REPORT

Population Estimation of Greater One-horned Rhinoceros (*Rhinoceros unicornis*) in Manas National Park, BTAD Assam

15th to 19thMarch, 2020

Submitted to

Office of the Field Director

Manas Tiger Project

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Background

Historically, the Greater One-horned Rhinoceros (*Rhinoceros unicornis* Linnaeus 1758) was distributed across the entire northern part of the Indian subcontinent, along the Indus, Ganges and Brahmaputra River basins. However, this mega-herbivore has been declined drastically from most of its distribution range mainly due to poaching and habitat alterationand lefttheir numbers plummeted to a few remnant populations in Nepal and India (Assam, West Bengal and Uttar Pradesh). Manas National Park in the *Terai*belt of Assam has a viable population of more than hundred rhinos prior to 1989. But, the entire rhino population of this protected area was exterminated by poaching in the early 1990s during insurgency in western Assam.After formation of Bodoland Territorial Council (BTC) in 2003, Assam Forest Department and BTC in collaboration with other conservation organizations (IFAW-WTI, IRF, WWF, USFWS) started rhino reintroduction programme under Indian Rhino Vision (IRV 2020) in 2006 through translocation of rehabilitated rhinos from Centre for Wildlife Rehabilitation and Conservation (CWRC) Kaziranga and wild to wild (W-W) translocation from both Kaziranga NP and Pobitara WLS of Assam.

Following the decisionsof a consultative meeting held on 13th March, 2020atthe office of the Field Director, Manas Tiger Project, a population estimation exercise was conducted from 15th to 19th March 2020 to estimate the total rhino population present in Manas NP. The entire rhino population estimation exercise was conductedas per the following schedules:

Table 1: Tentative Schedule of Population Estimation in Manas NP-2020

Date	Time	Area/Range	Exercise Details
15-03-2020	10:00 to 12:00 Hrs	Bhuyanpara	Pre-estimation Training
16-03-2020	06:00 to 10:00 Hrs	Bhuyanpara	Population Estimation
16-03-2020	16:00 to 18:00 Hrs	Bansbari	Pre-estimation Training
17-03-2020	06:00 to 10:00 Hrs	Bansbari	Population Estimation
18-03-2020	10:00 to 12:00 Hrs	Kahitema & Panbari	Pre-estimation Training
19-03-2020	06:00 to 10:00 Hrs	Kahitema & Panbari	Population Estimation

Methodology

Population estimation of wild animals is an important management tool forscientific management of a Protected Area. The primaryobjectives of conducting such population estimation of wild animals are as follows:

i. Estimation of total numbers of the species
ii. Sexing and determination of Male-Female sex ratio
iii. Analysis of population trend and age-class
iv. Monitoring of habitat and habitat utilization
v. Determination of carrying capacity of the protected area.
vi. To make changes in managerial strategy, if needed.

To assess the population of Rhinoceros, the "**Total Count**"or Direct count method was followed in each block of the Manas NP. This method involves dividing the total area into smaller units or blocks separated by natural barrier such as rivers or streams and forest paths (Fig 1). Each anti-poaching camp and its adjoining area was considered as a sample block. Some anti-poaching camps which are in close proximity were merged to form a single block for the population estimation exercise.This methodgenerally assumesthat the animals present in a block do not move to other block during population estimation andhence can be considered as "**Closed Population**" of the block. Also, simultaneous counting of the animalsin all blocks will avoid double counting even if the animal shifts from one block to other.

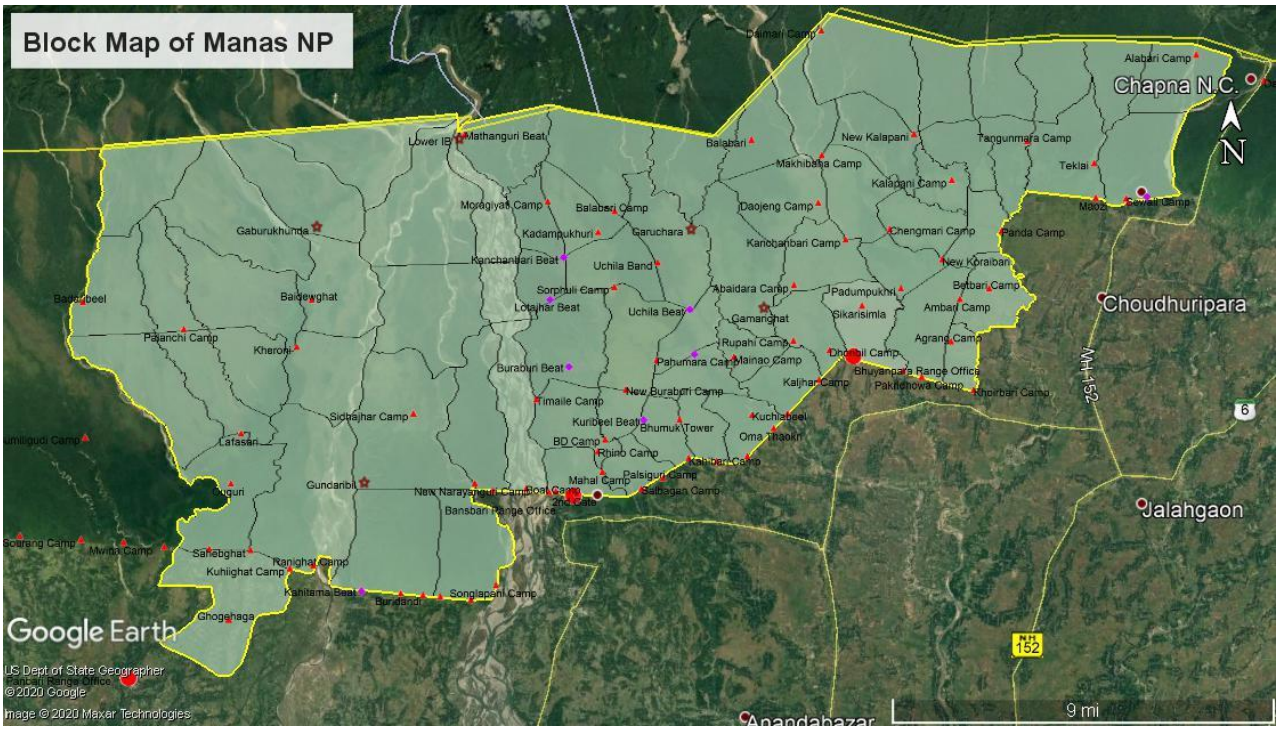

Figure 1: Block Map of Manas National Park, Assam

The rhino population estimation exercise was carried out in all the threeranges (Bhuyanpara, Bansbari andPanbari) of Manas NP. A total sixty-four estimation blocks were assessedin all the ranges such as Bhuyanpara (21 blocks) from eastern boundary of Manas NP to Goruchara river in the west, Bansbari (23 blocks) from Goruchara river in the east to Beki river in the west and Panbari including Kahitama beat area from Beki river in the east to the western boundary of Manas NP.To make ease of administration and logistics in terms captive elephant, the entire area of the park was enumerated over a series of days from 16th to 19th Mar 2020 (Bhuyanpara Range-16th; Bansbari Range-17th and Panbari Range including Kahitama Beat-19th Mar 2020) with a gap on 18th Mar 2020 to move all the logistics and captive elephants to the west of Beki river. Pre-estimation trainings were conducted before the day of estimation in each range where the enumerators were individually explained the area of estimation, methodology and the use of GPS in detail. One GPS and data sheetswere provided to each enumerator.Departmental Elephants were deployed to theallotted estimation blocks one day in advance. The estimation started at 6.00 am simultaneously in all over the enumeration areacoveringthe potential habitatsof rhinos within each of the block.

In each estimation block, rhinos were counted from elephant backs and on foot by one pre-trained enumeratorin each estimation group. Only direct sightings of the rhinos were considered for counting the numbers. Whenever the rhinos are sighted, total number of individuals, sighting time and geo-locations were noted down.Sex and age of each rhino were visually assigned and recorded into six age-sex classes such as adult males, adult females, sub-adult male, sub-adult female, unsexed sub-adult and calf for better understanding of the population structure.Special emphasis was also given to identify the reintroduced rhinos using ear-notched pattern and other distinct physical pattern of the body.

Figure 2: Pre-Estimation Training of the Enumerators

Results Summary

The threedays' estimation recorded a total 28 number ofrhino individuals in all the three ranges of Manas NP (Table 2). Besides, there are 10 other rhinos which have confirmed sighting records (with ID)within 48 hours of post estimation but not detected during the estimation period. Considering both these types of records, it has estimated the minimum total number of Rhinoceros of 38 individuals to the total population(total 43 rhinos as per official record of Manas TP) present in Manas National Park of Assam.

Table 2: Block wise sighting records of Rhinoceros in different ranges of Manas National Park

Block Name	Time	Geo-Location		Total Rhino Sighted	Adult		Sub-Adult			Calf
		Latitude	Longitude		Male	Female	Male	Female	Unsexed	
Bhuyanpara Range										
Dhanbeel	7.51 am	26.72251	91.09611	1	1	0	0	0	0	0
Dhanbeel	8.13 am	26.72681	91.09551	2	0	1	0	0	0	1
Rupohi	7.31 am	26.72277	91.08833	2	0	1	0	0	0	1
Daojeng	7.14 am	26.77194	91.11502	1	0	0	0	0	1	0
Daojeng	7.30 am	26.76694	91.08194	2	0	1	0	0	0	1
Bansbari Range										
Longdangpara	7.00 am	26.67594	91.04445	1	1	0	0	0	0	0
Latajhar	5.45 am	26.72501	90.99306	1	1	0	0	0	0	0
Uchila-2	6.39 am	26.72505	90.99333	2	0	2	0	0	0	0
Uchila-1	06:00am	26.71929	91.04179	1	0	1	0	0	0	0
Mahal	7.35 am	26.65972	91.00527	1	1	0	0	0	0	0
Mahal	7.56 am	26.66194	90.99667	1	1	0	0	0	0	0
Kahibari	6.28 am	26.67709	91.04505	1	1	0	0	0	0	0
New Buraburi	8.02am	26.70417	91.02638	1	0	0	1	0	0	0
Barengabari	6.57 am	26.67333	91.03444	1	0	1	0	0	0	0
Rhino Camp	8.59 am	26.77361	90.99556	1	1	0	0	0	0	0
Sorphuli-2	6.38 am	26.71689	91.01366	2	0	1	0	0	0	1
Sorphuli-2	6.45 am	26.72655	91.01187	2	0	1	0	0	0	1
Sorphuli-2	6.45 am	26.72655	91.01187	2	0	1	0	0	0	1
Mathanguri	08:30am	26.77963	90.96558	1	0	0	0	1	0	0
Kahitama Beat										
Sidajhar	7.59 am	26.68872	90.93257	2	0	0	1	1	0	0
Rhinos sighted during Estimation Period				**28**	**7**	**10**	**2**	**2**	**1**	**6**
Undetected Rhinos (have confirmed sighting records)				**10**	**3**	**4**	**0**	**1**	**0**	**2**
Total Estimated Rhinos of Manas NP in 2020				**38**	**10**	**14**	**2**	**3**	**1**	**8**

The sex ratio of Male and Female Rhinoceros population ofManas NP was estimated at 1: 1.4. This ratio has been obtained withoutconsidering 9 individuals (1 unsexed and 8 calf). The male and female ratio of 1: 1.4 has established that the rhino population of Manas NP is having a healthy sex

ratio. The number of calves born in the wild reflecting the positive growth of Rhino population in the protected area. The density appears to be very low (0.07 individual per sq. km) if we consider the entire landscape of Manas NP.

Table 3: Age and Sex classification of Rhinoceros in Manas NP

Age Class	Adult		Sub-Adult			Calf	Total Rhinoceros
	Male	Female	Male	Female	Unsexed		
Total	10	14	2	3	1	8	38

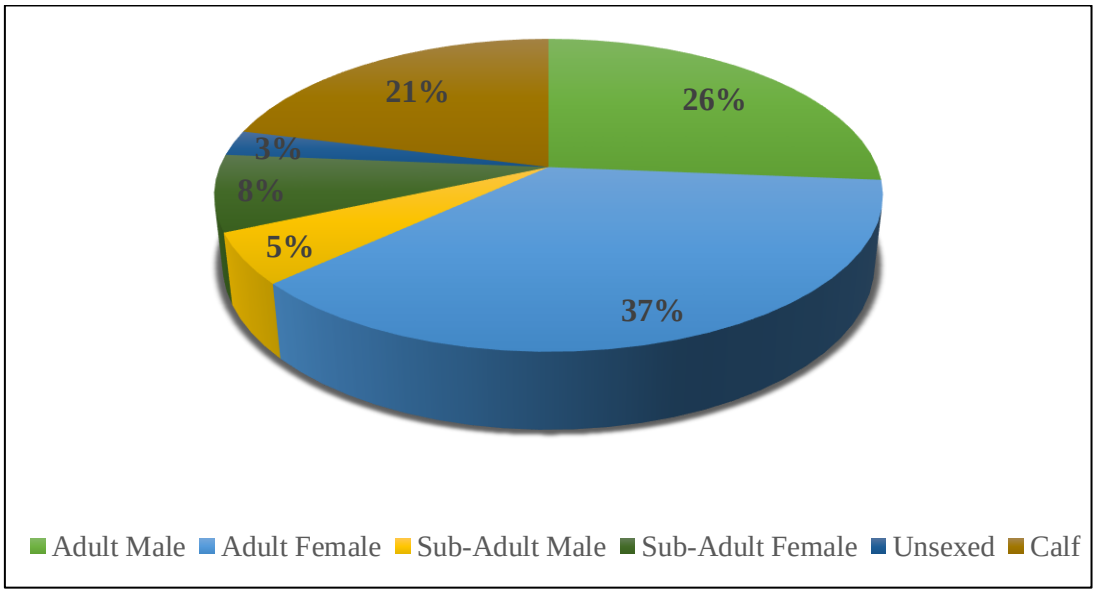

Figure 3: Age and Sex wise percentage of Rhinoceros in Manas NP

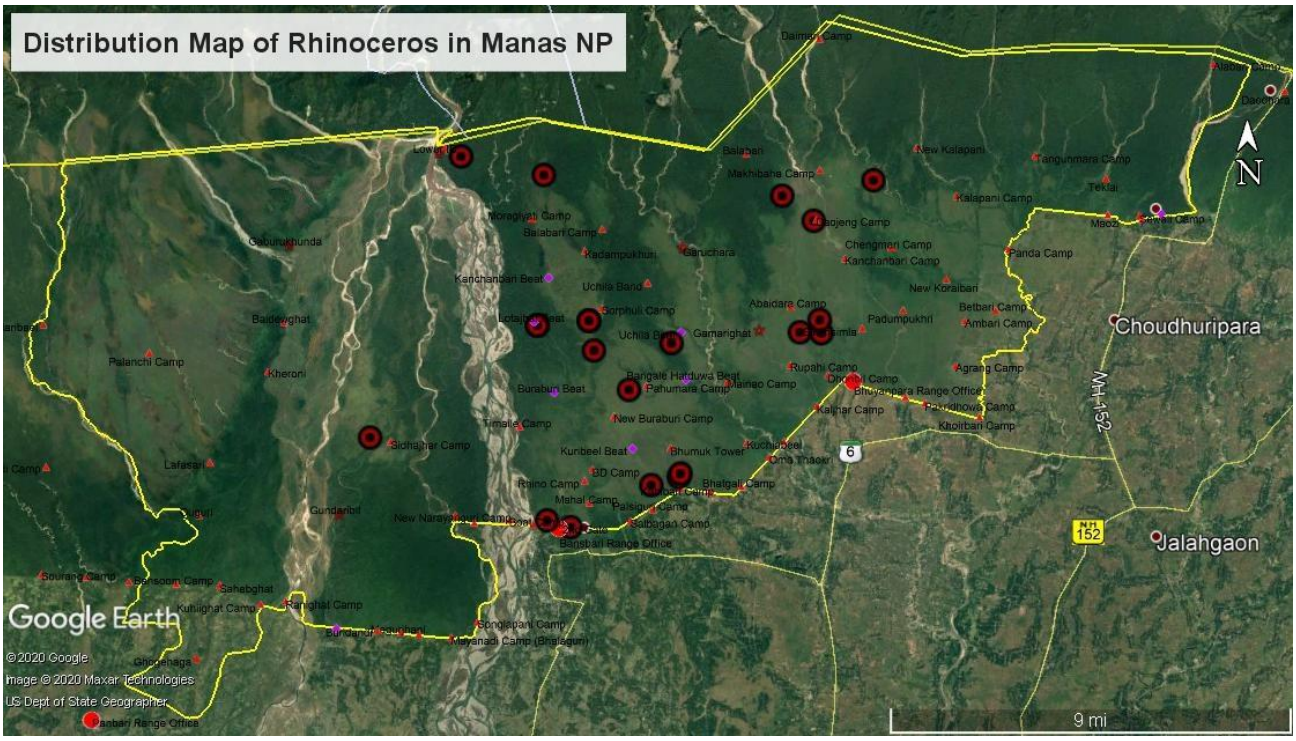

Figure 4: Distribution of Rhinoceros in Manas NP

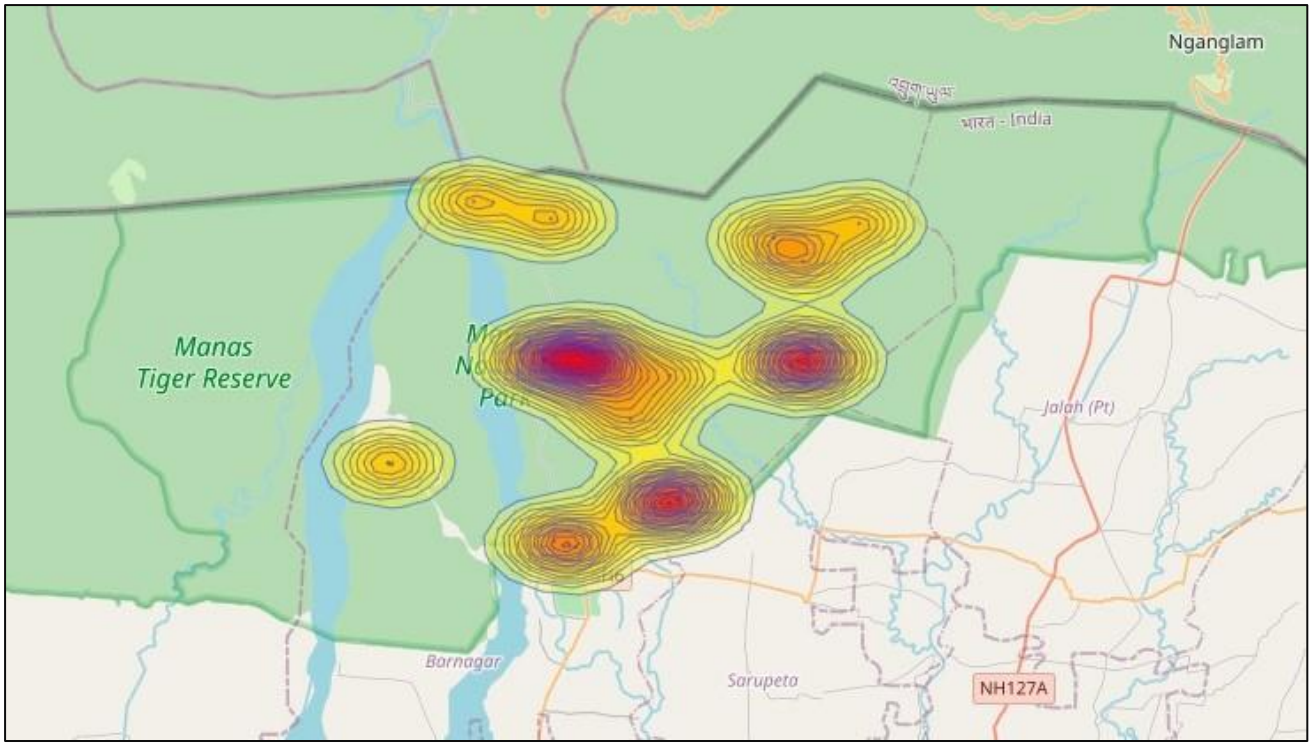

Figure 5: Heat Map of Rhino Distribution and their Habitats in Manas NP

Constraints

Though the population estimation was conducted intensively to enumerate all the individuals of Rhinoceros present in Manas National Park, certain limitations during the exercise have resulted in underestimation of the individual population of the target species. These limiting factors are mentioned below:

i. The enumerators in most of the estimation blocks couldn't cover the entire area due to inaccessibility. Some of them even didn't follow the exact zigzag manner of their path without scanning the potential habitats of rhinos in their respective blocks. Hence, there is maximum chances of left out of rhino individuals (undetected) during estimation. Periodic search operation (at least two search operation in every month) must necessary to maximize the detection of rhinos in different habitats of Manas NP.

ii. Maintenance of regular sighting records of rhinoceros in the respective areas of each anti-poaching camp will be useful to assess the number total rhinos and their movement in different seasons of the year in Manas NP.

iii. Enumerators must be trained more rigorously on identifying age-sex differences of the target species and on the proper methodology of population estimation to avoid biasness in age-sex classification.