



ESTIMATION OF INDIAN RHINOCEROS

(Rhinoceros unicornis)

2019

WEST BENGAL

Chief Conservator of Forests
Wildlife North
Directorate of Forests
Government of West Bengal



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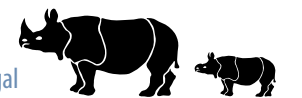
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& Chief Wildlife Warden,
Government of West Bengal

Foreword

A regular census programme is essential for evaluating the success of any conservation programme of an endangered species. This programme must be transparent and holistic, and incorporate any new methods available through ongoing research, addressing an array of parameters related to the survival of the species by using the blend of the best available science and technology. In this current census of rhinos in West Bengal the tried and tested method of “Total Count” has been adopted. Simultaneously, methods of genetic analysis and identifying individual DNA is also being introduced. The whole exercise has been conducted with active participation of NGOs and volunteers to ensure transparency.

Way back in 1993, a Population and Habitat Viability Analysis (PHVA) Workshop for the Great Indian Rhino was conducted for three days in Jaldapara Wildlife Sanctuary, with experts from all over the world participants. At the time, the Indian Rhino population of West Bengal was under severe threat, with only about 40-45 rhinos in the two National Parks.

The PHVA Workshop made recommendations for preserving the rhino population, mainly for controlling poaching, expansion of existing organizational structure, vegetation and water management to improve the habitat, economic recovery of fringe human population, wildlife tourism, training, monitoring and veterinary care. Specially, the Workshop had predicted that the population in Gorumara is not viable and would be extinct in the near future.

West Bengal can now very rightly claim to have worked on all the recommendations, as can be seen from the increasing rhino population of the State. With our continuing efforts, even the population in Gorumara has shown signs of revival. We still have some ways to go in terms of improving genetic diversity, expanding the rhino occupancy to geographically separated habitats, and improving our engagement with the fringe human population.

The efforts of all Officers and staff of Gorumara Wildlife Division, Jaldapara Wildlife Division and Jalpaiguri Division is conducting the census exercise is to be commended. They have been very ably guided by Shri Ujjal Ghosh, IFS, CCF (WLN), Shri Kumar Vimal, IFS, DFO (JWLD), Ms. Nisha Goswami, IFS, DFO (GWLD) and Shri Mridul Kumar, IFS, DFO (JPG)

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Preface

A population estimation exercise at regular interval is an essential scientific activity critical for estimating population of wildlife in a park/protected area. The population estimation of wild population of Indian Rhinoceros (*Rhinoceros unicornis*) in Gorumara Wildlife Division and Jaldapara Wildlife Division was conducted on 12th - 13th February and 15th - 16th February 2019 by the parks management.

Till the 19th century, the presence of Rhinoceros was very wide spread occurring in Asia, Africa and even Europe. Presently global Rhinoceros population of all five sub-species (White Rhino, Black Rhino, Indian Rhino, Javan Rhino, Sumatran Rhino) is about 29,000 individuals in the wild. The Indian Rhinoceros (*Rhinoceros unicornis*), native to the Indian sub-continent once roamed from Pakistan to Myanmar are now limited to few pockets of protected areas of India (Assam, West Bengal, Uttar Pradesh) & Nepal, along the foothills of Himalayas. Indian Rhinoceros having global population of 3550 individuals is listed as Vulnerable on the IUCN Red list, due to fragmentation and human encroachment of its prime habitat i.e. alluvial grassland and riverine forest. In West Bengal, Indian Rhinoceros having a population of 289 individuals, as per the recent Population Estimation Exercise - 2019 are found in two protected areas under Jaldapara Wildlife Division, Gorumara Wildlife Division and in adjoining reserve forest areas of Jalpaiguri Division.

The population of Indian Rhinoceros in Jaldapara National Park reached an abysmal low to 14 in 1985, has since shown a steady positive trend reaching 237 individuals as per the present 2019 Rhino population estimation exercise. On the other had the Rhino population in Gorumara landscape appears to remain almost static or little increase in comparison to estimation figure of 49 during 2015 estimation to 52 during 2019 estimation.

The population Estimation exercise - 2019 & its positive outcome is a proof of successful wildlife management techniques by implementing protection monitoring protocols & habitat management interventions. Although the population of Indian Rhinoceros has increased steadily the threat of poaching remains, requiring constant monitoring & robust protection monitoring protocol. The rise of population also necessitates evaluation of the carrying capacity of the Parks to support further increase in population of the Rhinoceros.

I hope this report will provide needed inputs for necessary intervention required for managing wildlife in our Jaldapara and Gorumara landscape and conserving the majestic wild animal, Indian Rhinoceros.



(Sri Ujjal Ghosh, IFS)
Chief Conservator of Forests
Wildlife North, West Bengal

Observers in enumeration line



Contents

Introduction	11
Location Map	12
Organizational Setup	14
Area of Interest / Distribution	16
Enumeration Methodology	17
Enumeration Design	19
Past History	21
NGO Participation	26
Enumeration Area Maps	27
Enumeration Area	35
Field Data	40
Result and Discussion	63
Conclusion	71



Introduction

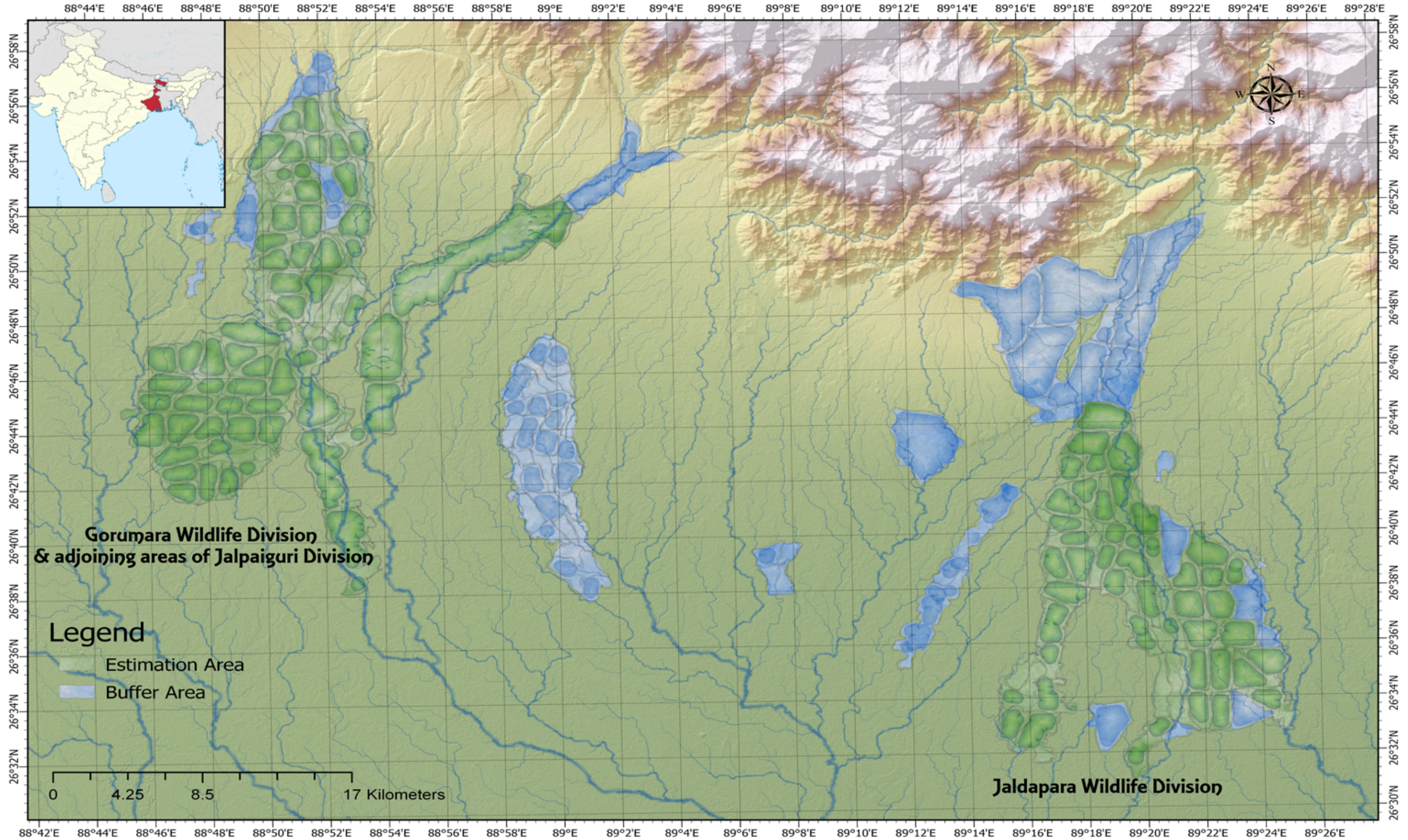
Population estimation of wild animals is an important management tool for scientific management of a Protected Area (PA). The following are the primary objectives of conducting such population estimation of wild animals

- Estimation of numbers of the species
- Sexing and determination of Male - Female Sex ratio
- Analysis of population trend and age-class
- Monitoring of habitat and habitat utilization
- To make changes in managerial strategy, if needed
- Determination of carrying capacity of PA's

Population estimation of Indian Rhinoceros (*Rhinoceros unicornis*) in Jaldapara Wildlife Division and Gorumara Wildlife Division was last conducted during 2015. To assist the population of Rhinoceros during 2015 these forest areas were enumerated following the technique of "Total Count" or Direct count method. Rhinos are monitored by the officers and frontline staff on a daily basis following strict and well-designed protocol. Taking advantage of the knowledge and vast field experience of frontline staff and officers, it was decided to follow the procedure of "Total Count" method in assessing the wild population of Indian Rhinoceros (*Rhinoceros unicornis*) in Jaldapara Wildlife Division and Gorumara Wildlife Division during 2019.



Location Map



Organizational Setup

JALDAPARA National Park ►

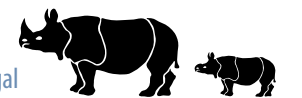
Sl No.	Range	Beat	Area (in Ha)	Total Estimation Blocks
1	CP	BN	1527.73	4
2	CP	CP	1070.76	4
3	CP	MB	379.60	1
4	KB	CCL	611.66	2
5	KB	MTR	1145.34	4
6	KB	NEC	566.34	2
7	KB	KB	630.89	2
8	JPN	SLT	602.7	2
9	JPN	50 FT	822.85	3
10	JPN	NWC	947.89	3
11	JPN	HM	1318.61	3
12	JPW	BDK	543.00	2
13	JPW	HLG	905.86	3
14	JPW	MRD	600.00	2
15	JPW	TEC	600.00	2
16	JPW	KJN	598.39	2
17	JPE	JP	1383.48	5
18	JPE	MLG	555.12	2
19	JPE	SSM	1157.79	4
20	JPE	DDG	556.01	1
Total	5 Ranges	20 Beats	16524.02	53

Total National Park Area	216.51 sq km
Total RF Area	89.78 sq km
Total Division Area	306.29 sq km

GORUMARA National Park ►

Sl No.	Range	Beat	Area (in Ha)	Total Estimation Blocks
1	Gorumara North Range	Chapramari	959.81	3
2	Gorumara North Range	Khunia	1443.9	4
3	Gorumara North Range	Murti	1408.26	5
4	Gorumara South Range	Dhupjhora	1214.45	3
5	Gorumara South Range	Gorumara	2492.92	7
6	Gorumara South Range	Budhuram	1489.05	5
7	Gorumara South Range	Bichabhanga	1086.97	4
Total	2	7	10095.36	31
Jalpaiguri Division				
8	Nathua Range	Gadhiarkuthi	1728.07	1
9	Nathua Range	Nathua	1800	1
10	Daina Range	Central Daina	1590	1
11	Daina Range	Khairkata & Sulkapara	1500.98	1
12	Ramsai Range	Kalamati Beat	650.45	1
13	Ramsai Range	Ramsai	650.03	1
14	Lataguri Range	Central Beat	684.58	2
15	Lataguri Range	Lataguri	600.55	2
16	Lataguri Range	Central & Baradighi	715.46	2
17	Lataguri Range	Baradighi	953.01	2
18	Chalsa Range	Nagrakata	1554.78	2
19	Chalsa Range	Sipchu	1072.4	2
20	Chalsa Range	Panjhora	1619.05	2
Total	5	13	15119.36	20
Grand Total	7	20	25214.72	51

Gorumara NP	79.45 sq km
Chapramari WLS	9.6 sq km
Ramsai & Bamandanga Extension	11.9 sq km
Jalpaiguri Division RF	151.19 sq km
Total	252.14 sq km



INDIAN RHINOCEROS HABITAT - LOCATION AND EXTENT ►

Jaldapara Wildlife Division

As per daily monitoring data for the first fortnight of February, 2019 Rhinoceros are found in ML-1, 2, 3, Torsa-1, 2, 3, CP-1B, 2B, 3B, JP-1, 2, 3, 4, 5, HM-3 on the western bank of river Torsa and BD-1B, 8, MB-5 and Bania-8 Compartments of eastern bank of Torsa river. Out of these Malangi – 1, 2, 3 CP-1B, 2B, 3B, JP-3, 4, 5, Torsa-2 are the compartments of high density whereas JP-1, 4, Torsa-1 & 3 MB-5, BN-8 are the compartments with relatively lower density of

Rhino presence out of the existing distribution range. Hasimara-3, JP-2, Malangi- 1, 2, 3 CP-1B, 2B, 3B are pristine grasslands whereas JP-3,5 Torsa-1,2,3 are having man-made grasslands and hence relatively more convenient for movement of monitoring or any survey teams. On the basis of distribution, topography, habitat type and daily monitoring report, the enumeration units have been formulated.

Gorumara Wildlife Division & adjoining reserve forests of Jalpaiguri Division

As per daily rhino monitoring data for the first fortnight of February, 2019 Rhinoceros are found in Dhupjhora 1B, Dhupjhora 1C, Jaldhaka 1B, Medla-III, Ramsai Extension, Tondu-II, Selka-I, Selka- II, BM-II, BM-III areas of Gorumara National Park and Chapramari Beat of Chapramari wildlife Sanctuary. Out of these Dhupjhora 1B, Dhupjhora 1C, Jaldhaka 1B, Medla-III and Ramsai Extension, are compartments of High density. Apart from that Gadhairkuti and Nathua beats under Nathua Range, Sursuti and

Borodighi Blocks under Lataguri Range and Sipchu Beat, Panjhora beat under chalsa Range of Jalpaiguri Division showed the presence of Indian Rhinoceros.

A GIS analysis of habitat types of Jaldapara Wildlife Division and Gorumara Wildlife Division using digitized map of these parks indicate that the area under natural grasslands, artificial grassland and fringe woodland is ideal habitat of Rhinoceros.



The method of 'Total count' or 'Direct count' is used for population estimation of mega-herbivore like Rhinoceros all over the country and in neighboring country of Nepal. Moreover, this method has been

proved to be effective in estimating the wild population of Rhino both in Jaldapara and Gorumara landscape in past also. Justification of following the 'Total count' or 'Direct count' method are :

1. The target animal is slow moving big animal with great amount of acceptability of patrolling teams on a daily basis.
2. Visibility in the Rhino bearing areas from elephant back with respect to rhino is very good with little or no chance of omission considering the experience of the staff and mahuts.
3. Range and distribution is well known on a dynamic basis due to daily monitoring protocols available on GIS platform.

But, the major challenges in using Total count

- i) Total coverage of the entire distribution range.
- ii) Possibility of double count

Jaldapara Wildlife Division and Gorumara Wildlife Division has developed facilities and infrastructure to keep a constant vigil over all rhinos throughout its range. On the basis of experience gained from practice of "Scanning" which is done frequently in the parks, almost on a fortnightly basis and track analysis on GIS platform. An average area of 250-300 Ha. can very conveniently be scanned by a person on elephant back and as such an enumeration team of average size for 250-300 Ha. was designed.

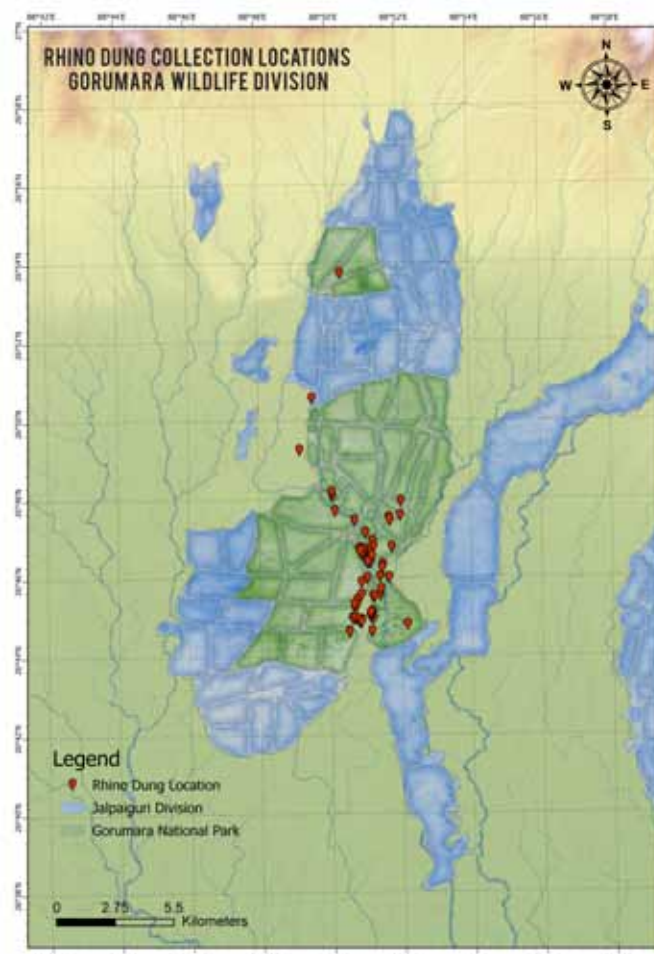
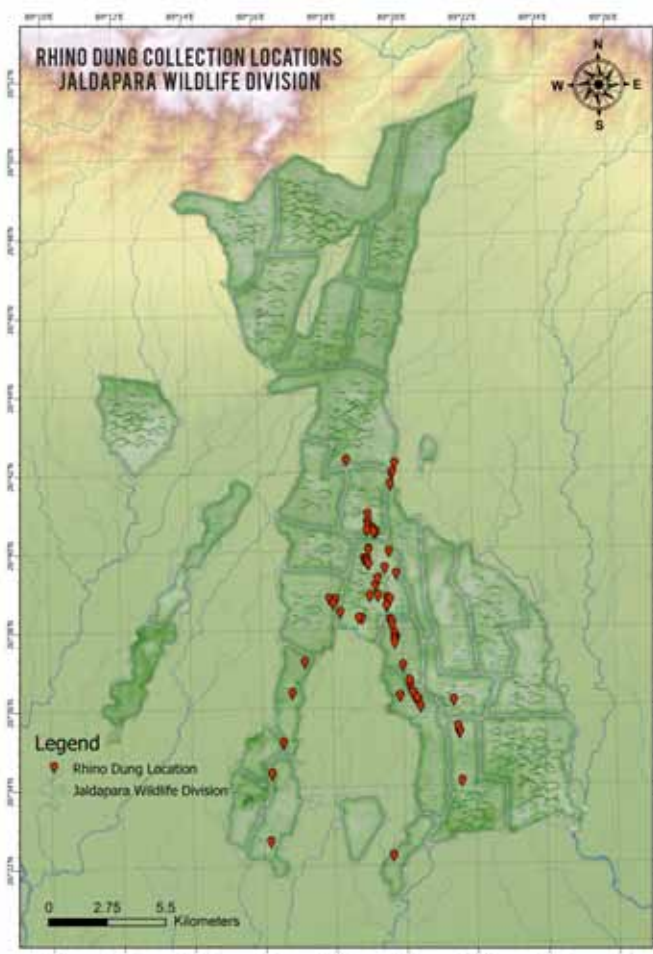
There has been a great gain in use of GIS technology by entire team of frontline staff of the parks since last estimation conducted is 2015. Daily patrols are done with GPS and patrolling tracks were analyzed and discussed to design patrolling schedules and tracks. This is felt that sighting records if analyzed with the help of patrolling tracks with reference to space and time can prove to be a great tool for validating individual sight-

ing records and ruling out double counts. Moreover, a survey team with a GPS is in a better situation to visualize its location, boundary of the unit and coverage on a real time basis. And therefore, as a change in tradition Total count method, it has been decided to provide each enumeration unit with a GPS having pre-loaded map of the each enumeration unit block.

In addition to direct count method attempt has been made to collect different Rhino dung samples from these areas with the help of WII & WWF team with an objective of conducting genetic analysis subsequently. A total of 99 and 109 dung samples have been collected by WII & WWF team from Jaldapara and Gorumara landscape respectively. Dung sample collection from Jaldapara landscape could not be completed due to time constraints and it will be completed subsequently. The following format has been used in recording the dung sample collection.

Sl	Date	Field id	Fresh/Old	Latitude	Longitude	Area





- Presence of Rhino, sighting reports and daily monitoring data – these three components were taken into account while deciding the enumeration area for Rhino estimation in these PA's and adjoining forest.

- The estimation was conducted for two (02) days in Gorumara Wildlife Division on 12th & 13th February'19 and at Jaldapara Wildlife Division on 15th & 16th February'19. On 11th & 14th Feb'19 training programme was organized at Murti complex and Madarihat NIC respectively involving the officers, frontline staff, Banyapran sathi, JFMC members, institutes and NGO representatives.

- Enumeration Blocks (EB) and Observation Lines (OL) were formed and each EB was digitized with the help of GARMIN E Trex-30 & E Trex-20 GPS. A total 53 and 50 EB's were identified and digitized in Jaldapara Wildlife Division and Gorumara Wildlife Division respectively. In addition to this OL's were also identified in the PA's respectively.

- Each team leader of EB's was provided GPS preloaded with the digitized map of the concerned EB only. On an average each team consisted of 3-4 members including NGO representative.

- Departmental Elephants were deployed to the allotted EB's one day in advance. The enumeration parties acquainted the area prior to the start of the census viz., EB boundary, important points (e.g. wallow pool, Glade, Salt licks, Dung piles, Fodder plantation, Grasslands etc.), where the Rhinos are likely to be sighted. A total of 53 and 13 departmental elephants were deployed in the population estimation exercise in Jaldapara WLD and Gorumara WLD and respectively.

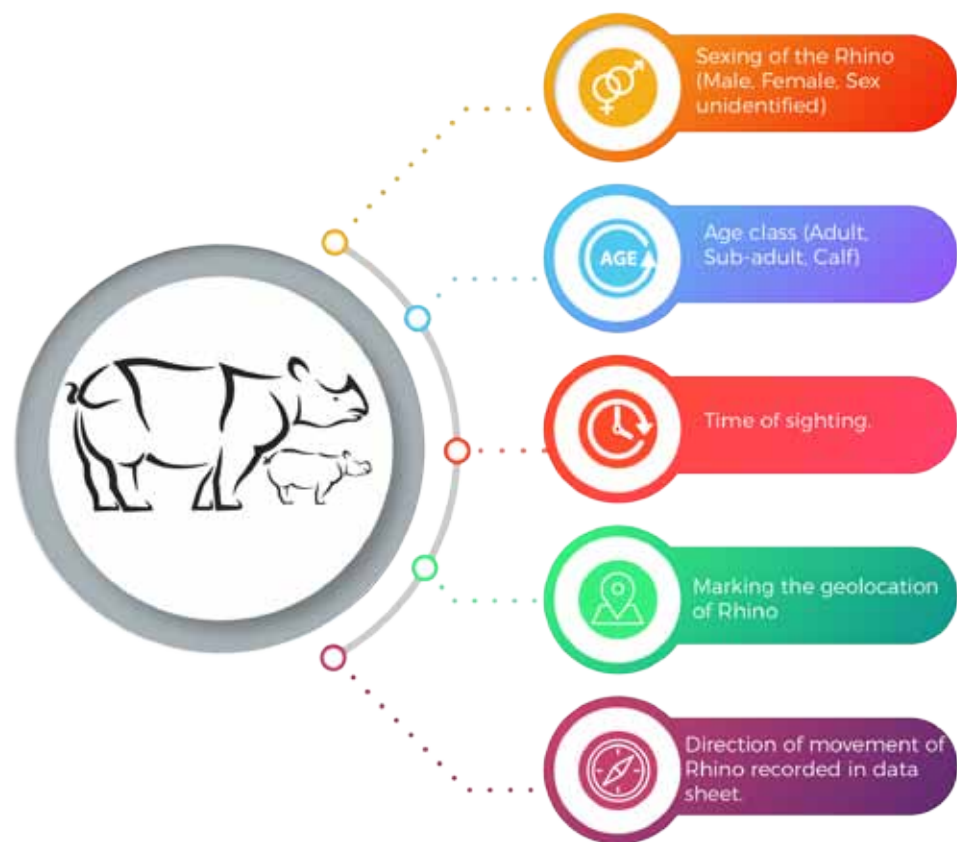
- On ELs depending on the visibility, persons were allotted to observe the movement of rhinos from one EB to other EB. As Rhinos move in particular paths (dandies), staff were deputed on all such paths.

- On the day of estimation all the enumeration party members reached the predetermined starting point within 5.30 am. All enumeration parties were provided with the estimation kit consisting of pre-loaded GPS, coloured hard copies of EB map, data sheet, pen/pencil, water bottle etc.

- The estimation started at 6.00 am simultaneously all over the enumeration area. The enumeration parties moved within the enumeration block for covering maximum area possible within the enumeration block. Whenever the Rhinos are sighted, the following details were noted.



WHENEVER THE RHINOS ARE SIGHTED, THE FOLLOWING DETAILS WERE NOTED ►



- The recorded movement track of each team in EB was subsequently transferred from GPS to GIS Data analysis platform.
- Rhino dung samples were simultaneously collected by a team comprising of WII & WWF representatives in the PA's. A total of 99 dung samples in Jaldapara Wildlife Division and 109 dung samples from Gorumara Wildlife Division have been collected. It may be mentioned here that Rhino dung samples could not be collected through the entire area of Jaldapara NP due to time constraint. It has been decided that WII team will continue the dung collection exercise in Jaldapara Wildlife Division and in adjoining areas of Gorumara Wildlife Division.

- GPS data, data sheets, photographs and data generated by each EB and OL was analyzed by Officers subsequently at Divisional level to arrive at a logical conclusion. While analyzing the directly sighted data of two (02) days estimation, the higher number sighted in a single day was taken into consideration to ascertain the population estimation range of Indian Rhinoceros in both the PA's.

Past History

The all India enumeration of Rhino population in the country is carried out a different point of the year in different states. Though wild population of Rhinoceros are only available in Assam and West Bengal, some Rhinos also exist in Dudhwa National Park which

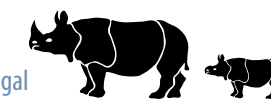
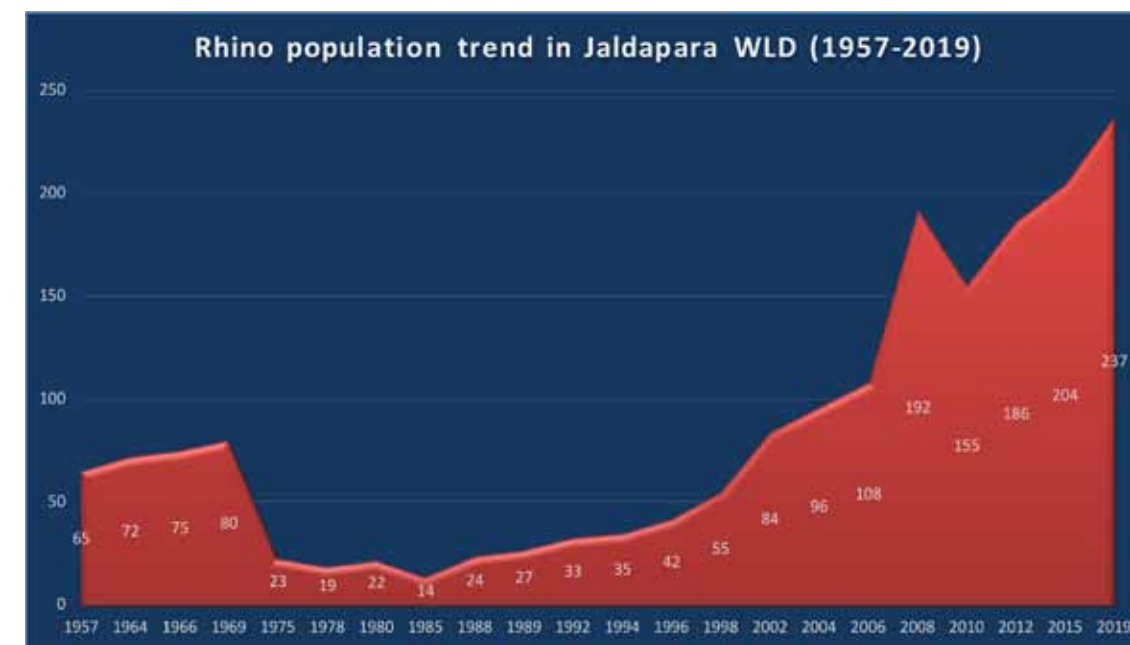
were basically translocated from Assam population. The comparative figure for these two states shows that the estimation population of Rhinoceros in the country has increased to 2702 as compared to 2656 in the year 2015.

JALDAPARA WILDLIFE DIVISION ►

The Rhinoceros Population Estimation has been a regular exercise in Jaldapara National Park since 1957 occurring at interval of every 3 to 5 years. The methodology adopted for the population estimation has always been "Total Count Method" because of its simplicity & it's potential of yielding actual physical count of the target species. The first Rhino population estimation exercise in 1957 pegged the population at 57 individuals. The population saw on steady rise to 80 individuals during population estimation exercise – 1969. But it crashed to low of 19 individuals in 1978. The threat of poaching led to crashing of Rhino population to abysmal low count of 14 individuals in 1985. Since then, the various initiatives by the park

management such as construction of anti-poaching camps (22 Nos.), 24-hour wireless communication network, Habitat improvement interventions etc. have aided the steady increase in the Rhinoceros population which reached to all time high of 204 individuals during Rhino population estimation exercise 2015. The rise of Rhino population and its expansion / movement to new areas have been complimented by creation of artificial grassland in MLG-2, CP-2, CP-3B, Torsa-1,2,3 and HM-3A Compartments of JP East, JP West and JP North Range. The Rhino population estimation – 2019 was planned & executed on 15th & 16th Feb, 2019 following a gap of 4 years since 2015 exercise, adopting 'Total Count' methodology.

INDIAN RHINOCEROS POPULATION TREND OF JALDAPARA ►



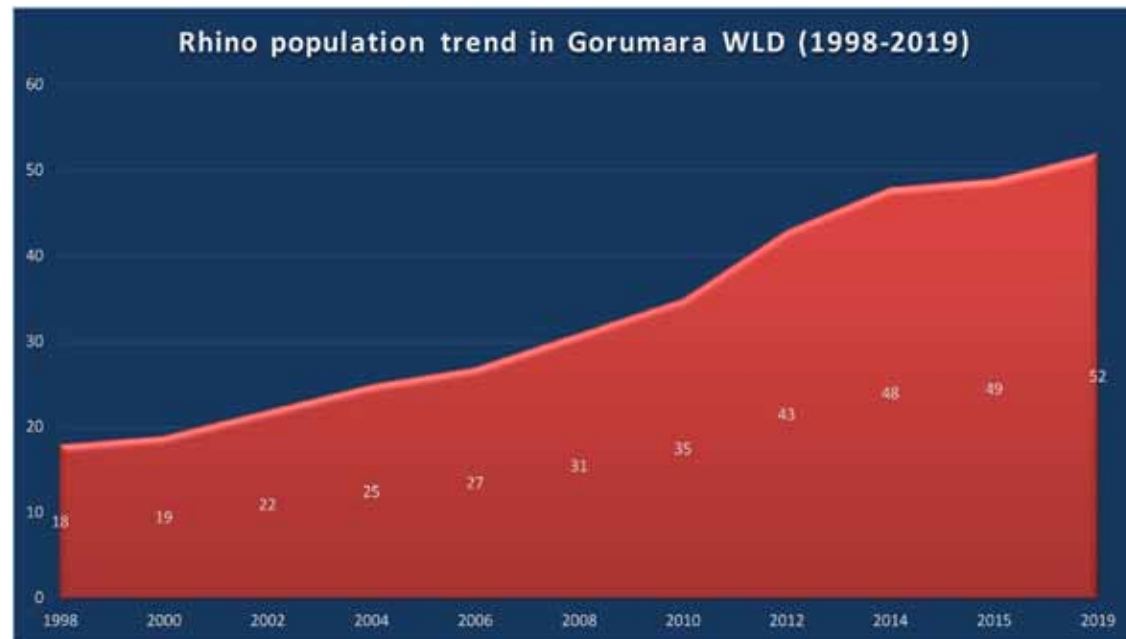
INDIAN RHINOCEROS POPULATION TREND OF GORUMARA WILDLIFE DIVISION ►

The Indian Rhinoceros (*Rhinoceros unicornis*) is a schedule I species according to Wildlife Protection Act, 1972, and listed by IUCN as Vulnerable and CITES as Appendix 1. Thus population estimation of Indian Rhinoceros (*Rhinoceros unicornis*) is an essential tool for determining the population trend so that necessary management practices can be effectively designed. Population estimation of Indian Rhinoceros has been

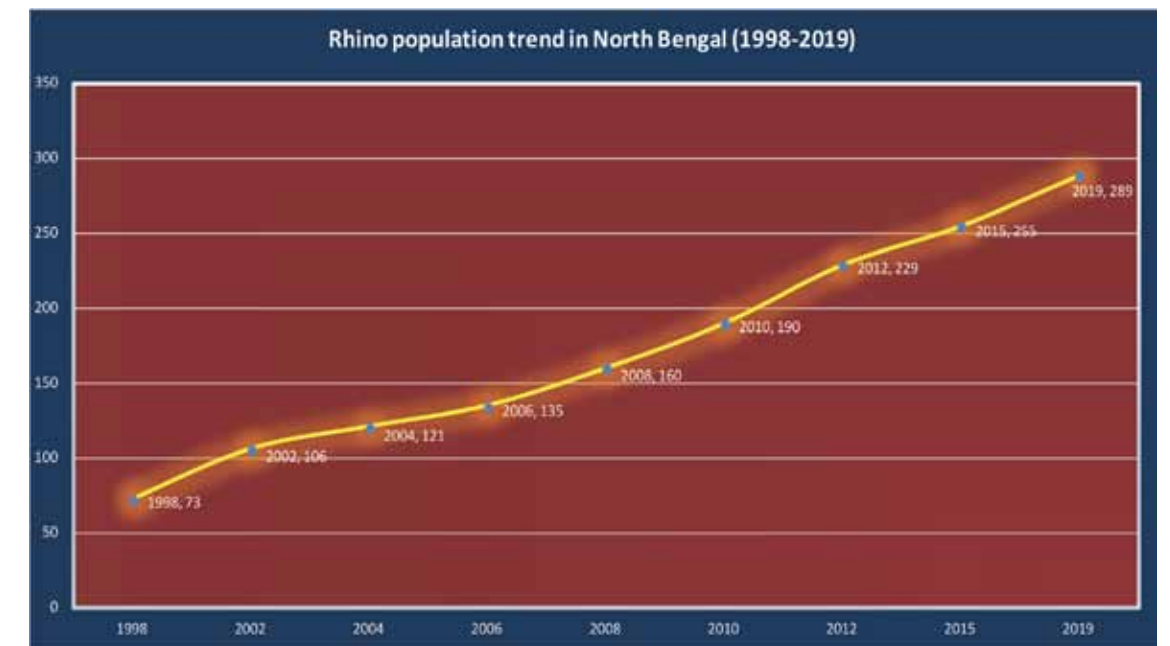
a regular exercise in Gorumara National Park at an interval of every 2-4 years. The methodology adopted for the exercise was always Total count method. The population estimation exercise in year 1998 showed the population to be 18 individuals. The population trend of Indian Rhinoceros (*Rhinoceros unicornis*) since 1998 has showed a steady increase in the PA tabulated as follows;



INDIAN RHINOCEROS POPULATION TREND OF GORUMARA ►



INDIAN RHINOCEROS POPULATION TREND IN NORTH BENGAL ►



FIELD DATA SHEET FOR RHINO CENSUS 2019

Beat: Range: Division: Date:
 Unit no.: Compartment: Mobile No of Team Leader:
 Name of Elephant(s): (if any): Name of Mahout: (if any):
 Members of team (1): (2) (3)
 Starting Place: GPS Location: Starting time:
 Finishing Place: GPS Location: Finishing time:

D	M	S	D	M	S
D	M	S	D	M	S

Sl. No.	Time of sighting	Block/ Compt. Mark location on map	Direction of movement	No. of Rhinos sighted	Sighting GPS Location (D-M-S)	If photographed mention Photo Name or Photo SL No.	Adult (Above 5'4")			Sub-Adult (4'5" to 5'4")			Calf (2' to 4'5")			Special feature of the animal (if any)	Remarks
							M	F	U	M	F	U	M	F	U		
1																	
2																	
3																	
4																	
5																	

Note: Special features of the animal if any (shape and size of horn, scar mark, sign of external injury, tail length, skin folds, ear marks etc.)

Signature of the team leader

Enumeration Blocks

JALDAPARA WILDLIFE DIVISION							
SL	Range	Beat	Compt.	Area (Ha)	Unit no	Mode	Team members
1	Chilapata	Bania, Chilapata, Mendabari	BN 2,3,4,5,1(a), 8(a), 8(b), 8, 9,7 MB 4, 12 : 12 nos	2978.1	9 nos (1 to 8 & 55)	Elephant, Foot	24
2	Kodalbasti	CC line, NEC, Mantharam, Kodalbasti	MB 5(p), 14, 1(p) BD 7(b), 16, 17, 4, 5, 8, 2, 23, 1(b), 25, 7(a), 6(a) : 15 nos	2954.2	10 nos (10 to 19)	Elephant, Foot	30
3	JP (North)	Siltorsa, 50 ft, NWC, Hasimara	JP 1(p), 2, 4(p), 31, 4(p), 34, HM 4(p), 3(b), 39, 40, 3a(p), 1, 43 : 13 nos	3692.1	11 nos (21 to 31)	Elephant, Foot	49
4	JP (West)	Bangdaki, Hollong, TEC, Moyradanga, Kunjnagar	TRS 2(p), 3(p), 1(p), JP 5(p), GL 48, JP 5(p) Torsa 2(p), 1(p), 3(p) : 9 nos	3247.3	11 nos (32, 34 to 39, 40 to 43)	Elephant, Foot	41
5	JP (East)	Jaldapara, Malangi, Sisamara, Dhaidhaighat	JP 3(p), MLG1(p),2,3, CP1 (p), 3b(p), 2(p), 4(b) : 8 nos	3007.8	12 nos (33, 44 to 54)	Elephant	32
Total	5 Ranges	20 Beats	57 Compts.	15879.5	53 nos	Elephant 53 nos	176
GORUMARA WILDLIFE DIVISION							
SL	Range	Beat	Compt.	Area (Ha)	Unit no	Mode	Team members
1	GNR	Chapramari, Khunia, Murti	CHP-3, 2, PNJ-1a, 2a, 4a, Shelka 1, Tondu 1,2A, Tondu 2B, 3, Kakorjhora-1, 2 BM1,2 : 14 nos	3811.97	12nos (1 to 12)	Elephant, Foot	33
2	GSR	Dhupjhora, Gorumara, Budhuram, Bichhabhanga	BM-3, Dhpi-1A, 1B, 1C(p), Indong S-1,2, 3 Tondu-4, Bdanga Extn(p), JLD 1A(p), 1B, GM-1, 2(p), Ramsai Extn (P), Medla - 1, 2, 3 (p), Barahati-1, 2,3 Central-1 : 21 nos	6283.39	19 nos (13 to 31)	Elephant, Foot	56
Total	2 Ranges	7 Beats	35 Compts.	10095.36	31 nos		89
JALPAIGURI FOREST DIVISION							
1	Nathua, Daina, Ramsai, Lataguri, Chalsa	Gadaierkuthi, Nathua, Central Diana, Khairkata, Sulkapara, Kalamati, Ramsai, Central, Lataguri, Baradighi, Nagrakata, Sipchu, Panjhora	Ramsai, S diana (P), Jaldhaka, C Diana (P), LT-1, 3, BCB-1, 2(p), LT-4(p),6(p), Central 2,3 Sursuti 1,2,3,4,5, Hilla 2, Odla 1,2a,2b, Chapramari 1a, 1b, Sipchu 2a,2b,2c Panjhora 1c,2b,3,4a,4b,5,6,7 : 34 nos	15119.36	19 nos	On foot	18
Total	5 Ranges	13 Beats	34 Compts.	15119.36	19 nos		18
Grand Total	7 Ranges	20 Beats	69 compts	25214.72	50 nos	Elephant 13 nos	107

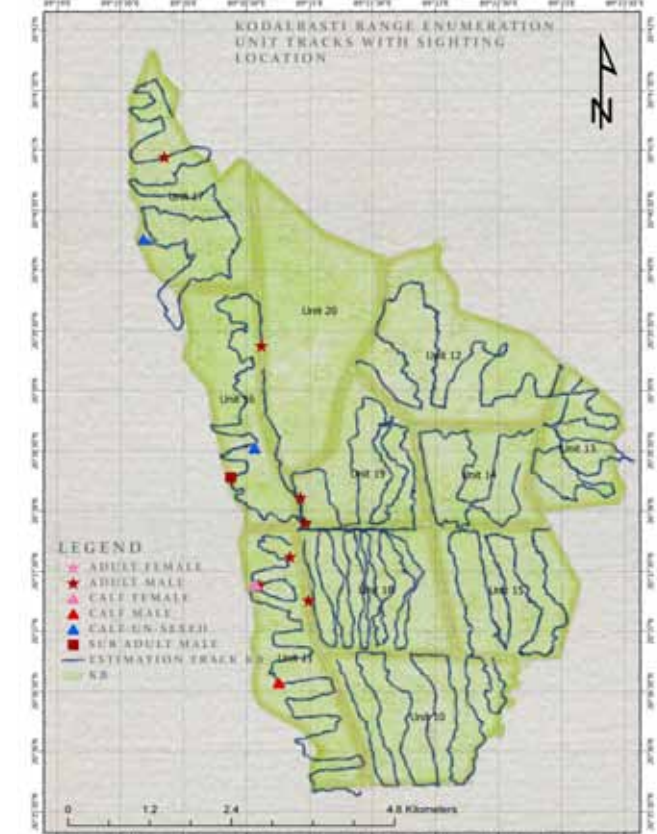
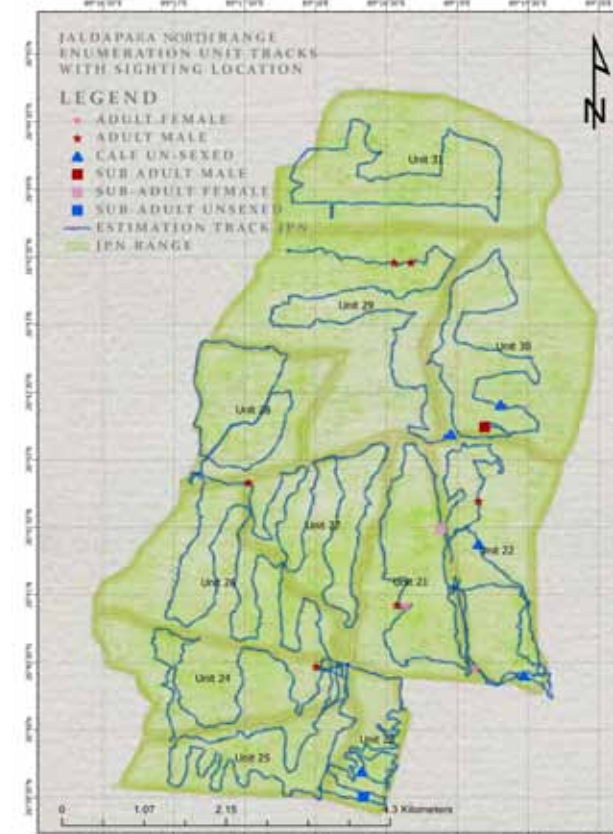
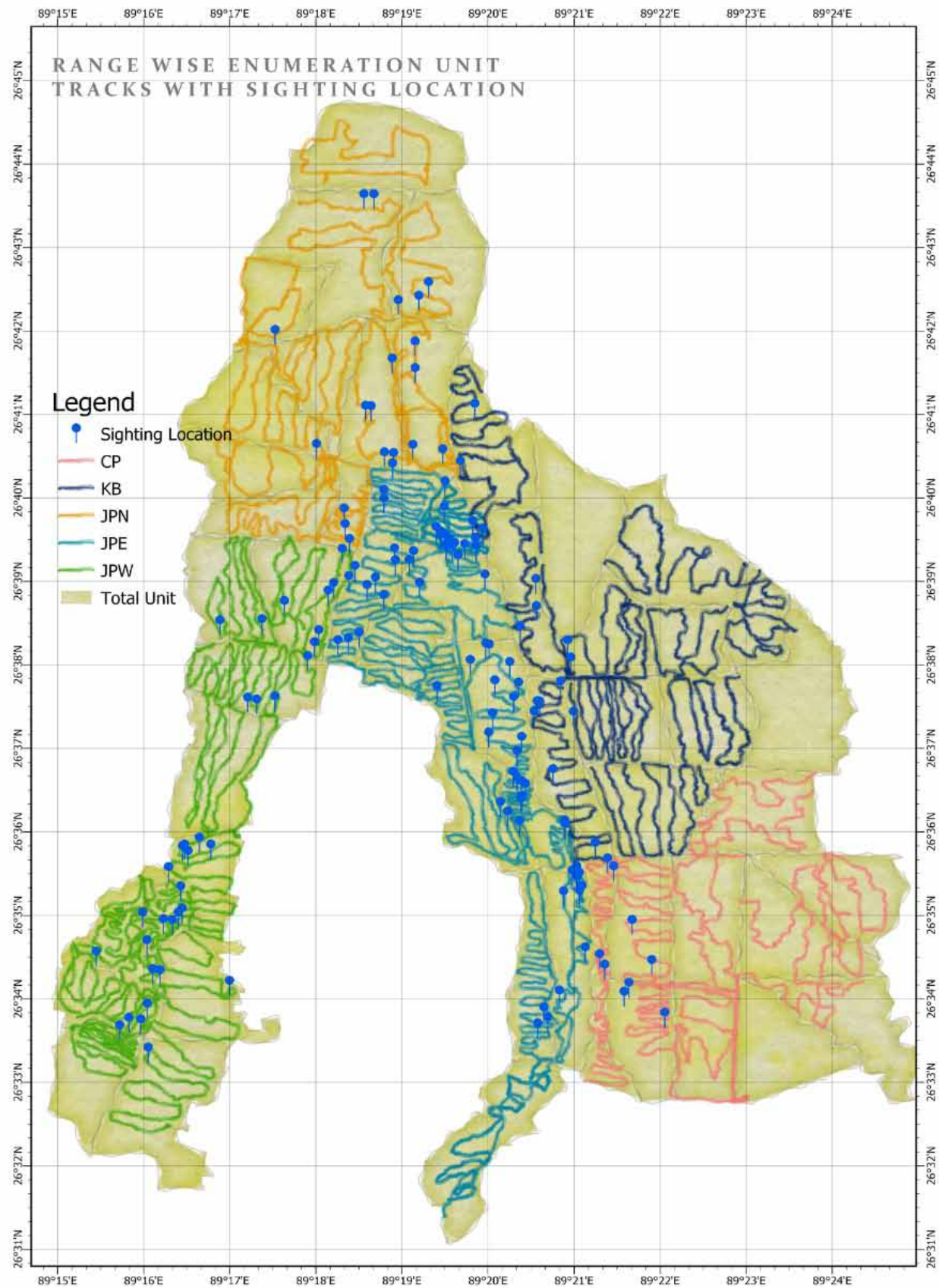




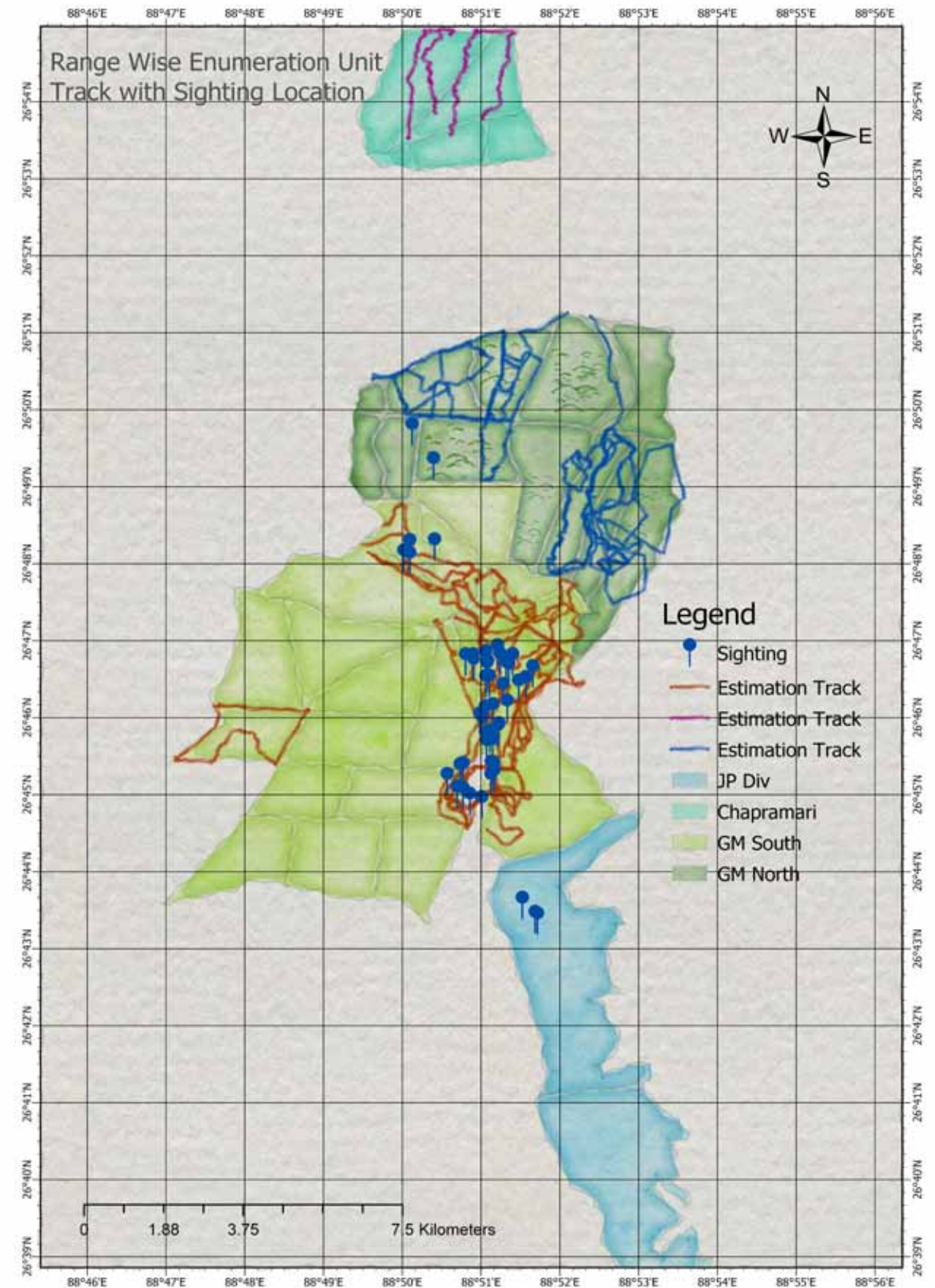
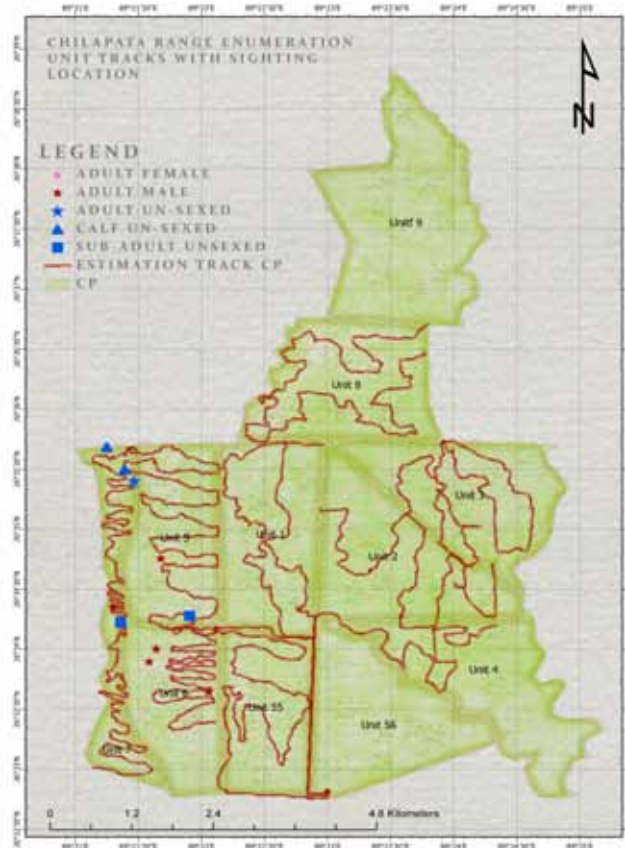
Enumeration team at Gorumara

Range wise Enumeration unit tracks with sighting location of Rhinos

Jaldapara Wildlife Division



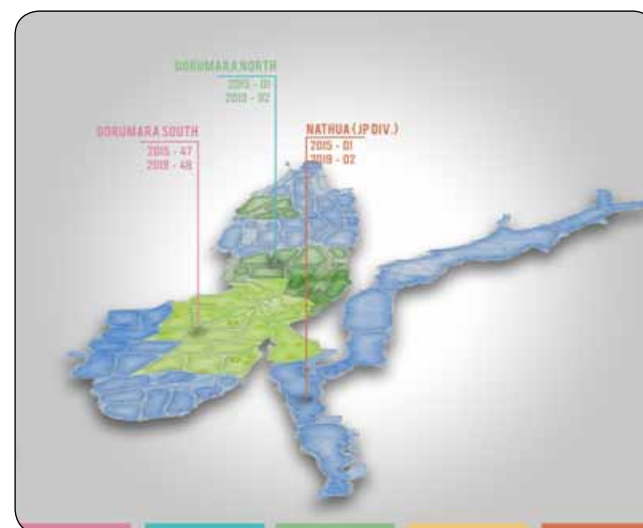
Gorumara Wildlife Division



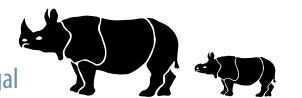
Range wise Rhino population of 2015 & 2019



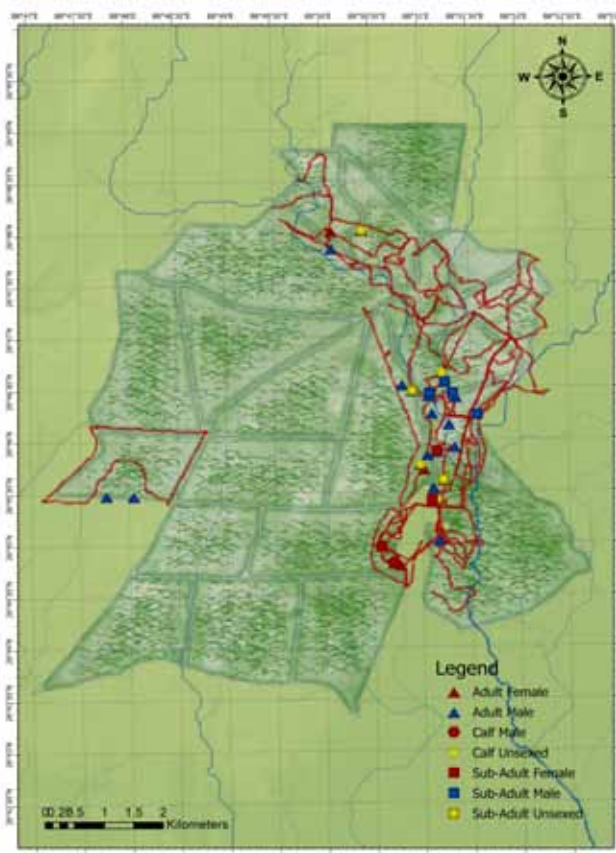
Jaldapara



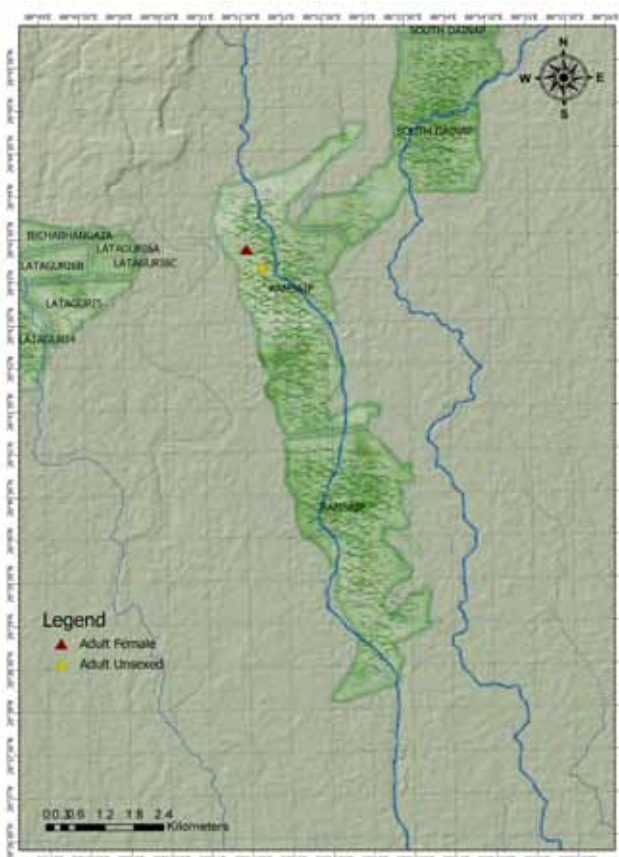
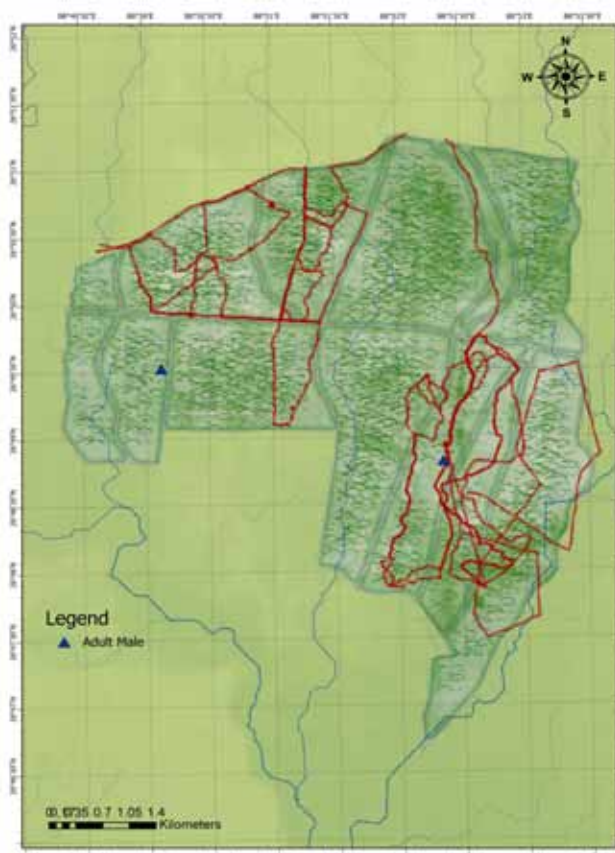
Gorumara



Gorumara South range enumeration unit tracks with sighting location



Gorumara North range enumeration unit tracks with sighting location



Nathua Range (JPG - DIV.) enumeration unit tracks with sighting location

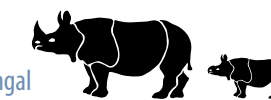
Enumeration Area

The estimation of Rhinoceros population was conducted over major potential habitat area of Jaldapara National Park (138.71 sq km), adjoining reserve forest areas of JNP (26.52 sq km), Gorumara Wildlife Division (79.45 sq km), adjoining areas of Chapramari WLS (9.6 sq km), Ramsai & Bamandanaga Extension area (11.9 sq km) and in adjoining reserve forest areas of Jalpaiguri Forest Division (151.19 sq km) where Rhinoceros movement is normally observed during daily Rhinoceros monitoring protocol. There

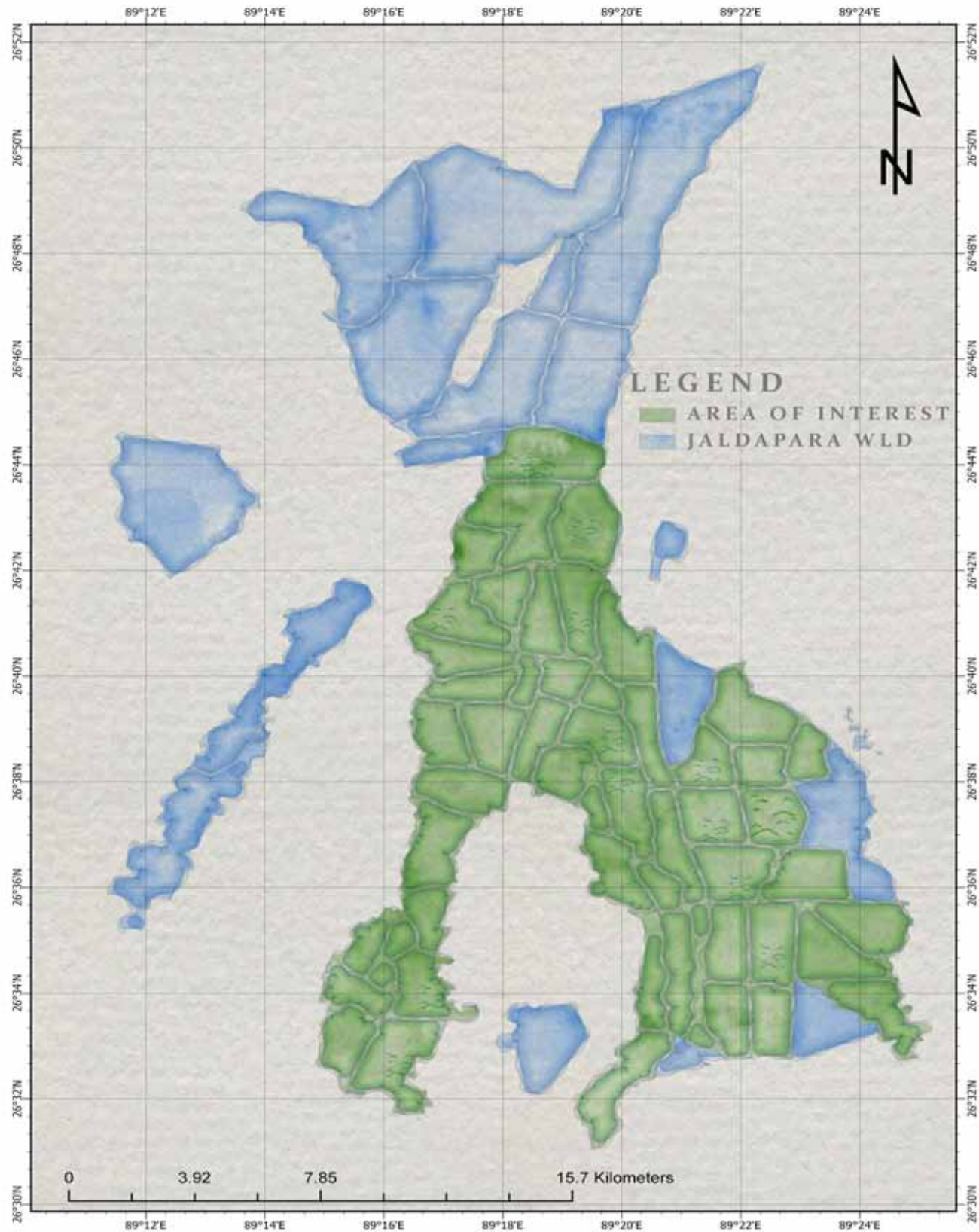
are two major reasons for selecting this time of the year for conducting population estimation of Rhinoceros. Firstly, during January and February, the vegetation dries up and visibility is increased, this provide ideal condition for any enumeration exercise. Secondly, all the previous enumerations were conducted during this period of the year. This will help in comparing the enumeration data of different year, which shall validate this scientific exercise through statistical analysis & arriving at logical conclusions.

Jaldapara Wildlife Division				
SL	Range	Beat	Area (in Ha)	Total Estimation Blocks
1	CP	BN	1527.73	4
2	CP	CP	1070.76	4
3	CP	MB	379.60	1
4	KB	CCL	611.66	2
5	KB	MTR	1145.34	4
6	KB	NEC	566.34	2
7	KB	KB	630.89	2
8	JPN	SLT	602.7	2
9	JPN	50 FT	822.85	3
10	JPN	NWC	947.89	3
11	JPN	HM	1318.61	3
12	JPW	BDK	543.00	2
13	JPW	HLG	905.86	3
14	JPW	MRD	600.00	2
15	JPW	TEC	600.00	2
16	JPW	KJN	598.39	2
17	JPE	JP	1383.48	5
18	JPE	MLG	555.12	2
19	JPE	SSM	1157.79	4
20	JPE	DDG	556.01	1
Total	5 Ranges	20 Beats	16524.02	53

Gorumara Wildlife Division				
SL	Range	Beat	Area (in Ha)	Total Estimation Blocks
1	GMN	BN	959.81	3
2	GMN	CP	1443.9	4
3	GMN	MB	1408.26	5
4	GMS	CCL	1214.45	3
5	GMS	MTR	2492.92	7
6	GMS	NEC	1489.05	5
7	GMS	KB	1086.97	4
Total	2	7	10095.4	31
Jalpaiguri Division				
8	Nathua	Gadhiarkuthi	1728.07	1
9	Nathua	Nathua	1800	1
10	Daina	Central Daina	1590	1
11	Daina	K/kata & S/para	1500.98	1
12	Ramsai	Kalamati Beat	650.45	1
13	Ramsai	Ramsai	650.03	1
14	Lataguri	Central Beat	684.58	2
15	Lataguri	Lataguri	600.55	2
16	Lataguri	Central & Baradighi	715.46	2
17	Lataguri	Baradighi	953.01	2
18	Chalsa	Nagrakata	1554.78	2
19	Chalsa	Sipchu	1072.4	2
20	Chalsa	Panjhora	1619.05	2
Total	5 Ranges	13 Beats	15119.4	20
Grand Total	7 Ranges	20 Beats	25214.7	51

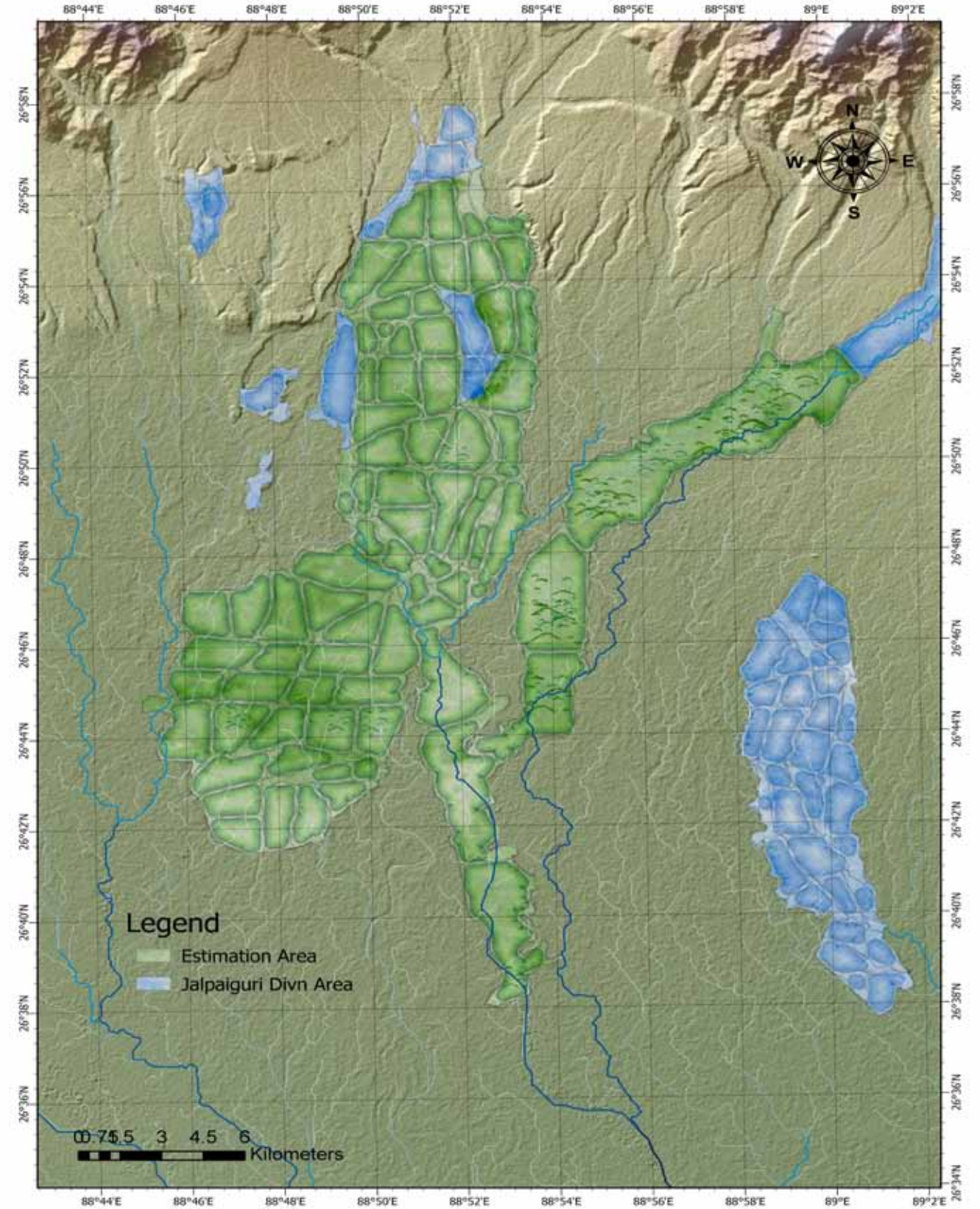


Area of estimation Jaldapara National Park & adjoining areas



Area of estimation
Total Area - 165.23 sqkm
(PA-138.71 sqkm & RF-26.52 sqkm)

Area of estimation Gorumara Wildlife Division & adjoining areas of Jalpaiguri Division



Area of estimation
Total Area - 252.14 sqkm
(PA-89.05 sqkm & RF-163.09 sqkm)





Field Data Sheet (15th Feb 2019) Jaldapara National Park ▶

SI No	Beat	Unit No	Time of sighting	Block/ Comptt.	Direction of Movement	Sighting GPS Location					
						D	M	S	D	M	S
1	MLG	48	9:42 AM	MLG-2	West to East	26	37	33.6	89	19	24.5
2	MLG	49	6:15 AM	CP-1	North to South	26	36	32.1	89	20	17.6
3	MLG	49	7:10 AM	MLG-3	North to South	26	36	47.0	89	20	20.3
4	MLG	49	7:45 AM	MLG-3	West to East	26	36	57.2	89	37	23.5
5	MLG	49	8:15 AM	MLG-3	South to North	26	37	14.2	89	20	03.3
6	MLG	49	9:05 AM	MLG-3	West to East	26	37	25.9	89	20	17.9
7	MLG	49	9:20 AM	MLG-3	East to West	26	37	36.3	89	20	21.3
8	MLG	49	9:25 AM	MLG-3	East to West	26	37	37.8	89	20	04.8
9	MLG	49	9:40 AM	MLG-3	North to South	26	37	51.0	89	20	15.2
10	MLG	49	10:05 AM	MLG-3		26	38	03.6	89	20	0.9
11	MLG	49	10:10 AM	MLG-3	East to West	26	38	0.68	89	20	0.51
12	MLG	49	10:12 AM	MLG-3	East to West	26	38	07.5	89	20	03.6
13	MLG	49	10:15 AM	MLG-3	North to South	26	38	04.4	89	19	58.5
14	MLG	49	10:30 AM	MLG-3	North to South	26	37	52.5	89	19	47.7
15	MLG	49	Nil								
16	MLG	49	7:30 AM	MLG-3	MLG-3 to CP-1						

Adult (Above 5'4")			Sub-Adult (4'5" to 5'4")			Calf (2' to 4'5")			Special Feature of the Sighted Animal	Remarks
M	F	U	M	F	U	M	F	U		
1									Bifurcated right ear and old injury mark on belly	
			1							
	1							1		
1										
1					2					
	1									
1	1							1		
2	1	1								
			2							
		1						1		
1										
			1							(Observer) Data rejected as confirmed double count / faulty record
	1							1		(Observer) Data rejected as confirmed double count / faulty record



Enumeration Team



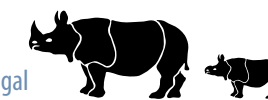
SI No	Beat	Unit No	Time of sighting	Block/ Comptt.	Direction of Movement	Sighting GPS Location					
						D	M	S	D	M	S
17	MLG	49	8:00 AM	MLG-3	MLG-3 to CP-1						
18	MLG	49	Nil								
19	MLG	49	Nil								
20	MLG	49	Nil								
21	JPE	45	Nil								
22	JPE	45	Nil								
23	JPE	45	6:17 AM	JP-3							
24	JPE	47	9:04 AM		North to South						
25	JPE		6:31 AM		Siltorsa to JP-3						
26	JPE		10:40 AM		Siltorsa to JP-3						
27	JPE	46	Nil								
28	JPE	33	Nil								
29	SSM	51	7:20 AM	CP-1	South	26	35	20.9	89	20	58.7
30	SSM	51	7:25 AM	CP-1	West	26	33	54.7	89	20	49.9
31	SSM	51	7:58 AM	CP-1	East	26	34	25.7	89	21	08.0
32	SSM	51	8:37 AM	CP-1	North	26	35	06.7	89	21	03.9
33	SSM	51	8:47 AM	CP-1	North	26	35	09.9	89	21	05.6
34	SSM	51	9:01 AM	CP-1	South	26	35	16.8	89	21	02.4
35	SSM	51	9:04 AM	CP-1	South	26	35	17.6	89	21	01.7
36	SSM	51	9:08 AM	CP-1	South	26	35	20.9	89	20	58.7
37	SSM	51	9:20 AM	CP-1	West	26	35	23.9	89	21	01.9
38	SSM	51	9:26 AM	CP-1	South	26	35	19.4	89	21	03.8
39	SSM	51	9:55 AM	CP-1	West	26	35	06.0	89	20	52.8
40	SSM	53	6:59 AM	CP-3b	South	26	33	31.2	89	20	51.00
41	SSM	53	7:07 AM	CP-3b	South	26	33	35.46	89	20	41.88
42	SSM	53	7:36 AM	CP-3b	South	26	33	42.60	89	20	39.00
43	SSM	52	6:16 AM	CP-2	South to West	26	35	56.7	89	20	22.1

Adult (Above 5'4")			Sub-Adult (4'5" to 5'4")			Calf (2' to 4'5")			Special Feature of the Sighted Animal	Remarks
M	F	U	M	F	U	M	F	U		
1										(Observer) Data rejected as confirmed double count / faulty record
										Observer
										Observer
1										(Observer) Data rejected as confirmed double count / faulty record
1										Observer
1	1								Infighting Dwarf	Observer
1										Observer
										Observer
										Observer
										Data rejected as confirmed double count / faulty record
	1								1	
1										
	1								1	
1										
1										Broken horn
	1								1	
	1								1	
1										Left ear slit, broken horn
	1								1	



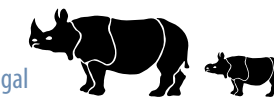
SI No	Beat	Unit No	Time of sighting	Block/ Comptt.	Direction of Movement	Sighting GPS Location					
						D	M	S	D	M	S
44	SSM	52	6:48 AM	CP-2	West	26	36	03.5	89	20	13.8
45	SSM	52	7:41 AM	CP-2	East to West	26	36	10.3	89	20	08.7
46	SSM	50	6:25 AM	CP-1	South	26	36	27.9			
47	SSM	50	6:56 AM	CP-1	South	26	36	25.2	89	20	23.3
48	SSM	50	7:03 AM	CP-1	North	26	36	23.5	89	20	26.1
49	SSM	50	7:39 AM	CP-1	North	26	36	14.7	89	20	23.8
50	SSM	50	7:47 AM	CP-1	North	26	36	13.1	89	20	22.8
51	SSM	50	9:09 AM	CP-1	West	26	35	54.3	89	20	53.9
52	SSM	50	9:13 AM	CP-1	West	26	35	57.2	89	20	53.5
53	SSM	50-52	Nil								
54	SSM	50-52	Nil								
55	SSM	51-53	Nil								
56	SSM	51-53	Nil								
57	SSM	53-51	Nil								
58	JPE	46	6:19 AM	MLG-1	Grazing	26	39	28.2	89	19	23.8
59	JPE	46	6:27 AM	MLG-1	East Facing, Grazing	26	39	22.7	89	19	26.6
60	JPE	46	6:34 AM	MLG-1	East Facing, Grazing	26	39	22.1	89	19	31.1
61	JPE	46	6:47 AM	MLG-1	West Facing, Grazing	26	39	20.4	89	19	51.2
62	JPE	46	7:00 AM	MLG-1 & CCL Border	West Facing	26	39	27.0	89	19	56.4
63	JPE	46	8:16 AM	MLG-1	East Facing, Grazing	26	39	42.9	89	19	29.6
64	JPE	46	9:30 AM	MLG-1	East Facing, Grazing	26	40	01.1	89	19	30.0
65	JPE	45	6:45 AM	MLG-2	West	26	38	12.3	89	18	30.2
66	JPE	44	7:15 AM	JP-3	North	26	39	55	89	18	47.4
67	JPE	44	7:36 AM	JP-3	South	26	39	48.7	89	18	47.4
68	JPE	44	9:55 AM	JP-3	North	26	40	14.0	89	18	53.4
69	JPE	47	6:16 AM	MLG-1	East	26	38	48.2	89	19	12.3
70	JPE	47	6:42 AM	MLG-1	East	26	39	04.5	89	19	05.1

Adult (Above 5'4")			Sub-Adult (4'5" to 5'4")			Calf (2' to 4'5")			Special Feature of the Sighted Animal	Remarks
M	F	U	M	F	U	M	F	U		
	1						1			
	2		1	1				2		
			1							
	1							1		
1	1									
	1							1		
	1									
	1							1		
	1							1		
										Observer
										Observer
										Observer
										Observer
										Observer
1									Broken Horn, Injury mark on Right leg	
1				1					Tall Horn	
				1						
				1						
1										
	1									"Gutkha Singh"
1									Tall Horn	"Talwar Singh"
1										
1				1					Long Horn	
1	1							1	Cut mark on Back	
	1							1		
1	1			1				1		
				1						



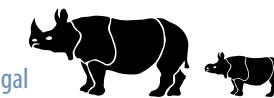
SI No	Beat	Unit No	Time of sighting	Block/ Comptt.	Direction of Movement	Sighting GPS Location					
						D	M	S	D	M	S
71	JPE	47	6:59 AM	MLG-1	West	26	39	10.8	89	19	08.0
72	JPE	47	7:14 AM	MLG-1	East	26	39	24.8	89	19	27.4
73	JPE	47	7:19 AM	MLG-1	North	26	39	20.4	89	19	32.2
74	JPE	47	7:23 AM	MLG-1	Grazing	26	39	19.4	89	19	33.6
75	JPE	47	7:27 AM	MLG-1	Grazing	26	39	16.7	89	19	36.7
76	JPE	47	7:32 AM	MLG-1	Grazing	26	39	15.8	89	19	43.8
77	JPE	47	7:39 AM	MLG-1	Grazing	26	39	14.3	89	19	51.8
78	JPE	47	7:59 AM	MLG-1	Grazing	26	39	15.0	89	19	35.0
79	JPE	47	8:00 AM	MLG-1	Grazing	26	39	15.3	89	19	30.8
80	JPE	47	8:10 AM	MLG-1	Grazing	26	39	08.0	89	19	39.2
81	JPE	47	10:10 AM	MLG-1	Grazing	26	39	32.3	89	19	49.4
82	JPE	33	6:14 AM	JP-3	North to East	26	38	06.8	89	18	15.3
83	JPE	33	6:20 AM	JP-3	East	26	38	08.1	89	18	22.6
84	JPE	33	8:00 AM	JP-3	South	26	38	39.3	89	18	47.3
85	JPE	33	8:42 AM	JP-3	North	26	38	46.3	89	18	35.6
86	JPE	33	9:07 AM	JP-3	East to North	26	38	51.9	89	18	41.5
87	JPE	33	9:30 AM	JP-3	East	26	38	53.0	89	18	22.9
88	JPE	33	9:45 AM	JP-3	South	26	39	00.2	89	18	27.1
89	JPE	33	10:15 AM	JP-3	South	26	39	04.3	89	18	55.4
90	JPE	33	10:45 AM	JP-3	South	26	39	12.8	89	18	54.8
91	JPE	33	10:50 AM	JP-3	South	26	39	13.3	89	19	00.9
92	DDG	54	Nil								
93	DDG		Nil								
94	CCL	11	6:43 AM	BD-7(b)	MB-6(b)	26	37	37.10	89	20	50.69
95	CCL	11	7:37 AM	MLG3(P)	MLG3(P)	26	37	22.86	89	20	34.34
96	CCL	11	7:40 AM	MLG3(P)	MLG3(P)	26	37	22.70	89	20	36.02
97	CCL	11	7:50 AM	MLG3(P)		26	37	15.43	89	20	32.18
98	CCL	11	8:56 AM	MB-6(b)	MB-6(b)	26	36	33.95	89	20	45.34
99	CCL	11	11:04 AM	CP-1	MB-6(b)	26	35	41.05	89	21	14.83
100	CCL	10	Nil								
101	CCL	10--11	Nil								

Adult (Above 5'4")			Sub-Adult (4'5" to 5'4")			Calf (2' to 4'5")			Special Feature of the Sighted Animal	Remarks
M	F	U	M	F	U	M	F	U		
			1							
1										
1										
				1						
				1						
				1		1				
				2						
			1			1				
2				1			1			
				1			1			
2				1						
	1						1			
2	2					1				
			1							
			1							
	1							1		
	1					1				
1	1							1		
			2							
	1									
1										Data accepted with probability of double count
1									Left Ear slit	
	1						1		Left Ear slit	
1										
1									Left ear folded	
	2					2				
	1									"Tera Singh"



SI No	Beat	Unit No	Time of sighting	Block/ Comptt.	Direction of Movement	Sighting GPS Location					
						D	M	S	D	M	S
102	CCL	10--11	Nil								
103	NEC	17	7:16 AM	BD-1	NEC Tower to SLT Tower	26	40	56.8	89	19	50.9
104	NEC	17	9:25 AM	BD-1	BD1 to NEC Tower	26	40	15.5	89	19	40.8
105	NEC	16	8:21 AM	New Tower tong MLG(E)	Stationary	26	38	31.19	89	20	33.80
106	NEC	16	8:32 AM	New Tower tong MLG(E)	Stationary	26	39	22.48	89	20	37.07
107	NEC	16	9:13 AM	BD-6(b)	Gos to Malangi	26	38	16.77	89	20	22.44
108	NEC	16	9:55 AM	BD-6(b)	Stationary	26	38	06.66	89	20	55.69
109	NEC	16--17	Nil								
110	KB	19	6:08 AM	BD-6(a)	West	26	37	54.3	89	20	57.8
111	KB	18	Nil								
112	KB	16-19	6:00 AM	BD-6a to NEC	West						
113	KB	18--11	7:10 AM	BD-7a	West						
114	KB	10--18	Nil								
115	KB	18-19	Nil								
116	KB	18-15	Nil								
117	KB	12--19	Nil								
118	MTR	12	Nil								
119	MTR	13	Nil								
120	MTR	15	Nil								
121	MTR	14	Nil								
122	MTR	13--12	Nil								
123	MTR	15-14	Nil								
124	TEC	39	Nil								
125	TEC	32	6:40 AM	Torsa-II	South	26	35	7.44	89	16	6.43
126	TEC	32	7:15 AM	Torsa-II	West	26	385	66.2	89	16	77.6
127	TEC	32	7:30 AM	Torsa-II	West	26	35	58.4	89	16	5.12
128	TEC	32	7:37 AM	Torsa-II	North	26	35	66.2	89	16	47.1

Adult (Above 5'4")			Sub-Adult (4'5" to 5'4")			Calf (2' to 4'5")			Special Feature of the Sighted Animal	Remarks
M	F	U	M	F	U	M	F	U		
1									Chadra	Chadra Local Name
	1							1	1 big Calf Horn. 4'-5" SLT Boundary BD1(b)	
	1							1	Left ear slight cut (1/2")	
1									4 inch Horn.	
			1							
1										
									Height 5' above, Horn-6inch Tail-2'(approx)	
	1								Height 4.5'(approx), Horn-3inch, Tail-1.5'	Data accepted with probability of double count
1									Big Horn 8 inch (approx)	
									1	Growing Horn
	1							1	Cut mark on left ear	
1									Cut mark on Tail	
									1	Sharp Horn Approx.2"



SI No	Beat	Unit No	Time of sighting	Block/ Comptt.	Direction of Movement	Sighting GPS Location					
						D	M	S	D	M	S
129	TEC	32	7:39 AM	Torsa-II	East	26	35	64.3	89	16	44.7
130	TEC	32	9:04 AM	Torsa-II	East	26	35	62.2	89	16	47.1
131	TEC	32	Nil								
132	MRD	37	Nil								
133	MRD	38	9:15 AM	Torsa-II	East	26	34	30.8	89	16	02.1
134	MRD	38	11:15 AM	Torsa-II	South	26	34	10.01	89	16	5.96
135	MRD	38	6:50 AM	Torsa-II	West	26	35	09.7	89	16	25.6
136	MRD	38	7:27 AM	Torsa-II	West	26	34	53.8	89	16	26.5
137	MRD	38	7:40 AM	Torsa-II	South	26	34	50.7	89	16	23.9
138	MRD	38	8:00 AM	Torsa-II	North	26	34	46.0	89	16	13.5
139	MRD	38	8:10 AM	Torsa-II	East	26	34	45.3	89	16	19.9
140	MRD	37-38	7:40 AM	Torsa-II	North						
141	MRD	37-38	8:36 AM	Torsa-II	West						
142	MRD	37-38	Nil								
143	KJN	41	10:10 AM	Torsa-II	North	26	33	35.1	89	15	49.4
144	KJN	41	10:59 AM	Torsa-II	East	26	33	45.2	89	16	02.3
145	KJN	42	Nil								
146	KJN	37/41	6:27 AM	Torsa-II	East						
147	KJN	41/42	7:20 AM	Torsa-II	North						
148	KJN	41/42	7:08 AM	Torsa River	East						
149	KJN	38/41	Nil								
150	KJN	41/42	Nil								
151	BDK	40	8:20 AM	Torsa -II	North to TEC beat	26	34	01.6	89	16	59.6
152	BDK	40	9:00 AM	Torsa -II	South to words unit-43	26	34	09.2	89	16	11.1

Adult (Above 5'4")			Sub-Adult (4'5" to 5'4")			Calf (2' to 4'5")			Special Feature of the Sighted Animal	Remarks
M	F	U	M	F	U	M	F	U		
	1							1	Horn Approx.10"	
	1							1		"Rajkumari" Data accepted with probability of double count
	1							1		"Bolloli" Local Name
1										"Kartick" Local Name
			1							"Rajkumar" Local Name
	1							1		"Janaki" Local Name
				1						"Anath" Local Name
				1						(D/O of Rajkumari) Local Name
			1							(S/O of Kanchiri) Local Name
1					1				Curve Horn	Observer
	1							1		"Choto Female" Observer
				1						
	1							1		
1										
1									Broken Horn	
1										New Male
1									Back left leg injury detected	"Langra"



Natural Grassland of Torsa River bed, Jaldapara

SI No	Beat	Unit No	Time of sighting	Block/ Comptt.	Direction of Movement	Sighting GPS Location					
						D	M	S	D	M	S
184	HLG	TEC Line	6:45 AM		North to South						
185	HLG	J Tala	Nil								
186	NWC	27	Nil								
187	NWC	26	Nil								
188	NWC	24-26	8:45 AM	JP-1	North to South	26	40	33.53	89	17	53.75
189	NWC	28	Nil								
190	NWC	26-28	7:12 AM		Plan poro mat to Howrah road						
191	HSM	30	7:02 AM	Hm-3a(p)	North	26	42	14.58	89	19	11.76
192	HSM	30	7:33 AM	Hm-3a(p)	West	26	42	24.36	89	19	18.54
193	HSM	29	6:22 AM	HM-3A	South	26	43	27.6	89	18	33.4
194	HSM	29	6:32 AM	HM-3A	South	26	43	27.6	89	18	40.4
195	HSM	31	Nil								
196	HSM	29-27	6:20 AM	HM-3A(P)	East	26	42	11.31	89	18	57.42
197	SLT	22	6:45 AM	JP-2	Grazing	26	40	24.1	89	19	28.5
198	SLT	22	7:47 AM	JP-2	East to West	26	41	22.5	89	19	09.2
199	SLT	22	8:11 AM	JP-2	East to West	26	41	41.6	89	19	09.1
200	SLT	21	6:27 AM	JP-1	Grazing	26	41	29.4	89	18	53.2
201	SLT	21	8:09 AM	JP-1	Grazing	26	40	55.4	89	18	34.6
202	SLT	21	8:16 AM	JP-1	Grazing	26	40	55.1	89	18	38.4
203	SLT		6:00 AM	JP-1	Grazing	26	40	27.4	89	19	07.6
204	50 FT	23	6:28 AM	JP-5	to West Side	26	39	30.3	89	18	20.3
205	50 FT	23	7:17 AM	JP-5	East to West	26	39	41.5	89	18	19.6
206	50 FT	24	8:50 AM	JP-4	North to South	26	40	27.9	89	18	00.4

Adult (Above 5'4")			Sub-Adult (4'5" to 5'4")			Calf (2' to 4'5")			Special Feature of the Sighted Animal	Remarks
M	F	U	M	F	U	M	F	U		
	1							1		Good
1									Observer (On Khagri line observation)	Data rejected as confirmed double count / faulty record
1										
			1							
	1		1					1	Injury in the left leg of the Female Rhino	
1										
1									Horn Base only	
	1							1		Observation Line
	1							1		
	1							1		
1				1				1	Horn Size 4"(Female Adult)	
1									Horn Size 7"(Pointed Sharp); aggressive behaviour	
	1									Observer(WT) Line
					1					
	1							1		Data rejected as confirmed double count / faulty record
1										"Mota Singh"

ABSTRACT OF ENUMERATION DATA (JALDAPARA WILDLIFE DIVISION) ▶

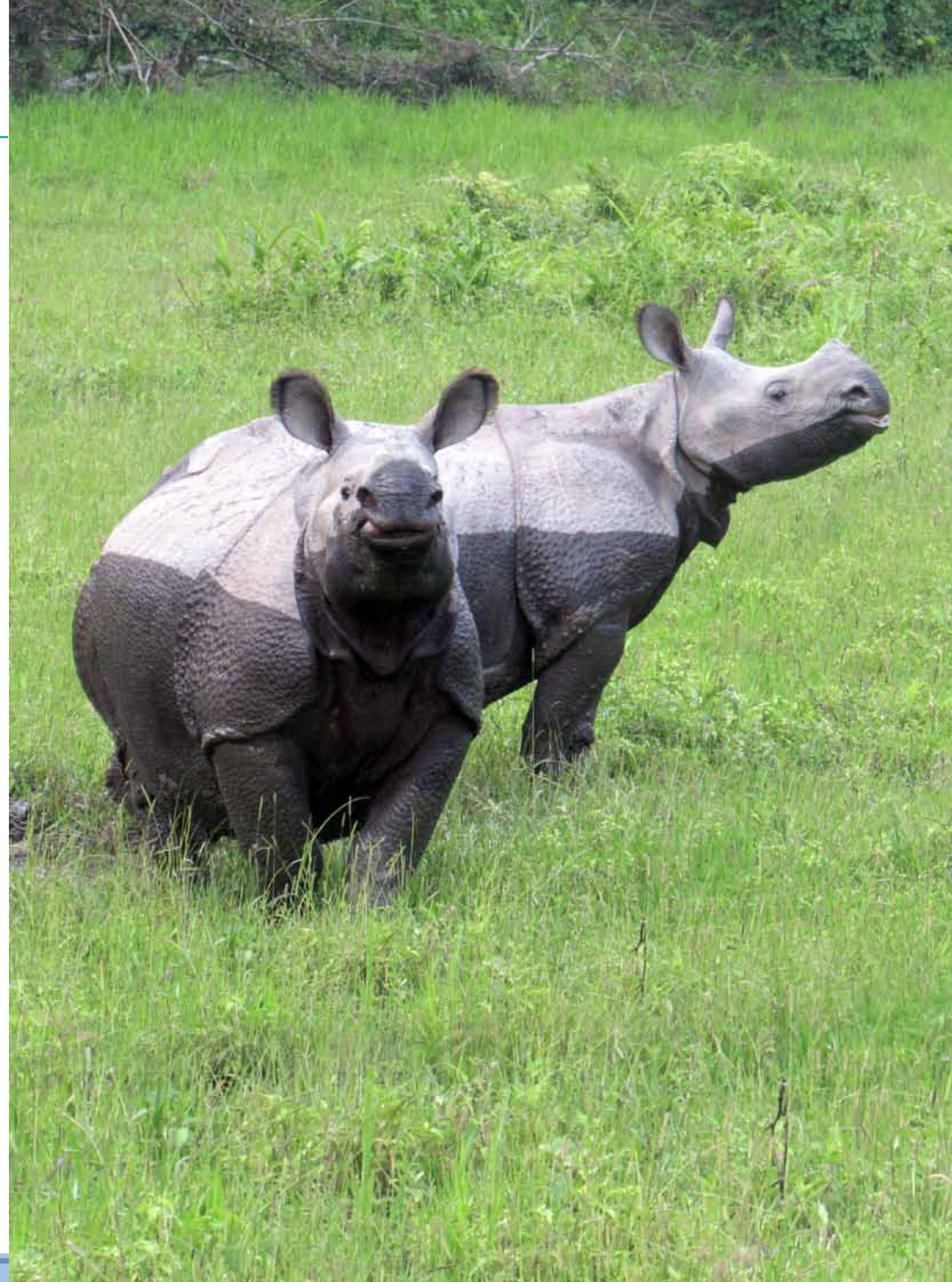
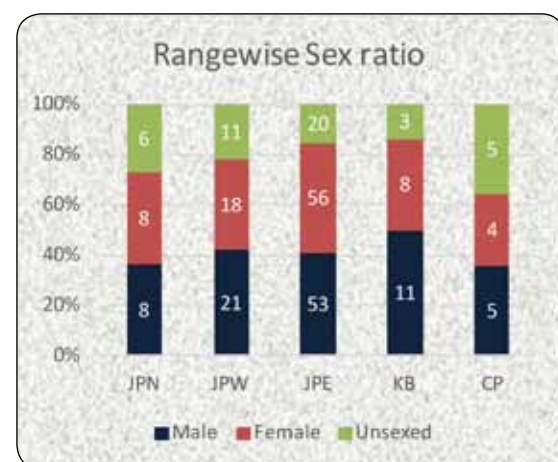
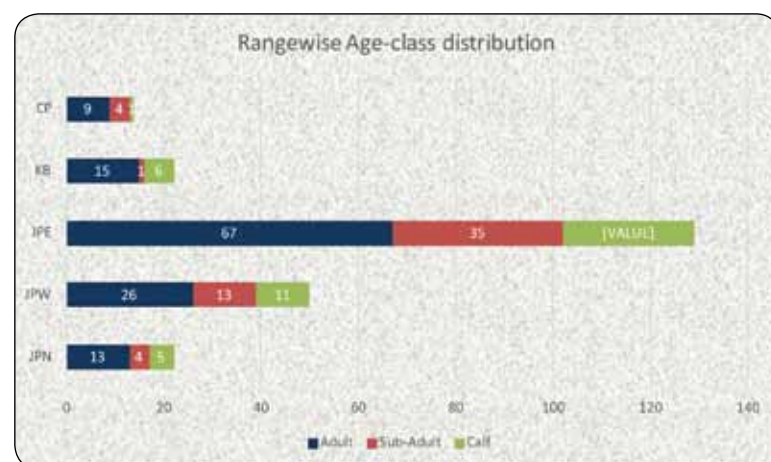
Range	Adult			Sub-Adult			Calf			Total
	M	F	U	M	F	U	M	F	U	
JP North	6	7	0	2	1	1	0	0	5	22
JP West	15	10+1	0	6	6	1	0	1	9+1	48+2
JP East	34+1	30+1	1	14	19	2	4	6	16+1	126+3
Kodalbasti	8	6+1	0	1	0	0	2	1	3	21+1
Chilapata	5	3	1	0	1	3	0	0	1	14
Total	68+1	56+3	2	23	27	7	6	8	34+2	231+6

Age Class Wise Abstract

Range	Adult	Sub-Adult	Calf	Total
JPN	13	4	5	22
JPW	26	13	11	50
JPE	67	35	27	129
KB	15	1	6	22
CP	9	4	1	14
Total	130	57	50	237

Sex Wise Abstract

Range	Male	Female	Unsexed	Total
JPN	8	8	6	22
JPW	21	18	11	50
JPE	53	56	20	129
KB	11	8	3	22
CP	5	4	5	14
Total	98	94	45	237



Field Data Sheet Gorumara Wildlife Division

Team No.	Date	Sl no.	Time of Sighting	Block/Compartment	GPS Location	Direction of Movement	Total Rhino Sighted
6/GNP/GWLD	13.02.2019	1	7:30 AM	Tondu2B		Standing	1
11/GNP/GWLD	12.02.2019	1	10:00 AM	Bhogolmari-1	26° 49' 85.1"N 88° 50' 07.4"E		1
14/GNP/GWLD	12.02.2019	1	6.50 AM	Dhupjhora-1B	26° 48' 01.24"N 88° 50' 05.64"E	North	1
14/GNP/GWLD	12.02.2019	2	7.03 AM	Dhupjhora-1B	26° 47' 51.15"N 88° 50' 05.64"E	North	1
14/GNP/GWLD	12.02.2019	3	7.16 AM	Dhupjhora-1B	26° 47' 43.48"N 88° 55' 22.02"E	West	2
17/GNP/GWLD	12.02.2019	1	6.41 AM	Jaldhaka-1B	26° 46' 39.09"N 88° 51' 12.49"E	North	2
17/GNP/GWLD	12.02.2019	2	6.52 AM	Jaldhaka-1B	26° 46' 26.86"N 88° 51' 05.02"E	West	2
17/GNP/GWLD	12.02.2019	3	7.18 AM	Jaldhaka-1B	26° 46' 26.85"N 88° 51' 19.07"E	North	1
17/GNP/GWLD	12.02.2019	4	7.52 AM	Jaldhaka-1B	26° 46' 14.28"N 88° 51' 34.18"E	East	1
17/GNP/GWLD	12.02.2019	5	8.05 AM	Jaldhaka-1B	26° 46' 24.7"N 88° 51' 21.0"E	South	1
17/GNP/GWLD	12.02.2019	6	9.38 AM	Jaldhaka-1B	26° 45' 43.05"N 88° 51' 01.08"E	South	1
19/GNP/GWLD/OL	13.02.2019	1	10:15 AM	Jaldhaka-1B	26° 46' 713"N 88° 51' 55"E	East	2
21/GNP/GWLD	12.02.2019	1	7.02 AM	Dhupjhora-1C	26° 46' 28.44"N 88° 50' 54.30"E	Towards Murtiriver	2
21/GNP/GWLD	12.02.2019	2	7.10 AM	Dhupjhora-1C	26° 46' 32.12"N 88° 50' 48.17"E	Rested inside Murtiriver	1
21/GNP/GWLD	12.02.2019	3	7.30 AM	Dhupjhora-1C	26° 46' 33.04"N 88° 51' 14.36"E	Towards Gandardova	1
21/GNP/GWLD	12.02.2019	4	8.07 AM	Dhupjhora-1C	26° 46' 15.46"N 88° 51' 06.26"E	Towards Murtiriver	1
21/GNP/GWLD	12.02.2019	5	8.35 AM	Dhupjhora-1C	26° 45' 51.30"N 88° 51' 03.22"E	Towards Jaldhaka-1B	1
22/GNP/GWLD	12.02.2019	1	08.01 AM	Jaldhaka-1B	26° 46' 09.03"N 88° 51' 16.70"E	Standing	1
22/GNP/GWLD	12.02.2019	2	8.20 AM	Jaldhaka-1B	26° 45' 32.26"N 88° 51' 06.75"E	Standing	1

Age / Sex									Special feature of the animal, if any	Remarks
Adult			Sub-Adult			Calf				
M	F	U	M	F	U	M	F	U		
1										un-named (Data accepted with probability of double count)
1										Champion
	1									Chanchala
1										Kharasing
	1							1		Santi with calf
	1							1		Mondira with calf
1			1							
			1							
			1							
1										(Data accepted with probability of double count)
	1							1		Bakanchepti with calf
1					1					Tera sing
1										Bottol Sing
			1							
1										Don
1										Madhai
1										Darpok
1										un-named (Data accepted with probability of double count)



Team No.	Date	Sl no.	Time of Sighting	Block / Compartment	GPS Location	Direction of Movement	Total Rhino Sighted
22/GNP/ GWLD	12.02.2019	3	8.22 Am	Jaldhaka-1B	26° 45'53.14" N 88° 51'08.98" E	Towards Kargil line	1
22/GNP/ GWLD	12.02.2019	4	8.28 Am	Jaldhaka-1B	26° 45'55.95" N 88° 51'19.98" E	Towards Kargil line	1
22/GNP/ GWLD	12.02.2019	5	8.41 AM	Jaldhaka-1B	26° 45'38.28" N 88° 51'13.52" E	Towards Kargil line	2
22/GNP/ GWLD	12.02.2019	6	8.45 AM	Jaldhaka-1B (in between central line and Bamni line	26° 45'36.79" N 88° 51'12.87" E	Standing	3
22/GNP/ GWLD	13.02.2019	1	7.52 AM	Jaldhaka-1B	26° 46'25.55" N 88° 51'04.47" E	Grazing	1
23/GNP/ GWLD	12.02.2019	1	7.03 AM	Medla-III	26° 45'07.20" N 88° 45'45.75" E	West	2
23/GNP/ GWLD	12.02.2019	2	7.05 AM	Medla-III	26° 45'07.21" N 88° 50'45.76" E	North	2
23/GNP/ GWLD	12.02.2019	3	8.07AM	Ramsai Extecscion	26° 45'25.75" N 88° 51'08.88" E	Towards Murti River	2
23/GNP/ GWLD	12.02.2019	4	8.15 AM	Ramsai Extecscion	26° 45'25.12" N 88° 51'04.21" E	Fodder plantation	3
23/GNP/ GWLD	12.02.2019	5	9.48 AM	Medla-III	26° 44'58.72" N 88° 50'34.18" E	North	2
23/GNP/ GWLD	12.02.2019	6	10.05 AM	Medla-III	26° 44'48.77" N 88° 50'41.70" E	Near salt lick	2
24/GNP/ GWLD	12.02.2019	1	10.05 AM	Ramsai Extension	26° 45'01.80" N 88° 51'10.02" E	North	2
25/GNP/ GWLD/OL	12.02.2019	1	9:58 AM	Central line		standing	1
25/GNP/ GWLD/OL	12.02.2019	1	10:36 AM	Central line		West	1
32/GNP/ GWLD	12.02.2019	1	8.20 AM	Ramsai	Lalpatta	Towards Jaldhaka	1
33/GNP/ JPG	13.02.2019	1	7.20 AM	Ramsai	26° 23'01.2" N 88° 52'21.6" E	North	1
							52

Age / Sex									Special feature of the animal, if any	Remarks
Adult			Sub-Adult			Calf				
M	F	U	M	F	U	M	F	U		
1				1						Garati Yuvraj
1										Jagai
1	1									Tarjan & un named female
	1				1			1		un-identified (Data accepted with probability of double count)
1										un-named (Data accepted with probability of double count)
	1							1		un-Named
	1							1	One injury mark 10" on left hind thai	Un- Named
	1							1		Phalguni
	1			1		1				Sundari
	1					1				Pousali
	1					1				
1	1									un-named
1										
1										un-named (Data accepted with probability of double count)
		1								
	1									Maybe Medla Rani
18	15	1	4	2	2	3	0	7		



ABSTRACT OF ENUMERATION DATA (GORUMARA WILDLIFE DIVISION) ▶

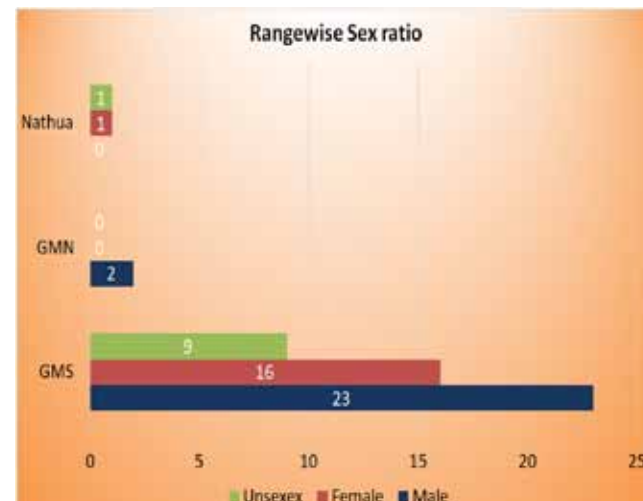
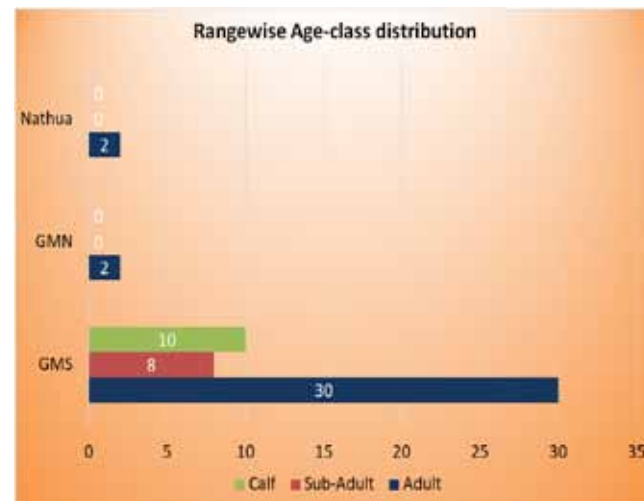
Sl. No.	Range	Beat	Adult			Sub-adult			Calf			Total
			M	F	U	M	F	U	M	F	U	
1	GMS	Dhupjhora	13	7	0	4	1	2	0	0	4	31
2	GMS	Gorumara	0	0	0	0	0	0	0	0	0	0
3	GMS	Budhuram	3	7	0	0	1	0	3	0	3	17
4	GMN	Chapramari	0	0	0	0	0	0	0	0	0	0
5	GMN	Khunia	1	0	0	0	0	0	0	0	0	1
6	GMN	Murti	1	0	0	0	0	0	0	0	0	1
7	Natua	Gadhuarkuthi	0	0	1	0	0	0	0	0	0	1
8	Natua	Natua	0	1	0	0	0	0	0	0	0	1
Total			18	15	1	4	2	2	3	0	7	52

Age Class Wise Abstract

Range	Adult	Sub-Adult	Calf	Total
GMS	2	4	5	48
GMN	26	13	11	2
Nathua	67	35	27	2
Total	34	8	10	52

Sex Wise Abstract

Range	Male	Female	Unsexed	Total
GMS	23	16	9	48
GMN	2	0	0	2
Nathua		1	1	2
Total	25	17	10	52



JALDAPARA WILDLIFE DIVISION ▶

FINAL COUNT

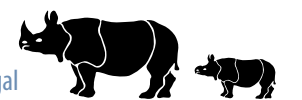
The Rhinoceros Population Estimation has been a regular exercise in Jaldapara National Park since 1957 occurring at interval of every 3 to 5 years. The methodology adopted for the population Estimation has always been “Total Count Method” because of its simplicity & it’s potential of yielding actual physical count of the target species. The first Rhino population estimation exercise in 1957 pegged the population at 57 individuals. The population saw on steady rise to 80 individuals during population estimation exercise – 1969. But it crashed to low of 19 individuals in 1978. The threat of poaching led to crashing of Rhino population to abysmal low count of 14 individuals in 1985. Since then, the various initiatives by the park management such construction of anti-poaching

camps (22), 24-hour Radio Telemetry network, Habitat improvement interventions have aided the steady increase in the Rhinoceros population which reached to all time high of 204 individuals during Rhino population estimation exercise 2015. The rise of Rhino population and its expansion / movement to new areas have been complimented by creation of artificial grassland in MLG-2, CP-2, CP-3B, Torsa-1,2,3 and HM-3A Compartments of JP East, JP West and JP North Range.

The Rhino Population Estimation – 2019 was planned & executed on 15th & 16th Feb, 2019 following a gap of 4 years since 2015 exercise, adopting Total Count Methodology.

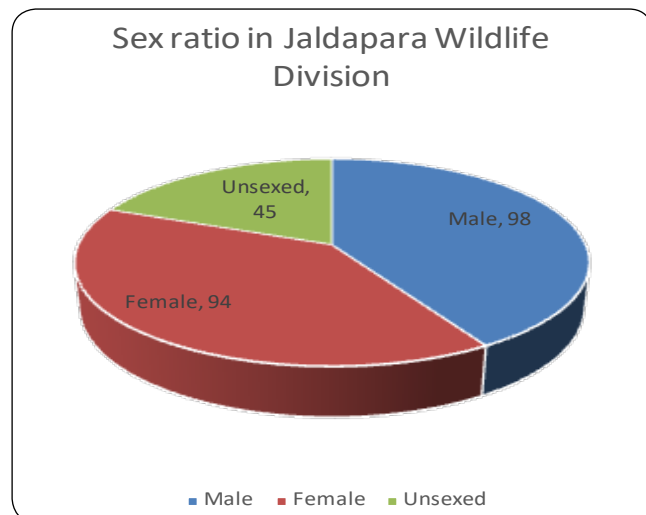
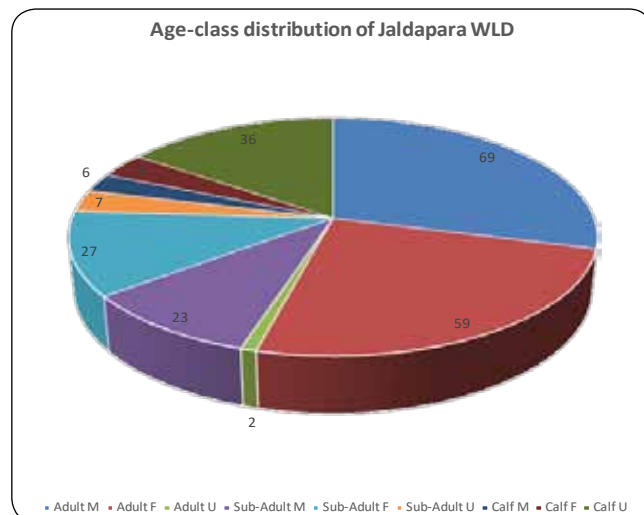
COMPARISON WITH 2015 DATA ▶

Range	Year	Adult			Sub-Adult			Calf			Total
		M	F	U	M	F	U	M	F	U	
JP North	2015	14	11	0	5	2	2	0	0	4	38
	2019	6	7	0	2	1	1	0	0	5	22
JP West	2015	9	13	0	5	5	0	1	0	8	41
	2019	15	10+1	0	6	6	1	0	1	9+1	48+2
JP East	2015	12	34	10	9	7	3	5	1	24	99
	2019	34+1	30+1	1	14	19	2	4	6	16+1	126+3
Kodalbasti	2015	11	4	1	1		1			3	21
	2019	8	6+1	0	1	0	0	2	1	3	21+1
Chilapata	2015	2	2							1	5
	2019	5	3	1	0	1	3	0	0	1	14
Total	2015	48	64	5	20	14	6	6	1	40	204
	2019	68+1	56+3	2	23	27	7	6	8	34+2	231+6



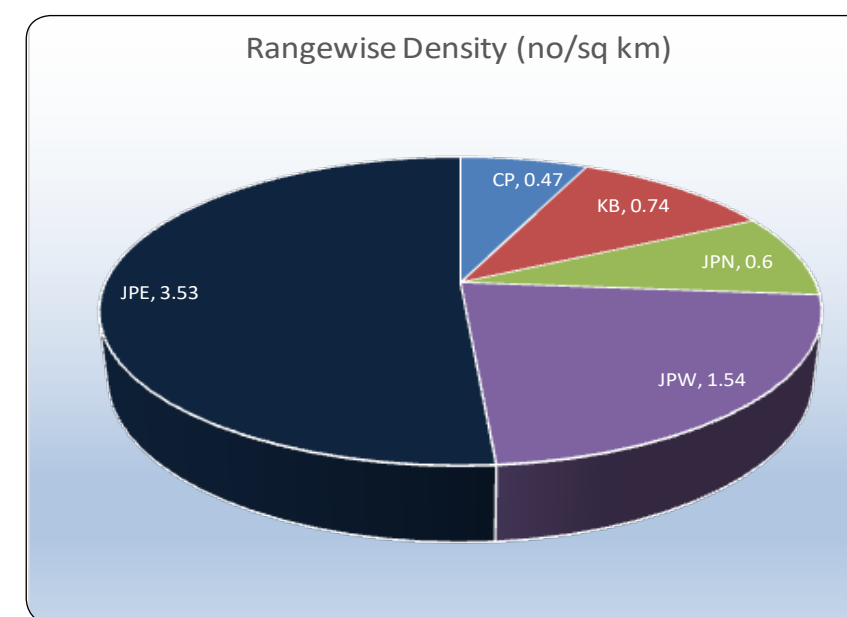
AGE CLASS DISTRIBUTION OF JALDAPARA ►

Age Class	Adult			Sub-Adult			Calf			Total
	M	F	U	M	F	U	M	F	U	
Total	69	59	2	23	27	7	6	8	36	237



DENSITY OF RHINOS IN JALDAPARA ►

SL	Range	Beat	Area (in Ha)	Area (in km ²)	Total Estimation Blocks	Sightings	Density
1	CP	BN	1527.73	15.28	4	0	0.00
2	CP	CP	1070.76	10.71	4	14	1.31
3	CP	MB	379.60	3.80	1	0	0.00
Total	CP		2978.09	29.78	9.00	14.00	0.47
4	KB	CCL	611.66	6.12	2	11	1.80
5	KB	MTR	1145.34	11.45	4	0	0.00
6	KB	NEC	566.34	5.66	2	8	1.41
7	KB	KB	630.89	6.31	2	3	0.48
Total	KB		2954.23	29.54	10.00	22.00	0.74
8	JPN	SLT	602.70	6.03	2	11	1.83
9	JPN	50 FT	822.85	8.23	3	2	0.24
10	JPN	NWC	947.89	9.48	3	1	0.11
11	JPN	HM	1318.61	13.19	3	8	0.61
Total	JPN		3692.05	36.92	11.00	22.00	0.60
12	JPW	BDK	543.00	5.43	2	3	0.55
13	JPW	HLG	905.86	9.06	3	19	2.10
14	JPW	MRD	600.00	6.00	2	13	2.17
15	JPW	TEC	600.00	6.00	2	9	1.50
16	JPW	KJN	598.39	5.98	2	6	1.00
Total	JPW		3247.25	32.47	11.00	50.00	1.54
17	JPE	JP	1383.48	13.83	5	65	4.70
18	JPE	MLG	555.12	5.55	2	24	4.32
19	JPE	SSM	1157.79	11.58	4	40	3.45
20	JPE	DDG	556.01	5.56	1	0	0.00
Total	JPE		3652.40	36.52	12.00	129.00	3.53
Grand Total	5 Ranges	20 Beats	16524.02	165.24	53.00	237.00	1.43



GORUMARA WILDLIFE DIVISION ►

FINAL COUNT

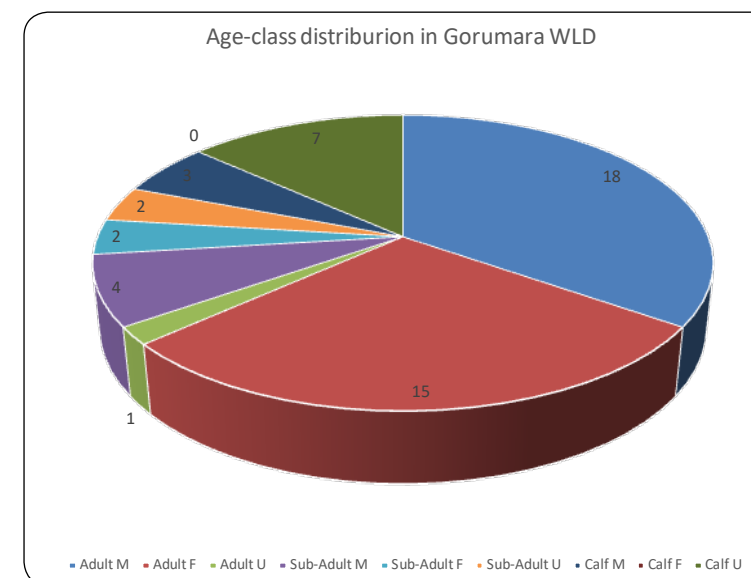
The Indian Rhinoceros (*Rhinoceros unicornis*) is a schedule I species according to Wildlife Protection Act, 1972 and listed by IUCN as Vulnerable and CITES as Appendix 1. Thus population estimation of Indian Rhinoceros (*Rhinoceros unicornis*) is an essential tool for determining the population trend so that necessary management practices can be effectively designed. Population estimation of Indian Rhinoceros has been a regular exercise in Gorumara National Park at an interval of every 2-4 years. The methodology adopted for the exercise was always Block count method. The population estimation exercise in year 1998 showed the population to be 18 individuals. The population trend of Indian Rhinoceros since 1998 has showed a steady increase.

The population estimation of the Indian Rhinoceros

in Gorumara National Park, Chapramari Wildlife Sanctuary and adjoining Reserve Forest areas of Jalpaiguri Division was conducted on 12th and 13th of February 2019. Preliminary training on conducting the population estimation was imparted to the staff members, representatives of various NGO's, Banyapran sathis and JFMC members on 11/02/2019, at Murti conference hall of Murti Beat, Gorumara North Range. Also a one day training programme for Officers and staff members of Gorumara Wildlife Division and Jaldapara Wildlife Division, on Rhino dung sample collection for genetic analysis was held at Murti conference hall on 05/02/2019, resource persons being members of WWF and Aranyak, Assam.

AGE CLASS DISTRIBUTION OF GORUMARA ►

Age Class	Adult			Sub-Adult			Calf			Total
	M	F	U	M	F	U	M	F	U	
Total	18	15	1	4	2	2	3	0	7	52

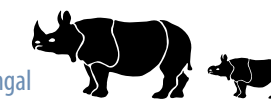
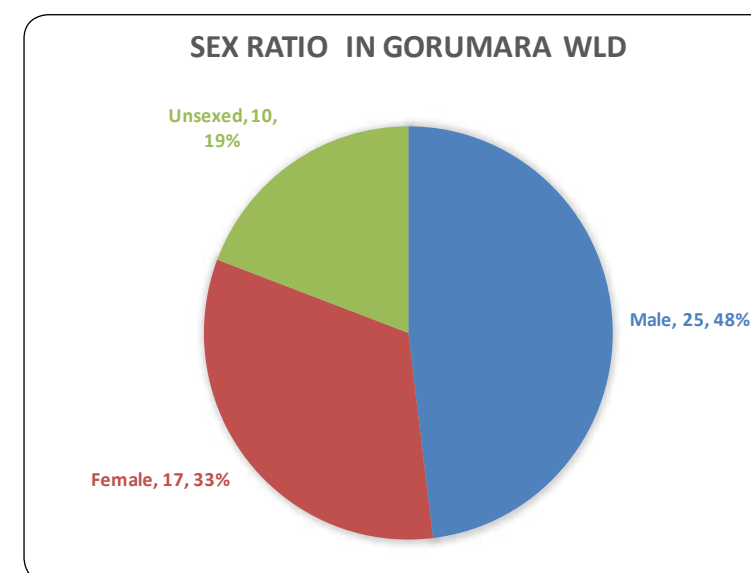


COMPARISON WITH 2015 DATA ►

Range	Year	Adult			Sub-Adult			Calf			Total
		M	F	U	M	F	U	M	F	U	
GNR	2015	1	0	0	0	0	0	0	0	0	1
	2019	1	0	0	0	0	0	0	0	0	1
GSR	2015	17	16	1	2	2	1	0	0	8	47
	2019	15	15	1	4	2	2	3	0	7	49
Nathula Range, JPG Division	2015	1	0	0	0	0	0	0	0	0	1
	2019	2	0	0	0	0	0	0	0	0	2
Total	2015	19	16	1	2	2	1	0	0	8	49
	2019	18	15	1	4	2	2	3	0	7	52

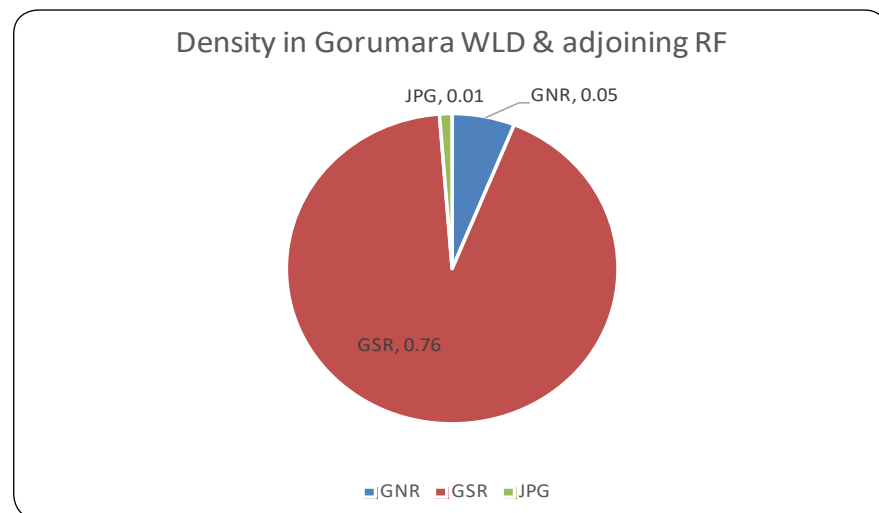
SEX RATIO IN GORUMARA WLD ►

Sex Class	Male	Female	Unsexed	Total
Total	25	17	10	52

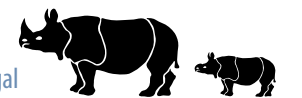
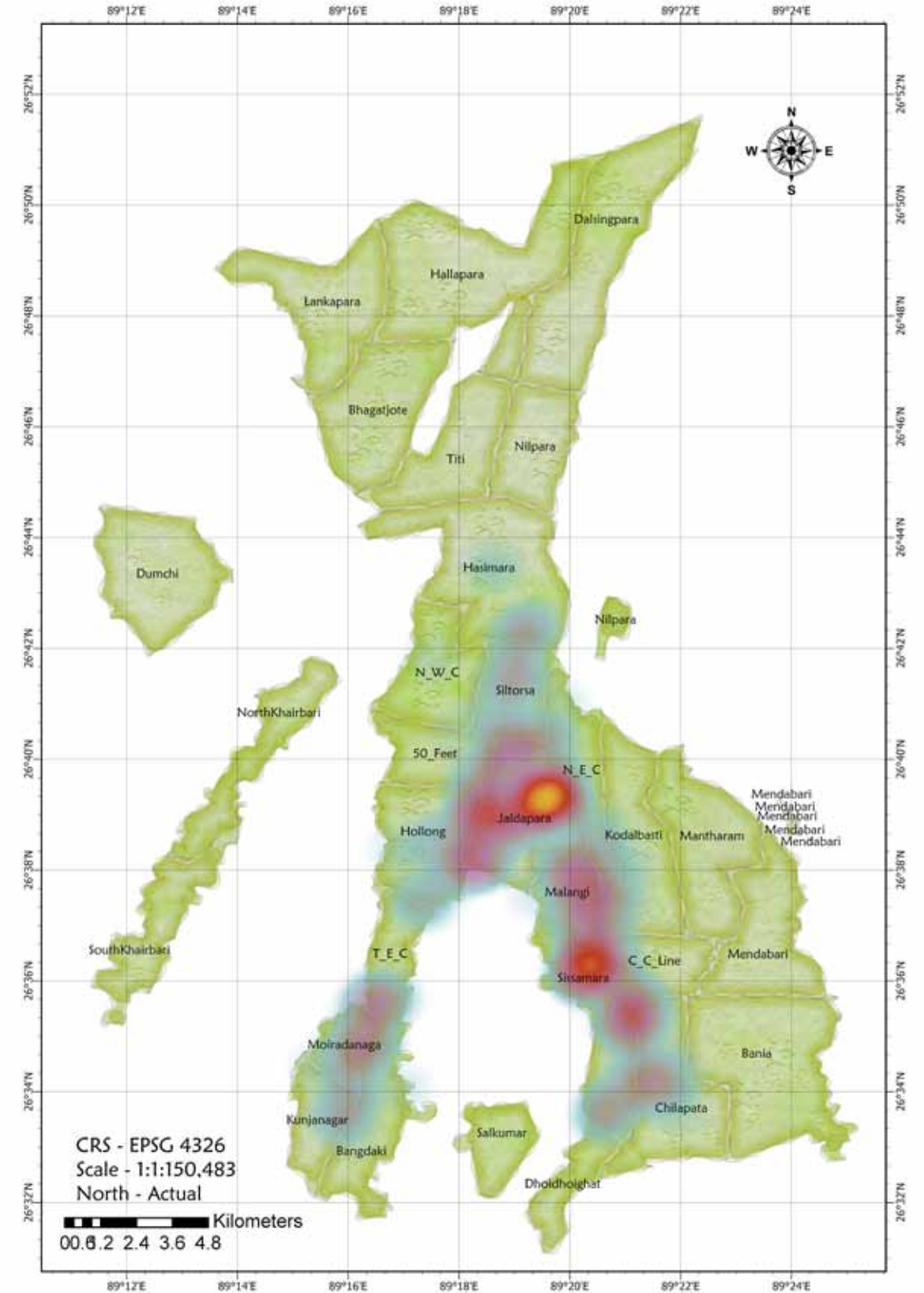


DENSITY OF RHINOS IN GORUMARA ▶

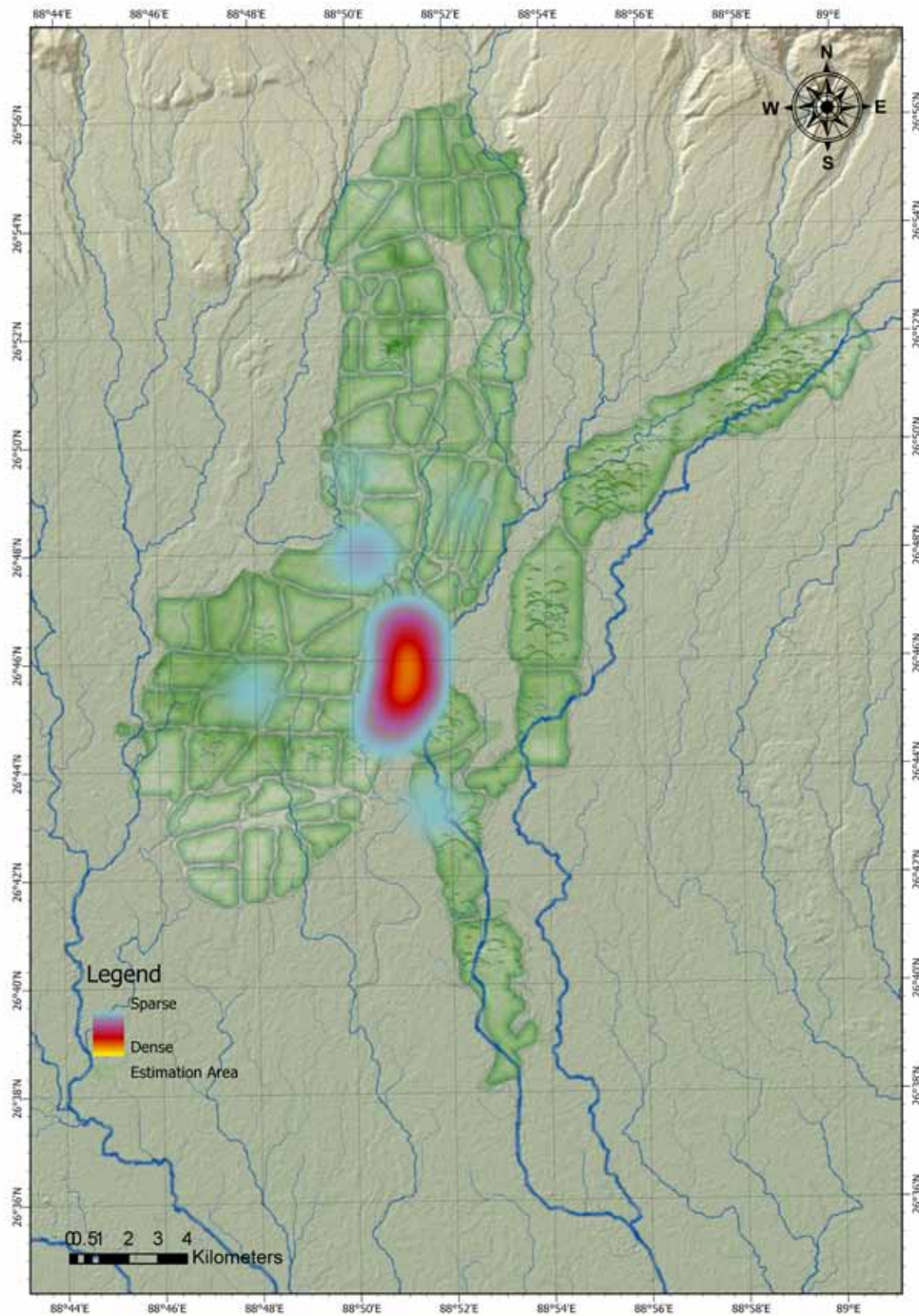
SL No	Range	Beat	Area in Ha.	Area in Sqkm	Sighting	Estimation Blocks	Density
1	GNR	Chapramari	959.81	9.60	0	3	0.00
2	GNR	Khunia	1443.9	14.44	1	4	0.07
3	GNR	Murti	1408.26	14.08	1	5	0.07
4	GSR	Dhupjhora	1214.45	12.14	31	3	2.55
5	GSR	Gorumara	2492.92	24.93	0	7	0.00
6	GSR	Budhuram	1489.05	14.89	17	5	1.14
7	GSR	Bichabhanga	1086.97	10.87	0	4	0.00
Total	2	7	10095.36	100.95	50	31	0.50
Jalpaiguri Division							
8	Nathua	Gadhiarkuthi	1728.07	17.28	1	1	0.06
9	Nathua	Nathua	1800	18.00	1	1	0.06
10	Daina	Central Daina	1590	15.90	0	1	0.00
11	Daina	Khairkata & Sulkapara	1500.98	15.01	0	1	0.00
12	Ramsai	Kalamati Beat	650.45	6.50	0	1	0.00
13	Ramsai	Ramsai	650.03	6.50	0	1	0.00
14	Lataguri	Central Beat	684.58	6.85	0	2	0.00
15	Lataguri	Lataguri	600.55	6.01	0	2	0.00
16	Lataguri	Central & Baradighi	715.46	7.15	0	2	0.00
17	Lataguri	Baradighi	953.01	9.53	0	2	0.00
18	Chalsa	Nagrakata	1554.78	15.55	0	2	0.00
19	Chalsa	Sipchu	1072.4	10.72	0	2	0.00
20	Chalsa	Panjhora	1619.05	16.19	0	2	0.00
Total	5	13	15119.36	151.19	0	20	0.00
Grand Total	7	20	25214.72	252.15	2	51	0.01



HEAT MAP OF RHINO PRESENCE IN JALDAPARA ▶



HEAT MAP OF RHINO PRESENCE IN GORUMARA ►



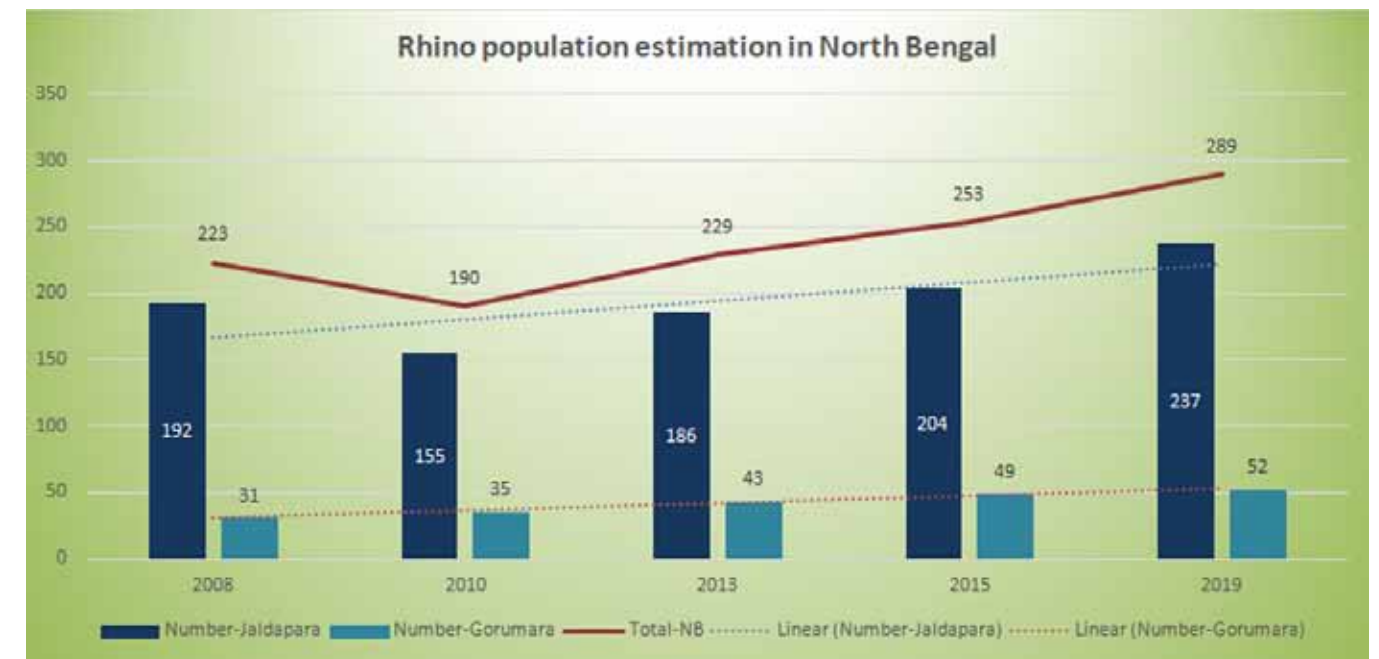
Conclusion

JALDAPARA WILDLIFE DIVISION GORUMARA WILDLIFE DIVISION AND ADJOINING LANDSCAPE

The enumeration tables of Rhino Population estimation 2019 conducted in Jaldapara landscape, estimated the minimum total number of Rhinos at **231 individuals** and to a maximum total number of Rhinos at **237 individuals**.

The standard data sheet was recorded during the course of enumeration by the respective team leader. The data sheet was verified by the park managers during validation session at NIC Madarihat and in Gorumara Wildlife Division headquarter in presence of all team leaders. The double count reporting by observers on observation lines were more frequent in high intensity Rhino areas.

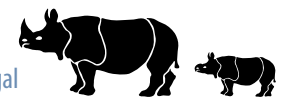
The enumeration tables of Rhino Population estimation 2019 conducted in Gorumara National Park, Chapramari WL Sanctuary and adjoining reserve forest areas of Jalpaiguri Division estimated the total number of rhinoceros at 52 individuals. Thus the total wild population of Indian Rhinoceros (*Rhinoceros unicornis*) in North Bengal landscape appears to be **minimum of 283 individuals to a maximum of 289 individuals during 2019**.



AGE CLASS

Post data validation and the statistical analysis was conducted to calculate age class and sex group of Rhinos in Jaldapara. The age class shows that ratio of adult : sub-adult : calf was 130 : 57 : 50 i.e. 1 : 0.43 : 0.38. Hence, the estimated population comprises of 55% adult, 24% Sub-adult & 21% calf. The figure reflects a healthy ratio with increasing sub-adult and calf i.e. a vibrant growing population.

Whereas the Age class ratio in Gorumara landscape shows that ratio of Adult : sub-adult : Calf was 34 : 08 : 10 i.e. 1 : 0.23 : 0.29. The estimated population comprises of 65.4% Adult, 15.4% Sub-adult and 19.2% Calf. In this case the % of sub-adult and calf is less (34.6%) in comparison to Jaldapara landscape (45%).



DENSITY ►

Density of Indian Rhinoceros in Jaldapara landscape was estimated at 1.43 Rhinos per sq km. On the contrary the Rhino density in Gorumara National Park calculated to be 0.62 per sq km. If we consider entire landscape of Gorumara Wildlife Division and its adjoining landscape of Jalpaiguri Division, the density appears to be much less. (0.20 per sq km).

This significantly lower figure of density in Gorumara Wildlife Division is mainly due to insignificant population of Rhino in adjoining areas of Jalpaiguri Forest Division (only 02 nos in 151.19 sq km area).

SEX RATIO ►

The sex ratio of Rhinoceros population in Jaldapara landscape was estimated as Male : Female - 98 : 94 i.e. 1 : 0.95. This ratio has been obtained without considering 45 un-sexed individuals (Adult – 02, Sub-Adult – 7, Calf – 36). The sex ratio of 1 : 0.95 is almost same as Rhino population estimation 2015. In-spite of reflecting 1:0.95 ratio, the Rhino population has dramatically increased to 237 individuals (increase of 33 individuals since 2015). The positive population growth establishes that wild Rhino population of Jaldapara landscape is having a healthy sex ratio.

The Sex Ratio of Indian Rhinoceros in Gorumara landscape comes out to be Male : female - 25 : 17 i.e. 1 : 0.68. The said ratio has been obtained without considering 10 un-sexed individuals. From the results of present estimation, it is evident that the number of male Rhinos appears to be on the higher side and this may lead to more incidences of infighting in future, as they gain maturity. The sex ratio in 2015 estimate was 1:1. The decrease in number of females is a persistent issue which needs to be seriously taken into consideration. Management intervention like translocating few male sub-adult to adjoining landscape of Jaldapara or Nathua and Bamandanaga Extension or Patlakhawa forest may be analyzed as well as translocating few sub-adult female from Jaldapara landscape to Gorumara may also be thought of to maintain a steady balance in the sex ratio of Gorumara Rhino population.

The Dhupjhora, Jaldhaka, Medhlajhora and Ramsai extension blocks have higher concentration of Rhinos as these are grasslands with abundance of water availability in the form of rivers (Jaldhaka & Murti) and artificially created wallow pools. This is preferred habitat of Rhinos. The distribution of male and female Rhinos in these blocks also shows a significant pattern. The Jaldhaka block of Gorumara Beat is mostly inhabited by male Rhinos with occasional presence of females, while the Dhupjhora, Medhlajhora and Ramsai extension blocks are primarily inhabited by female Rhinos, mostly with calves, with presence of few dominant bulls. Currently rhinos stray out to Central Diana RF, Ramsai Extn. R.F. Nathua Beat, Bichabhanga R.F. & Saraswati R.F. of Jalpaiguri Division and in northern side to Sipchu, Naxal, Jaldhaka under Kalimpong Forest Division to forests under jurisdiction of Bhutan. The inclusion of Nathua Range of Jalpaiguri Division, which is an excellent rhino habitat and frequented by rhinos under Wildlife Management would be a welcome step in conservation of Indian Rhinoceros in this landscape.

The Rhino population estimation exercise – 2019 and its subsequent statistical analysis have validated the successful management principles in vogue and also thrown up many management challenges. The over increasing population is finding new habitat towards North along Torsa flood plains. The Rhino extension to newer areas presents protection challenges and necessitate adequate infrastructure and sufficient man power. Habitat improvements viz. weed eradication, cut back, over wood removal over new areas need to be adopted for providing good quality habitat to rising Rhino population. From genetic point of view, new blood needs to be introduced from different landscape to avoid in-breeding. The reintroduction programme of Indian Rhinoceros from Jaldapara National Park to repopulate new areas like Patalakhawa under Coochbehar Division should be vigorously pursued to lighten the population burden of Jaldapara landscape.

Considering the management aspect of population estimation of Rhinoceros and also four (04) years periodical population estimation of Elephant and large carnivores it is suggested that the next population estimation of Indian Rhinoceros in North Bengal landscape is to be carried out after Four (04) years i.e. during 2023 and obviously the results obtained in the estimation are to be analyzed in GIS platform. Use of GPS, digitized maps etc. are to be made mandatory in such exercise.





Use of Departmental Elephants during estimation





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