Letter No. FD/TR/Rhino Census/608   **Dated: May 7, 2022**

To,
The Principal Chief Conservator of Forest, Wildlife
& Chief Wildlife Warden, Assam
Aranya Bhawan, Panjabari, Guwahati- 37

Sub. :   **Submission of 14th Assam Rhino Estimation report at Manas**
Ref. :   **Your O.O.No.152, dated-24.03.2022**

Sir,

     Reference is invited to the subject and order cited above. In this context, kindly find enclosed herewith report of the 14th Assam Rhino Estimation as conducted at the Manas National Park for kind information and perusal.

Encl: As above

Yours faithfully,

(Dr. Vaibhav C. Mathur, IFS, CF)
Field Director, Manas Tiger Reserve

Copy for information to:

1. The PCCF & HoFF, Panjabari, Guwahati, Assam
2. The CCF cum CHD, Forests, BTC, Kokrajhar
3. Deputy Director/Assistant Director, MTR
4. All ROs & BOs, MTR.

Field Director, Manas Tiger Reserve

14th ASSAM RHINO ESTIMATION

Manas Tiger Reserve

April 2022

Manas National Park in the *Terai* belt of Assam had a population of about eighty to hundred rhinos prior to 1990. However, this resident rhino population of Manas National Park was exterminated during the ethno-political conflict in western Assam. After the formation of the Bodoland Territorial Council (BTC) in 2003, Assam Forest Department and BTC in collaboration with other conservation partners started a rhino reintroduction program under aegis of the Indian Rhino Vision (IRV 2020) in 2006 wherein translocation of rehabilitated rhinos from the Centre for Wildlife Rehabilitation and Conservation (CWRC) at Kaziranga and wild to wild (W-W) translocation from Kaziranga NP and Pobitara WLS of Assam to Manas took place.

As per directions of the Chief Wildlife Warden, Assam, rhino population estimation was scheduled on April 1 and 2, 2022, at Manas National Park.

OBJECTIVES

The objectives of conducting rhino population estimation 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.   Habitat Occupancy

METHODOLOGY

To assess the population of Rhinoceros, the "**Total Count**" or Direct count method was followed in the Manas National Park. A total count is generally used when a single species is targeted to be counted in a well-defined, specific area. This method assumes the detection probability to be one, which means that each and every animal has a 100 % chance of being seen during the counting. The total area is divided into smaller units or blocks separated by natural barriers such as rivers or streams and forest paths, which is supposed to take into account population closure, that means no animal can move in or out during the counting process. This however, has the following limitations.

1. There is undercounting, as the assumption of a detection probability of 1 is unrealistic, especially if population closure cannot be established satisfactorily

2. The method is generally successful in small areas of 10 to 20 sq kms as population closure can be met satisfactorily

3. Requires visibility to be high so that animals can be observed from far off

4. Not possible in case of shy, cryptic animals

5. The level of precision cannot be measured in total counts

6. As several teams have to be deployed, sometimes with elephants, total counts are expensive to conduct

For the exercise at Manas, each anti-poaching camp and its adjoining area was considered a sample block. Some anti-poaching camps which are in close proximity were merged to form a single block for the population estimation exercise. The rhino population estimation exercise was carried out in all the three ranges (Bhuyanpara, Bansbari and Panbari) of Manas NP. A total seventy-one estimation blocks were assessed in all the ranges.

Prior to conducting the exercise, occupancy of rhinos as mapped using rhino dung piles as follows so as to optimize search and counting efforts:

Pre-estimation training was conducted from March 28 to 31, 2022 wherein the enumerators were individually explained the area of estimation, methodology and the use of smart application in detail before the estimation in each range.

Date	Time	Venue	Participants	Exercise Details
28-03-2022	1530 to 1700 Hrs	Mahal Camp	All Mahuts	Briefing of Mahuts
29-03-2022	1530 to 1700 Hrs	Bhuyanpara	Bhuyanpara Staff and external enumerators	Pre-estimation Training
30-03-2022	1000 to 1200 Hrs	Panbari	Panbari Staff and external enumerators	Pre-estimation Training
31-03-2022	1000 to 1200 Hrs	Bansbari	Bansbari Staff and external enumerators	Pre-estimation Training
01-04-2022	0530 Hrs onwards	Manas National Park	All teams	Block counts
02-04-2022	0530 Hrs onwards	Manas National Park	All teams	Block counts

Mahut briefing

Panbari training

Bansbari training

Bhuyanpara training

The M-STrIPES Mobile Patrol application was used to document the exercise in the GIS domain. One M-STrIPES Mobile and data sheets were provided to each enumerator. Departmental Elephants were deployed to the allotted estimation blocks one day in advance. The estimation started at 0530 hours simultaneously all over the enumeration area covering the potential habitats of rhinos within each of the block and ended on completion of scrutiny of the block.


Ready for the count!

In each estimation block, rhinos were counted from elephant backs and on foot by one pre-trained enumerator in each estimation group. Only direct sightings of the rhinos were considered for counting the numbers. Whenever the rhinos were 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 four age-sex classes such as adult males, adult females, sub-adult, and calf for understanding the population structure. A compilation committee was constituted to collate and present the results.

OBSERVATIONS

Due to incessant rains and inclement weather, all blocks could not be searched adequately. The effort as documented using M-STrIPES is as follows which clearly shows inadequate as well as
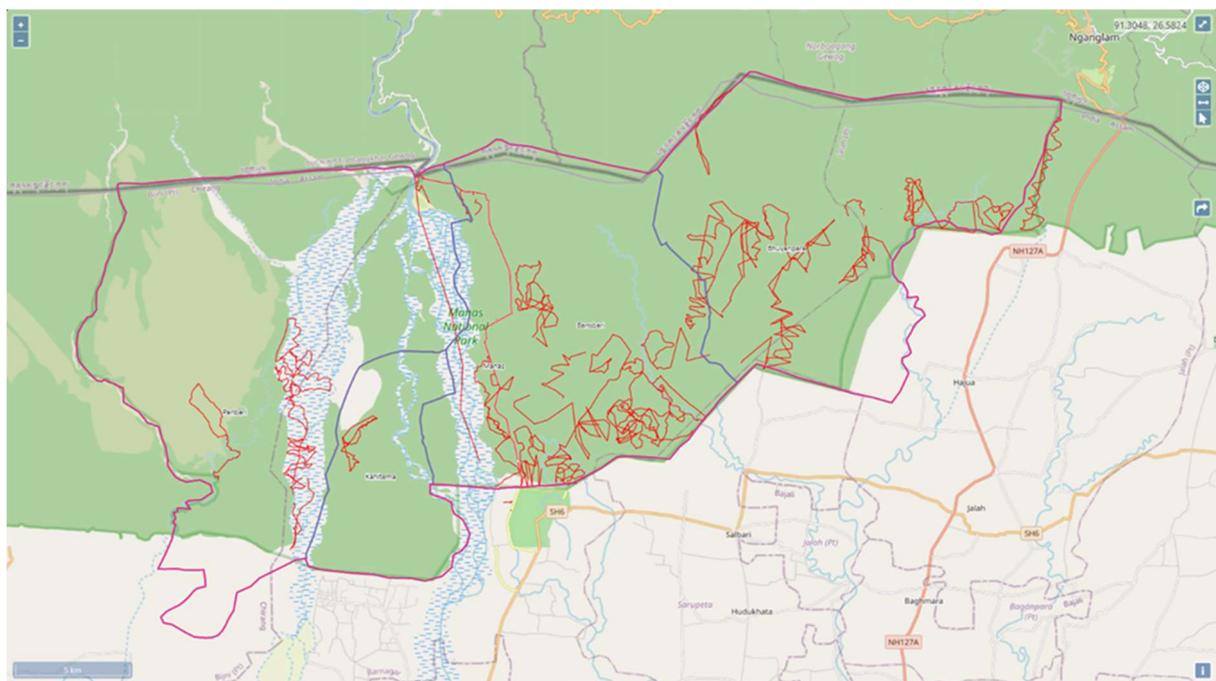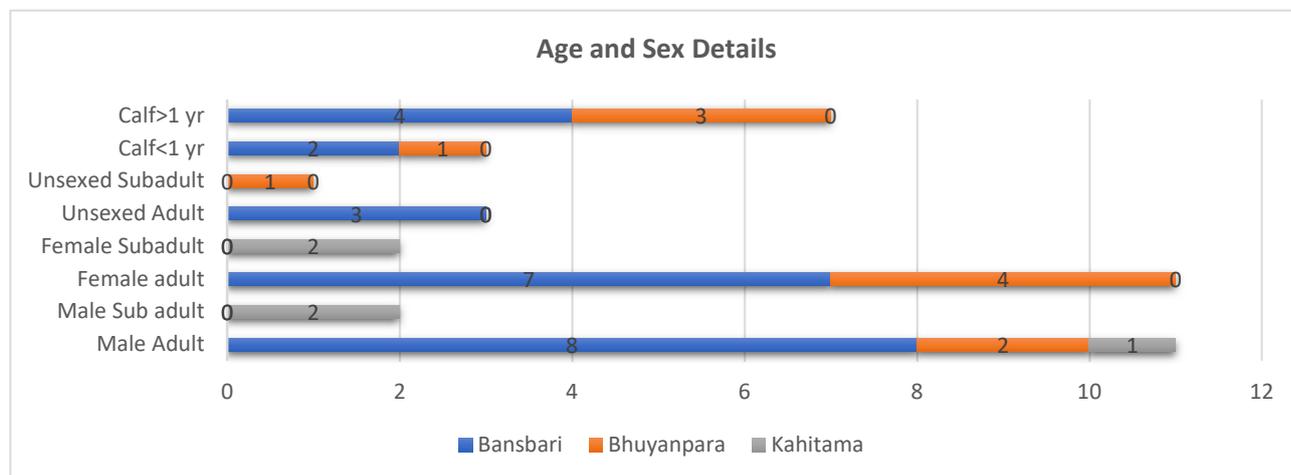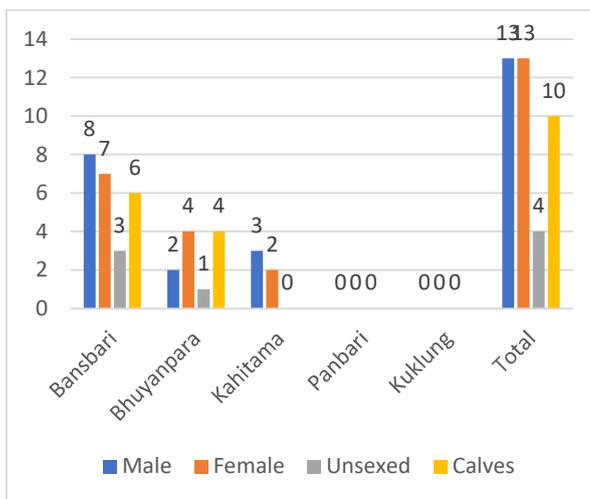
Some sightings during the exercise

inappropriate effort because of the severe weather constraints. Heavy rains prevented teams from moving in thickly wooded areas which was compounded by the presence of leeches.

A total 40 number of rhino individuals were observed in all two ranges and one beat of Manas National Park which are confirmed sighting records. Considering this, the minimum number of rhinos at Manas is 40.

The sex ratio of the Male and Female Rhinoceros population of Manas NP was estimated at **1:1** This ratio has been obtained without considering 18 individuals (05 sub-adults and 10 calves). The number of calves born in the wild reflects availability of welfare factors to foster rhinos in Manas National Park.

Range	Block	Team	Adult			Subadult			Calf		TOTAL
			M	F	U	M	F	U	Upto 1	More than 1	
Bansbari	Buraburijhar	New Buraburi		1						1	2
	Katajhar	Bhatgali	1		1						2
	Palsiguri	Barengabari									0
	Palsiguri	Rhino camp		2					1	1	4
	Sorphuly	Sorphuly		2	1				1	1	5
	Kuribeel	Kuribeel									0
	Kuribeel	Bhomuk	1	1							2
	Bispani	Bispani	2								2
	Narayanguri	Boatcamp	1								1
	Palsiguri	Salbagan	2	1	1					1	5
	Bengal	Pohumara									0
	Buraburijhar	Buraburi	1								1
Kahitama	Sidajhar	Sidajhar	1			2	2				5
		Gundaribeel									0
Bhuyanpara	Kanchanburi 2	Chengmari	1								1
		Daojeng 1		2					1	1	4
		Daojeng 2	1	1						1	3
	Dhonbeel	Dhonbeel						1			1
		Rupahi		1						1	2
		Total	11	11	3	2	2	1	3	7	40

Bar chart (Male, Female, Unsexed, Calves by range):
- Bansbari: Male 8, Female 7, Unsexed 3, Calves 6
- Bhuyanpara: Male 2, Female 4, Unsexed 1, Calves 4
- Kahitama: Male 3, Female 2, Unsexed 0, Calves 0
- Panbari: 0, 0, 0
- Kuklung: 0, 0, 0
- Total: Male 13, Female 13, Unsexed 4, Calves 10

Age and Sex Details (Bansbari, Bhuyanpara, Kahitama):
- Calf>1 yr: 4, 3, 0
- Calf<1 yr: 2, 1, 0
- Unsexed Subadult: 0, 1, 0
- Unsexed Adult: 3, 0
- Female Subadult: 0, 2
- Female adult: 7, 4, 0
- Male Sub adult: 0, 2
- Male Adult: 8, 2, 1

The rhino sighting locations during the exercise are depicted in the following map:

Rhino Sighting Locations, Manas National Park

Kernel Density of Rhino, Manas National Park
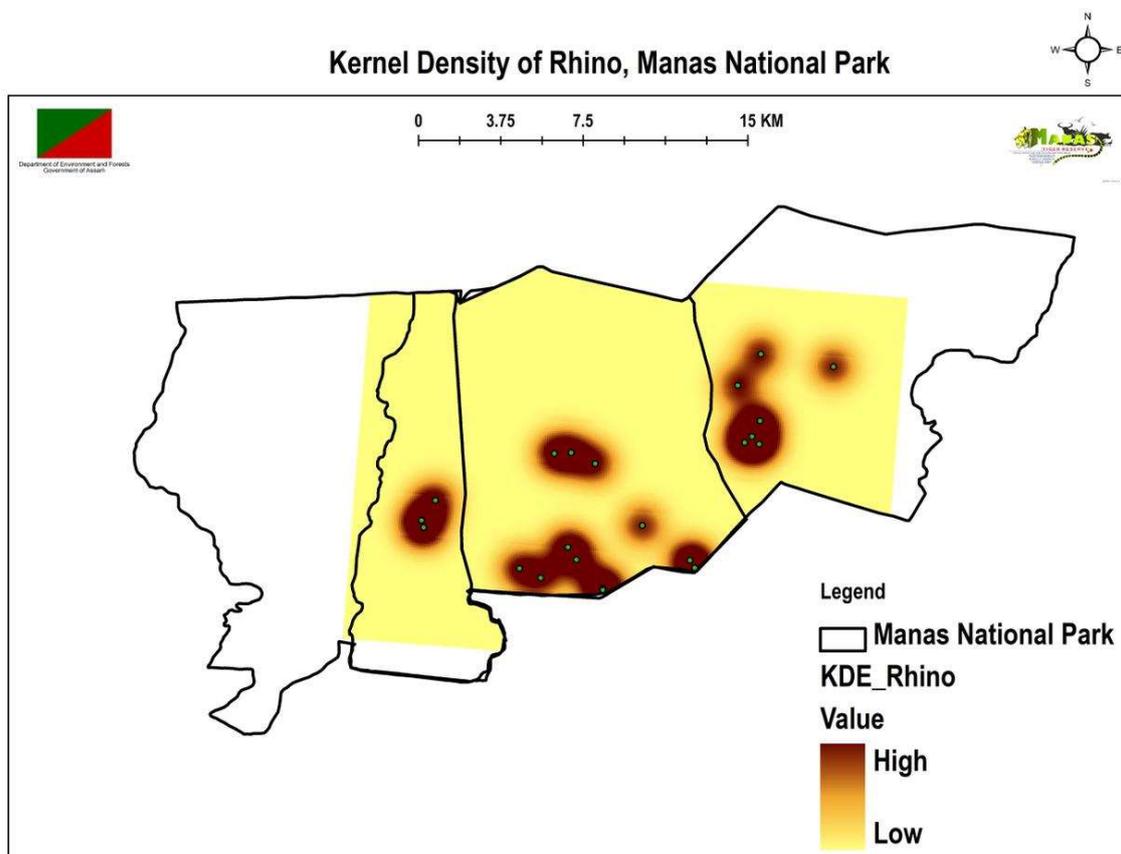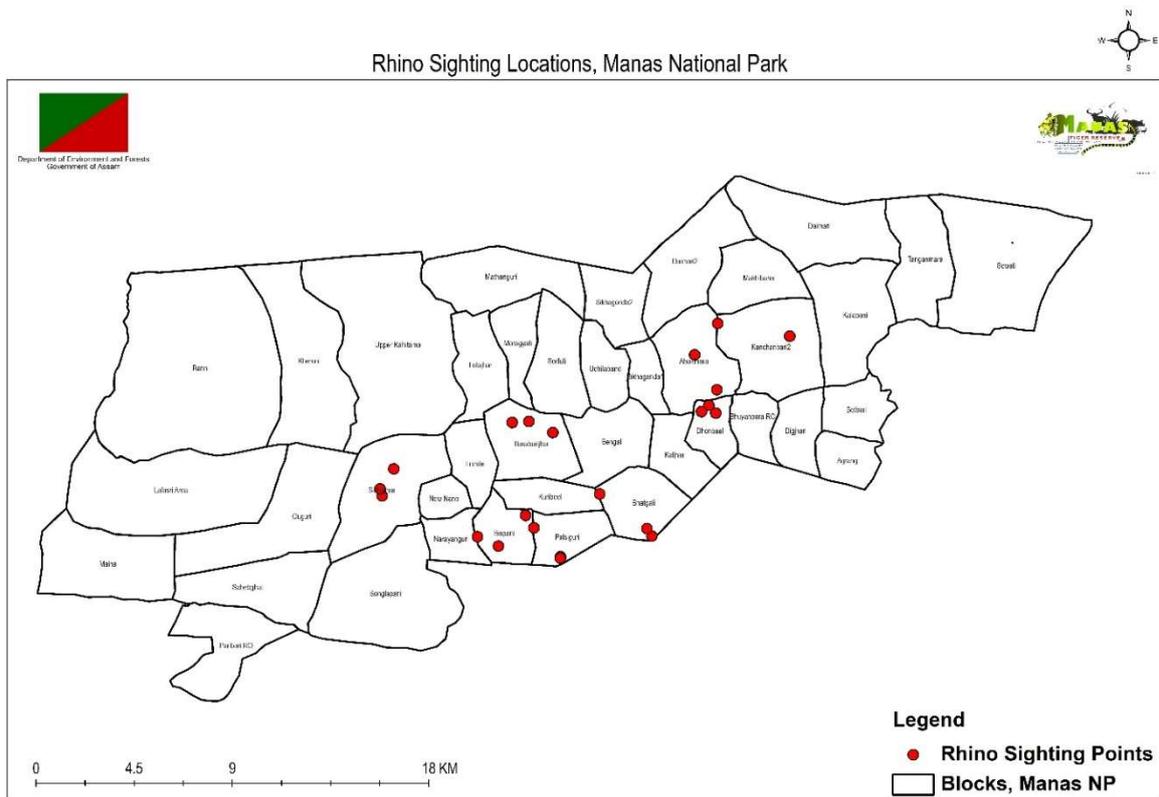
Keeping in view the 1:1 adult as well as the 1:1 subadult male to female ratio, we assumed the same to be hold good for calves in respect of constructing a population pyramid for rhinos at Manas. This reveals the following structure:
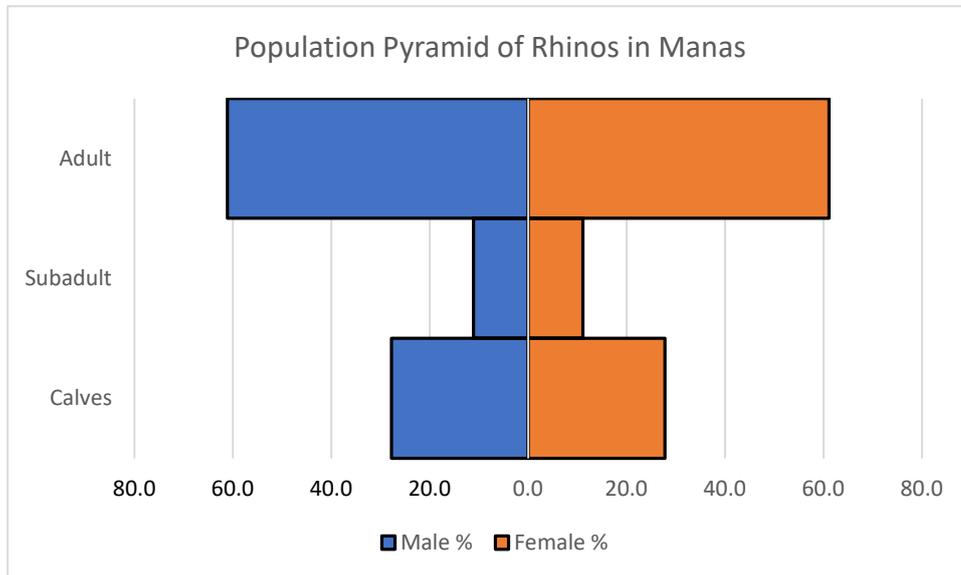
The graph is clearly indicative of a low birth rate, but is also suggestive of a lower death rate, which means that there is higher life expectancy. However, this kind of a population may suffer population losses if not supplemented through translocations. A suitable strategy to bring in more rhinos from other rhino bearing areas is required so as to have a wider representation of calves and sub adults over time.

The current rhino population of Manas is built up from wild-to-wild translocations and rehabilitation of orphaned and rescued calves. This along with a record of births and deaths has been scrupulously maintained in collaboration with our conservation partner, WWF, which however has the potential to miss out on early calf mortality. Notwithstanding this mortality, based on available records, an arithmetic assessment arrives at a total rhino population figure of 50 for Manas till the end of 2021.
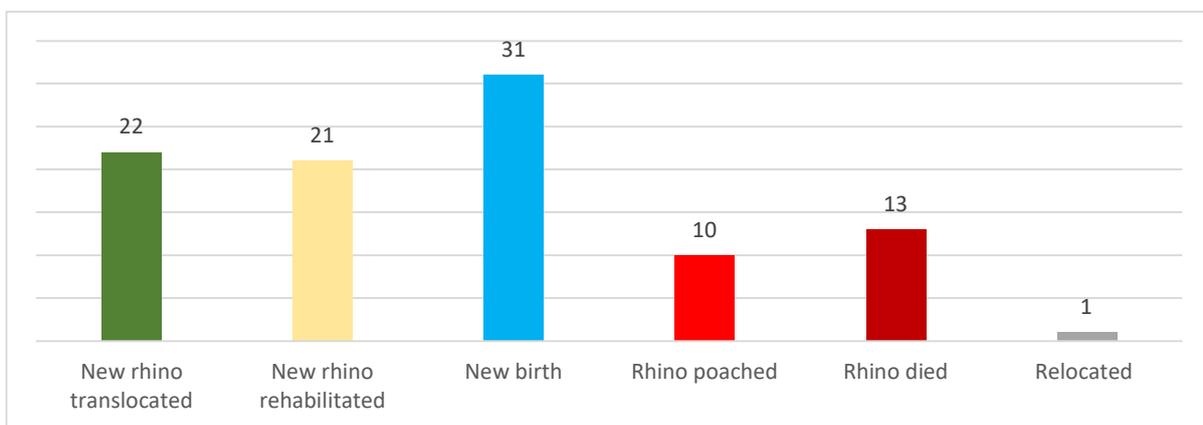
RESULTS AND DISCUSSION

The counting on first day had to be neglected as effort was not optimum because of the adverse weather conditions. The compilation committee finalized the results at 50 rhinos keeping in view the records available and detection of 40 rhinos in inclement weather conditions during the count.

Unlike protected areas like Pobitora Wildlife Sanctuary, Orang National Park and Kaziranga National Park, where the open grassland area is 72% (of rhino inhabited area), 48% (Tiger Conservation Plan, Orang Tiger Reserve) and 63% (Draft Tiger Conservation Plan, Kaziranga Tiger Reserve) respectively, Manas has an open grassland area of just 35% (Sinha et. al., 2022), which makes conducting total counts difficult. In the current exercise, due to poor weather conditions, sufficient effort could not be put in the total count, which is constrained in itself when applied to large areas and where population closure cannot be accurately met with. However, considering the fact that arithmetically 50 rhinos should be present and 80% of those, which amount to 40, were accounted for during the exercise is proof of the fact that rhino numbers have increased since the last official count of 34 in 2018. As the total count method is reputed for underestimating, it can be safely assumed that rhino numbers at Manas are more than 40.

The age structure pyramid is indicative of a low birth rate, low death rate and higher life expectancy. However, this kind of a population structure may suffer losses if not supplemented through conservation translocations. However, the age structure pyramid, though positively reveals that life expectancy is high, also indicates that supplementation efforts need to continue in order to have a younger rhino population which can sustain itself in the long term. A suitable strategy to bring in more rhinos from other rhino bearing areas is required so as to have a wider representation of calves and sub adults over time.

It is also necessary to maintain regular sighting records of rhinoceros in the respective areas of each anti-poaching camp which will be useful to assess the number total rhinos and their movement in different seasons of the year in Manas NP. While without a radio transmitter, it is difficult to monitor each and every rhino, these sighting records will aid formal monitoring and assessment methods when deployed from time to time.

The need of the hour is to adopt a sampling approach offered by methods such as Distance sampling wherein, the results shall be statistically presentable.

A NOTE ON DISTANCE SAMPLING

As part of Phase I of the All-India Tiger Estimation 2022 and annual Phase IV wildlife monitoring, frontline staff of the Manas Tiger Reserve conducted transects on elephant back for assessing abundance of herbivores in the month of March 2022. A total effort 424 kms was put wherein 53 transects of 2 kms each were deployed randomly across different habitat types. During this exercise there were 6 rhino encounters with a total of 8 rhinos. When this data was analyzed in Distance Software (Ver. 7.4), following results were obtained:

Parameter	Value	Standard Error
Detection probability	0.48	0.15
ESW	95.64	31.18
Group Density (groups per sq km)	0.073	0.048
Group size	1.3	0.21
Density/sq km	0.09	0.06
Population Size	**49**	32.9
Encounter	6	-
Count	8	-
CV	67.14	
Model	Half Normal cosine	

As can be observed, the estimate for rhinos in Manas National Park is nearly the same as obtained through the arithmetic record i.e total count of 50, being maintained since 2006, which is indicative of the usefulness of this method. However, due to very few observations the coefficient of variation on the estimated mean was high. The high variability on mean can be addressed by more spatial and temporal replicates of the line transects. Based on line transect encounters, a spatial map of Rhinoceros intensity of use was generated using kernel density estimators in ArcGIS 9.3:

Kernel Density (KDE) of Rhino, Manas National Park
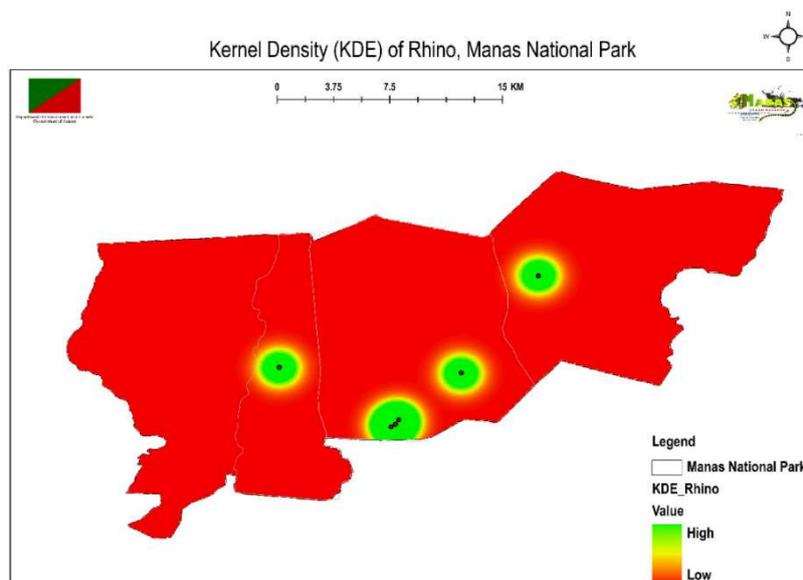
As can be observed, this is similar to the intensity of use obtained using total count, further proof of the fact that Distance Sampling can be used for rhino estimation in the Manas landscape.

ACKNOWLEDGEMENTS

The 14th All Assam Rhino Estimation, 2022 could not have been completed without the hard work and effort put in by the frontline staff, mahuts and Field Biologists of Manas Tiger Reserve, who form the backbone of conservation efforts at Manas.

The Manas Tiger Reserve places on record its appreciation for the following people, who in spite of constrained weather conditions, actively participated in the Rhino Estimation at Manas.

MMES
Hemanta Basumatary
Jimi Boro
Swgwmsar Boro
Rajib Basumatary
Phohor Basumatary
Ringsar Basumatary
Kumar Basumatary
Khansay Basumatary
Thobsa Basumatary
Ramesh Narzary

Sandeep, B.V. DFO, Dibrugarh
Arun Vignesh C.S., DFO, Sonitpur East
Dr. Sonali Ghosh, CCF, REWP
B.N. Patiri, DFO, Chirang
Kaushik Baruah, Elephant Foundation
Ratul Saha, Wildlife Expert, PMMC, AFPBC

GAUHATI UNIVERSITY
Joyshree Bhuyan
Nandita Khound
Niharika Brahma
Amy Bordoloi
Chimi Chetia

WWF
Dr. Deba Dutta
Amit Sharma
Dr. Parikshit Kakati
Sushanta Kashyap Borthakur
Rupak Das
Bipul Ch. Nath
Sukeswar Narth
Sonde Daimari
Champak Deka
Sunit Das,
Kaushik Medhi,
Subham Bhowmik

WTI
Dr. Daoharu Boro
Nazrul Islam
Rathin Barman
Suravi Dutta
Maheswar Basumatary
Keshab Pathak
Debojit Saikia

AARANYAK
Jonmoni Kalita
Bijit Boro
Pronit Basumatary
Gayatri Dutta
Ivy Farhin Hussain
Kaushik Rajbongshi

EXPENDITURE

A sum of Rs. 3,72, 727 only (Three lakh seventy two thousand seven hundred and twenty seven only) was spent for successful completion of the exercise (This amount does not include fuel used in departmental vehicles besides departmental elephant upkeep costs)

SIGHTING RECORD OBSERVATION SHEETS

02 - 04 - 2022

RHINO ESTIMATION 2022
MANAS MANAS NATIONAL PARK
DATE:

BLOCK NAME/RANGE/TEAM NO.	Bispani
NAME OF ENUMERATOR AND DESIGNATION	
NAME OF ELEPHANT (IF ON ELEPHANT)	
STARTING POINT COORDINATES	26·660172 / 90·990973
END POINT COORDINATES	26·691822 / 90·985599

AREA OF BLOCK IN SQ KM	
NAME OF OBSERVER (FRONTLINE STAFF)	
NAME OF MAHUT (IF ON ELEPHANT)	
WEATHER	
END POINT COORDINATES	

ANIMAL SPECIES	ADULT			SUB-ADULT			CALF		Total	GPS COORDINATES		ID, IF ANY	SIGHTING TIME	DIRECTION OF MOVEMENT
	M	F	U	M	F	U	Up to 1 year	Above 1 Year		Lat	Long			
RHINO	1			·					1	26466u51	90993921			
	1								1	"	"			
TOTALS														

Page No.:

Signature of Observer:

Signature of Enumerator: Kanskan Das

RHINO ESTIMATION 2022
MANAS MANAS NATIONAL PARK
DATE: 02/04/22,

BLOCK NAME/RANGE/TEAM NO.	Chorbuti -
NAME OF ENUMERATOR AND DESIGNATION	Bipul ch. Nath.
NAME OF ELEPHANT (IF ON ELEPHANT)	
STARTING POINT COORDINATES	26·730005 91.015843
END POINT COORDINATES	

AREA OF BLOCK IN SQ KM	
NAME OF OBSERVER (FRONTLINE STAFF)	
NAME OF MAHUT (IF ON ELEPHANT)	
WEATHER	
END POINT COORDINATES	

ANIMAL SPECIES	ADULT			SUB-ADULT			CALF		Total	GPS COORDINATES		ID, IF ANY	SIGHTING TIME	DIRECTION OF MOVEMENT
	M	F	U	M	F	U	Up to 1 year	Above 1 Year		Lat	Long			
RHINO		2	1				J	1	5	26·718553	91·00700			
TOTALS														

Page No.:

Signature of Observer:

Signature of Enumerator: Bipul ch. Nath.

RHINO ESTIMATION 2022
MANAS MANAS NATIONAL PARK
DATE: 2/2/2022

BLOCK NAME/RANGE/TEAM NO.	Semremari - M - I		
NAME OF ENUMERATOR AND DESIGNATION	Durga Kherkatary SP	AREA OF BLOCK IN SQ KM	7.6 AU
NAME OF ELEPHANT (IF ON ELEPHANT)	Penku	NAME OF OBSERVER (FRONTLINE STAFF)	Ranjan Basumatary, Pobon Lag
STARTING POINT COORDINATES	26·7493 03/9111063	NAME OF MAHUT (IF ON ELEPHANT)	
END POINT COORDINATES	267672/945887	WEATHER	Cloudy.
		END POINT COORDINATES	

ANIMAL SPECIES	ADULT			SUB-ADULT			CALF		Total	GPS COORDINATES		ID, IF ANY	SIGHTING TIME	DIRECTION OF MOVEMENT
	M	F	U	M	F	U	Up to 1 year	Above 1 Year		Lat	Long			
	1								1	26·755748	91·126555		10:55 hr	West
RHINO														
TOTALS	1							1						

Page No.:

Signature of Observer: CM

Signature of Enumerator: Durga Kherkutay

Form 1

RHINO ESTIMATION 2022
MANAS MANAS NATIONAL PARK
DATE: 02-04-22

BLOCK NAME/RANGE/TEAM NO.	Rupahi		
NAME OF ENUMERATOR AND DESIGNATION	Arjun Kr. Rabha		
NAME OF ELEPHANT (IF ON ELEPHANT)	Pramila Rubshing		
STARTING POINT COORDINATES	N-26°11'55.5"E-91°08'17		
END POINT COORDINATES	N-26°42'42.0"E-91°5'2.0		

AREA OF BLOCK IN SQ KM	
NAME OF OBSERVER (FRONTLINE STAFF)	Bangshidhar Das
NAME OF MAHUT (IF ON ELEPHANT)	Mising Mushi/Mohendra Boro
WEATHER	Cloudy and Rain
END POINT COORDINATES	

ANIMAL SPECIES	ADULT			SUB-ADULT			CALF		Total	GPS COORDINATES		ID, IF ANY	SIGHTING TIME	DIRECTION OF MOVEMENT
	M	F	U	M	F	U	Up to 1 year	Above 1 Year		Lat	Long			
		1						01	02	26.72376	91.08642	Mauiao A	11.29 Am	South
RHINO														
TOTALS		1						01	2					

Page No.: 02

Arjun Kr. Rabha
Signature of Observer:

Signature of Enumerator:

Form 2

RHINO ESTIMATION 2022
MANAS MANAS NATIONAL PARK
DATE: 24/2022

BLOCK NAME/RANGE/TEAM NO.	DAOJEHG.2		
NAME OF ENUMERATOR AND DESIGNATION	BUBUL NATH		
NAME OF ELEPHANT (IF ON ELEPHANT)	DARI GDHUA		
STARTING POINT COORDINATES	DAOJEHG. CAMP		
END POINT COORDINATES	2.4A		

AREA OF BLOCK IN SQ KM	14.2
NAME OF OBSERVER (FRONTLINE STAFF)	DENINKHU MUSHA
NAME OF MAHUT (IF ON ELEPHANT)	INKI, HITESH
WEATHER	SEMI Rinni
END POINT COORDINATES	A BWIDARA

ANIMAL SPECIES	ADULT			SUB-ADULT			CALF		Total	GPS COORDINATES		ID, IF ANY	SIGHTING TIME	DIRECTION OF MOVEMENT
	M	F	U	M	F	U	Up to 1 year	Above 1 Year		Lat	Long			
		1						1	2	25.76055	91.0932 58	13 HB	10.42	
	1							1	1	26.74739	910525872	18 N0	11.45	
RHINO														
TOTALS	1	1						1	5					

Page No.: 2

Denkhu Murahary
Signature of Observer:

Rubul Nath
Signature of Enumerator:

Form 1

RHINO ESTIMATION 2022
MANAS MANAS NATIONAL PARK
DATE: 02-04-2022

BLOCK NAME/RANGE/TEAM NO.	Dhonbil Block
NAME OF ENUMERATOR AND DESIGNATION	Sande Daimary
NAME OF ELEPHANT (IF ON ELEPHANT)	
STARTING POINT COORDINATES	26°70863,91°09790
END POINT COORDINATES	26°708218,91°1050 85

AREA OF BLOCK IN SQ KM	Mangat Kherkatary, Haro Chanbo Biyi, Nimai biaTary
NAME OF OBSERVER (FRONTLINE STAFF)	
NAME OF MAHUT (IF ON ELEPHANT)	
WEATHER	Cloudy/Rainy
END POINT COORDINATES	

ANIMAL SPECIES	ADULT			SUB-ADULT			CALF		Total	GPS COORDINATES		ID, IF ANY	SIGHTING TIME	DIRECTION OF MOVEMENT
	M	F	U	M	F	U	Up to 1 year	Above 1 Year		Lat	Long			
						1			1	26°72323	91°093052		11.30	West
RHINO														
TOTALS						1			1					

Page No.:

Signature of Observer: mangal kherkatary (fgd)

Signature of Enumerator: Sande Daimary

Form 2

RHINO ESTIMATION 2022
MANAS MANAS NATIONAL PARK
DATE: 02/04/2022

BLOCK NAME/RANGE/TEAM NO.	Daojeng T-1
NAME OF ENUMERATOR AND DESIGNATION	Jogodish Borumatary
NAME OF ELEPHANT (IF ON ELEPHANT)	Joxoda.
STARTING POINT COORDINATES	26°
END POINT COORDINATES	26°

AREA OF BLOCK IN SQ KM	
NAME OF OBSERVER (FRONTLINE STAFF)	Nobin Borumatary, Powosom D
NAME OF MAHUT (IF ON ELEPHANT)	Powasrow Dor.
WEATHER	Cloudy.
END POINT COORDINATES	

ANIMAL SPECIES	ADULT			SUB-ADULT			CALF		Total	GPS COORDINATES		ID, IF ANY	SIGHTING TIME	DIRECTION OF MOVEMENT
	M	F	U	M	F	U	Up to 1 year	Above 1 Year		Lat	Long			
		1						1	2	26.732.92	91.09357	15	12:17 Pm	South
		1					1		2	26.726348	91.089765	6	12:43 Pm	South.
RHINO														
TOTALS		2					1	1	4					

Page No.: 2

Signature of Observer: Jagadish Basty

Signature of Enumerator: Jagadish Basty

RHINO ESTIMATION 2022
MANAS MANAS NATIONAL PARK
DATE: 02 – 04 – 2022   2 ND DAY –

BLOCK NAME/RANGE/TEAM NO.	SESHAJHAR BANSBARI KANSTHAM		
NAME OF ENUMERATOR AND DESIGNATION	Amrit Boro, (CL)	AREA OF BLOCK IN SQ KM	
NAME OF ELEPHANT (IF ON ELEPHANT)	AS UKBOKAI BS PANCHALI	NAME OF OBSERVER (FRONTLINE STAFF)	BAJO GORA, DAYAL O ATITHI
STARTING POINT COORDINATES	26.68663 30.933 45	NAME OF MAHUT (IF ON ELEPHANT)	1) ANIL DAS GANESH MEDHI
END POINT COORDINATES	26.68214 90.93 8255	WEATHER	RAINY
		END POINT COORDINATES	

ANIMAL SPECIES	ADULT			SUB-ADULT			CALF		Total	GPS COORDINATES		ID, IF ANY	SIGHTING TIME	DIRECTION OF MOVEMENT
	M	F	U	M	F	U	Up to 1 year	Above 1 Year		Lat	Long			
				2	2				4	26.68 6538	90.94002		10.31am	GRAZING
										26.68347	90.93897		10.42am	GRAZING
	1								1	26.67215	90.94816		11.27am	GRAZING
RHINO														
TOTALS									4					

Page No.: 02

Signature of Observer: Signature of Enumerator: Amrit Boro

RHINO ESTIMATION 2022
MANAS MANAS NATIONAL PARK
DATE: 02 – 04 – 2022

BLOCK NAME/RANGE/TEAM NO.	Bhumic K		
NAME OF ENUMERATOR AND DESIGNATION	Govinda Wary		
NAME OF ELEPHANT (IF ON ELEPHANT)	Partima & Leela	AREA OF BLOCK IN SQ KM	
STARTING POINT COORDINATES	26.68832 / 91.03372	NAME OF OBSERVER (FRONTLINE STAFF)	
END POINT COORDINATES	26.68855 / 91.03994	NAME OF MAHUT (IF ON ELEPHANT)	
		WEATHER	
		END POINT COORDINATES	

ANIMAL SPECIES	ADULT			SUB-ADULT			CALF		Total	GPS COORDINATES		ID, IF ANY	SIGHTING TIME	DIRECTION OF MOVEMENT
	M	F	U	M	F	U	Up to 1 year	Above 1 Year		Lat	Long			
	✓	✓							2	26.688793	91.04016			
RHINO														
TOTALS														

Page No.:

Signature of Observer: Signature of Enumerator: Gobinda Wary

02-04-2022

RHINO ESTIMATION 2022
MANAS MANAS NATIONAL PARK
DATE:

BLOCK NAME/RANGE/TEAM NO.	Boat Camp		AREA OF BLOCK IN SQ KM	
NAME OF ENUMERATOR AND DESIGNATION	Dilawar		NAME OF OBSERVER (FRONTLINE STAFF)	
NAME OF ELEPHANT (IF ON ELEPHANT)			NAME OF MAHUT (IF ON ELEPHANT)	
STARTING POINT COORDINATES			WEATHER	
END POINT COORDINATES			END POINT COORDINATES	

ANIMAL SPECIES	ADULT			SUB-ADULT			CALF		Total	GPS COORDINATES		ID, IF ANY	SIGHTING TIME	DIRECTION OF MOVEMENT
	M	F	U	M	F	U	Up to 1 year	Above 1 Year		Lat	Long			
RHINO	✓								1			Ramu		
TOTALS														

Page No.:

Signature of Observer:

Signature of Enumerator:

02-04-2022

RHINO ESTIMATION 2022
MANAS MANAS NATIONAL PARK
DATE:

BLOCK NAME/RANGE/TEAM NO.	Salbagan		AREA OF BLOCK IN SQ KM	
NAME OF ENUMERATOR AND DESIGNATION	Dengkhw Narzary			
NAME OF ELEPHANT (IF ON ELEPHANT)			NAME OF OBSERVER (FRONTLINE STAFF)	
STARTING POINT COORDINATES	26.662458/91.022503		NAME OF MAHUT (IF ON ELEPHANT)	
END POINT COORDINATES			WEATHER	
			END POINT COORDINATES	

ANIMAL SPECIES	ADULT			SUB-ADULT			CALF		Total	GPS COORDINATES		ID, IF ANY	SIGHTING TIME	DIRECTION OF MOVEMENT
	M	F	U	M	F	U	Up to 1 year	Above 1 Year		Lat	Long			
	✓	✓						✓	3	26.662458	91.022503			
	✓		✓						2	26.661852	91.022493			
RHINO														
TOTALS														

Page No.:

Signature of Observer:

Dengkhw Narzary Fgd.

Signature of Enumerator: