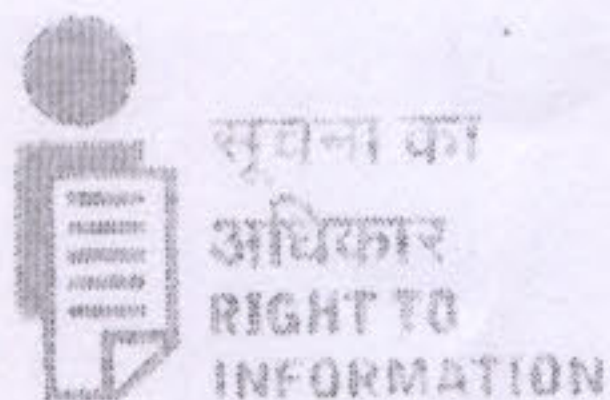




भारतीय वन्यजीव संस्थान
Wildlife Institute of India



SPEED POST

No. A/2-1/2007-WII (Vol.X:2016-17/Part-III)

Dated 19.10.2016

To,

Dr. Renuka Patil,
604-D, Swapnil Enclave,
Amravati Road,
Near Highway Glory Restaurant,
Kachimet, Nagpur – 440 023

Sub.: Information sought under Right to Information Act, 2005- reg.

Ref.: Your RTI Application dated 10.09.2016 forwarded by CTR vide letter dated 21.09.2016, received in this office on 29.09.2016.

Sir,

Please refer to your above cited RTI application (No.37). In this context, the point-wise information pertains to WII, has been collected from the concerned authority of the Institute, contained in 6 (six) pages only, is attached herewith.

If you are not satisfied with the aforesaid reply, you may file an appeal before the First Appellate Authority i.e. "Dr. V.B.Mathur, Director, Wildlife Institute of India, P.B.18, Chandrabani, Dehradun – 248 001, Ph. 0135-2640910" within a period of one month.

Thanking you,

Yours faithfully,

(Ajay Srivastav)

CPIO

Encl: four pages only.

Copy for kind information to – Shri Lalit Ram Chaniyal, CPIO, Corbett Tiger Reserve, Ramnagar, Nainital District, Uttarakhand.

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19/10/16

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पत्रपेटी सं. 18, चन्द्रबनी, देहरादून-248 001, (उत्तराखण्ड), भारत
Post Box No. 18, Chandrabani, Dehradun-248 001, (Uttarakhand), INDIA
ई.पी.ए.बी.एक्स. : +91-135-2640111 से 2640115, एवं 2644462 से 2644464, फ़ैक्स: 0135-2640117, तार: WILDLIFE
EPABX : +91-135-2640111 to 2640115 & 2644462 to 2644464 Fax : 0135-2640117, GRAM : WILDLIFE
ई-मेल/E-mail : wii@wii.gov.in

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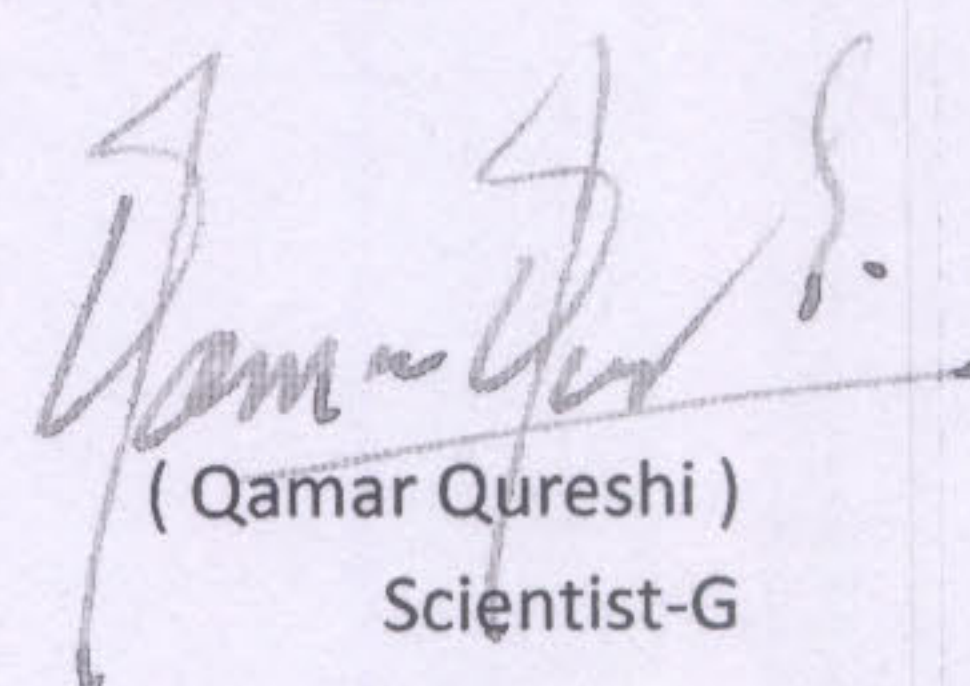
Date: 18 October 2016

Note

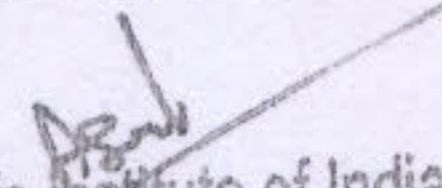
Subject: Response to RTI application (No. 37) of Dr. Renuka Patil.

In response to above mentioned subject the questions (4 to 7) pertaining to population of unique tigers is provided. Since tigers regularly move freely between core and buffer areas it is not possible to segregate them as per administrative boundaries. We have provided consolidated data of our sampled study areas in the attach documents.

Questions 8 to 12 pertain to Corbett Tiger Reserve management. This analysis is not done by WII.


(Qamar Qureshi)
Scientist-G

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Answers to Question 4), 5), 6), & 7)

Number of tigers photo-captured according to the available information:

Year	Number of tiger photo-captured
2011-2012	143
2012-2013	149
2013-2014	176
2014-2015	163

To get the tiger images (photo-captured in camera traps) please find the following links:

1) 2010 Tiger photographs:

http://wii.gov.in/images/publications/researchreports/2011/tiger/staus_tiger_2010.pdf

2) 2014 Tiger photographs:

http://210.212.84.122/download/status_tigers_2014/status_tigers_2014_capera_trap_images.pdf

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Table 2.1 Landscape characteristics of the Shivaliks and the Gangetic Plain

Parameters	Value
Number of forest patches	5660
Forest patch density per 1000 km ²	3.5
Mean forest patch area (km ²)	11.48
Mean forest perimeter to area ratio	33.8
Total forest core area (km ²)	3337
Number of disjoint forest core areas	233
Mean forest core area (km ²)	0.59
Median forest core area (km ²)	9
Total forest core area in forest patches > 1000 km ²	2796

Tiger Status

The tiger has become locally extinct in 29% of the districts of this landscape where it was historically recorded. Currently the tiger occupies 5,080 km² of forested habitats with an estimated population size of 297 (259 to 335) in six separate populations (Figure 2.2).

Tiger habitat in this landscape exists in two contiguous 'relatively large patches' (Figure 2.1) which consist of:

- (a) Kalesar in Haridwar to Kishanpur in Uttar Pradesh covering areas of Rajaji National Park and Corbett Tiger Reserve (21,500 km²). This landscape unit is most promising for long term tiger conservation.

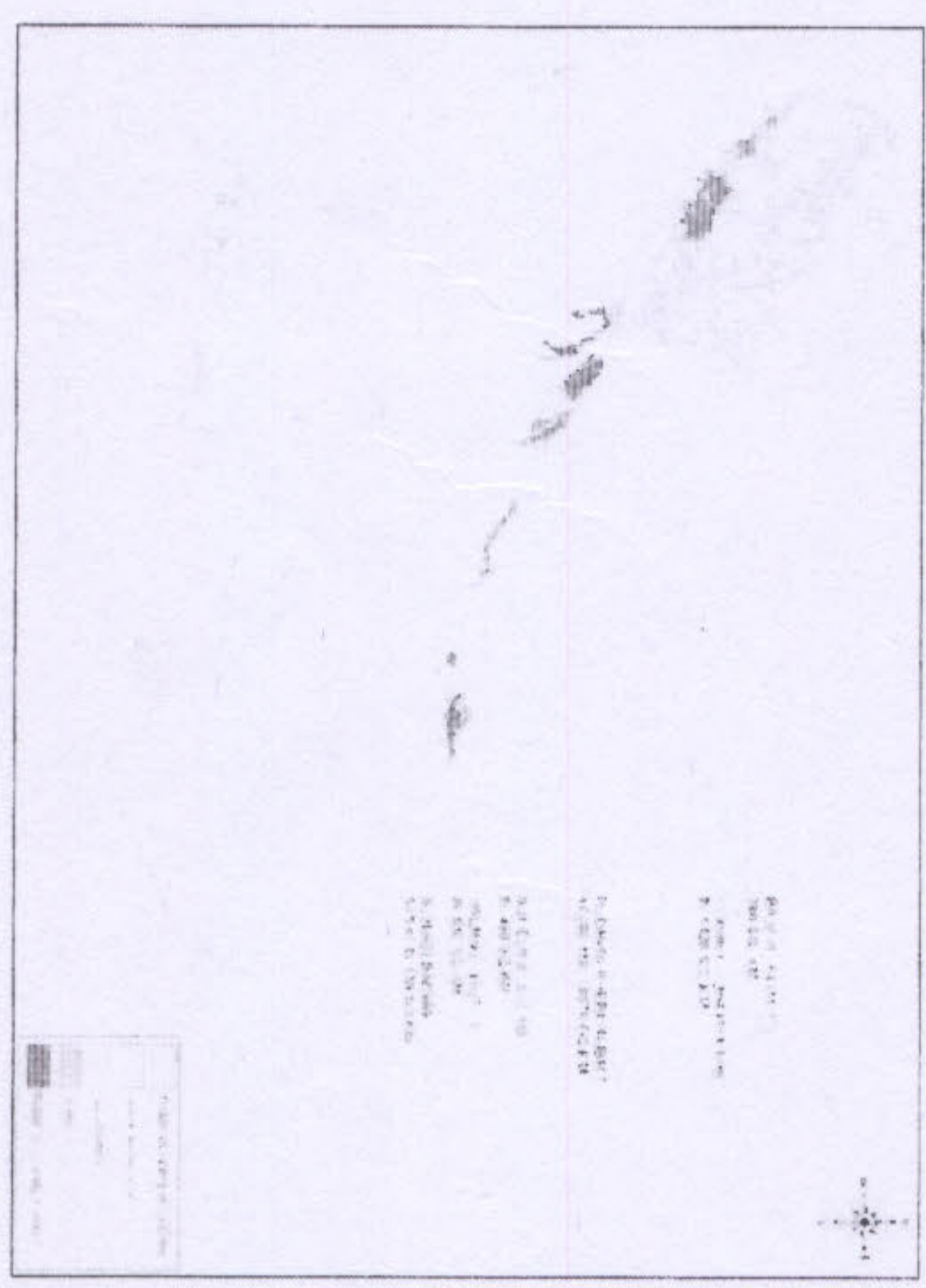
- (b) Dudhwa Tiger Reserve and Solanji Barva in Uttar Pradesh and Valmiki Tiger Reserve in Bihar (2,600 km²) are connected through the Shivalik forests (Jharna hills) of Nepal. These forests in Nepal have protected areas like Salsila Phanta, Bardia, and Chitwan National Parks. This landscape unit has high tiger conservation potential through transboundary conservation efforts and international cooperation and commitment. The tiger habitats within India by themselves have limited long term value, unless managed as a holistic landscape including connectivities and source populations in Nepal.

The most important tiger population within this landscape is Corbett having tiger presence in 1,524 km² with an estimated

population of 104 (151-178). The landscape is characterized by having the ability of sustaining high density tiger populations e.g. Corbett 19.6 tigers per 100 km². Dudhwa, Kishanpur and Karamnaghat tiger density ranging between 1.5 to 6.5 tigers per 100 km². Thus, with good management and protection tiger

reserves in this landscape can serve an important role for tiger conservation. Reserves and landscapes that need fostering to achieve their inherent potential are Rajaji along with Shivalik and Haridwar Forest Divisions, and Valmiki Tiger Reserve.

Figure 2.2: Tiger occupied forests, individual populations, their extent and habitat linkages within the Shivalik-Gangetic floodplain landscape



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PHASE III RESULTS

Authors: Qamar Qureshi, Yadvendradev Jhala,
Joseph Vattakaven, K.Sankar, Anil Singh, M. Firoz Ahmed.

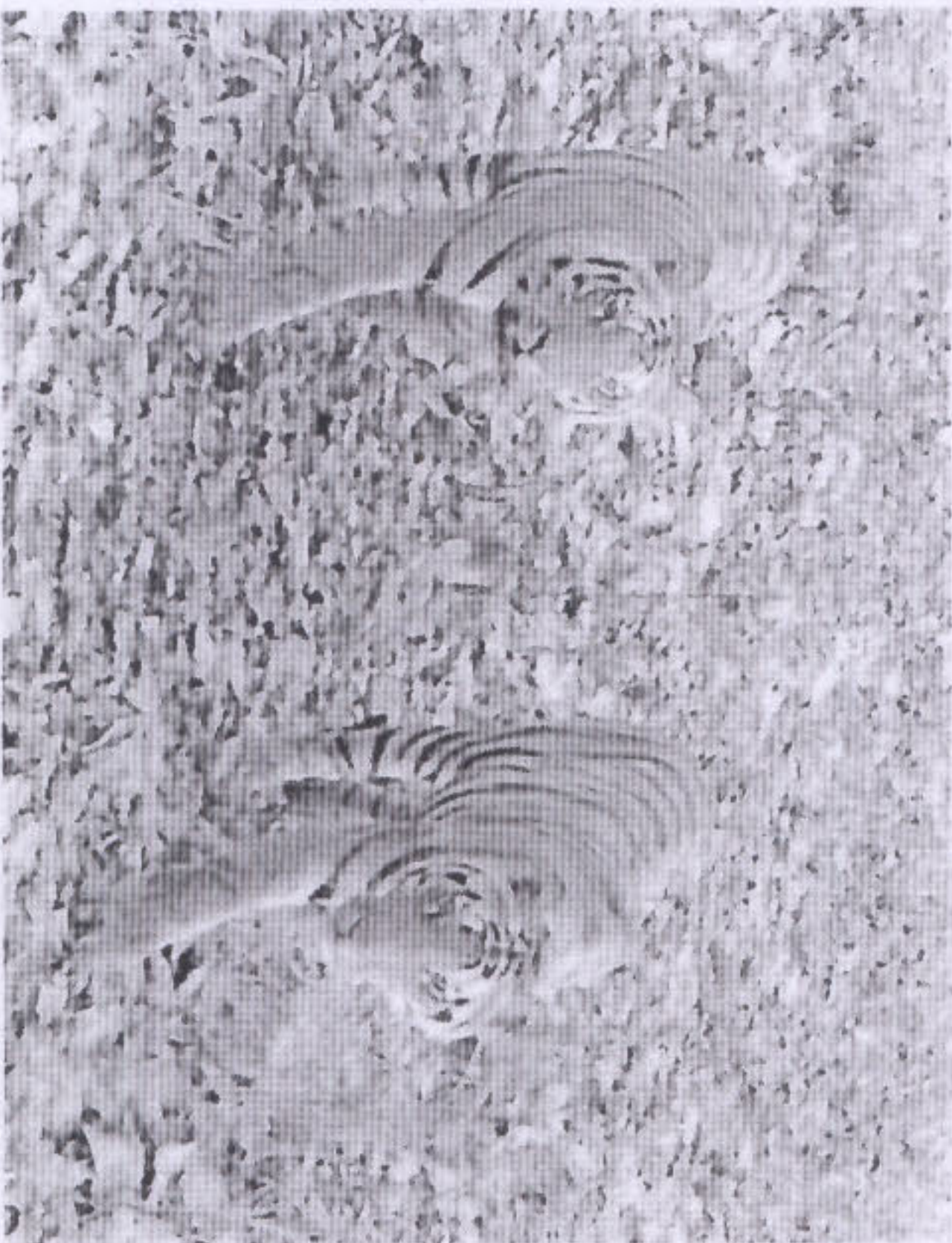


Figure 6.1

Corbett Tiger Reserve



VARIABLES	ESTIMATION	STANDARD ERROR
EFFECTIVE TRAPPING AREA (ETA) km ²	611	(594-629)*
CAMERA POINTS	103	-
NO. OF TRAP NIGHTS	9064	-
UNIQUE INDIVIDUAL (M+1)	101	-
POPULATION ESTIMATE (N)	109	5.4
D DENSITY ESTIMATE	17.83	1.40
D MLSECR	16.23	1.63

- Standard Error Range *
- (N) The best fit model is Mh
- D is based on ETA by 1/2 MMDM
- D MLSECR (Maximum Likelihood Spatially Explicit Capture Recapture) based on Half Normal model.

Research Team: WIL: Shikha Bisht, Debmalya Roy Chowdhury, Sudip Banerjee, Neha Awasthi, Rubi Kumari Sharma, Anant Pande, Devlin Leishangthem, Pushkal Bagchie, Abhinash Parida, Preeti Virkar, Subhasis Mahato, Ayan Sadhu, Priyanka Runwal.

Teams of trained wildlife biologists collected information on the actual population and density of tigers and their prey from 29 different sites from across the tiger bearing forests of India by using statistically rigorous methods like camera trap based mark-recapture. The results of this exercise (Phase III) were then used to calibrate against the Phase I and Phase II data sets, which consist of indices and covariates of tiger abundance.

Tiger abundance was estimated from areas ranging between 74 (Orang) to 894 km² (Achanakmar) based on available tiger occupied habitats at various sites (Figures 6.1 to 6.31). The effort exerted ranged between 713 (Orang) to 12,400 (Pench) trap nights. The total area camera trapped was 11,192 km² across 29 sites with a total effort of 81,409 trap nights. Tiger (>1.5 years of age) captures ranged between 1 (Achanakmar) to 101 (Corbett) individuals. The total number of tigers photo-captured was 635 (table 6.1, Appendix 3). The minimum density (ETA estimated by half MMDM) of 0.11 tigers per 100 km² was estimated for Achanakmar while the maximum was 17.8 (se 1.4) tigers per 100 km² in Corbett. Tiger densities of more than 10 tigers per 100 km² were recorded from seven sites (table 6.1). For comparison with earlier studies the density estimates were obtained from effective trapping area estimated by half mean maximum distance moved by recaptured tigers. Density was also estimated by spatially explicit likelihood models (table 6.1).

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Corbett Tiger Reserve (Uttarakhand)

Shikha Bisht¹, Sudip Banerjee², Samir Sinha², Saket Badola², Prerna Sharma¹, Syed Abrar¹, Urvashi Sharma¹, Bivash Pandav¹, Parabita Basu¹, Qamar Qureshi¹ and Y. V. Jhala¹.

¹Wildlife Institute of India and ²Corbett Tiger Reserve.

Corbett Tiger Reserve (CTR) encompasses a multitude of habitats since it is spread across the Terai, Shivalik Hill Range, Bhabhar tract, Ramganga valley and the foothills of Himalayas. It is located within Nainital and Pauri Garhwal districts of the state of Uttarakhand. It lies between 29° 25' N to 29° 40' N latitudes and 78° 5'E to 79° 5'E longitudes. Corbett Tiger Reserve covers an area of 1288.32 km² which includes 520.82 km² of Corbett National Park (CNP), 301.18 km² of adjoining Sonanadi Wildlife Sanctuary (SWS) and 466.32 km² of buffer zone (Bharthari 1999). After experiencing several name changes it came to be recognized as CTR, after the famous hunter turned conservationist, Jim Corbett, in the year 1957. The forest divisions of Uttar Pradesh surrounding the tiger reserve namely Bijnore Forest Division (BFD) (80 km²) and Najibabad Forest Division (NFD) (71.60 km²) have been incorporated as buffer of the tiger reserve.

The forests of CTR are classified into three major forest types viz. Northern moist deciduous (3C), Northern tropical dry deciduous (5B) and Himalayan sub tropical pine forest (9) (Champion and Seth 1968). Sal (*Shorea robusta*) is the most dominant tree species growing in the park. Evergreen species like *Mallotus philippinensis* and *Syzygium cumini* are also commonly seen. Other medium sized evergreens include *Litsea monopetala*, *L. glutinosa*, and the fragrant *Murraya paniculata*. Among deciduous species *Terminalia alata*, *Tokebula*, *Semicarpus angocardium*, *Lannea coromandelica*, *Sapium insigne*, *Lagerstomia parviflora*, *Butea monisperma*, *Cassia fistula* and *Ehretia laevis* can be seen throughout the park in good numbers. At several places *Bombax ceiba* and *Anogeissus latifolia* can be seen as Sal associates. *Phyllanthus emblica*, *Acacia catechu*, *Kydia calycina*, *Dalbergia sissoo* and *Holoptelia integrifolia* can be seen at open sunny places near sots and lining grasslands edges. Plantations of *Tectona grandis* and *Eucalyptus* spp. can be seen near the eastern and southern boundaries of the park.

Other than the tiger the park supports felids like leopard, leopard cat, jungle cat, rusty spotted cat and fishing cat. Other carnivores include the golden jackal, sloth bear and Himalayan black bear. Herbivores include elephants, sambar, chital, barking deer, hog deer, goral and serow. Nilgai is seen mostly in the disturbed fringes. Small Indian civet, Himalayan palm civet and common palm civet are found along with mustelids like yellow throated marten and mongoose. Black napped hare and Indian porcupine are of common occurrence. The Ramganga river system also supports a good population of smooth coated otters. Among reptiles, a good population of gharials and mugger can be seen in the river as well as the reservoir. Snakes like king cobra, cobra and python are also found in the park. Among other reptiles are the rock agama, monitor lizard and various turtle species like, Indian black turtle and tricarinate hill turtle (Bharthari 1999).

The avifauna of CTR and its adjoining forest divisions is very rich and more than 549 species of resident and migratory birds have been reported from CNP.

Corbett is the largest source population for tigers in Shivalik-Gangetic landscape and responsible for the remarkable recovery of tiger population in this landscape. The corridors connecting Corbett with the surrounding forest divisions and protected areas are crucial for the long term survival of this metapopulation.

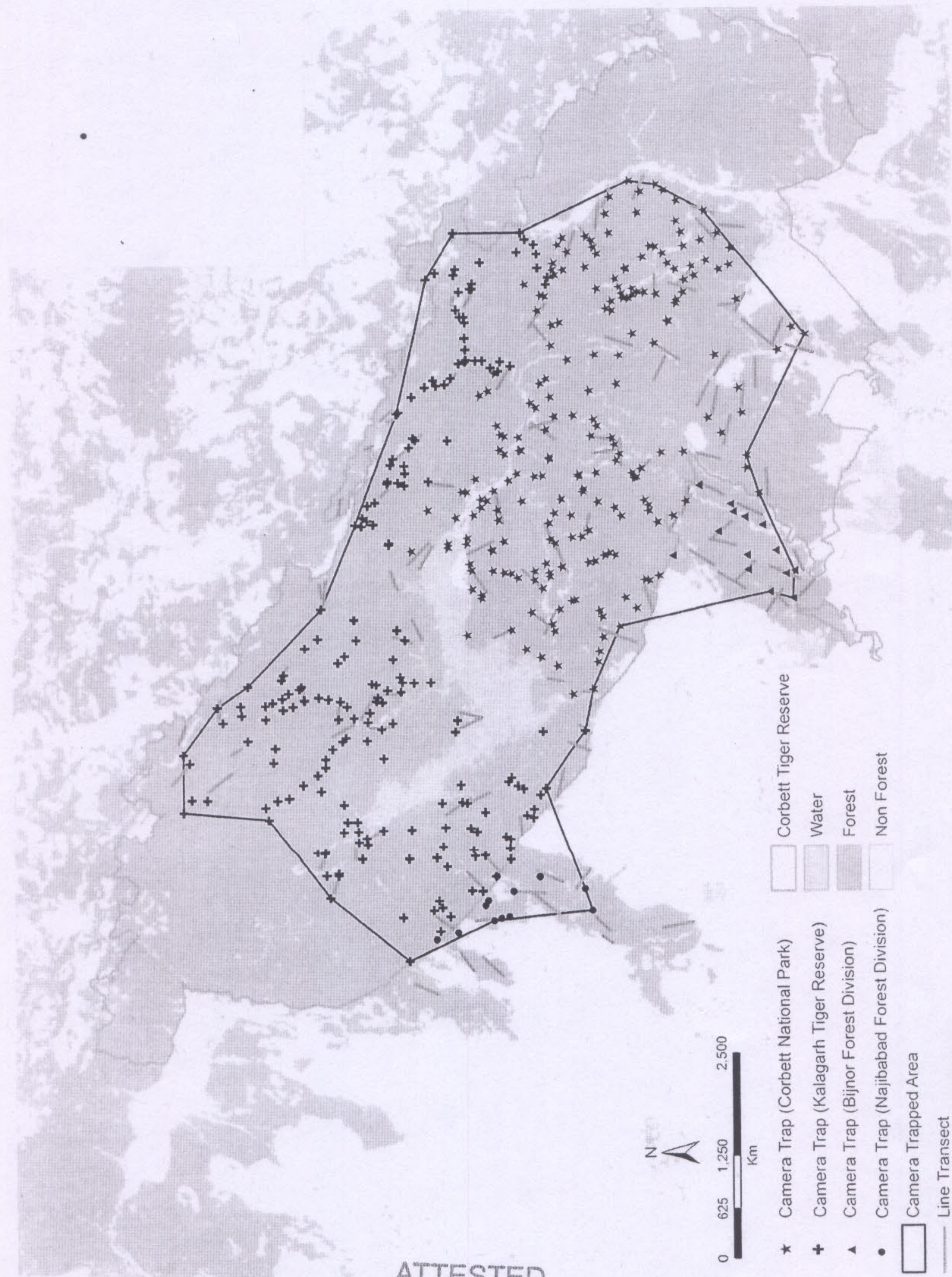
Sampling Details:

- a) Camera traps were deployed in 4 different blocks, viz, CNP (6/3/2014 to 25/5/2014), SWS (18/4/2014 to 23/6/2014), BFD (6/3/2014 to 13/05/2014) and NFD (9/3/2014 to 9/4/2014). A total of 444 camera trap locations covering an area of 1288.32 km² (Fig. 9.3) resulted in a sampling effort of 14631 trap nights (Table 9.4).

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Figure 9.3. Distribution of Camera traps (n=444) and line transects (n=126) in Corbett Tiger Reserve, 2014.



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- b) Line transect ($n=126$) for prey were walked during March- June 2014 (Fig. 9.3). Each transect was walked in the morning between 0600 to 0800 hours with three temporal replicates yielding a total walk effort of 570.49 km (Table 9.5)
- c) Carnivore sign survey was carried out during March- June 2014 in 70 beats comprising of 15 km walk effort in each beat. The total effort in CTR and its adjoining forest was 837.31 km (CNP- 341.55 km, SWS- 415.55 km, NFD - 37.47 km and BFD- 43.14 km).

Table 9.4: Sampling details and tiger density parameter estimates in spatially explicit capture recapture in likelihood framework for Corbett Tiger Reserve and its adjoining forest divisions, 2014.

Variables	Estimates
Minimum bounding polygon (km^2)	1271.32
Camera Points	444
Trap Nights (effort)	14631
Unique tigers captured	176
Model	$g0(.)\sigma(.)$
$\hat{D}$ ML SECR (SE) (per 100 km^2)	11(0.80)
Sigma (SE) (km)	2.23 (0.0036)
$g0$ (SE)	0.03 (0.001)

SE: Standard error

$\hat{D}$ ML SECR: Density estimate from Maximum Likelihood based spatially explicit capture recapture

σ (Sigma): Spatial scale of detection function, $g0$: Magnitude (intercept) of detection function

Table 9.5: Model statistics and parameter estimates of line transect ($n=126$, Total effort 570.49 km) based distance sampling for prey species in Corbett Tiger Reserve, 2014.

Species	Model	Chi Sq P Value	Effective Strip Width (SE)	No. Groups Detected	Mean Group size (SE)	Detection Probability (SE)	Encounter Rate per km	Group Density (SE) per km^2	Individual Density (SE) per km^2
Barking Deer	Hazard Cosine	0.91	33.17(4.65)	86	1.34(0.05)	0.36(0.05)	0.15	2.27(0.43)	3.06(0.59)
Chital	Hazard Cosine	0.91	35.18(2.3)	261	9.9(0.59)	0.44(0.02)	0.45	6.5(0.78)	64.38(8.6)
Elephant	Uniform Cosine	0.98	67.27(6.7)	32	5.91(1.10)	0.57(0.05)	0.05	0.41(0.09)	2.46(0.74)
Langur	Half normal Simple	0.86	33.61(2.8)	71	12.40(1.10)	0.45(0.03)	0.12	1.85(0.39)	23.18(5.87)
Nilgai	Half normal Simple	0.87	35.17(4.4)	30	4.86(0.49)	0.47(0.05)	0.05	0.74(0.24)	3.63(1.25)
Sambar	Half normal Hermite	0.92	41.16(2.64)	162	2.71(0.12)	0.53(0.03)	0.27	3.34(0.37)	9.09(1.1)
Wildpig	Uniform Cosine	0.84	36.04(2.8)	55	6.90(0.87)	0.58(0.04)	0.09	1.26(0.21)	8.7(1.84)

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