in southerly season (May – September) causes waters around Ujung Kulon to become still and swell diminishes (TNUK, 1995) until September. In North West season (October – April), the wind blows from west side with high speed bringing occasional big storms.

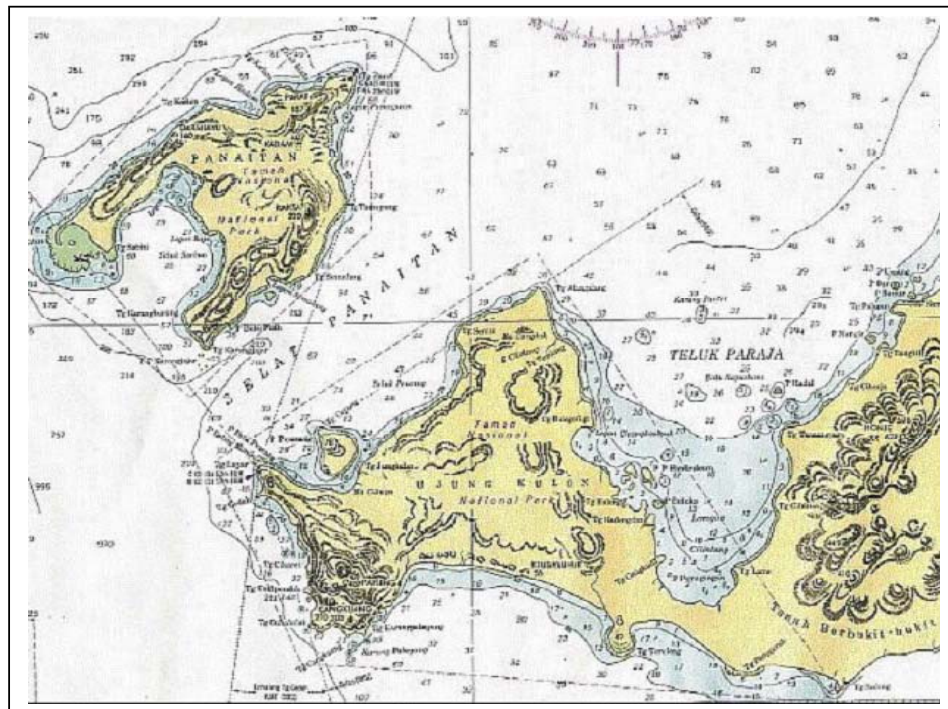


Figure 1. Map of Ujung Kulon National Park

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2.3 Physiography, Geology and Vegetation of Ujung Kulon Peninsula Area

Hommel (1985) has already discussed the history of physiography and geology on Ujung Kulon Peninsula. Generally, Ujung Kulon Peninsula has a flat topography along the northern and eastern seashore and along the northwestern beach side of southern Mount Telanca and along the northwestern coastline of the south, with its 480 m above sea level highest peak. The flat land is composed with mangrove-covered swampland, while the shore consists of formation of sandy and rocky beaches. The Payung Mountain dominates most of the western side. The soil in Ujung Kulon National Park has gone through extreme local modification which happened right after there had formed up sediment of volcano when Krakatau Mountain exploded in 1883.

Based on the physiography, soil and vegetation condition, Hommel (1987) has classified 30 units of ecological landscapes in Ujung Kulon Peninsula, which are the Javan Rhinoceros habitats. Out of the 30 ecological, landscapes, the units which are the most suitable for Javan Rhinoceros are: *Arenga* plateau (10), *Arenga* slope and *dissected* plateau (12), *Daemonorops* plain (19a), Transition between 12 and farm area (28) (overlay between *Landscape Ecology Map of Ujung Kulon* and Habitat Feasibility map of Javan Rhinoceros).

2.4 Fauna found in the Survey Area.

Ujung Kulon National Park has a variety of wild animals including several endemic species, most of which are protected. The rare species crucial to be conserved are: Owa Jawa/Javan Gibbon (*Hylobates moloch*), surili/Javan Leaf Monkey (*Presbytis aygula*), anjing hutan / wild dog (*Cuon alpinus*). In addition there are more than 30 mammal species include as

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banteng/bull (*Bos javanicus*), kijang/barking deer (*Muntiacus muntjak*), rusa/ deer (*Cervus timorensis*), macan tutul/leopard (*Panthera pardus*) and macan kumbang/black panther (*Panthera pardus*), 5 species of primates, 59 species of reptiles, 22 species of amphibian, 240 species of fish and 33 species of corals.

III. SURVEY METHOD

3.1 Materials and Tools

In the attempt to yield optimum result, several tools and materials were needed. These materials and equipments included:

- a. Global Positioning System (GPS) is used to identify the position of found objects.
- b. Camera (Olympus mju 2); used to identify every character of founded objects
- c. Compass (Suunto); used to recognize the direction of founded objects.
- d. Meter measuring device; used to take measurement of founded objects.
- e. Pincher; used to get the faeces sample of Javan Rhinoceros
- f. Centrifugal jar; used to contain the faeces samples
- g. Recording tools such as writing tools, data paper and labels
- h. Map of survey location
- i. Dagger / sword; used to open/clear cut the pathway.
- j. 70% Alcohol
- k. Tissue

3.2 Times and Place of Survey

The survey to identify Javan Rhinoceros population utilizing faeces collection for DNA analysis and recording of factor findings, operated from October 1999 to July 2001, or runs for 20 months of effectively work in the field location. There are 15 effective surveying days in every month, so during 20 months of the total survey period, there are 300 days total in which the observations were made.

3.3 Survey Method

Direct observation is often difficult for rare animals, as they are not easily seen. One method commonly used in population survey of such animals involves estimating the size of population based on the counting of footprint “size” or foot factor which are found in observation paths (*Track Count with Strip Method*).

Estimating population size using this method has some weaknesses both in survey process and in analysing the survey result, so it cannot be determined whether the population is already sufficiently sampled. Unintentional double counting is hard to avoid because different animals can have similar foot-sizes. Other than faeces and footprint data, information regarding mud wallow, food and behaviour considered as supporting information to determine the population structure of Javan Rhinoceros.

Observation paths in this survey did not use nor walk through available patrol trails in Ujung Kulon Peninsula. However, as a starting point, these patrol trails can lead to observation path. The observation paths ran as indicated by divider blocks that had been clearly defined using location map with grid **(2.1 km² per grid)**, before the field observation started.

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3.3.1 Criteria of Observation Blocks Decision

Criteria for deciding the observation blocks have been one of the most important steps taken in this survey (see **Figure 2**). Factors to select specific blocks were:

- Effectiveness and simplicity of the observation area, therefore the sequence tends to one direction, goes from east to west of Ujung Kulon Peninsula.
- Availability of information regarding several survey and monitoring activities which has been conducted by the Rhino Monitoring Protection Unit (RMPU) – PHKA Ujung Kulon National Park Body officers, which also includes maps of findings of the last footprints (Ujung Kulon National Park Body, Dirjen PKA, Forestry Department, 1999) and map of Javan Rhinoceros habitat (Griffith, 1993).
- Existence of internal and external obstacles that influence the size and time of observation.

3.3.2. Sample and Data Collection technique in the Field.

Sample collection was done in two ways. All of these techniques have the same goal that is to calculate the population size and identify the concentration of Javan Rhinoceros.

□ Collection of Faeces sample

The goal is to gather the more accurate result of the population, particularly individual identity, sex, age group and distribution. Faecal material contains part of the gastrointestinal mucus tissue, inner lining of the intestines that is secreted out along with faeces. This tissue contains materials that can be

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used for genetic analysis. Genetic analysis would reveal important information on individual identity.

Criteria of faeces collection are:

- Level of freshness (faeces age) is not more than one week old.
- Completeness of faeces shape (ball) that relatively has not been deformed (still intact).

And the standard procedures of faeces collection are:

- Record the time of finding, area location, GPS position, prediction of faeces age and the vegetation condition.
- To measure the width and length of faeces pile, to count the numbers of faeces ball (if possible), location of faeces drop (land or river)
- Taking picture (photo) and the index number.
- Gathering sample using pincer and putting sample in a centrifugal jar filled with 70% alcohol. First sample is taken from the top layer of faeces ball for DNA analysis. The second sample is taken from middle layer of faeces ball for hormones analysis. Both of sample jars are labelled.
- Sample is stored in refrigerator as soon as returning from the field, which latter will be sent to the laboratory for DNA analysis.

See DNA Analysis report submitted by Columbia University.

➤ Collection of footprint data

The goal is obtaining population estimate consisting of the number of individual, age group and distribution. Important factor in footprint measurement is finding a fresh footprint that shows clearly defined prints with obvious borders. Information on the behaviour of several individuals can be observed directly. Information on individual home range can be determined by tracking and mapping browsing paths and position of Javan Rhinoceros. It is measured based on coordinate point using GPS.

Procedures for recording footprint findings are:

- Measuring the width of back and front footprints.
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- Recording finding time, area location, footprint direction, GPS position and vegetation condition.
- Obtaining picture (photo) and its index number

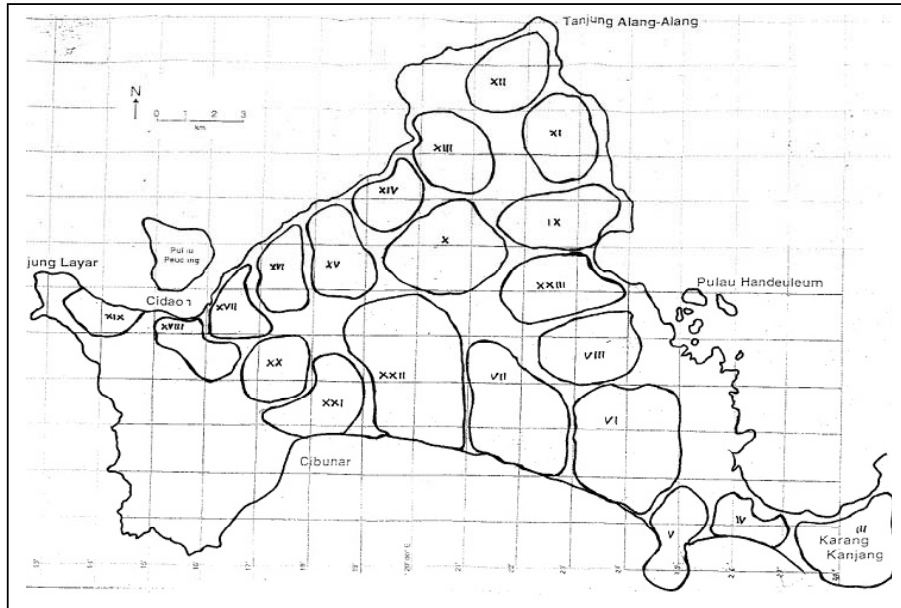


Figure 2. Observation blocks



Figure 3. *Footprint of Javan Rhinoceros and the Measurement*

3.3.3 Method of Analysis

Collected data is grouped based on the purpose. The population calculation using DNA analysis taken from faecal sample is reported separately by Columbia University, New York - USA. However, these faeces findings and other findings in form of footprint, food remnants and mud wallow are also counted to determine the population concentration or density. Density can be defined as the number of individual of one species per block per area unit (ind/m^2). Blocks with high density are regarded as population concentration. An object in form of faeces and footprint is regarded as signs of presence of an individual. As essential instruments, the footprint sizes can be used to indicate the variety of age class using Shannon-Wiener Diversity index. To find out about Javan Rhinoceros home range, behaviour data

recorded on GPS describes the average of daily journey of several Javan Rhinoceros individual.

The density and diversity of Javan Rhinoceros age can be calculated using these formulas:

Density:

$$K = \frac{a}{B}$$

Where : K = Density (ind/m²)
 'a = Number of individual of one species
 'b = Block coverage size (m²)

Shannon-Wiener's Diversity Index:

$$H' = - \sum Pi \cdot \log_2 Pi$$

Where : H' = Diversity Index
 Pi = ni/N
 'ni = Individual per footprint size
 N = Total individual number per size
 Pi = Possibility

IV. RESULT and ANALYSIS

For 20 months of data collection in the field, the results are significant to describe the population of Javan Rhinoceros in Ujung Kulon. As much as 23 blocks are already surveyed within this period. Size of all observation blocks is 112.2 km² or 11,220 ha, these blocks represent Javan Rhinoceros habitat area in Ujung Kulon Peninsula, which has 30,000 ha area or around 37.4 %. The average of observation block size is 4.9 km² (490 ha) with 2.1 km² (210 ha) as the smallest size located in Air Mokla block and, 11.8 km² (1,180 ha) as the largest size located in Citadahan block (**Table 2**). Grid map used in counting the block size is a map with size of 2 times 2 km square.

The rest of the Javan Rhinoceros habitat that has not been observed is an area of mount Payung (480 – 500 asl), swamp area, and grazing ground. These areas are not suitable as habitat of Javan Rhinoceros. Mount Payung has montane type of vegetation with thick primary forest. Several savannas vegetations located in Peninsula are Cigenter, Cidaon, Cibom, Ciujungkulon, Cibunar dan Cikuya.

As stated in the method explanation of data collection and data analysis, there are two sets of data gathered from this study. The first is the record of faeces density and factor based on the findings in observation blocks. The second is data in form of factor measurement to uncover the variety of Javan Rhinoceros age. Other findings such as wallows, remnants of food plant, urine etc., act as supporting information of the main data, and are not included as instrument of population calculation.

Table 2. *The Size of Observation Block*

No.	Block	Location	Block Size (km ²)	Observation Days
1	I	Air Mokla	2.1	6
2	II	Kalajetan	3.2	6
3	III	Karang Ranjang	6.8	11
4	IV	Pangukusan	3.4	14
5	V	Tanjung Tereleng	4.2	7
6	VI	Cibandawoh	10.9	50
7	VII	Cikeusik	9.1	65
8	VIII	Cihandeuleum	4.6	11
9	IX	Citengah	4.6	8
10	X	Cikarang	6.7	18
11	XI	Citelang	4.4	8
12	XII	Nyiur	5.0	8
13	XIII	Nyawaan	4.7	8
14	XIV	Cimayang	3.7	5
15	XV	Cinogar	3.8	13
16	XVI	Citerjun	3.7	15
17	XVII	Citelanca	2.6	6
18	XVIII	Cidaon	2.7	5
19	XIX	Cibom	2.3	5
20	XX	Gunung Kendeng	2.9	6
21	XXI	Cibunar	4.5	7
22	XXII	Citadahan	11.8	11
23	XXIII	Cigenter	4.4	7
Total			112.2	300

Variation in survey time span effects directly to the observation block size is the fact that cannot be avoided in the field, especially if related with the observation method that relies on the team's walking coverage ability. The time span of observation is heavily affected by internal factors such as the speed and survey material availability. External factors are related to the real condition in the field, such as the observation field, the condition of team's physical condition and also the signs of Javan Rhinoceros' presence.

The following section will discuss on several smallest and largest blocks. The field observation result can identify the reasons why some of the findings within certain blocks are so few (with exception of internal factor). The reasons may include variety of food vegetation are not adequate, human disturbances are very high, the numbers of mud wallow locations (block Air Mokla, Cibom and Cidaon) are very few, almost to none. In Air Mokla block - located in the most east of Ujung Kulon Peninsula- is gateway to the village, there are savannas and open forest vegetations. In Cibom block -located in the westernmost tip of Ujung Kulon Peninsula- there are savannas grounds, in this area, activities of lighthouse keeper are observed. There is Cidaon block that has significance as eco-tour route, (next to Peucang island, a tourist destination) as well as connects to Mount Kendeng, Cibunar and Cibom.

The blocks used by rhinos most are Citadahan, Cibandawoh and Cikeusik. The three blocks are for long known as the location where Javan Rhinoceros frequently found either directly or secondary signs. A lot of the survey report supports where is the largest Javan Rhinoceros domination out of the three locations (Schenkel & Schenkel, 1968; Sadjudin & Djaya, 1984; Griffith, 1993). In general, the topography of these areas is flat. It contains ecotone, the transition from secondary forest to tropical rain forest, and is also covered with lowland vegetation. Permanent and non-permanent mud wallows are numerous in these blocks.

4.1 Javan Rhinoceros Density Based on Faeces

The presence of data variations is not used to calculate species density. Only data in form of faeces collection or inventory is taken into account to calculate density. The reason for choosing faecal sample to calculate population density is due to the fact that there are faeces findings in almost all blocks, except Nyiur, Cidaon and Cibunar. Therefore, it is predefined as component for calculating the density of individual number of one species per block per area size (ind/m²). Then it is assumed that one individual is represented with faeces. Based on the counting result using the density formula or faeces density, Cikeusik (VII), Citerjun (XVI) and Cinogar (XV) sequentially have the highest density values of **0.0000071**; **0.0000038** and **0.0000034** respectively (**Table 3**).

The faeces density could also show the influence of vegetation differentiation and topography between Cikeusik block representing the southern area and Citerjun-Cinogar block representing the northern area. The observation time in Cikeusik block is the largest number among the entire blocks (65 days), therefore the possibility to collect findings of various secondary objects is larger. This area fulfil the criteria of Javan Rhinoceros habitat where can be found variety of **food type** (frequency: 28 findings), a lot of permanent and non-permanent mud wallows were found (11), the topography tends to be flat, vegetation dominated by lowland type (bush, rattan, and tepus), and there are water spring which run the whole year round. In the adjacent blocks, Cinogar and Citerjun with observation time each are 13 and 15 days has similar characteristics where the elevation tends to be higher, vegetation cover is dominated by langkap (*Arenga obtusifolia*), in each blocks were found 4 mud holes, 16 findings of food remnants in each blocks.

Over the observation time in these three blocks, encounter of signs of human presence is rare; therefore, human disturbance can be considered small. However, the existing patrol report shows that there are bird poaching in Cikeusik, Citerjun and Cinogar blocks. In several occasions the surveyor team found several local fishermen resting in the beach bordering of those blocks.

Based on the vegetation and topography grouping by Hommel (1970), Cikeusik vegetation is dominated by *Dendrocnidae*, *Arenga obtusifolia* (langkap) and *Pandanus tectorius* (pandanus plants), vegetation in the Cinogar area is dominated by *Calamus* (rattan / rotan), *Arenga obtusifolia* (langkap) and *Schizosfachyum sollingeri* (cangkeuteuk), and the vegetation in Citerjun area is dominated by *Calamus* (rattan / rotan), *Arenga obtusifolia* (langkap) and *Salacca edulis* (snake fruit / salak).

Javan Rhinoceros has adapted to the transition area between vegetation of lowland and open space, which usually are secondary forest and tropical rain forest. The first requirement to be considered as a suitable Javan Rhinoceros' habitat is the accessibility for the animal. The Javan Rhinoceros is a heavy animal and has difficulty to get through steep or swampy areas. Several particular areas that are preferred consist of mud holes, and shallow / calm rivers. High-density forest is preferred as hiding place from threats (Schenkel & Schenkel, 1969 in Sajudin, 1984).

Work effectivity (dung piles found / working days) in each block is used as rhinoceros density indicator. The work effectivity calculation shows that Citadahan (XXII) block has effectiveness score as high as 1.5455, followed by three blocks with equal score 1.0000, that are Cikeusik, Cinogar and Cibandawoh blocks, and then Cihandeuleum (VIII) block with score of 0.7273. This information could illustrate the Javan Rhinoceros population

concentration in Ujung Kulon Peninsula. High effectiveness score suggests high concentration of rhinoceros.

Table 3. Various Results of Signs Found within 20 Months of Observation

Block	Working Days	Faeces (Piles)	Footprint	Effectivity (Piles /days)	Mud Wallow	Food	Density (Pile /m ²)
I	6	3	0	0.5000	0	2	0.0000014
II	6	3	3	0.5000	0	2	0.0000009
III	11	6	2	0.5455	6	7	0.0000009
IV	14	6	2	0.4286	2	1	0.0000018
V	7	2	0	0.2857	1	0	0.0000005
VI	50	29	14	0.5800	15	30	0.0000026
VII	65	65	48	1.0000	11	28	0.0000071
VIII	11	8	4	0.7273	1	4	0.0000017
IX	8	2	2	0.2500	0	0	0.0000004
X	18	6	6	0.3333	4	4	0.0000009
XI	8	2	2	0.2500	0	0	0.0000005
XII	8	0	1	0.0000	0	0	-
XIII	8	1	1	0.1250	1	0	0.0000002
XIV	5	1	2	0.2000	1	0	0.0000003
XV	13	13	4	1.0000	4	12	0.0000034
XVI	15	14	5	0.9333	4	4	0.0000038
XVII	6	6	4	1.0000	6	0	0.0000023
XVIII	5	0	1	0.0000	1	0	-
XIX	5	1	1	0.2000	1	3	0.0000004
XX	6	1	0	0.1667	2	0	0.0000003
XXI	7	0	1	0.0000	0	0	-
XXII	11	17	25	1.5455	10	1	0.0000014
XXIII	7	4	4	0.5714	5	0	0.0000009
	300	190	132		75	98	

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Concentration or density using the above method shows that Javan Rhinoceros concentration population has changed, except Cikeusik. Borner (1979), as in Sadjudin (1991), stated that Javan Rhinoceros population concentration in several locations is assumed as the result of natural boundaries in the form of steep areas that restrict movement of rhinos between areas of concentration.

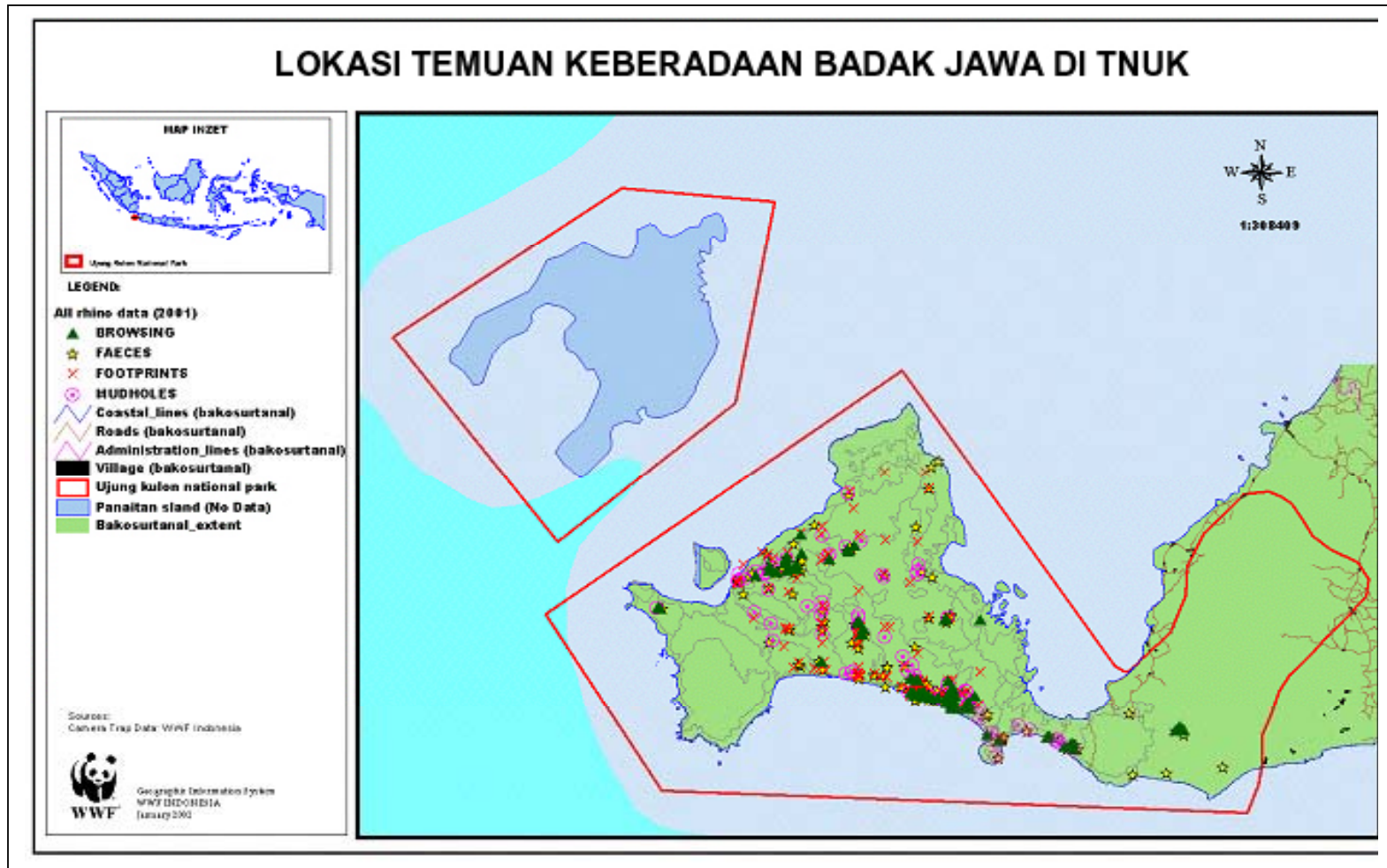


Figure 4. Map of Observation Object Findings

Population distribution Of Javan Rhinoceros from fecal and footprint analysis

4.2 Variation of Footprint Size

Observed footprints that are not older than one week with imprint and border line that is obvious, were measured in several soil types. Measurements were done on the back and front footprints and were repeated 3 times and then the more representative average number was taken. 132 footprints were encountered, measured and recorded within 10 size categories. Raw data on footprint sizes are presented in **Appendix 1** (Footprint Measurement Result) and **Figure 5**.

Utilizing diversity analysis (Shannon-Wiener's Diversity index) where any number larger than or equal to 2 is assumed as having high variation, and vice versa any number lower than 2 has low variation, then the counting result, 3 blocks has high variation rate and 20 blocks with very low to low variation. Block with the highest variation is block 7 (Cikeusik) as high as 6.729 with 7 footprint sizes variation, followed by block 22 (Citadahan) as high as 4.915 with 6 sizes, and block 6 (Cibandawoh) rates 2.838 with 4 sizes. There are 9 blocks with variation that are very low, but did not mean that Javan Rhinoceros existence cannot be found by footprint findings. Those nine blocks are Air Mokla (block 1), Kalajetan (2), Tanjung Tereleng (5), Nyiur (12), Nyawaan (13), Cidaon (18), Cibom (19), Gunung Kendeng (20) and Cibunar (21). There are only 3 blocks where no footprints were found (0 rate): Air Mokla, Tanjung Tereleng and Gunung Kendeng. The lowest variations were found in blocks 11, with rates between 0.612 – 1.730. High variations confirm the faeces finding that more rhinoceros's are present in the area.

Variation calculation indicating good results were obtained from Cikeusik and Citadahan blocks where footprints with sizes of 16-17 and 17-18 cm were encountered. These areas are quite far from each other and there is a small probability that rhinos at that age move between these two areas. These most likely belong to a calf (0–1/2 year of age). This information

indicates in the period from October 1999 until July 2001, at least two calves were born.

Factors causing the high age variations – based on the high number of variation on footprint findings (especially in Cikeusik and Citadahan blocks)- are the same as those that cause high value of faeces density which are also caused by habitat condition that are right for the animal, including the low rate of human existence that, reduce the threat to the calves and new-borns of the animal.

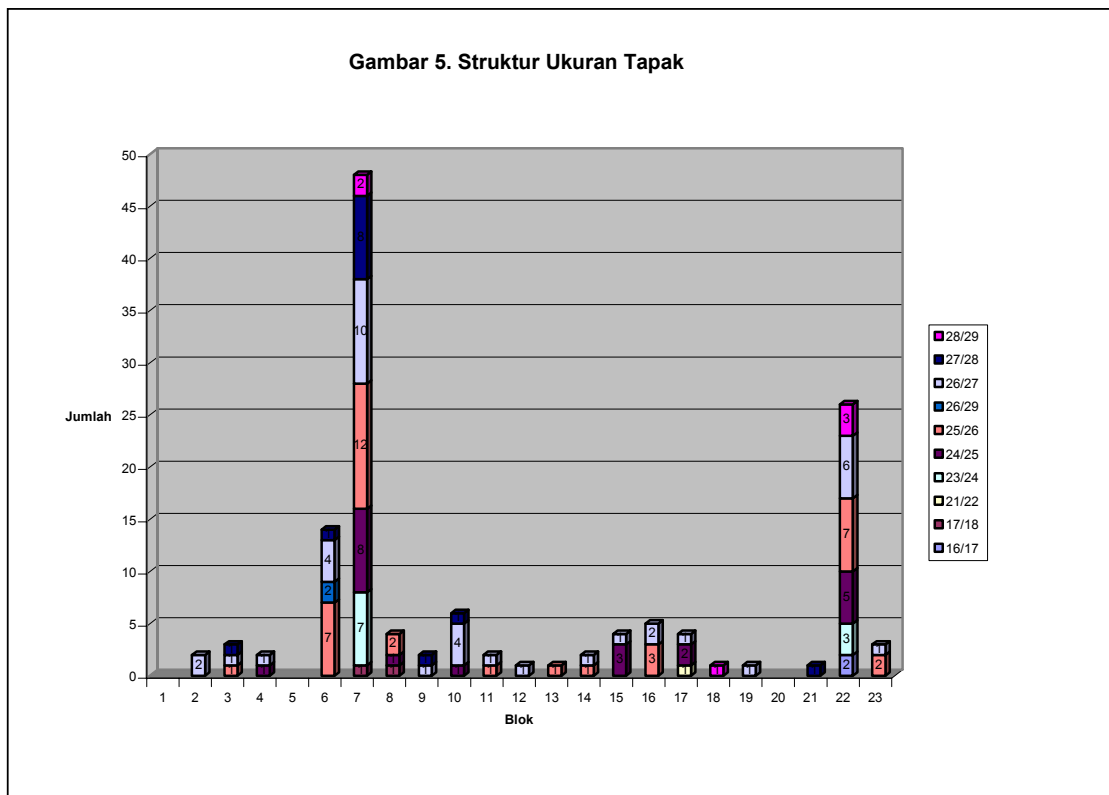


Figure 5. Structure of Footprint Sizes

4.2.1 Population Structure Based on Footprint Size against Age Group

Consistency in conducting measurement with fixed criteria of measuring footprint produces composition estimation of all footprints found over the observation period. Recapitulation data of footprint size (see Appendix 2) is then analysed to obtain minimum and maximum estimation. Taking into account footprint age, footprint direction/bearing (azimuth), differences in time when footprints left in the same block, and the approximation of movement activity ability related to vegetation and topography condition are really helpful in determining the individual counting within and between the observation blocks; Thus producing minimum and maximum estimation of rhinoceros for each footprint size group.

Table 4. Estimation of Minimum and Maximum Number of Observation Result where T= Total findings, I=Minimum estimate and A= Maximum estimate.

No	Size (cm)	Estimation of Minimum and Maximum Number in Block											
		1	2	3	4	5	6	7	8	9	10	11	12
		T I A	T I A	T I A	T I A	T I A	T I A	T I A	T I A	T I A	T I A	T I A	T I A
1	16-17												
2	17-18							1 1 1	1 1 1				
3	21-22												
4	23-24							7 2 2					
5	24-25				1 1 1			8 2 2	1 1 1		1 1 1		
6	25-26			1 1 1			7 1 2	12 3 3	2 1 1			1 1 1	
7	26-29						2 1 1						
8	26-27		2 1 1	1 1 1	1 1 1		4 1 2	10 2 2		1 1 1	4 1 2	1 1 1	1 1 1
9	27-28			1 1 1			1 1 1	8 2 2		1 1 1	1 1 1		
10	28-29							2 1 1					

Continuation of table 4

No	Size (cm)	Estimation of Minimum and Maximum Number in Every Blocks											Total
		13	14	15	16	17	18	19	20	21	22	23	
		T I A	T I A	T I A	T I A	T I A	T I A	T I A	T I A	T I A	T I A	T I A	
1	16-17											2 1 2	
2	17-18												
3	21-22					1 1 1							
4	23-24										3 1 2		
5	24-25			3 1 2		2 1 1					5 1 2		
6	25-26	1 1 1	1 1 1		3 1 1						7 2 2	2 1 1	
7	26-29												
8	26-27		1 1 1	1 1 1	2 1 1	1 1 1		1 1 1			6 2 2	1 1 1	
9	27-28									1 1 1			
10	28-29						1 1 1				3 1 1		

132 footprints were measured over the 300-day period, in 23 blocks. Footprint measurement generates the estimation of minimum and maximum Javan Rhinoceros population between 57 – 64 animals or 61 animals (**Table 5**). The population calculation result seems almost equal to population of the last 10 years. But in comparing the census result to those of 1980 -1981, 1981 and 1982 -1983, illustrates population fluctuation. Assumption of 1994, number of Javan Rhinoceros individual in Ujung Kulon is around 61 individual, and the census result in July 1996 shows population estimation is about 51 - 67 (TNUK, 1996).

Table 5. Estimation of Javan Rhinoceros Minimum and Maximum Number in October 1999 – July 2001

No	Footprint Size	Minimum Number (individual)	Maximum Number (individual)
1	16 – 17	1	2
2	17 – 18	2	2
3	21 – 22	1	1
4	23 – 24	3	4
5	24 – 25	8	10
6	25 – 26	13	14
7	26 – 27	18	20
8	26 – 29	1	1
9	27 – 28	7	7
10	28 – 29	3	3
		57	64

To find out population composition, age class estimation is grouped based on the Schenkel & Schenkel (1969) theory, where the individual grouping based on the rhino age comparison using front footprint size of every individual which encountered in observation period. Analysis result gathered from Javan Rhinoceros population composition is shown in **Table 6.**

Based on the population composition, Javan Rhinoceros age class or group is dominated by immature male and / or mature female 68.2 %, followed by 15.9 % with age approximation of 1 – 2 years old, 8.3% age approximation of ½ - 1 year old, 4.5% is mature male, and 3% are newborns or calves age of 0 – ½ year. The result is very good considering the Javan Rhinoceros age variety findings. The illustration is acceptable when it is assumed if half (34.1%) of the most dominant age class (68.2%) is mature

female individuals. It is essential for Javan Rhinoceros to have balanced sex ratio to survive the population.

In the dynamic population, the natality-mortality factor is a main variable that has to be taken into account. A very encouraging fact (evidence) is a discovery of footprints with size of 16-17 and 17-18 cm which indicates there are 3 to 4 Javan Rhinoceros births around May 1999 to January 2001 period, in 3 different blocks: Cihandeleum, Cikeusik and Citadahan. The birth month of those newborns is within the rainy season (January) and transition of dry season (May), which supports the assumption that the wet / rainy season is ideal time for a Javan Rhinoceros mother to have easier delivery. One of the reasons is that a delivering Rhino mother needs to be close to water source that helps save her from long journey and is more energy efficient. Mortality of the rhinoceros is not very well known. Except for recording the deaths of 5 rhinoceros in 1985, one in 2000, and the last one found in 2003, mortality rate cannot be estimated.

Table 6. Population Composition based on Estimation of Age Class Variation within Observation Period of October 1999 to July 2001

No	Footprint Class	I	II	III	IV	V	
1	Front Footprint Size	< 20	20-23	24-25	25/26 –28	29-30	
2	Estimation of Rhino age (in year)	½ year	1/2 - 1 year	1 - 2 year	Adult female or Pre-adult male	Adult Male	
3	Estimation of Minimum Number	3	1	11	39	3	57
4	Recorded Number of Footprint	4	11	21	90	6	132
5	In Percentage (%)	3.0	8.3	15.9	68.2	4.5	100
6	Estimation of Maximum Number	4	1	14	42	3	64

In comparing with the observation result on Javan Rhinoceros age structure in 1989 indicates an unstable population and even a declining tendency based on assumption of a large number of deaths in early age

especially female (Sudjono, 1991). Therefore this observation shows the contradicting result where there can be found a lot of young animals (0 – 2 years) 27.2% and at least 34.1 % of female (adult). This population composition can be considered good, and is essential for the population survival of Javan Rhinoceros in Ujung Kulon National Park.

V. SUMMARY and SUGGESTION

5.1 Summary

Based on the observation result and analysis of object parameter of faeces findings and footprints of Javan Rhinoceros in Ujung Kulon National Park, can be summarized as follows:

1. Based on the calculation of faeces concentration, **Cikeusik**, Citerjun dan Cinogar blocks are the most faeces-findings concentrated blocks.
2. Based on the footprint size variation, **Cikeusik** (6.729), Cidadahan (4.915) and Cibandawoh (2.838) are blocks with high variations, confirming the high numbers of rhinoceros present in these areas.
3. The largest Javan Rhinoceros age class is pre-adult male and or adult female (68.2%), age of 1-2 years (15.9%), and ½ - 1 year (8.3%).
4. Javan Rhinoceros population estimation is 61 animals or between 57 – 64 animals.
5. There are discovery of 3-4 Javan Rhinoceros calves have been born.

5.2 Suggestion

Based on the observation and analysis result, concentration blocks or areas of Javan Rhinoceros are supposed to be monitored and protected from human disturbance activity more intensively.

1. It is necessary to continue performing the periodical surveys in the highly populated blocks, and especially in Cinogar and Citerjun blocks considering that these blocks have not recorded as Javan Rhinoceros concentration area. However, extensive observations should be made to ensure that this activity do not create significant disturbances for rhinoceros population.
2. Park management would need special research focusing on birth, the period from breastfeeding to next reproduction time that illustrates the biology of Javan Rhinoceros reproduction and life cycle as a whole.

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APPENDIX 1

Data of footprint sizes recorded throughout observation period.

Block No	Location	Footprints findings based on size groups										Total
		16/17	17/18	21/22	23/24	24/25	25/26	26/29	26/27	27/28	28/29	
1	Air Mokla											0
2	Kalajetan								2			2
3	Karang Ranjang						1		1	1		3
4	Pangukusan					1			1			2
5	Tanjung Tereleng											0
6	Cibandawoh						7	2	4	1		14
7	Cikeusik		1		7	8	12		10	8	2	48
8	Cihandeuleum		1			1	2					4
9	Citengah								1	1		2
10	Cikarang					1			4	1		6
11	Citelang						1		1			2
12	Nyiur (?)								1			1
13	Nyawaan						1					1
14	Cimayang						1		1			2
15	Cinogar					3			1			4
16	Citerjun						3		2			5
17	Telanca			1		2			1			4
18	Cidaon (?)										1	1
19	Cibom								1			1
20	Gunung Kendeng											0
21	Cibunar									1		1
22	Citadahan	2			3	5	7		6		3	26
23	Cigenter						2		1			3
	Totals	2	2	1	10	21	37	2	38	13	6	132

Remarks: 16/17 = 2 findings, 7 month apart

Blok	No	Localities	Georeference		Footprint sizes
			Lon.	Lat.	
I		Air Mokla			
II		Kalejetan	06° 50' 40.3"	105° 30' 08.3"	26/27
		Kalejetan	06° 51' 30.7"	105° 30' 51.7"	26/27
III	1	Karang ranjang	06° 50' 28.0"	105° 27' 14.1"	25/26
		Karang ranjang	06° 50' 21.9"	105° 27' 26.1"	26/27
		Karang ranjang	06° 50' 16.2"	105° 26' 52.1"	27/28
IV	1	Pangukusan	06° 50' 21.6"	105° 25' 19.0"	24/25
	2	Pangukusan	06° 50' 30.0"	105° 25' 08.6"	26/27
V	1	Tanjung Tereleng			
VI	1	Bandawoh Barat	06° 48' 54.7"	105° 23' 09.5"	25/26
		Bandawoh atas	06° 48' 45.2"	105° 23' 33.6"	25/26
		Bandawoh barat	06° 49' 17.6"	105° 23' 36.5"	25/26
		Bandawoh barat	06° 48' 35.6"	105° 22' 24.4"	25/26
		Ci baandawoh barat	06° 48' 19.0"	105° 23' 27.7"	25/26
		Bandawoh	06° 49' 11.3"	105° 24' 29.8"	25/26
		Cibandawoh timur	06° 48' 40.9"	105° 24' 06.1"	25/26
		Bandawoh barat	06° 48' 37.9"	105° 22' 39.4"	26/27
		Bandawoh barat	06° 49' 13.5"	105° 24' 07.5"	26/27
		Bandawoh	06° 49' 18.1"	105° 23' 50.0"	26/27
		Bandawoh	06° 48' 55.1"	105° 23' 14.0"	26/27
		Ci baandawoh barat	06° 49' 06.6"	105° 23' 34.4"	26/29
		Bandawoh	06° 48' 45.4"	105° 23' 56.3"	26/29
		Bandawoh barat	06° 48' 56.6"	105° 23' 30.0"	27/28
VII	1	Cikeusik Timur	06° 48' 52.8"	105° 22' 10.8"	23/24
		Cikeusik Timur	06° 48' 40.1"	105° 22' 32.0"	23/24
		Rorah bogo	06° 48' 54.5"	105° 22' 39.1"	17/18
		Rorah bogo	06° 48' 47.8"	105° 22' 48.1"	23/24
		Anak Cikeusik Barat	06° 46' 40.0"	105° 20' 24.7"	23/24
		Cikeusik Barat	06° 46' 42.1"	105° 20' 26.0"	23/24
		Cikeusik Timur	06° 48' 48.4"	105° 22' 22.2"	23/24
		Cikeusik Timur	06° 48' 42.9"	105° 22' 23.4"	23/24
		Cikeusik Timur	06° 48' 45.8"	105° 22' 21.4"	24/25
		Cikeusik Timur	06° 48' 44.9"	105° 22' 16.6"	24/25
		Cikeusik Timur	06° 48' 42.0"	105° 22' 27.9"	24/25
		Citadahan Atas	06° 46' 20.9"	105° 19' 12.0"	24/25
		Cikeusik Timur	06° 48' 53.3"	105° 22' 51.1"	24/25
		Cikeusik Timur	06° 48' 41.1"	105° 22' 28.1"	24/25
		Cikeusik Timur	06° 48' 40.7"	105° 22' 38.1"	24/25
		Cikeusik Timur	06° 48' 40.2"	105° 22' 20.9"	24/25

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		Cikeusik	06° 48' 10.4"	105° 21' 09.9"	24/25
		Cikeusik	06° 48' 12.7"	105° 21' 22.6"	25/26
		Cikeusik Timur	06° 48' 37.8"	105° 22' 08.5"	25/26
		Cikeusik timur	06° 48' 44.9"	105° 23' 16.6"	25/26
		Anak Cikeusik barat	06° 47' 06.8"	105° 20' 22.8"	25/26
		Cikeusik muara	06° 48' 29.7"	105° 20' 21.6"	25/26
		Cikeusik	06° 48' 32.8"	105° 21' 52.1"	25/26
		Cikeusik Barat	06° 45' 14.6"	105° 20' 26.8"	25/26
		Cikeusik Timur	06° 46' 27.7"	105° 20' 30.7"	25/26
		Cikeusik Timur	06° 48' 41.1"	105° 22' 37.2"	25/26
		Cikeusik Timur	06° 48' 44.8"	105° 22' 40.8"	25/26
		Cikeusik	06° 46' 28.7"	105° 21' 20.1"	25/26
		Cikeusik	06° 48' 06.2"	105° 20' 57.8"	25/26
		Cikeusik Timur	06° 48' 28.8"	105° 22' 35.3"	26/27
		Anak Cikeusik Barat	06° 46' 45.5"	105° 20' 22.4"	26/27
		Cikeusik Barat	06° 46' 33.8"	105° 20' 25.2"	26/27
		Cikeusik Timur	06° 48' 42.1"	105° 22' 34.9"	26/27
		Cikeusik Timur	06° 47' 22.9"	105° 22' 27.1"	26/27
		Cikeusik Timur	06° 48' 44.0"	105° 22' 30.0"	26/27
		Cikeusik Timur	06° 48' 44.5"	105° 22' 42.8"	26/27
		Cikeusik	06° 47' 49.4"	105° 22' 00.1"	26/27
		Cikeusik Timur	06° 49' 11.3"	105° 24' 29.8"	26/27
		Cikeusik Timur	06° 48' 48.2"	105° 22' 34.1"	26/27
		Cikeusik Timur	06° 48' 19.8"	105° 22' 37.7"	27/28
		Cikeusik Timur	06° 48' 18.0"	105° 22' 26.6"	27/28
		Cikusik atas	06° 48' 43.7"	105° 23' 31.5"	27/28
		Anak Cikeusik barat	06° 48' 06.8"	105° 20' 25.2"	27/28
		Cikeusik Timur	06° 48' 38.2"	105° 22' 27.0"	27/28
		Cikarang tengah	06° 43' 18.5"	105° 20' 30.5"	27/28
		Cikeusik	06° 46' 58.0"	105° 20' 26.7"	27/28
		Cikeusik	06° 46' 28.7"	105° 21' 29.7"	27/28
		Cikeusik	06° 48' 10.1"	105° 21' 23.1"	28/29
		Cikeusik Timur	06° 48' 40.6"	105° 22' 35.4"	28/29
		Cikeusik Timur	06° 49' 11.3"	105° 24' 29.8"	27/28
VIII	1	Cihandeuleum	06° 46' 11.3"	105° 23' 27.5"	17/18
		Cihandeuleum	06° 46' 07.7"	105° 22' 49.1"	24/25
		Cihandeuleum	06° 46' 09.7"	105° 23' 30.9"	25/26
		Pamanggangan	06° 48' 01.6"	105° 24' 33.2"	25/26
IX	1	Citengah	06° 46' 33.0"	105° 18' 05.2"	26/27
		Citengah	06° 41' 40.4"	105° 22' 48.7"	27/28
X	1	Cikarang tengah	06° 43' 21.6"	105° 20' 27.1"	24/25
		Cikarang Atas	06° 44' 11.3"	105° 19' 10.2"	26/27
		Cikarang Atas	06° 43' 57.6"	105° 19' 25.1"	26/27
		Cikarang atas	06° 43' 59.3"	105° 19' 22.9"	26/27
		Cikarang atas	06° 44' 06.0"	105° 19' 17.8"	26/27

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XI	1	Citelang	06° 41' 08.3"	105° 22' 42.7"	26/27
		Cicangkok atas	06° 41' 08.0"	105° 21' 19.1"	25/26
XII		Nyiur	06° 42' 23.9"	105° 20' 16.3"	26/27
XIII	1	Nyawaan	06° 41' 49.0"	105° 20' 08.4"	25/26
XIV	1	Cimayang Barat	06° 43' 01.3"	105° 19' 13.0"	25/26
		Cimayang atas	06° 43' 15.7"	105° 19' 11.4"	26/27
XV	1	Cinogar	06° 43' 56.0"	105° 18' 02.3"	24/25
		Cinogar	06° 44' 28.2"	105° 17' 58.7"	26/27
		Cinogar timur	06° 43' 15.2"	105° 18' 29.2"	24/25
		Cinogar atas	06° 42' 43.4"	105° 18' 01.1"	24/25
XVI	1	Citerjun	06° 45' 08.9"	105° 17' 23.8"	25/26
	2	Rorah kawung	06° 44' 31.3"	105° 18' 00.7"	26/27
	3	Rorah kawung	06° 43' 58.8"	105° 17' 21.9"	26/27
		Rorah kawung	06° 43' 55.9"	105° 17' 11.0"	25/26
		Rorah kawung	06° 44' 07.1"	105° 17' 31.7"	25/26
XVII	1	Citalanca	06° 44' 19.2"	105° 16' 31.6"	24/25
	2	Citalanca	06° 44' 51.3"	105° 16' 22.2"	21/22
	3	Citalanca	06° 44' 58.8"	105° 16' 19.8"	26/27
	4	Citalanca	06° 44' 56.9"	105° 16' 19.7"	24/25
XVIII		Ciujung kulon atas	06° 46' 11.2"	105° 16' 54.2"	28/29
XIX	1	Cibom	06° 44' 15.7"	105° 13' 22.3"	26/27
XX	1	Gunung Kendeng			
XXI		Cibunar barat	06° 47' 09.0"	105° 17' 54.0"	27/28
XXII	1	Citadahan barat	06° 47' 54.6"	105° 18' 57.7"	23/24
		Rorah daon	06° 48' 04.4"	105° 20' 22.2"	16/17
		Citadahan	06° 46' 30.4"	105° 17' 58.8"	16/17
		Rorah Daon	06° 48' 09.9"	105° 20' 30.3"	23/24
		Rorah Daon	06° 48' 05.7"	105° 20' 26.5"	23/24
		Rorah daon	06° 47' 51.5"	105° 20' 26.2"	24/25
		Citadahan Atas	06° 45' 45.3"	105° 19' 14.8"	26/27
		Citadahan Atas	06° 45' 50.9"	105° 19' 18.0"	26/27
		Citadahan Atas	06° 46' 21.9"	105° 19' 10.9"	26/27
		Citadahan Atas	06° 46' 40.8"	105° 19' 12.2"	28/29
		Citadahan Atas	06° 47' 01.9"	105° 19' 12.0"	28/29
		Citadahan barat	06° 46' 34.4"	105° 17' 58.6"	28/29
		Rorah Daon	06° 48' 04.5"	105° 20' 23.2"	26/27
		Citadahan timur	06° 48' 04.3"	105° 20' 15.4"	24/25
		Citadahan timur	06° 47' 56.6"	105° 19' 06.2"	24/25
		Citadahan timur	06° 47' 53.0"	105° 19' 14.8"	26/27
		Citadahan	06° 44' 48.2"	105° 18' 20.8"	25/26

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		Citadahan	06° 47' 43.5"	105° 18' 25.6"	25/26
		Citadahan	06° 46' 30.4"	105° 17' 58.8"	26/27
		Citadahan timur	06° 47' 58.9"	105° 19' 18.8"	25/26
		Citadahan Atas	06° 47' 40.9"	105° 19' 16.8"	25/26
		Rorah Daon	06° 48' 12.9"	105° 20' 25.5"	25/26
		Citadahan	06° 45' 16.4"	105° 18' 04.2"	25/26
		rorah daon	06° 48' 08.8"	105° 20' 28.0"	25/26
XXIII	1	Cigenter atas	06° 44' 56.7"	105° 22' 10.9"	24/25
	2	S. Cigenter	06° 43' 29.8"	105° 21' 21.6"	25/26
	3	Cigenter	06° 43' 31.9"	105° 22' 26.4"	25/26
	4	Cigenter atas	06° 44' 39.3"	105° 21' 18.3"	26/27

APPENDIX 2

Faeces findings

No.	Date	Time	Vegetation	Freshness	Remarks
1	17-Oct-99	9:47	Langkap	5 days	4 faeces nearby
2	17-Oct-99	13:40	Langkap	1 night	24/25 cm
3	17-Oct-99	14:25	Langkap	7 days	11 faeces nearby
4	19-Oct-99	9:57	Langkap	1 night	60 X 69 cm, 3 faeces nearby, 24/25
5	19-Oct-99	9:57	Langkap		Different faeces from FS4R: suspected
6	19-Oct-99	14:29	Salak	7 days	
7	20-Oct-99	11:03	Langkap	4 days	85 X 102 cm, 2 faeces nearby
8	20-Oct-99	12:41	Bambu Haur	4 days	In stream
9	20-Oct-99	12:59	Bambu Haur	1 night	25/26 cm
10	21-Oct-99	11:18	Langkap	1 night	64 X 70 cm, 1 faeces nearby
11	21-Oct-99	11:18	Langkap		Different faeces from FS10R: suspected
12	24-Oct-99	11:00	Jejerukan	2 days	25/26 cm
13	24-Oct-99	11:00	Jejerukan	2 days	27/28 cm
14	24-Oct-99	12:48	Jambu Kopo	7 days	60 X 70 cm, 7 faeces nearby
15	10-Sep-99	11:25	Langkap	3 days	close to river
16	13-Nov-99	10:07	Langkap	2 days	size 90 X 110 cm, 25/26 cm
17	15-Nov-99	10:56	Tepus	1 night	70 X 80 cm
18	17-Nov-99	13:34	Tepus	14 days	55 X 60 cm, 26/27 cm
19	18-Nov-99	10:45	Tepus	< 1 day	by the river, foot: 26/27 cm
20	18-Nov-99	11:18	Tepus	1 day	by the river, 50 X 64 cm, foot: 26/27 cm
21	18-Nov-99	11:58	Bambu Haur	1 day	65 X 80 cm, foot: 26/27 cm
22	19-Nov-99	11:45	Rotan	2 days	In stream, 80 X 105 cm
23	22-Nov-99	12:40	Langkap	1 month	
24	23-Nov-99	10:44	Langkap	7 days	25/26 cm
25	23-Nov-99	11:14	Langkap	4 days	65 X 82 cm
26	23-Nov-99	11:14	Langkap	4 days	
27	24-Nov-99	9:52	Langkap	7 days	57 X 70 cm, 21/22 cm
28	24-Nov-99	9:55	Langkap	14 days	90 X 123 cm, 26/27 cm
29	24-Nov-99	10:00	Langkap	14 days	80 X 90 cm, 26/27 cm
30	24-Nov-99	10:38	Langkap	14 days	80 X 87 cm
31	24-Nov-99	11:08	Langkap	7 days	72 X 115 cm
32	1-Dec-99	13:50	Langkap	1 month	In stream, 61 X 72 cm
33	16-Dec-99	11:45	Bangban	< 1 day	89 X 100 cm, 25/26 cm
34	16-Dec-99	11:55	Bangban	< 1 day	80 X 125 cm, 27/28 cm

Population distribution Of Javan Rhinoceros from fecal and footprint analysis

35	17-Dec-99	14:49	Rotan Seel	10 days	In stream, 50 X 60 cm, 27/28 cm
36	18-Dec-99	9:30	Rotan Seel, Bangban	2 days	76 X 82 cm, 25/26 cm
37	18-Dec-99	13:40	Tepus	< 1 day	In stream, 40 X 140 cm, 26/27 cm
38	19-Dec-99	10:30	Rotan	2 days	In stream, 26/27 cm
39	19-Dec-99	13:49	Kitulang	< 1 day	In stream, 50 X 60 cm, 23/24 cm
40	20-Dec-99	12:50	Pandan, Bidur	< 1 day	In stream, 25/26 cm
41	21-Dec-99	11:20	Cangkeuteuk	< 1 day	In stream, 28/29 cm
42	22-Dec-99	8:30	Nipah	3 days	25/26 cm
43	22-Dec-99	9:43	Langkap	2 days	23/24 cm
44	22-Dec-99	10:40	Salak	< 1 day	70 X 74 cm
45	2-Jan-00	9:13	Kitulang / Rotan	< 1 day	In stream, 70 X 80 cm, 25/26 cm
46	28-Jan-00	9:12	Jambu kopo	7 days	
47	30-Jan-00	12:00	Salak	1 day	In stream, 26/27 cm
48	1-Feb-00	9:11	Langkap	< 1 day	70 X 72 cm, 28/29 cm
49	1-Feb-00	9:50	Langkap	1 day	24/25 cm
50	1-Feb-00	12:55	Waru, Cente	2 days	26/27 cm
51	1-Feb-00	13:50	Waru, Cente	2 days	In stream, 70 X 100 cm, 26/27 cm
52	2-Feb-00	14:00	Salak	3 days	28/29 cm
53	12-Feb-00	11:00	Pinang	< 1 day	24/25 cm
54	12-Feb-00	12:55	Salak	< 1 day	In stream, 26/27 cm
55	12-Feb-00	14:10	Bangban	< 1 day	In stream, 26/27 cm
56	14-Feb-00	11:10	Langkap	2 days	110 X 130 cm, 25/26 cm
57	16-Feb-00	11:30	Langkap	2 days	55 X 60 cm, 24/25 cm
58	10-Mar-00	11:09	Rotan, Langkap	3 days	70 X 83 cm, 27/28 (JK63R)
59	11-Mar-00	9:02	Langkap	4 days	75 X 105 cm, 27/28 (JK63R)
60	12-Mar-00	10:25	Rotan	5 days	In stream, 27/28 cm (JK63R)
61	19-Mar-00	9:05	Salak	< 1 day	In stream, 65 X 80 cm, 26/27 cm (JK64R)
62	19-Mar-00	10:00	Bangban, Langkap	< 1 day	In swamp, 26/27 cm (JK64R)
63	19-Mar-00	13:40	Bambu haur		42 X 50 cm
64	18-May-00	8:35	Salak	3 days	In stream
65	18-May-00	9:45	Bambu Cangkeuteuk		In stream
66	18-May-00	13:20	Salak, Bambu haur		In stream, 28 X 68 cm
67	19-May-00	17:50	Langkap		70 X 90 cm
68	21-May-00	9:21	Langkap	1 day	68 X 100 cm, 24/25 cm JK68R
69	21-May-00	9:23	Langkap	1 day	90 X 120 cm, 24/25 cm JK68R
70	23-May-00	15:42	Rotan		53 X 60 cm, 25/26 JK69R

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71	29-May-00	15:42	Bangban	< 1 day	53 X 60 cm, 25/26 JK69R
72	29-May-00	12:50	Langkap	< 1 day	26/27 cm JK70R
73	29-May-00	13:50	Cangkeuteuk	< 1 day	26/27 cm JK70R
74	15-Jun-00	11:35	Bambu haur	< 1 week	In stream, 90 X 120 cm JK71R
75	16-Jun-00	11:05	Langkap	2 days	90 X 120 cm, 26/27 cm JK72R
76	16-Jun-00	13:47	Salak, Tepus	2 days	In stream, 26/27 cm JK72R
77	17-Jun-00	11:15	Kitulang	3 days	In stream, 65 X 80 cm, 26/27 cm JK72R
78	17-Jun-00	12:15	Bambu haur	3 days	In stream, 40 X 60 cm, 26/27 cm JK72R
79	18-Jun-00	9:30	Langkap	4 days	In stream, 60 X 85 cm, 26/27 cm, JK72R
80	23-Jun-00	10:00	Langkap	2 days	47 X 67 cm, 25/26 cm
81	24-Jun-00	8:56	Kitulang	< 1 day	In stream, 40 X 55 cm, 25/26 cm JK74R
82	25-Jun-00	9:05	Langkap	1 day	60 X 60 cm, 25/26 cm
83	25-Jun-00	12:45	Bambu cangkeuteuk	1 day	In stream, 26/29 cm JK75R
84	25-Jun-00	12:45	Bambu cangkeuteuk	1 day	In stream, 26/29 cm JK75R
85	25-Jun-00	9:05	Langkap	< 1 day	In stream, 40 X 60 cm, 26 cm JK75R
86	27-Jun-00	9:35	Jambu kopo	2 days	50 X 60 cm, JK62R
87	13 juli 00.	11:40	Cangkeuteuk	2 days	In stream, 25/26cm, 80x70 cm, Jk 77 R
88	13-juli-00	11:40	Bambu cangkeuteuk	2 days	In stream, 27/28 cm, 80x70 cm, Jk 78 R
89	14- Juli-00	9:50	Bambu cangkeuteuk	3 days	In stream, Jk 77 R
90	15- juli-00	11:25	Langkap, Cangkeuteuk	4 days	
91	17-Juli-00	11:00	Bambu haur	1 days	In stream , 27/28 cm, 50x75 cm,Jk 81 R
92	25-Juli-00	12:35	Langkap	< 1days	80x80 cm, 25x26 cm,Jk 83 R
93	26-Juli-00	10:25	Rotan, Pinang	2 days	27x28 cm, 75x72cm,Jk 81R
94	26-Juli-00	12:20	Rotan, Pinang	1 days	27x28 cm, 71x66cm,Jk 81R
95	26-Juli-00	12:30	Rotan, Pinang	1 days	17x18 cm, 30x25 cm
96	26-Juli-00	14:10	Rotan, Langkap	2 days	25x26 cm, 100x70 cm
97	26-Juli-00	15:15	Rotan, Tepus	2 days	17x18 cm, 18x20 cm
98	28-Juli-00	12:30	Rotan, Bambu haur	4 days	25/26 cm, 90x51 cm
99	29-Juli-00	10:05	Rotan	3 days	In stream,80x90 cm,25/26cm
100	29-Juli-00	10:05	Rotan	7 days	In stream,70x90 cm
101	29-Juli-00	10:10	Rotan	3 days	50x50 cm,25/26 cm
102	30-Juli-00	15:55	Bangban	>7 days	110x70 cm,26x27 cm
103	31-Juli-00	9:20	Rotan	7 days	90x90 cm,26/27 cm
104	26-Aug-00	13:30	Bambu haur	2 days	In stream, 70 X 100 cm, 25/26, JK85R
105	27-Aug-00	16:08	Rotan, bangban	5 days	60 X 70 cm, 26/27
106	7-Sep-00	8:40	Langkap, Rotan	2 days	65 X 60 cm, 27/29, JK91R

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107	9-Sep-00	3:36	Langkap, Cangkeuteuk	2 days	In stream, 26/27, JK92R
108	9-Sep-00	15:05	Langkap	2 days	In stream, 26/27, JK92R
109	14-Sep-00	10:30	Bambu haur	1 week	In stream, 50 X 90, 26/27, JK94R
110	15-Sep-00	12:10	Langkap	1 day	80 X 81, 25/26
111	9-Oct-00	11:30	Rotan, nipah	1 day	26/27
112	9-Oct-00	15:10	Langkap, Rotan	< 1 week	26/27
113	11-Oct-00	14:15	Rotan, nipah	1 week	
114	11-Oct-00	14:40	Rotan, nipah	1 week	
115	13-Oct-00	12:45	Carelang, Kitanjung	5 days	95 X 100 cm, 26/27
116	13-Oct-00	12:45	Carelang, Kitanjung	7 days	70 X 80 cm, 26/27
117	21-Oct-00	9:01	Salak, Langkap	> 1 week	In the stream, 50 X 50 cm, 24/25
118	21-Oct-00	10:45	Langkap	> 1 week	80 X 86 cm, 25/26
119	21-Oct-00	11:05	Langkap	< 1 week	80 X 92 cm, 24/25, 2 old faeces nearby
120	22-Oct-00	8:45	Rotan, salak	1 day	15 X 35 cm, 28/29
121	22-Oct-00	9:40	Rotan, bambu bunar	2 days	64 X 70 cm, 25/26
122	6-Nov-00	8:30	Langkap	< 1 day	64 X 80 cm, 27/28, 3 faeces nearby
123	6-Nov-00	13:52	Langkap	< 1 day	70 X 70 cm, 27/28
124	8-Nov-00	12:00	Cacabean, suheum	< 1 day	80 X 90 cm, 26/27 cm
125	8-Nov-00	12:05	Langkap	4 days	80 X 102 cm, 27/28
126	11-Nov-00	9:45	Tepus	4 days	In the stream, 26/27
127	13-Nov-00	11:25	Langkap	1 week	60 X 90 cm, 26/27
128	14-Nov-00	12:05	Langkap	1 day	In stream, 40 X 50 cm, 25/26
129	14-Nov-00	13:30	Jambu Kopo	< 1 day	45 X 47 cm, 25/26
130	17-Nov-00	14:55	Cebreng, Gerenuk	< 1 week	Ricefield, 26/27
131	27-Nov-00	11:00	Langkap	< 1 day	70 X 80 cm, 26/27
132	27-Nov-00	11:00	Langkap	2 days	70 X 110 cm, 26/27
133	27-Nov-00	11:00	Langkap	4 days	50 X 70 cm, 26/27
134	29-Nov-00	12:18	Kitulang, rotan	1 week	60 X 70 cm, 25/26
135	29-Nov-00	13:15	Kitulang, rotan	4 days	In stream, 62 X 73 cm, 25/26
136	29-Nov-00	14:00	Pandan	3 days	River mouth, 90 X 100 cm, 26/27
137	2-Dec-00	10:40	Langkap	1 day	50 X 90 cm, 26/27
138	2-Dec-00	9:00	Langkap	1 day	80 X 91 cm, 24/25
139	19-Dec-00	10:00	Langkap	1 day	80 X 87 cm, 28/29
140	19-Dec-00	13:45	Salak	1 week	In stream, 40 X 50 cm, 25/26
141	20-Dec-00	12:05	Rotan	2 days	In stream, 24/25
142	20-Dec-00	12:45	Cangkeuteuk	2 days	In stream, 24/25

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143	16-Jan-01	12:55	Langkap	3 days	72 X 97 cm, 26/27
144	20-Jan-01	10:05	Langkap	5 days	In stream, 36 X 40 cm, 24/25
145	24-Jan-01	11:45	Langkap	1 week	In stream, 60 X 90 cm, 24/25
146	24-Jan-01	13:35	Langkap	5 days	In stream, 52 X 86 cm, 24/25
147	26-Jan-01	13:10	Langkap	3 days	150x90 cm, 25/26 cm
148	26-Jan-01	13:10	Langkap	6 days	110x60 cm, 25/26 cm
149	26-Jan-01	14:15	Langkap	3 days	110x97 cm, 25/26 cm
150	27-Jan-01	11:45	Langkap	3 days	70x57 cm, 25x26 cm
151	27-Jan-01	14:00	Langkap	3 days	55x60 cm, 25x26 cm
152	27-Jan-01	14:50	Langkap	3 days	100x70 cm, 25x26 cm
153	28-Jan-01	12:00	Langkap,Pinang	2 days	In stream, 25x26 cm
154	28-Jan-01	14:15	Tepus,Rotan	2 days	In stream, 67x65 cm, 25x26 cm
155	16-mart-01	13:30	Langkap	5 days	150x80 cm, 24x25 cm
156	17-Mart-01	10:30	Rotan, Bangban	7 days	67x63 cm, 25x26 cm
157	20-Mart-01	11:35	Rotan, Salak	5 days	In stream, 97x60 cm, 26x27 cm
158	26-Mart-01	15:30	Rotan	10 days	In stream, 80x65 cm, 25x26 cm
159	19-Apr-01	11:35	gebang	< 1 days	In stream, 80x50 cm, 26x27 cm
160	19-Apr-01	13:40	Lampeni,Purancak	<1 days	50x40 cm, 26x27 cm
161	29-Apr-01	9:20	Langkap,Salak	7 days	76x60 cm, 26x27 cm
162	29-Apr-01	11:00	Bambu Cangkeuteuk	7 days	In stream, 36x38 cm, 26x27 cm
163	28-May-01	10:20	Langkap,Kitulang	<1 days	In stream, 70x50 cm, 25x26 cm
164	28-May-01	11:30	Bangban,Rotan	<5 days	In stream, 67x66 cm, 25x26 cm
165	28-May-01	14:45	Rotan,Kaman	5 days	In stream, 110x70 cm, 25x26 cm
166	30-May-01	13:10	Langkap,Bayur	<1 days	In stream, 106x103 cm, 28x29 cm
167	1-Juni-01	9:50	Langkap	1 days	66x65 cm, 25x26 cm
168	01-Juni-01	10:20	Langkap,Kiara	< days	70x50 cm, 23x24 cm
169	01-Juni-01	14:45	Bangban,cente	2 days	90x70 cm, 28x29 cm
170	21-Juni-01	12:06	Cangketeuk	<1 days	In stream, 63x60 cm, 24x25 cm
171	21-Juni-01	12:06	Cangketeuk	2 days	In stream, 100x90 cm, 26x27 cm
172	24-juni-01	10:04	Langkap dan Tereup		In stream, 65x60 cm, 24x25 cm
173	25-Juni-01	10:00	Tepus dan rotan	2 days	In stream, 110x60 cm, 26x27 cm
174	26-Juni-01	13:14	Rotan dan Sulangkar	<1days	In stream, 100x92 cm, 27x28 cm
175	26-Juni-01	14:28	Kitulang	< 1days	In stream, 106x70 cm,27x28 cm
176	29-Juni-01	10:43	Nipah dan Nibung	1 days	In stream, 100x60 cm, 23x24 cm
177	30-Juni-01	9:56	Salak dan Tepus	<1 days	In stream, 82x78 cm, 25x26 cm
178	30-Juni-01	12:05	Laban, kitulang	< 1 days	62x60 cm, 25x26 cm

Population distribution Of Javan Rhinoceros from fecal and footprint analysis

179	30-Juni-01	12:05	Laban, kitulang	< 1 days	80x74 cm, 25x26 cm
180	30-Juni-01	13:33	Putat, langkap	< 1 days	In stream, 57x50 cm, 25x26 cm
181	21-Juli-01	14:50	Bangban, Rotan	1 days	In stream, 72x74 cm, 26x27 cm
182	21-Juli-01	15:14	Rotan, Banmbu	1 days	In stream, 90x60 cm, 26x27 cm
183	27-Juli-01	11:50	Langkap, Rotan	1 days	In stream, 83x50 cm, 26x27 cm
184	23-Juli-01	9:40	Langkap, kiara	1 days	70x53 cm, 25x26 cm
185	25-Juli-01	11:00	Salak & Teurep	<1 days	In stream, 70x63 cm, 16x17 cm
186	25- Juli-01	11:00	Salak & Teurep	<1 days	In stream, 60x50 cm, 26x27 cm
187	25- Juli-01	15:29	Salak & Rotan	<1 days	In stream, 90x70 cm, 26x27 cm
188	27-Juli-01	10:17	Salak & Kiara	<1 days	83x60 cm, 26x27 cm
189	27-Juli-01	10:17	Salak & Kiara	<1 days	In stream, 68x50 cm, 24x25 cm
190	27-Juli-01	18:19	Rotan & Waru	1 days	68x57 cm, 25x26 cm
191	27-Juli-01	18:19	Rotan & Waru	1 days	65x59 cm, 24x25 cm

Appendix 3

Footprints findings

No.	Date	Time	Ukuran tapak (cm)											Georeference		Freshness	Remarks
			Right					Left					Lebar	Lon.	Lat.		
			WW	FF	AA	FA	FA'	WW	FF	AA	FA	FA'					
1	20-Dec-99	11:20	6	13	15	3.5	3.5	6	13	15	3.5	3.5	16/17	06° 48' 04.4"	105° 20' 22.2"	< 1 day	Azimut 84°
2	25-Jul-01	10:00	-	-	-	-	-	-	-	-	-	-	16/17	06° 46' 30.4"	105° 17' 58.8"	< 1 days	Azimut 150°
3	18-May-00	9:50	-	-	-	-	-	-	-	-	-	-	17/18	06° 48' 54.5"	105° 22' 39.1"	1 weeks	Azimut 135°
4	26-Jul-00	9:30	7	13	16	5	5	7	13	16	5	5	17/18	06° 46' 11.3"	105° 23' 27.5"	2 day	Azimut 180°
5	24-Nov-99	9:30	-	-	-	-	-	-	-	-	-	-	21/22	06° 44' 51.3"	105° 16' 22.2"	14 days	Azimut 152°
6	17-Oct-99	8:50	-	-	-	-	-	-	-	-	-	-	23/24	06° 48' 52.8"	105° 22' 10.8"	2 Days	Azimut 180°
7	18-Oct-99	13:45	-	-	-	-	-	-	-	-	-	-	23/24	06° 48' 40.1"	105° 22' 32.0"	1 night	Azimut 150°
8	16-Dec-99	10:54	10	16	19	7.5	7.5	10	16	19	7.5	7.5	23/24	06° 48' 09.9"	105° 20' 30.3"	< 4 day	Azimut 25°
9	18-Dec-99	13:00	10	18	20	9	9	10	18	20	9	9	23/24	06° 46' 40.0"	105° 20' 24.7"	< 1 days	Azimut 360°
10	19-Dec-99	12:55	10	18	20	8	8	10	18	20	8	8	23/24	06° 46' 42.1"	105° 20' 26.0"	< 1 day	Azimut 300°
11	20-Dec-99	10:15	12	18	18	9	9	12	18	18	9	9	23/24	06° 48' 05.7"	105° 20' 26.5"	1 days	Azimut 280°
12	22-Dec-99	9:43	10	19	19	9	9	10	19	19	9	9	23/24	06° 48' 48.4"	105° 22' 22.2"	2 day	Azimut 90°
13	18-May-00	10:00	10	16	20	9	9	10	16	20	9	9	23/24	06° 48' 47.8"	105° 22' 48.1"	1 weeks	Azimut 52°
14	19-Mar-01	11:10	9	17	19	7.5	7.5	9	17	19	7.5	7.5	23/24	06° 47' 54.6"	105° 18' 57.7"	5 days	Azimut 240°
15	29-Jun-01	9:20	-	-	-	-	-	-	-	-	-	-	23/24	06° 48' 42.9"	105° 22' 23.4"	< 1 days	Azimut 180°
16	17-Oct-99	9:47	-	-	-	-	-	-	-	-	-	-	24/25	06° 48' 45.8"	105° 22' 21.4"	1 night	Azimut 140°
17	18-Oct-99	9:40	-	-	-	-	-	-	-	-	-	-	24/25	06° 48' 44.9"	105° 22' 16.6"	1 night	Azimut 180°
18	19-Oct-99	9:44	-	-	-	-	-	-	-	-	-	-	24/25	06° 48' 42.0"	105° 22' 27.9"	1 days	Azimut 360°
19	18-Nov-99	10:02	-	-	-	-	-	-	-	-	-	-	24/25	06° 46' 20.9"	105° 19' 12.0"	< 7 days	Azimut 90°
20	30-Dec-99	15:20	10	18	22	8	8	10	18	22	8	8	24/25	06° 47' 51.5"	105° 20' 26.2"	5 days	Azimut 290°

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21	1-Feb-00	9:50	10	20	22	9	9	10	20	22	9	9	24/25	06° 48' 53.3"	105° 22' 51.1"	< 1 days	Azimut 360°
22	1-Feb-00	11:05	10	17	19	9.5	9.5	10	17	19	9.5	9.5	24/25	06° 48' 41.1"	105° 22' 28.1"	5 jam	Azimut 360°
23	16-Feb-00	11:25	11	19	23	8	8	11	19	23	8	8	24/25	06° 50' 21.6"	105° 25' 19.0"	2 days	Azimut 50°
24	18-May-00	13:11	9.5	15	18.5	7.5	7.5	9.5	15	18.5	7.5	7.5	24/25	06° 48' 40.7"	105° 22' 38.1"	1 night	Azimut 260°
25	22-May-00	9:05	9	16	2	10	10	9	16	2	10	10	24/25	06° 48' 40.2"	105° 22' 20.9"	1 days	Azimut 300°
26	15-Jun-00	10:30	10	16	20	8.5	8.5	10	16	20	8.5	8.5	24/25	06° 43' 56.0"	105° 18' 02.3"	3 day	Azimut 40°
27	12-Jul-00	14:35	10	18	21	8	8	10	18	21	8	8	24/25	06° 43' 21.6"	105° 20' 27.1"	1 days	Azimut 118°
28	26-Aug-00	8:30	9	18	19	7	7	9	18	19	7	7	24/25	06° 48' 10.4"	105° 21' 09.9"	1 days	Azimut 270°
29	20-Dec-00	11:15	11	19	21	9	9	11	19	21	9	9	24/25	06° 43' 15.2"	105° 18' 29.2"	2 days	Azimut 190°
30	20-Jan-01	12:15	10	19	22	7	7	10	19	22	7	7	24/25	06° 44' 19.2"	105° 16' 31.6"	5 days	Azimut 268°
31	16-Mar-01	10:20	9	18	20	8	8	9	18	20	8	8	24/25	06° 48' 04.3"	105° 20' 15.4"	2 days	Azimut 245°
32	19-Mar-01	10:30	10	18	20	8	8	10	18	20	8	8	24/25	06° 47' 56.6"	105° 19' 06.2"	4 days	Azimut 310°
33	21-Jun-01	8:38	-	-	-	-	-	-	-	-	-	-	24/25	06° 44' 56.7"	105° 22' 10.9"	< 1 days	Azimut 330°
34	24-Jun-01	10:04	-	-	-	-	-	-	-	-	-	-	24/25	06° 46' 07.7"	105° 22' 49.1"	4 days	Azimut 220°
35	20-Jul-01	10:28	-	-	-	-	-	-	-	-	-	-	24/25	06° 42' 43.4"	105° 18' 01.1"	2 days	Azimut 170°
36	29-Jul-01	9:10	-	-	-	-	-	-	-	-	-	-	24/25	06° 44' 56.9"	105° 16' 19.7"	< 1 days	Azimut 130°
37	21-Dec-99	9:30	10	19	20	9.5	9.5	10	19	20	9.5	9.5	25/26	06° 48' 12.7"	105° 21' 22.6"	< 7 day	Azimut 180°
38	17-Oct-99	8:40	-	-	-	-	-	-	-	-	-	-	25/26	06° 48' 37.8"	105° 22' 08.5"	1 Days	Azimut 35°
39	20-Oct-99	12:59	-	-	-	-	-	-	-	-	-	-	25/26	06° 48' 44.9"	105° 23' 16.6"	1 night	Azimut 210°
40	21-Oct-99	9:59	-	-	-	-	-	-	-	-	-	-	25/26	06° 48' 54.7"	105° 23' 09.5"	1 night	Azimut 330°
41	23-Oct-99	15:58	-	-	-	-	-	-	-	-	-	-	25/26	06° 48' 45.2"	105° 23' 33.6"	1 days	Azimut 360°
42	25-Oct-99	9:06	-	-	-	-	-	-	-	-	-	-	25/26	06°49' 17.6"	105° 23' 36.5"	3 Hours	Azimut 120°

Population distribution Of Javan Rhinoceros from fecal and footprint analysis

43	12-Nov-99	13:54	-	-	-	-	-	-	-	-	-	-	25/26	06° 43' 01.3"	105° 19' 13.0"	< 1 days	Azimut 298°
44	19-Nov-99	12:27	-	-	-	-	-	-	-	-	-	-	25/26	06° 47' 40.9"	105° 19' 16.8"	2 days	Azimut 180°
45	22-Nov-99	12:37	-	-	-	-	-	-	-	-	-	-	25/26	06° 45' 08.9"	105° 17' 23.8"	< 7 days	Azimut 360°
46	23-Nov-99	10:09	-	-	-	-	-	-	-	-	-	-	25/26	06° 43' 55.9"	105° 17' 11.0"	7 days	Azimut 320°
47	16-Dec-99	10:20	10	-18	20	7.5	7.5	10	18	20	7.5	7.5	25/26	06° 48' 12.9"	105° 20' 25.5"	< 1 day	Azimut 128°
48	17-Dec-99	15:00	12	19	20	9	9	12	19	20	9	9	25/26	06° 47' 06.8"	105° 20' 22.8"	< 1 days	Azimut 12°
49	20-Dec-99	12:30	11	19	20	9	9	11	19	20	9	9	25/26	06° 48' 29.7"	105° 20' 21.6"	< 1 day	Azimut 290°
50	22-Dec-99	8:10	14.5	21	21	12	12	14.5	21	21	12	12	25/26	06° 48' 32.8"	105° 21' 52.1"	3 day	Azimut 34°
51	1-Jan-00	15:08	11.5	19	20	9	9	11.5	19	20	9	9	25/26	06° 45' 14.6"	105° 20' 26.8"	7 days	Azimut 155°
52	2-Jan-00	8:49	11	21	21	9	9	11	21	21	9	9	25/26	06° 46' 27.7"	105° 20' 30.7"	< 1days	Azimut 160°
53	4-Jan-00	11:30	12	20	20	8	8	12	20	20	8	8	25/26	06° 48' 08.8"	105° 20' 28.0"	< 1 day	Azimut 90°
54	1-Feb-00	12:55	10	17	20	8	8	10	17	20	8	8	25/26	06° 48' 41.1"	105° 22' 37.2"	1 night	Azimut 40°
55	13-Feb-00	12:30	10	20	22	10	10	10	20	22	10	10	25/26	06° 48' 44.8"	105° 22' 40.8"	< 1 day	Azimut 180°
56	23-May-00	9:01	11	21	22	9	9	11	21	22	9	9	25/26	06° 48' 35.6"	105° 22' 24.4"	3 jam	Azimut 328°
57	24-Jun-00	8:56	11	18	20	8.5	8.5	11	18	20	8.5	8.5	25/26	06° 48' 19.0"	105° 23' 27.7"	1 days	Azimut 360°
58	20-Jul-00	10:30	12	19	20	9	9	12	19	20	9	9	25/26	06° 50' 28.0"	105° 27' 14.1"	1 day	Azimut120°
59	25-Jul-00	11:40	11	18	22	9	9	11	18	22	9	9	25/26	06° 46' 09.7"	105° 23' 30.9"	1 day	Azimut 180°
60	20-Aug-00	8:40	11	18	20	8	8	11	18	20	8	8	25/26	06° 41' 08.0"	105° 21' 19.1"	1 day	Azimut 360°
61	22-Aug-00	8:20	11	18	20	9	9	11	18	20	9	9	25/26	06° 43' 29.8"	105° 21' 21.6"	< 7 days	Azimut 304°
62	25-Aug-00	9:20	11	20	21	9	9	11	20	21	9	9	25/26	06° 46' 28.7"	105° 21' 20.1'		Azimut 135°
63	26-Aug-00	13:30	10	21	23	9	9	10	21	23	9	9	25/26	06° 48' 06.2"	105° 20' 57.8"	2 days	Azimut 360°
64	10-Sep-00	13:40	10	18	20	9	9	10	18	20	9	9	25/26	06° 43' 31.9"	105° 22' 26.4"	< 7days	Azimut 106°

Population distribution Of Javan Rhinoceros from fecal and footprint analysis

65	8-Oct-00	11:10	9	20	22	8	8	9	20	22	8	8	25/26	06° 49' 11.3"	105° 24' 29.8"	7 days	Azimut 345°
66	18-Oct-00	11:35	10	19	21	8	8	10	19	21	8	8	25/26	06° 48' 01.6"	105° 24' 33.2"	1 days	Azimut 140°
67	19-Dec-00	12:30	11	20	22	9	9	11	20	22	9	9	25/26	06° 41' 49.0"	105° 20' 08.4"	7 days	Azimut 230°
68	26-Jan-01	10:30	10	20	22	7.5	7.5	10	20	22	7.5	7.5	25/26	06° 44' 07.1"	105° 17' 31.7"	3 days	Azimut 140°
69	18-Mar-01	9:10	10	18	20	8	8	10	18	20	8	8	25/26	06° 47' 58.9"	105° 19' 18.8"	3 days	Azimut 355°
70	30-Jun-01	9:03	-	-	-	-	-	-	-	-	-	-	25/26	06° 48' 40.9"	105° 24' 06.1"	< 1 days	Azimut 180°
71	23-Jul-01	9:00	-	-	-	-	-	-	-	-	-	-	25/26	06° 45' 16.4"	105° 18' 04.2"	3 days	Azimut 150°
72	27-Jul-01	9:44	-	-	-	-	-	-	-	-	-	-	25/26	06° 44' 48.2"	105° 18' 20.8"	< 1 days	Azimut 50°
73	27-Jul-01	18:10	-	-	-	-	-	-	-	-	-	-	25/26	06° 47' 43.5"	105° 18' 25.6"	1 days	Azimut 90°
74	20-Oct-99	9:22	-	-	-	-	-	-	-	-	-	-	26/27	06° 48' 28.8"	105° 22' 35.3"	4 days	Azimut 270°
75	13-Nov-99	11:15	-	-	-	-	-	-	-	-	-	-	26/27	06° 43' 15.7"	105° 19' 11.4"	< 4 days	Azimut 250°
76	14-Nov-99	10:02	-	-	-	-	-	-	-	-	-	-	26/27	06° 44' 11.3"	105° 19' 10.2"	< 4 days	Azimut 213°
77	14-Nov-99	15:50	-	-	-	-	-	-	-	-	-	-	26/27	06° 43' 57.6"	105° 19' 25.1"	1 days	Azimut 200°
78	15-Nov-99	9:26	-	-	-	-	-	-	-	-	-	-	26/27	06° 43' 59.3"	105° 19' 22.9"	1 day	Azimut 15°
79	16-Nov-99	13:57	-	-	-	-	-	-	-	-	-	-	26/27	06° 45' 45.3"	105° 19' 14.8"	7 day	Azimut 82°
80	17-Nov-99	10:36	-	-	-	-	-	-	-	-	-	-	26/27	06° 45' 50.9"	105° 19' 18.0"	3 day	Azimut 90°
81	18-Nov-99	10:42	-	-	-	-	-	-	-	-	-	-	26/27	06° 46' 21.9"	105° 19' 10.9"	< 1 days	Azimut 276°
82	24-Nov-99	10:27	-	-	-	-	-	-	-	-	-	-	26/27	06° 44' 58.8"	105° 16' 19.8"	14 days	Azimut 152°
83	27-Nov-99	14:01	-	-	-	-	-	-	-	-	-	-	26/27	06° 50' 21.9"	105° 27' 26.1"	2 days	Azimut 152°
84	18-Dec-99	12:55	13	22	22	10	10	13	22	22	10	10	26/27	06° 46' 45.5"	105° 20' 22.4"	< 1 day	Azimut 360°
85	19-Dec-99	10:20	12	22	22	10	10	12	22	22	10	10	26/27	06° 46' 33.8"	105° 20' 25.2"	2 day	Azimut 310°
86	20-Dec-99	10:30	12	20	20	10	10	12	20	20	10	10	26/27	06° 48' 04.5"	105° 20' 23.2"	< 1 days	Azimut 270°

Population distribution Of Javan Rhinoceros from fecal and footprint analysis

87	22-Dec-99	10:38	10.5	18	21	11	11	10.5	18	21	11	11	26/27	06° 48' 42.1"	105° 22' 34.9"	< 1 day	Azimut 25°
88	29-Jan-00	13:25	12	17	20	10	10	12	17	20	10	10	26/27	06° 47' 22.9"	105° 22' 27.1"	1 day	Azimut 124°
89	30-Jan-00	9:43	11	20	21	10	10	11	20	21	10	10	26/27	06° 48' 44.0"	105° 22' 30.0"	1 day	Azimut 150°
90	1-Feb-00	14:10	10	20	23	9	9	10	20	23	9	9	26/27	06° 48' 44.5"	105° 22' 42.8"	1 day	Azimut 320°
91	19-Mar-00	8:25	11	18	23	9	9	11	18	23	9	9	26/27	06° 48' 37.9"	105° 22' 39.4"	1 days	Azimut 124°
92	28-May-00	11:44	11	20	22	9.5	9.5	11	20	22	9.5	9.5	26/27	06° 50' 40.3"	105° 30' 08.3"	1 night	Azimut 55°
93	16-Jun-00	9:00	12	18	20	9	9	12	18	20	9	9	26/27	06° 44' 28.2"	105° 17' 58.7"	1 day	Azimut 120°
94	12-Jul-00	10:13	11	18	20	9	9	11	18	20	9	9	26/27	06° 42' 23.9"	105° 20' 16.3"	4 days	Azimut 360°
95	29-Jul-00	10:10	12	19	25	9	9	12	19	25	9	9	26/27	06° 49' 13.5"	105° 24' 07.5"	3 day	Azimut 248°
96	14-Sep-00	13:15	11	19	21	9	9	11	19	21	9	9	26/27	06° 47' 49.4"	105° 22' 00.1"	<7 days	Azimut 84°
97	9-Oct-00	11:15	10	20	22	9	9	10	20	22	9	9	26/27	06° 49' 18.1"	105° 23' 50.0"	1 days	Azimut 306°
98	9-Oct-00	15:10	9	20	22	9	9	9	20	22	9	9	26/27	06° 48' 55.1"	105° 23' 14.0"	7 days	Azimut 60°
99	20-Oct-00	11:30	10	21	23	8	8	10	21	23	8	8	26/27	06° 50' 30.0"	105° 25' 08.6"	1 days	Azimut 20°
100	11-Nov-00	9:45	11	19	21	9	9	11	19	21	9	9	26/27	06° 51' 30.7"	105° 30' 51.7"	4 days	Azimut 240°
101	16-Dec-00	13:00	10	20	22	9	9	10	20	22	9	9	26/27	06° 44' 06.0"	105° 19' 17.8"	1 days	Azimut 30°
102	16-Jan-01	8:00	11	19	22	8	8	11	19	22	8	8	26/27	06° 44' 15.7"	105° 13' 22.3"	3 days	Azimut 140°
103	20-Mar-01	11:35	10	20	22	8	8	10	20	22	8	8	26/27	06° 47' 53.0"	105° 19' 14.8"	5 days	Azimut 180°
104	19-Apr-01	10:30	10	18	20	8	8	10	18	20	8	8	26/27	06° 41' 08.3"	105° 22' 42.7"	<1 days	Azimut 90°
105	21-Jun-01	12:06	-	-	-	-	-	-	-	-	-	-	26/27	06° 44' 39.3"	105° 21' 18.3"	2 days	Azimut 330°
106	25-Jun-01	9:11	-	-	-	-	-	-	-	-	-	-	26/27	06° 49' 11.3"	105° 24' 29.8"	2 days	Azimut 330°
107	28-Jun-01	12:13	-	-	-	-	-	-	-	-	-	-	26/27	06° 48' 48.2"	105° 22' 34.1"	2 days	Azimut 220°
108	21-Jul-01	13:46	-	-	-	-	-	-	-	-	-	-	26/27	06° 44' 31.3"	105° 18' 00.7"	3 days	Azimut 130°

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109	22-Jul-01	11:28	-	-	-	-	-	-	-	-	-	-	26/27	06° 43' 58.8"	105° 17' 21.9"	< 1 days	Azimut 270°
110	25-Jul-01	10:00	-	-	-	-	-	-	-	-	-	-	26/27	06° 46' 30.4"	105° 17' 58.8"	< 1 days	Azimut 150°
111	25-Jul-01	17:29	-	-	-	-	-	-	-	-	-	-	26/27	06° 46' 33.0"	105° 18' 05.2"	< 1 days	Azimut 180°
112	24-Jun-00	14:57	9	21	23	8	8	9	21	23	8	8	26/29	06° 49' 06.6"	105° 23' 34.4"	2 days	Azimut 300°
113	22-Oct-00	8:30	12	23	25	9	9	12	23	25	9	9	26/29	06° 48' 45.4"	105° 23' 56.3"	1 days	Azimut 60°
114	20-Oct-99	11:36	-	-	-	-	-	-	-	-	-	-	27/28	06° 48' 19.8"	105° 22' 37.7"	1 night	Azimut 180°
115	20-Oct-99	12:59	-	-	-	-	-	-	-	-	-	-	27/28	06° 48' 18.0"	105° 22' 26.6"	2 days	Azimut 315°
116	23-Oct-99	16:23	-	-	-	-	-	-	-	-	-	-	27/28	06° 48' 43.7"	105° 23' 31.5"	1 days	Azimut 345°
117	16-Dec-99	11:45	11	23	23	9	9	11	23	23	9	9	27/28	06° 48' 06.8"	105° 20' 25.2"	< 1 days	Azimut 180°
118	30-Jan-00	10:02	11	20	20	9	9	11	20	20	9	9	27/28	06° 48' 38.2"	105° 22' 27.0"	< 1 days	Azimut 180°
119	10-Mar-00	9:30	11	21	28	9	9	11	21	28	9	9	27/28	06° 48' 56.6"	105° 23' 30.0"	1 days	Azimut 35°
120	12-Jul-00	15:00	10	19	23	9	9	10	21	23	9	9	27/28	06° 43' 18.5"	105° 20' 30.5"	1 days	Azimut 248°
121	17-Jul-00	11:00	12	21	23	10	10	12	21	23	10	10	27/28	06° 46' 58.0"	105° 20' 26.7"	1 days	Azimut 180°
122	24 agust 00.	14:30	9	19	20	8	8	9	19	20	8	8	27/28	06° 46' 28.7"	105° 21' 29.7"	7 days	Azimut 344°
123	8-Sep-00	8:30	10	18	22	8	8	10	18	22	8	8	27/28	06° 41' 40.4"	105° 22' 48.7"		Azimut 140°
124	6-Nov-00	8:30	12	20	22	10	10	12	20	22	10	10	27/28	06° 50' 16.2"	105° 26' 52.1"	1 days	Azimut 270°
125	24-Mar-01	10:55	12	21	23	9	9	12	21	23	9	9	27/28	06° 47' 09.0"	105° 17' 54.0"	7 days	Azimut 320°
126	26-Jun-01	11:43	-	-	-	-	-	-	-	-	-	-	27/28	06° 49' 11.3"	105° 24' 29.8"	< 1 days	Azimut 180°
127	18-Nov-99	11:48	-	-	-	-	-	-	-	-	-	-	28/29	06° 46' 40.8"	105° 19' 12.2"	< 1 days	Azimut 272°
128	19-Nov-99	9:41	-	-	-	-	-	-	-	-	-	-	28/29	06° 47' 01.9"	105° 19' 12.0"	< 1 days	Azimut 180°
129	30-Nov-99	7:17	-	-	-	-	-	-	-	-	-	-	28/29	06° 46' 11.2"	105° 16' 54.2"	2 days	Azimut 130°
130	21-Dec-99	10:30	13	20	25	10	10	13	20	25	10	10	28/29	06° 48' 10.1"	105° 21' 23.1"	< 1 days	Azimut 298°

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131	30-Jan-00	6:30	13	21	24	10	10	13	21	24	10	10	28/29	06° 48' 40.6"	105° 22' 35.4"	3,5 jam	Azimut 360°
132	19-Jun-00	11:15	12	23	24	10	10	12	23	24	10	10	28/29	06° 46' 34.4"	105° 17' 58.6"	1 days	Azimut 180°

Population distribution Of Javan Rhinoceros from fecal and footprint analysis

APPENDIX 4

Foodplant findings

No.	Date	Time	Food		Localities	Georeference		Parts eaten		
			Lokal	Latin		Lon.	Lat.	Leaf	Stem	Top
1	17-Oct-99	9:18	Rotan	<i>Calamus sp</i>	Cikeusik timur	06° 48' 42.2"	105° 22' 12.8"	+		+
2	17-Oct-99	9:26	Kikukupu		Cikeusik timur	06° 48' 43.1"	105° 22' 17.1"	+	+	+
3	17-Oct-99	9:36	Pulus	<i>Laportea stimulans</i>	Cikeusik timur	06° 48' 44.3"	105° 22' 14.8"	+		+
4	17-Oct-99	10:29	Pisang kole	<i>Musa sp</i>	Cikeusik timur	06° 48' 47.1"	105° 22' 27.0"	+		+
5	20-Oct-99	13:05	Kicalung	<i>Diospyros macrophyla</i>	Cikeusik timur	06° 48' 18.0"	105° 22' 26.6"	+		+
			Leuksa	<i>Poikilospermum suaveolens</i>				+	+	+
6	21-Oct-99	10:10	Huru batu	<i>Litsea sp</i>	Cibandawoh barat	06° 48' 54.7"	105° 23' 09.5"	+		+
			Heucit	<i>Baccaurea javanica</i>				+		+
			Jirak	<i>Symplocos fasciculata</i>				+		+
			Kitanah	<i>Zanthoxylum retetsa</i>				+		+
7	23-Oct-99	16:15	Sulangkar	<i>Leea sambucina</i>	Cibandawoh	06° 48' 43.7"	105° 23' 31.5"	+		+
			Poreket	<i>Phitecellobium ellipticum</i>				+		+
			Kedongdong	<i>Spondias pinata</i>				+		+
			Jaha	<i>Combretum latifolium</i>				+	+	+
8	24-Oct-99	10:05	Katumpang	<i>Callicarpa longifolia</i>	Cibandawoh	06° 49' 02.7"	105° 23' 35.9"	+		+
			Kijaran					+		+
			Kokosongan					+		+
			Singugu	<i>Alchornea javanensis</i>				+	+	+
			Jingjing kulit	<i>Zizipus hosfieldii</i>				+	+	+

Population distribution Of Javan Rhinoceros from fecal and footprint analysis

			Kawao	<i>Derris elliptica</i>				+	+	+
			Waru	<i>Hibiscus tiliaceus puberulum</i>				+	+	+
			Dahu	<i>Dracontomelum</i>				+		+
9	15-Nov-99	10:50	Tepus	<i>Acasma</i>	Cikarang atas	06° 44' 07.0"	105° 19' 26.0"	+		+
10	19-Nov-99	11:30	Tepus	<i>Acasma</i>	Citadahan	06° 47' 40.0"	105° 19' 10.6"	+		+
			Pisang kole	<i>Musa sp</i>				+		+
			Songgom	<i>Barringtonia macrocarpa</i>				+		+
			Bangban	<i>Donax canaeformis</i>				+		+
11	18-Dec-99	13:05	Hantap	<i>Sterculia sp</i>	Cikesik barat	06° 46' 41.9"	105° 20' 32.8"	+		+
12	18-Dec-99	13:18	Mara	<i>Macaranga tanarius</i>	Cikeusik barat	06° 46' 41.2"	105° 20' 34.2"	+		+
13	18-Dec-99	13:25	Pangsor	<i>Ficus callosa</i>	Cikeusik barat	06° 46' 30.0"	105° 20' 34.8"	+		+
			Kidangder	<i>Salmalia valentonii</i>	Cikeusik barat			+		+
		13:10	Leuksa	<i>Poikilospermum suaveolens</i>	Cikeusik barat	06° 46' 16.8"	105° 20' 24.4"	+	+	+
			Kilaja	<i>Pseuduvaria reticulata</i>	Cikeusik barat			+		+
		13:20	Segel	<i>Dillenia exelsa</i>	Cikeusik barat	06° 46' 18.8"	105° 20' 28.4"	+		+
14	30-Jan-00	14:00	Cente	<i>Lantana camara</i>	Cikeusik timur	06° 48' 42.7"	105° 23' 30.7"	+		+
			Kiendog	<i>Gynotroches axillaris</i>				+		+
		14:20	Tepus	<i>Acasma sp</i>		06° 48' 45.3"	105° 22' 28.5"	+		+
			Huru batu	<i>Dracontomelum puberulum</i>				+		+
15	1-Feb-00	11:07	Leuksa	<i>Poikilospermum suaveolens</i>	Cikeusik timur	06° 48' 55.8"	105° 23' 05.1"	+	+	+
		12:45	Cente	<i>Lantana camara</i>	Cikeusik timur	06° 48' 54.3"	105° 22' 55.3"	+		+
		13:00	Cente	<i>Lantana camara</i>	Cikeusik timur	06° 48' 50.5"	105° 22' 49.4"	+		+

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			Kiendog	<i>Gynotroches axillaris</i>	Cikeusik timur	06° 48' 52.2"	105° 22' 39.9"	+		+
			Leuksa	<i>Poikilospermum suaveolens</i>	Cikeusik timur	06° 48' 50.0"	105° 22' 41.4"	+	+	+
		10:05	Leuksa	<i>Poikilospermum suaveolens</i>	Cikeusik timur	06° 48' 52.0"	105° 22' 42.4"	+	+	+
		10:20	Cente	<i>Lantana camara</i>	Cikeusik timur	06° 48' 51.7"	105° 22' 40.8"	+		+
		11:00	Leuksa	<i>Poikilospermum suaveolens</i>	Cikeusik timur	06° 48' 46.0"	105° 22' 34.2"	+	+	+
		11:05	Kiendog	<i>Gynotroches axillaris</i>	Cikeusik timur	06° 48' 44.2"	105° 22' 35.8"	+		+
16	11-Feb-00	15:30	Leuksa	<i>Poikilospermum suaveolens</i>	Cikeusik Timur	06° 48' 44.2"	105° 22' 30.0"	+	+	+
			Kuku heulang	<i>Uncaria gambir</i>				+	+	+
17	13-Feb-00	12:44	Kiendog	<i>Gynotroches axillaris</i>	Cikeusik Timur	06° 48' 46.4"	105° 22' 39.6"	+		+
		12:55	Tepus	<i>Acasma</i>	Cikeusik Timur	06° 48' 52.9"	105° 22' 43.7"	+		+
18	14-Feb-00	10:50	Kigentel	<i>Diospyros Javanica</i>	Cibandawoh	06° 49' 05.9"	105° 23' 24.3'	+		+
			kopo	<i>Eugenia Subglauca</i>				+		+
			Kiara	<i>Ficus sp</i>				+		+
		12:20	Kilangir	<i>Chisocheten sp</i>	Cibandawoh	06° 49' 12.9"	105° 23' 34.8"	+		+
			Kiendog	<i>Gynotroches axillaris</i>				+		+
			Lampeni	<i>Ardisia humilis</i>				+		+
			Bungbung delan	<i>Cassia javanica</i>				+		+
			Kiciap	<i>Ficus callosa</i>				+		+
			Kitanjung	<i>Bucanania arborensen</i>				+		+
			Kilalayu	<i>Erioglossum rubringinosum</i>				+		+
19	14-Feb-00	12:35	Bisoro	<i>Ficus sp</i>	Cibandawoh	06° 49' 17.8"	105° 23' 36.0"	+		+
		14:30	Pulus	<i>Laportea stimulan</i>	Cibandawoh	06° 49' 16.9"	105° 23' 45.1"	+		+

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			Kitanjung	<i>Erioglossum rubringinosum</i>		06° 48' 49.1"	105° 22' 48.98"	+		+
20	15-Feb-00	13:08	Kibatok	<i>Xylocarpus granatum</i>		06° 49' 15.6"	105° 24' 01.5"	+		+
			Kitumpang	<i>Callicarpa longifolia</i>		06° 48' 41.3"	105° 22' 38.8"	+		+
		14:00	Jingjing kulit	<i>Zizipus hosfieldii</i>	Cibandawoh	06° 49' 18.1"	105° 24' 07.5"	+	+	+
			Sulangkar	<i>Leea sambucina</i>				+		+
			Kikukupu					+	+	+
21	10-Mar-00	9:25	Kiara	<i>Ficus sp</i>	Cibandawoh	06° 48' 57.2"	105° 23' 26.1"	+		+
		10:00	Kimokla	<i>Horsfieldia glabra</i>	Cibandawoh	06° 40' 56.8"	105° 23' 28.9"	+		+
			Tepus	<i>Acasma sp</i>	Cibandawoh			+		+
			Leuksa	<i>Poikilospermum suaveolens</i>	Cibandawoh	06° 48' 59.9"	105° 23' 28.9"	+	+	+
			Kolebahe	<i>Uncaria sp</i>	Cibandawoh	06° 48' 47.1"	105° 23' 34.1"	+	+	+
			Jingjing kulit	<i>Zizipus sp</i>				+	+	+
			Pacing	<i>Globa pendula</i>				+	+	+
		12:25	Jingjing kulit	<i>Zizipus hosfieldii</i>	Cibandawoh	06° 48' 51.1"	105° 23' 42.3"	+	+	+
22	11-Mar-00	8:40	Tepus	<i>Acasma sp</i>	Cibandawoh	06° 48' 59.2"	105° 23' 39.6"	+		+
			Marengpeng	<i>Homallantus popunea</i>	Cibandawoh			+		+
			Singugu	<i>Alchornea javanensis</i>	Cibandawoh			+	+	+
23	12-Mar-00	9:15	Lame	<i>Alstonia scholaris</i>	Cibandawoh	06° 49' 06.3"	105° 24' 06.9"	+		+
			Beunying	<i>Ficus fistulosa</i>	Cibandawoh	06° 49' 07.0"	105° 24' 07.9"	+		+
			Kolebahe	<i>Uncaria sp</i>	Cibandawoh			+	+	+
		10:12	Taritih	<i>Drypetes sumatrana</i>	Cibandawoh	06° 49' 06.1"	105° 24' 09.9"	+		+
		10:54	Sulangkar	<i>Leea sambucina</i>	Cibandawoh	06° 49' 11.9"	105° 24' 09.0"	+		+

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		11:50	Cente	<i>Lantana camara</i>	Cibandawoh	06° 49' 18.0"	105° 24' 11.5"	+		+
24	19-Mar-00	9:50	Laban laut	<i>Vitex triplolia</i>	Cibandawoh	06° 48' 50.4"	105° 22' 42.7"	+		+
		10:30	Cente	<i>Lantana camara</i>	Cibandawoh	06° 48' 56.4"	105° 23' 23.5"	+		+
		13:20	Kendongdong	<i>Spondias pinata</i>	Cibandawoh	06° 48' 58.4"	105° 23' 28.0"	+		+
25	23-May-00	14:06	Jingjing kulit	<i>Zizipus hosfieldii</i>	Cibandawoh	06° 48' 32.3"	105° 23' 36.4"	+	+	+
26	29-May-00	10:47	Tepus	<i>Acasma sp</i>	Kalejetan	06° 50' 02.7"	105° 31' 09.9"	+		+
			Babanjuran	<i>Piper aduncum</i>				+		+
			Kuku heulang	<i>Uncaria gambir</i>				+	+	+
			Palungpung	<i>Meremia peltata</i>				+	+	+
			Jingjing kulit	<i>Zizipus hosfieldii</i>				+	+	+
		12:20	Kuku heulang	<i>Uncaria gambir</i>	Air mokla	06° 49' 54.7"	105° 31' 18.6"	+	+	+
			Palungpung	<i>Merremia Peltata</i>				+	+	+
			Jingjing kulit	<i>Zizipus hosfieldii</i>				+	+	+
		13:26	Kuku heulang	<i>Uncaria gambir</i>		06° 50' 00.0'	105° 31' 25.4"	+	+	+
			Tepus	<i>Acasma sp</i>				+		+
			Leuksa	<i>Poikilospermum suaveolens</i>				+	+	+
27	30-May-00	11:29	Kitanah	<i>zanthoxylum puberulum</i>		06° 50' 04.1"	105° 31' 25.4"	+		+
28	17-Jun-00	9:35	Kitanah	<i>zanthoxylum puberulum</i>	Cinogar	06° 44' 24.2"	105° 18' 16.7"	+		+
			Kuku heulang	<i>Uncaria gambir</i>				+	+	+
		10:28	Kitanjung	<i>Buchanania arborensens</i>	Cinogar	06° 44' 19.0"	105° 18' 20.4"	+		+
			Bayur	<i>Pterospermum javanicum</i>				+		+
29	18-Jun-00	10:30	Tepus	<i>Acasma sp</i>	Cinogar	06° 44' 26.5"	105° 18' 21.6"	+		+

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			Palungpung	<i>Meremia peltata</i>				+	+	+
			Kacembang	<i>Embelia ribes</i>				+	+	+
30	24-Jun-00	9:00	Jaha	<i>Combretum latifolium</i>	Bandawoh	06° 48' 19.0"	105° 23' 27.7"	+	+	+
			Kikukupu					+	+	+
			Kiseueur	<i>Antidesma velutinsum</i>				+		+
31	13-Jul-00	9:40	Kicalung	<i>Diospyros macrophylla</i>	Cikarang	06° 43' 38.5"	105° 20' 18.4"	+		+
			Cente	<i>Lantana camara</i>				+		+
			Tepus	<i>Acasma Sp</i>				+		+
		10:09	Cente	<i>Lantana camara</i>	Cikarang	06° 43' 51.6"	105° 20' 06.0"	+		+
			Tepus	<i>Acasma Sp</i>				+		+
			Kuku heulang	<i>Uncaria gambir</i>				+	+	+
32	13-Jul-00	13:40	Kilaja	<i>Pseuderaria reticulata</i>	Cikarang	06° 43' 47.1"	105° 20' 04.3"	+		+
			Bisoro	<i>Ficus sp</i>				+		+
33	26-Jul-00	9:20	Bayur	<i>Pterusperrum javanicum</i>	Cihandeuleum	06° 46' 11.3"	105° 23' 27.5"	+		+
			Sulangkar	<i>Leea sambucina</i>				+		+
			Kendongdong	<i>Spondias pinata</i>				+		+
		9:50	Kiara	<i>Ficus sp</i>	Cihandeuleum	06° 46' 13.5"	105° 23' 24.2"	+		+
			Kikukupu					+	+	+
			Kilaja	<i>Pseuderaria reticulata</i>				+		+
34	26-Jul-00	11:25	Tepus	<i>Acasma Sp</i>	Cihandeuleum	06° 46' 13.0"	105° 23' 20.9"	+		+
			Jingjing kulit	<i>Zizipus hosfieldii</i>				+	+	+
			Segel	<i>Dillenia exelsa</i>				+		+

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35	30-Jul-00	15:20	Kondang	<i>Ficus Variegata</i>	Karang ranjang	06° 50' 30.7"	105° 27' 42.6"	+		+
36	31-Jul-00	10:05	Leuksa	<i>Poikilospermum suaveolens</i>	Karang ranjang	06° 50' 41.5"	105° 27' 44.5"	+	+	+
		11:40	Sulangkar	<i>Leea Sambucina</i>	Karang ranjang	06° 50' 34.3"	105° 27' 42.4"	+		+
		12:00	Kisampang	<i>Eudia latifolia</i>	Karang ranjang	06° 50' 32.4"	105° 27' 36.0"	+		+
		13:30	Kisampang	<i>Eudia latifolia</i>	Karang ranjang	06° 50' 37.4"	105° 27' 24.8"	+		+
37	13-Oct-00	11:00	Kondang	<i>Ficus Variegata</i>	Bandawoh	06° 50' 11.6"	105° 24' 47.6"	+		+
			Lame peucang	<i>Alstonia Spectrabilis</i>				+		+
			Kiendog	<i>Gyionotroches Axillaris</i>				+		+
			Mara	<i>Macaranga tanarius</i>				+		+
			Kedongdong	<i>Spondias pinata</i>				+		+
			Sulangkar	<i>Leea Sambucina</i>				+		+
38	14-Oct-00	11:55	Sulangkar	<i>Leea Sambucina</i>	Pamanggangan	06° 48' 00.7"	105° 24' 33.3"	+		+
			Palungpung	<i>Meremia peltata</i>				+	+	+
			Jingjing kulit	<i>Zizipus hosfieldii</i>				+	+	+
			Kolebahe	<i>Uncaria sp</i>				+	+	+
39	20-Oct-00	12:00	Pacing	<i>Globa pendula</i>	Pangukusan	06° 50' 25.6"	105° 25' 10.2"	+	+	+
			Waru	<i>Hibiscus tiliaceus</i>				+		+
			Sulangkar	<i>Leea Sambucina</i>				+		+
			Leuksa	<i>Poikilospermum suaveolens</i>				+	+	+
			Capatuhur	<i>Micania Cordata</i>				+	+	+
			Kilangir	<i>Dysoxylum Caulostacium</i>				+		+
		12:50	Lame peucang	<i>Alstonia Spectrabilis</i>				+		+

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			Tepus	<i>Acasma sp</i>				+		+
			Palungpung	<i>Merremia Peltata</i>				+	+	+
40	6-Nov-00	9:05	Mara	<i>Macaranga Tanarius</i>	Karang ranjang	06° 50' 15.7"	105° 26' 53.5"	+		+
			Jingjing kulit	<i>Zizipus hosfieldii</i>				+	+	+
		11:00	Kikukupu		Karang ranjang	06° 50' 16.9"	105° 26' 48.6"	+	+	+
			Cente	<i>Lantana camara</i>				+		+
			Sulangkar	<i>Leea sambucina</i>				+		+
41	20-Dec-00	11:30	Sempur	<i>Dillenia obovata</i>	Cinogar	06° 43' 16.4"	105° 18.28.2"	+		+
			Kedongdong	<i>Spondias pinata</i>				+		+
		13:45	Kikamaler	<i>Micromelum minutum</i>	Cinogar	06° 43' 54.8"	105° 18' 29.4"	+		+
42	16-Jan-01	11:35	Kituak		Cibom	06° 45' 45.8"	105° 13' 40.8"	+		+
			Putat	<i>Plangkonnia valida</i>				+		+
			Ceuri	<i>Garnicinia Parvifolia</i>				+		+
		11:45	Kihampeulas	<i>Ficus Hampeulas</i>	Cibom	06° 45' 48.0"	105° 13' 41.1"	+		+
		12:00	Kolebahe	<i>Uncaria Sp</i>		06° 45' 49.1"	105° 13' 44.2"	+	+	+
43	26-Jan-01	11:10	Cente	<i>Lantana camara</i>	Rorah kawung	06° 44' 41.7"	105° 16' 56.9"	+		+
			Dahu	<i>Dracontomelum puberulum</i>				+		+
			Bisoro	<i>Ficus septica</i>				+		+
			Tepus	<i>Amomum Sp</i>				+		+
			Rotan	<i>Calamus Sp</i>	Rorah kawung	06° 44' 22.2"	105° 17' 24.3"	+		+
			Kolebahe	<i>Uncaria Sp</i>				+	+	+
			Tepus	<i>Amomum Sp</i>				+		+

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			Palungpung	<i>Meremia peltata</i>				+	+	+
			Sulangkar	<i>Leea sambucina</i>				+		+
			Buluh					+		+
44	27-Jan-01	13:05	Sulangkar	<i>Leea sambucina</i>	Rorah kawung	06° 44' 30.1"	105° 17' 25.5"	+		+
			Bayur	<i>Pterospermum Javanicum</i>				+		+
			Leuksa	<i>Poikilospermum Suaveolens</i>				+	+	+
		13:10	Jingjing kulit	<i>Zizipus hosfieldii</i>				+	+	+
			Kolebahe	<i>Uncaria Sp</i>				+	+	+
			Kadongdong	<i>Spondias pinata</i>	Cinogar			+		+
		13:40	Palungpung	<i>Meremia peltata</i>				+	+	+
			Cente	<i>Lantana camara</i>				+		+
			Jingjing kulit	<i>Zizipus hosfieldii</i>				+	+	+
			Tepus	<i>Amomum Sp</i>				+		+
			Leuksa	<i>Poikilospermum Suaveolens</i>				+	+	+
			Tepus	<i>Amomum Sp</i>		06° 44' 33.6"	105° 17' 37.0"	+		+
		14:30	Tepus	<i>Amomum Sp</i>	Cinogar	06° 44' 34.6"	105° 17' 40.0"	+		+
			Bisoro	<i>Ficus septica</i>				+		+
			Kikacang	<i>Aglaia odoratisima</i>				+		+
			Bungburutu	<i>Ampelocissus arachnoidea</i>				+	+	+
		15:00	Tepus	<i>Amomum Sp</i>				+		+
			Hareumeung					+		+
			Tokbray	<i>Aglaia latifolia</i>				+		+

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45	28-Jan-01	13:13	Kedondong	<i>Spondias pinata</i>	Cinogar	06° 44' 17.1"	105° 17' 55.1"	+		+
			Kolebahe	<i>Uncaria Sp</i>				+	+	+
		13:58	Cente	<i>Lantana camara</i>	Cinogar	06° 44' 14.0"	105° 17' 58.0"	+		+
			Sulangkar	<i>Leea sambucina</i>				+		+
			Tepus	<i>Amomum Sp</i>				+		+
			Bisoro	<i>Ficus septica</i>				+		+
		14:00	Tongtolok	<i>Pterocymbium tinctorium</i>		06° 44' 10.6"	105° 17' 58.2"	+		+
		14:20	Kitulang	<i>Diospyros pendula</i>		06° 44' 06.1"	105° 17' 58.9"	+		+
		14:50	Kirapeut			06° 44' 03.2"	105° 18' 00.9"	+		+
			Kikukupu					+	+	+
46	26-Jun-01	11:57	Segel	<i>Dillenia exelsa</i>	Cikeusik	06° 48' 17.6"	105° 22' 22.4"	+		+
		14:08	Kicalung	<i>Diosphyros macrophilla</i>		06° 48' 15.2"	105° 22' 11.6"	+		+
47	27-Jun-01	9:35	Palungpung	<i>Meremia peltata</i>	Cibandawoh	06° 48' 51.8"	105° 24' 21.9"	+	+	+
		11:57	Segel	<i>Dillenia exelsa</i>	Cikeusik	06° 48' 17.6"	105° 22' 22.4"	+		+
		14:08	Kicalung	<i>Diosphiros macrophilla</i>	Cikeusik	06° 48'15.2"	105° 22' 11.6"	+		+
48	30-Jun-01	9:35	Palungpung	<i>Meremia peltata</i>	Cibandawoh	06° 48' 51.8"	105° 24' 21.9"	+	+	+
49	21-Jul-01	13:53	Leuksa	<i>Poikilospermum Suaveolens</i>	Rorah kawung	06° 44' 31.3"	105° 18' 00.7"	+	+	+

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APPENDIX 5

Mud Wallow Findings

No.	Date	Time	Localities	Georeference		Types	Length	Wide	Remarks
				Lon.	Lat.				
1	19-Oct-99	14:12	Cikeusik	06° 48' 43.1"	105° 22' 09.1"	Temporary	3 m	2.7 m	Tajuk tertinggi 20 m
2	21-Oct-99	10:10	Cibandawoh	06° 48' 54.7"	105° 23' 09.5"	Permanent	6 m	3 m	Tajuk tertinggi 30 m
3	14-Nov-99	9:24	Cimayang	06° 43' 17.5"	105° 19' 12.1"	Temporary	5 m	3.2 m	
4		15:38	Cikarang	06° 44' 01.3"	105° 19' 25.8"	Permanent	16 m	20 m	
5	15-Nov-99	9:55	Cikarang	06° 43' 57.0"	105° 19' 28.3"	Permanent	4 m	3.5 m	
6	16-Nov-99	13:23	Citadahan	06° 45' 36.2"	105° 19' 13.2"	Permanent	3.5 m	2.3 m	
7	17-Nov-99	8:58	Citadahan	06° 45' 49.7"	105° 19' 13.2"	Permanent	6 m	4 m	
8		10:04	Citadahan	06° 45' 44.0"	105° 18' 42.9"	Temporary	6 m	4 m	
9	18-Nov-99	9:10	Citadahan	06° 46' 04.3"	105° 19' 11.5"	Permanent	3 m	3 m	
10		13:57	Citadahan	06° 46' 43.2"	105° 19' 12.6"	Permanent	5 m	3.5 m	
11		12:37	Citerjun	06° 45' 08.9"	105° 17' 23.8"	Temporary	2.2 m	2 m	
12		13:48	Citerjun	06° 44' 38.7"	105° 17' 12.1"	Temporary	4 m	3 m	
13	23-Nov-99	10:09	Rorah Kawung	06° 44' 10.5"	105° 17' 30.0"	Permanent	4.5 m	3.2 m	
14	24-Nov-99	10:47	Citalanca	06° 44' 52.1"	105° 16' 23.7"	Permanent	2.2 m	1.5 m	
15		10:50	Citalanca	06° 44' 51.0"	105° 16' 21.5"	Permanent	3.2 m	2 m	
16	30-Nov-99	11:42	Ciujung Kulon	06° 45' 56.7"	105° 16' 55.5"	Permanent	4.5 m	4 m	
17	1-Dec-99	10:47	Citalanca	06° 44' 38.5"	105° 16' 23.7"	Permanent	2.2 m	1.5 m	
18	16-Dec-99	12:56	Rorah Daon	06° 48' 06.7"	105° 20' 26.9"	Permanent			tanggal 20 Des 99 temuan
19	19-Dec-99	11:20	Cikeusik	06° 46' 25.2"	105° 20' 25.4"	Permanent	-	-	
20	1-Jan-00	13:02	Cikeusik	06° 46' 02.2"	105° 20' 26.0"	Permanent	-	-	

Population distribution Of Javan Rhinoceros from fecal and footprint analysis

21	12-Mar-00	11:00	Cibandawoh	06° 49' 13.2"	105° 24' 12.4"	Permanent	4.4 m	4 m	
22		11:14	Cibandawoh	06° 49' 10.0'	105° 24' 07.2"	Permanent	+ 8 m	+ 5 m	
23	18-May-00	10:00	Rorah Bogo	06° 48' 47.8"	105° 22' 48.1"	Temporary	4.2 m	1.8 m	
24	20-May-00	15:30	Cibandawoh	06° 48' 45.1"	105° 23' 30.8"	Temporary	-	-	
25	23-May-00	8:32	Cibandawoh	06° 48' 36.4"	105° 23' 25.9"	Temporary	5 m	3 m	
26		9:45	Cibandawoh	06° 48' 24.1"	105° 23' 27.8"	Temporary	4 m	3 m	
27	14-Jul-00	9:25	Cikarang	06° 43' 41.2"	105° 20' 00.2"	Temporary	10 m	2.5 m	
28	15-Jul-00	9:20	Cikarang	06° 43' 29.5"	105° 20' 32.4"	Temporary	8 m	5 m	
29	26-Jul-00	13:30	Cihadeuleum	06° 46' 07.8"	105° 23' 28.2"	Temporary	3.8 m	2.5 m	kondisi kering
30	29-Jul-00	11:30	Cibandawoh	06° 49' 11.6"	105° 24' 07.6"	Permanent	3 m	3.5 m	Kondisi berlumpur
31	23-Aug-00	11:38	Cigenter	06° 44' 45.3"	105° 21' 17.2"	Temporary	-	-	kondisi kering
32	25-Aug-00	9:25	Cikeusik	06° 46' 28.7"	105° 21' 20.1"	Temporary	4.1 m	2.6 m	Kondisi berlumpur
33	27-Aug-00	16:35	Karang ranjang	06° 50' 21.5"	105° 27' 07.8"	Temporary	3.1 m	2.5 m	Kondisi berlumpur
34		16:47	Karang ranjang	06° 50' 24.1"	105° 27' 08.9"	Temporary	1.8 m	2.8 m	Kondisi berlumpur
35	10-Sep-00	13:40	Cigenter	06° 44' 31.9"	105° 22' 26.4"	Temporary	6 m	6 m	kondisi kering
36		14:00	Cigenter	06° 44' 37.9"	105° 22' 26.1"	Temporary	4 m	5 m	kondisi kering
37	11-Sep-00	9:20	Cigenter	06° 44' 17.6"	105° 22' 27.3"	Temporary	4 m	5 m	kondisi kering
38	13-Sep-00	11:14	Cikeusik	06° 47' 42.8"	105° 21' 55.7"	Temporary	6 m	6.1 m	kondisi kering
39	8-Oct-00	11:10	Cibandawoh	06° 49' 11.3"	105° 24' 29.8"	Temporary	5 m	2.7 m	Kondisi Kering
40		10:50	Cibandawoh	06° 49' 38.3"	105° 24' 33.2"	Temporary	6 m	4 m	Kondisi Kering
41	10-Oct-00	11:30	Cikeusik Timur	06° 48' 46.4"	105° 23' 03.3"	Temporary	6 m	3 m	Kondisi berair
42	13-Oct-00	15:05	Cibandawoh	06° 50' 23.6"	105° 24' 54.4"	Temporary	4 m	3 m	Kondisi Kering

Population distribution Of Javan Rhinoceros from fecal and footprint analysis

43	14-Oct-00	13:08	Cibandawoh	06° 50' 07.8"	105° 24' 56.4"	Temporary	9.1 m	3.5 m	Kondisi Kering
44	20-Oct-00	12:35	Pangukusan	06° 50' 24.9"	105° 25' 07.7"	Temporary	4 m	3 m	Kondisi berair
45		13:45	Tanjung treheng	06° 50' 55.9"	105° 25' 06.7"	Temporary	7 m	5 m	-
46	24-Oct-00	9:13	Cibandawoh	06° 48' 39.5"	105° 24' 04.1"	Temporary	9 m	4 m	Kondisi berlumpur
47	6-Nov-00	13:36	Karang Ranjang	06° 50' 02.0"	105° 26' 14.9"	Temporary	3.5 m	2.5 m	Kondisi berair
48	7-Nov-00	10:00	Pangukusan	06° 49' 50.9"	105° 25' 51.4"	Permanent	10 m	8 m	Kondisi berair
49	9-Nov-00	11:22	Karang Ranjang	06° 50' 44.6"	105° 27' 42.8"	Temporary	5 m	5 m	Kondisi berair
50		13:00	Karang Ranjang	06° 50' 29.0"	105° 27' 14.2"	Temporary	3.1 m	2.1 m	Kondisi berair
51		13:10	Karang Ranjang	06° 50' 28.5"	105° 27' 15.0"	Temporary	3.5 m	2.3 m	Kondisi berair
52	19-Dec-00	12:55	Nyawaan	06° 41' 49.6"	105° 20' 05.8"	Temporary	5 m	5.5 m	Kondisi berair
53						Temporary	4 m	3.5 m	Kondisi berair
54	16-Jan-01	11:15	Cibom	06° 45' 48.2"	105° 13' 38.0"	Temporary	0 m	0 m	Kondisi dialiran anak sungai
55	24-Jan-01	11:10	Citerjun	06° 44' 47.7"	105° 16' 34.2"	Temporary	3.5 m	3.2 m	Kondisi berair
56	27-Jan-01	15:44	Cinogar	06° 44' 35.8"	105° 17' 15.0"	Temporary	3.1 m	3.2 m	Kondisi berair
57		15:50	Cinogar	06° 44' 34.1"	105° 17' 15.6"	Temporary	3.5 m	3.3 m	Kondisi berair
58	28-Jan-01	12:15	Cinogar	06° 44' 20.0"	105° 17' 48.5"	Temporary	5 m	3.4 m	Kondisi berair
59		14:30	Cinogar	06° 44' 06.5"	105° 17' 59.8"	Permanent	10 m	8 m	Kondisi berair
60	30-Jan-01	10:00	Citelanca	06° 44' 32.6"	105° 16' 57.4"	Temporary	4.5 m	3.7 m	Kondisi berair
61		10:00	Citelanca	06° 44' 52.1"	105° 16' 23.7"	Permanent	2.2 m	1.5 m	24-11-99 Cek Ulang
62				06° 44' 51.0"	105° 16' 21.5"	Permanent	3.2 m	2 m	24-11-99 Cek Ulang
63	15-Mar-01	9:55	Citadahan	06° 48' 04.0"	105° 20' 00.6"	Temporary	15 m	12 m	Kondisi berair
64	16-Mar-01	13:30	Citadahan	06° 47' 58.7"	105° 20' 16.9"	Temporary	3 m	2.5 m	Kondisi berair

Population distribution Of Javan Rhinoceros from fecal and footprint analysis

65		14:00	Citadahan	06° 48' 00.9"	105° 20' 11.9"	Permanent	4 m	3 m	Kondisi berair
66		14:10	Citadahan	06° 48' 01.3"	105° 20' 12.0"	Permanent	5 m	2.5 m	Kondisi berair
67	26-Mar-01	10:15	Gunung Kendeng	06° 46' 54.3"	105° 17' 32.8"	Temporary	4 m	6 m	Kondisi berair
68		13:10	Gunung Kendeng	06° 46' 20.0"	105° 17' 29.3"	Permanent	6 m	5 m	Kondisi berair
69	21-Jun-01	12:30	Cigenter	06° 44' 38.9"	105° 21' 14.1"	Temporary	3 m	2.5 m	Kondisi berair
70	26-Jun-01	12:19	Cikeusik	06° 48' 17.0"	105° 22' 22.5"	Temporary	3.5 m	3.12 m	Kondisi kering
71		12:30	Cikeusik	06° 48' 06.7"	105° 22' 21.5"	Permanent	4.1 m	3.2 m	Kondisi berair
72	27-Jun-01	10:00	Cikeusik	06° 47' 56.7"	105° 22' 05.7"	Permanent	3.3 m	2.3 m	Kondisi berair
73		12:50	Cikeusik	06° 47' 46.2"	105° 22' 15.2"	Permanent	3.6 m	1.55 m	Kondisi berair
74	30-Jun-01	8:33	Cibandawoh	06° 48' 45.9"	105° 23' 56.9"	Permanent	6 m	3.2 m	Kondisi berair
75		8:54	Cibandawoh	06° 48' 39.9"	105° 24' 05.7"	Permanent	5 m	3.1 m	Kondisi berair
76		10:16	Cibandawoh	06° 45' 01.9"	105° 24' 28.6"	Permanent	4 m	2.8 m	Kondisi berair

APPENDIX 6

Cat Tien report

FINAL REPORT ON USFWS – RHINO DNA PROJECT; CAT TIEN NATIONAL PARK – VIETNAM

Two Garmin 12 GPS's were bought in October 1999 for a total amount of USD 544.15 (budget USD 550).

In April and May of the year 2000, Cat Tien National Park's Forest Protection Department constructed 40 km (@ USD 70 / km) of new patrol trails in the Cat Loc area. An existing stretch of 90 km patrol trail received maintenance clearing (@ USD 15 / km) in 2000. An additional 40 km has been maintained in 2001. In total USD 4,750.00 has been spent on this activity. The budget of USD 4,200 under this grant has been supplemented by WWF – Cat Tien National Park Conservation Project funds. A map with the patrol trail system is attached.

After obtaining CITES Export and Import permits, the following materials were sent to Columbia University, New York – USA, early August 2000:

- Two dung samples: 1. collected on 10-12-'99 at K'lo K'it – Cat Loc.
2. collected on 01-04-'00 at Bau Chim - Phuoc Son – Cat Loc.
- One rhino skin sample: This skin is most likely from the an animal killed in 1988. We are sure that this animal is from Lam Dong Province, Cat Loc area of present day Cat Tien National Park..
- Three rhino horn samples; all samples were obtained in Ho Chi Minh City and are said by the owners to be from rhinos originating from Lam Dong Province. It is said by the owners that the horns are very old, up to 40 years.

On August 30, 2000 Mr. Prithiviraj Fernando of Columbia University informed us that: *“I have been able to get good sequences from the recent rhino horn and the two dung samples. The skin sample I need to run a few more tests to confirm. The two older horn samples did not work. The results so far indicate that the Vietnamese Javan rhinos are quite distinct from the Indonesian ones, confirming their sub-species status. However, all three samples analysed so far have provided the same sequence, suggesting low variability – which is not unexpected from what you said about the geographic location of the samples.”* and *“There may also be a possibility of using some of the tissue you sent us to make primers for analysing genomic DNA micro-satellites (these may allow us to distinguish between even closely related individuals). So far we have been using Indian rhino DNA to develop primers which we hope will also work for Javan rhinos. However, using Javan rhino DNA to develop primers for that species would be much better. Currently we do primer development work in collaboration with the Queens University molecular laboratory in Canada. They clone the DNA and we sequence it and make primers. We would like to know whether it would be acceptable to you, to send the Queens laboratory a small sample of the tissue you sent us, for this work.”*

Further analysis results are awaited. Meanwhile more rhino dung samples are being collected which will be sent to Columbia University.

Prospects:

- While inputs from the this project and other interventions has greatly improved the security situation for the rhinos in Cat Tien National Park, it has not resulted in a routine flow of information on rhinos to the Park's management. This has also been recognised by an IUCN-SSC Asian Rhino Specialist Group evaluation team which assessed current rhino protection measures taken in Cat Tien National Park last September 2000. Three Rhino Patrol Teams dedicated to protection and data gathering work in the rhino range in Cat Tien National Park are being set-up. These team will receive additional training and intensive coaching. It is hoped that in this approach more dung samples, foot print measurements and other information on the rhinos can be obtained.
- Rhino dung samples will continued to be sent to Columbia University.
- A Conservation Management Plan is in its final stages of formulation after which it will be implemented. This plan includes measures to improve the conservation situation for the rhinos, including changing Park boundaries so that large numbers of people will be located outside the Park and the resettlement of about 750 people who are living in biologically sensitive areas.

FINANCIAL STATEMENT

ITEM	BUDGET	EXPENDITURE
GPS	4,200.00	4,205.85
Patrol Trails	550.00	544.15
TOTAL	4,750.00	4,750.00