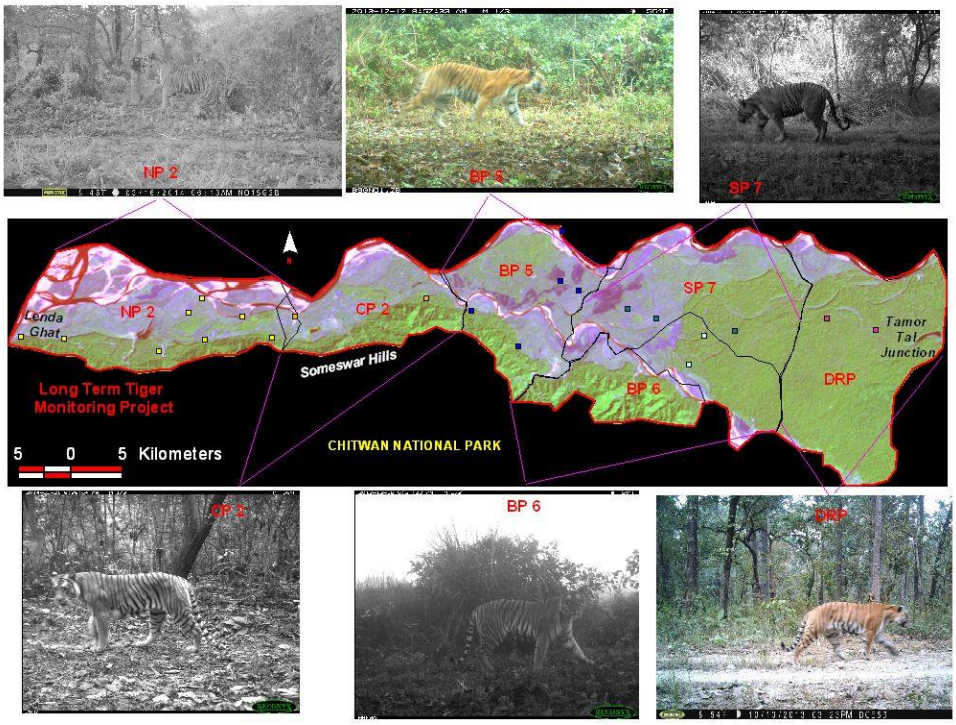
LONG TERM CAMERA TRAPPING TIGERS AT CHITWAN NATIONAL PARK AND BUFFER ZONE, NEPAL

An Annual Report and a Summary of Camera Trapping Results since 1995



Submitted

To

Department of National Parks and Wildlife Conservation

Chitwan National Park, Kasara

By

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BACKGROUND AND STUDY AREA

Since 1995 we have focused on the same study area year after year: approximately 100 km² area bounded by Tamor Tal Junction, on the east, and Lenda Ghat, on the west; between the Rapti and Narayani Rivers, on the north, and the Reu River and the base of the Someswar Hills, on the south (Figure 1). By virtue of trapping in successive seasons we have been able to identify the resident tigers photographed, as opposed to the sub-adults and transients, something that it is not possible to do after a single season of camera trapping. Only the breeding adults are counted as part of the population.

CAMERA TRAPPING IN CNP 2013 – 2014 SEASON

METHODOLOGY

The study area of the Park was divided into 4 blocks which were successively trapped between 9 December 2013 and 17 March 2014. Sets of 2 digital cameras were set up at intervals along roads, trails, and other routes of tiger travel (Figure 1). The camera traps remained in place for 24 hours. Each period was a trap "day." Effort was the number of camera traps used times the number of days they were set up. For example in Block One 12 cameras were set up for 23 days, so the effort was 276 trap days. It was 396 in Block 2, 420 in Block 3, and 522 in Block 4. Total effort was 1,614 trap days. The output was 540 tiger photographs.

RESULTS OF THE 2013 – 2014 SEASON

During the current season we trapped the same 6 resident females as 2 years previously in 2011-12, namely Deorali Pothi (DRP), Sukhibhar Pothi (SP7), Bhaluwai

Pothi (BP6), Baghmara Pothi (BP5), Chamka Pothi (CP2), and Nandapur Pothi (NP2) (Figure 2; Appendix 1). Five of the females, all but SP7, gave birth to new litters in 2013, a total of 12 cubs, all photographed. Three of the litters were sired by new males, Kamal Bhale and Lenda Bhale, which had replaced 2 earlier males, Dhurba Bhale and Khoria Bhale, present in 2011-12. Dhurba Bhale was actually photographed leaving the study area. Two litters were sired by Gaida Kawa (Rhino eater) Bhale, a male who has been breeding since 2009.

We also captured one transient male that had been photographed in a previous season, as well as 2 unknown sub-adult males.

LONG TERM CAMERA TRAPPING RESULTS BEGINNING 1995 - 2014

We have completed 16 seasons of camera trapping: ten years from 1995 - 2005, five years from 2007 - 2012 and lastly one year 2013-2014, over a total period of 19 years.

Even during the 2 intervals between the 3 periods we were able to collect data on individual residents, so that we have a complete data set covering 19 years. It will be rewarding to examine some of the salient results of the entire period. During that time we recorded 20 resident breeding females and one post-reproductive female. There were 10 resident breeding males. All the residents were given names, shown here as abbreviations. There were 137 young recorded belonging to 49 litters; mean litter size was 2.80.

For reproduction, the critical resource of a tiger population is its resident reproductive females: their number, stability, density, longevity, and reproductive

success. Males are also important, but less so, because one male can mate with several females in a relatively short period of time.

The most surprising result of our study was the stability of the number of resident females in the study area. Season after season the number of breeding females was six; occasionally rising to seven or eight, but it always leveled off it six. For instance, in 1995-96 the newly established female BP3 replaced her post-reproductive mother JP, reducing the number of females that year from 7 to 6. The density therefore is 6 breeding females/100 km² (At Carrying Capacity).

At Carrying Capacity

Beginning of camera trapping 1995 -2005

1995-96	TP2	AP	RP2	BP3>JP	TP	JP2	6<7
1996-97	TP2	AP	RP2	BP3	TP	KP3	6
1997-98	TP2	RP2>AP	LP3>AP2	BP3	TP	KP3	6<8
1998-99	TP2	RP2	LP3	BP3	TP	KP3	6
1999-00	TP2	RP2	LP3	BP3	TP	KP3	6
2000-01	CP2	TP2	LP3	BP3	SP7	KP3	6
2001-02	CP2	TP2	LP3	BP3	SP7	KP3	6
2002-03	CP2	TP2	LP3	BP3	SP7	EP	6
2003-04	CP2>TP2	DP3>No4	LP3	BP3	SP7	EP	6<8
2004-05	CP2	DP3	LP3	BP3	SP7	EP	6

2005-07 Only ad hoc camera Trapping

Camera trapping 2007-2012

2007-08	NP2	CP2	LP3	BP5	SP7	CPP	6

2008-09	NP2	CP2	LP3	BP5	SP7	CPP	6
2009-10	NP2	CP2	LP3	BP5	SP7	CPP	6
2010-11	NP2	CP2	LP3	BP5	SP7	CPP ½ / KP4 ½	6
2011-12	NP2	CP2	BP6>LP3	BP5	SP7	DRP	6<7
2013-14	NP2	CP2	BP6	BP5	SP7	DRP	6

During 7 seasons only one male was present, during another 7 seasons 2 males were present, and during the 5 remaining seasons 3 were present.
There was considerable disparity in reproductive success for both sexes. Seven long-lived females (35% of the total) produced 67% of the young. One of the 10 males sired 31% of the cubs, while 2 of them accounted for 51%.

Now we will examine in more detail the 7 long-lived resident females. In order to get complete pictures it will be necessary to include 2 litters born to one of them, and one litter to another to one, prior to the beginning of the camera trapping in 1995-96.
These 7 females produced a mean of 4.9 litters during their lifetimes (range 4-6). The 34 litters were comprised of 101 young, yielding a mean litter size of 2.97 (3.0). Survival rate to dispersal age was 63%. The 7 females lived to a mean of 14 years (range 11-16). One male, Eastern Bhale, in his 6 year breeding life, double the average for males, sired 16 litters with 10 different females; from 1999 through 2001, five of those females resided in EB's territory concurrently.

Eight cases of male turnover were recorded; in 3 of them infanticide was proven by the discovery of dead cubs killed by the new male, in 2 other cases evidence for infanticide was circumstantial; the last litter of the replaced male disappeared shortly

after he died. In a final case a female's young cubs were killed by another female after she died/was killed.

CONCLUSIONS

Chitwan National Park has a stable number of breeding females that occur at very high density and can raise their young in territories of <20 km². Mean territory size in this study was 17 km² (16.6 km²). Long lived resident females giving birth to nearly 5 litters (mean 4.9) each during their lives characterize the population. Reproductive success is high. The limiting factor is the small amount of breeding habitat available in the Park, which is almost entirely confined to riverine habitat, consisting of alluvial grassland, riverine forest, and lowland Sal forest. The majority of the Park consists of unsuitable upland Sal forest.

In 1995 ITNC, NTNC and DNPWC together conducted a tiger count of CNP lasting 3 months. One of the salient results was a tabulation totaling 30 resident breeding females. Given the degree of stability described over the last 19 years, it is not likely that the number has changed appreciably.

Given the stability that characterizes the CNP tiger population, one cannot expect any dramatic increase. More tigers require more prey and since the prey base in the Park is synch with the habitat, the only way to increase the prey is to increase the habitat. A big step in this direction has been the creation of the Buffer Zone. Improved management of the BZ community forests has resulted in the creation of additional tiger habitat outside the park in the Buffer Zone. But the number of breeding females that can be accommodated in the BZ forests is limited. See below.

CAMERA TRAPPING IN THE BUFFER ZONE OF CNP 2013 - 2014

Camera trapping was conducted in three areas in the buffer zone: 1) Nawal Parasi CFs, 2) Madi CFs and 3) Meghauly CFs (Figure 1). Cameras were successfully set between 19 March 2014 and 8 June 2014 (19 March 2014 and 14 April 2014 in the Nawal Parasi CF; 17 April 2014 and 12 May 2014, in Madi CF; and 15 May 2014 and 8 June 2014, in Meghauly CF). In each area 7 to 8 camera locations were established with a set of 2 digital cameras in each location. The cameras traps were placed for 24 hours and it was monitored by respective community forests guards and camera trapping technicians on a regular basis. Number of camera trap days varied from 23 to 27 days. The total effort was 534 trap days. 177 trap days in Nawal Parasi, 191 days in Madi and 166 trap days in Meghauly CF.

RESULTS AND DISCUSSION

The output of the trapping effort was 34 tiger photographs. These photographs included four individual tigers. A male and a female tigers were photographed in Nawal Parasi, one male was photographed in Madi and a female was photographed at Meghauly (Figure 3).

At Nawal Parasi, during the 2012-13 trapping season, only a male tiger was photographed. However, this season we photographed the same male and a female. The riverine forest in this area is a potentially good tiger habitat and is large enough to support a resident female provided good protection and prey base is maintained. Therefore, BZ forests have been instrumental in increasing the land base for CNP tigers.

Meghauly CFs is narrow strip of forest along the CNP border. This area is not

large enough to support the tiger independently. However, tigers from the Park use these areas frequently, extending their territory. In 2012-13 camera trapping season we had photographed five resident females, three of which were the resident females documented in the Long Term Tiger Monitoring area. This season all three resident females were also photographed but was not included in Meghauly CF results. We camera trapped CFs along the Narayani River. In this area, only one female was photographed out of two females' photographed last season. It is likely that the tiger did not use the BZ CFs during the camera trapping days.

During the two camera trapping seasons in Madi CFs in 2005 – 2007, only male tigers were successfully photographed. However, pugmarks indicated a presence of a resident female and her two sub-adult cubs. Likewise, this year only one male was successfully photographed. The low frequency of tigers photographed in Madi CFs is due to the steep and hilly terrain. Placing a camera traps in a grid or determining a tiger travel routes in such environment is very difficult. This area covers approximately 126 km^2 of community forests and can support two females and a male tiger indicated by photographs and pugmarks.

It can be concluded that the buffer zone community forests has increased the land base for CNP tigers. Tigers are expanding and establishing their territories into these forests. These community forests including Barandabhar, Nawal Parasi and Madi can support approximately six resident females that increase the overall Chitwan tiger population.

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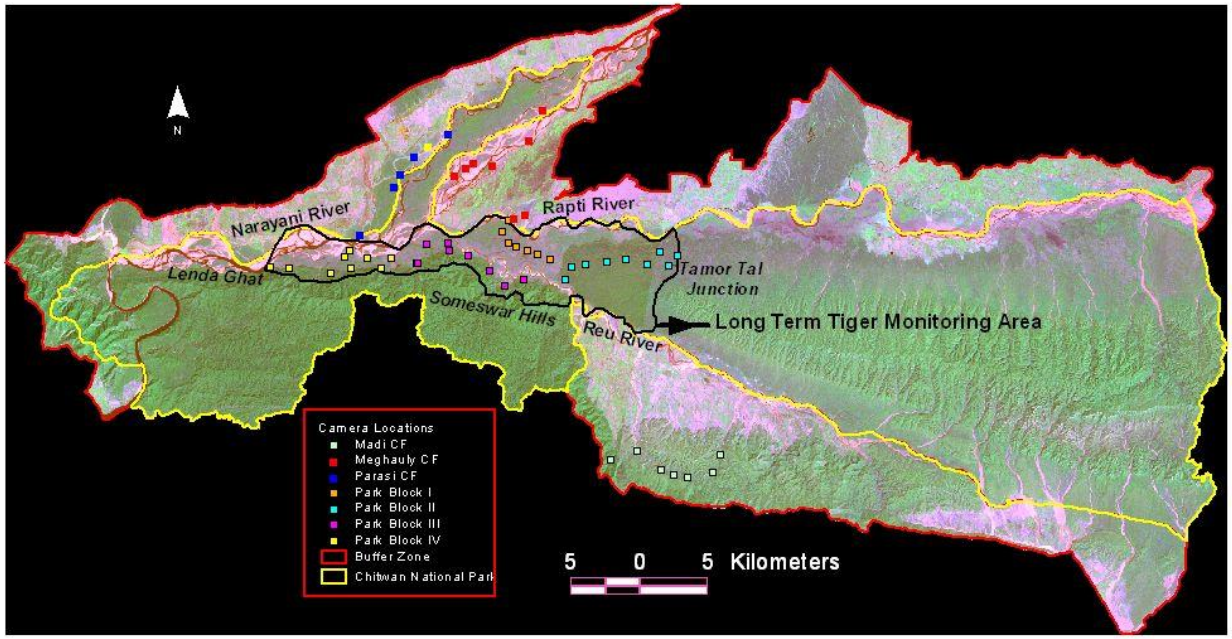


Figure 1: Long Term Tiger Monitoring Area and locations of camera trapping in 2013-14.

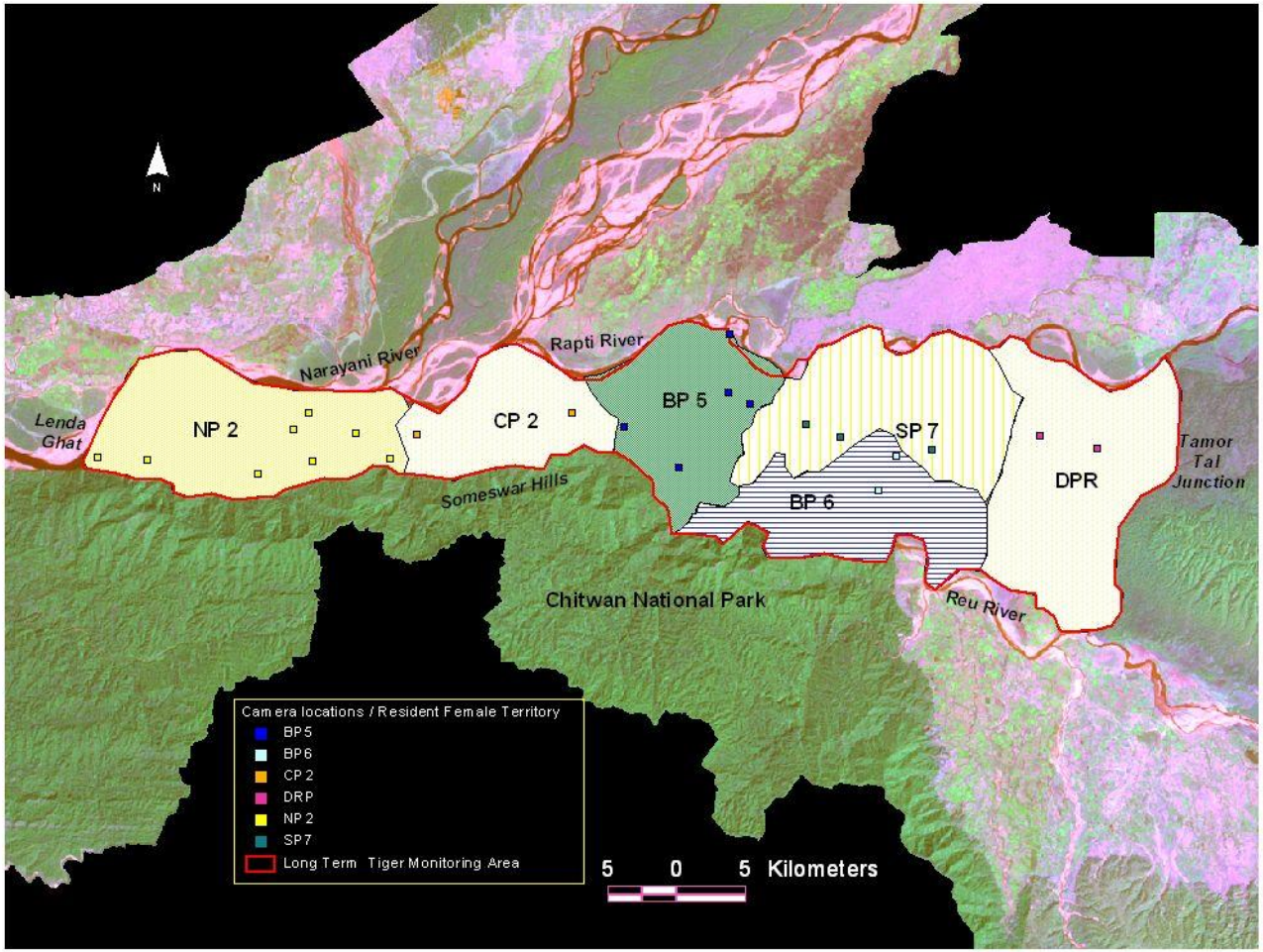


Figure 2: Name of resident female tigers and their territories during the 2013-14 season in the Chitwan National Park.

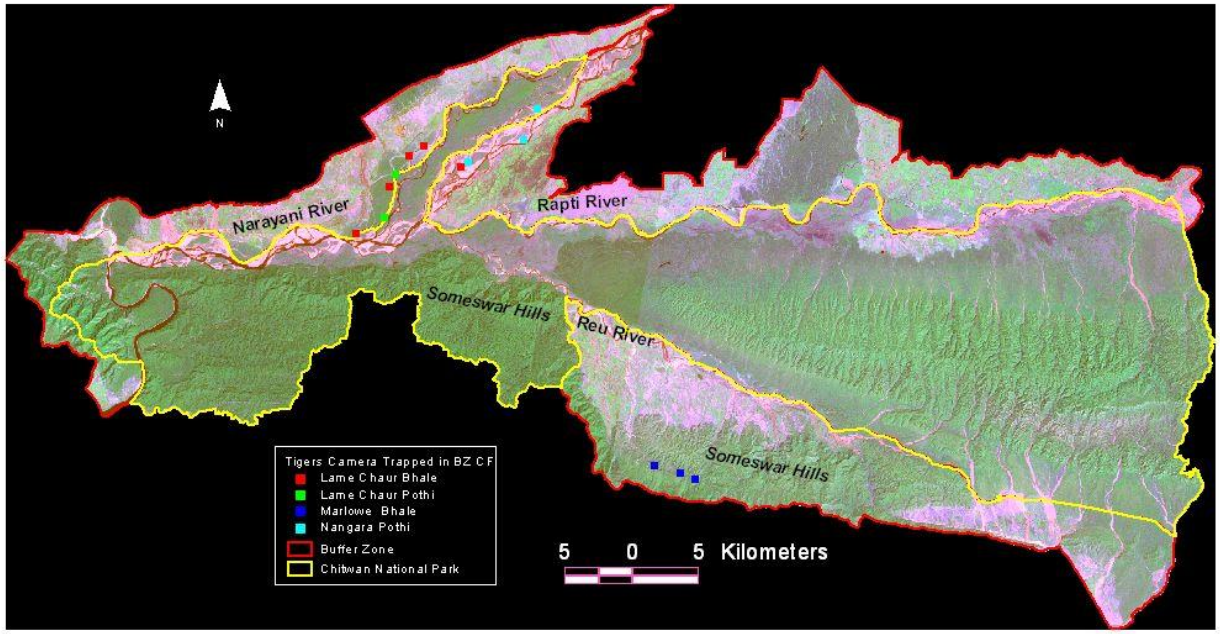
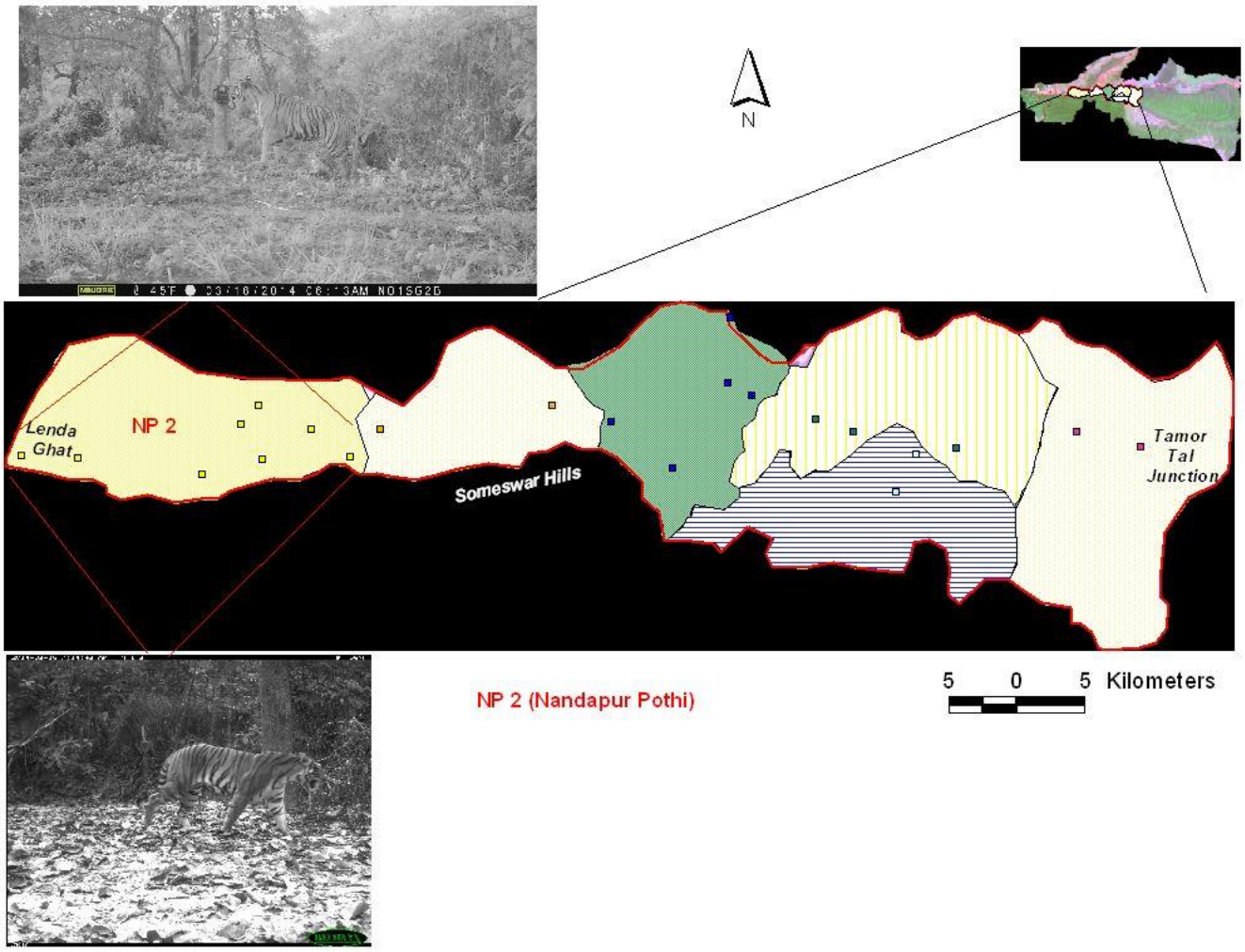
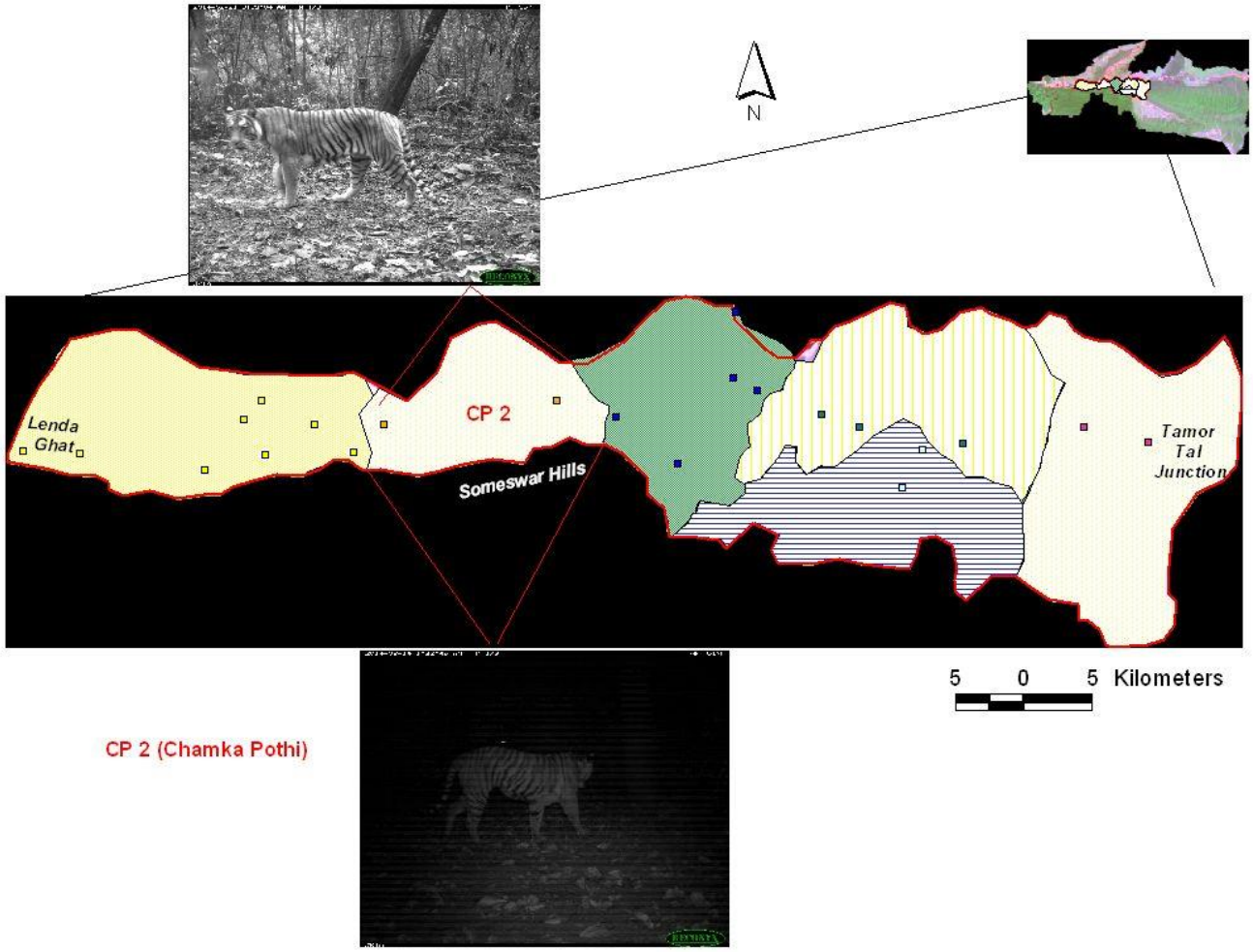


Figure 3: Name and locations of tiger's camera trapped in the buffer zone of Chitwan National Park during 2013-14.

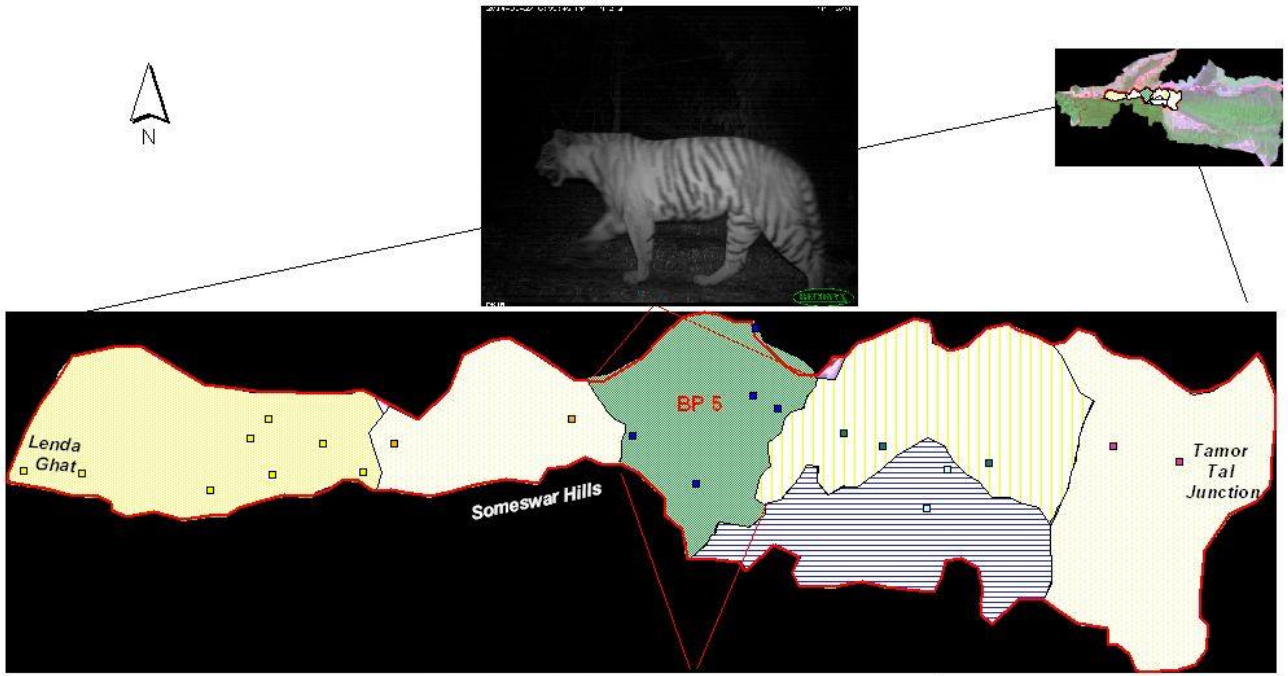
Appendix 1 (a): NP 2 (Nandapur Pothi) photographed locations and territory during 2013-14



Appendix 1 (b): CP 2 (Chamka Pothi) photographed locations and territory during 2013-14

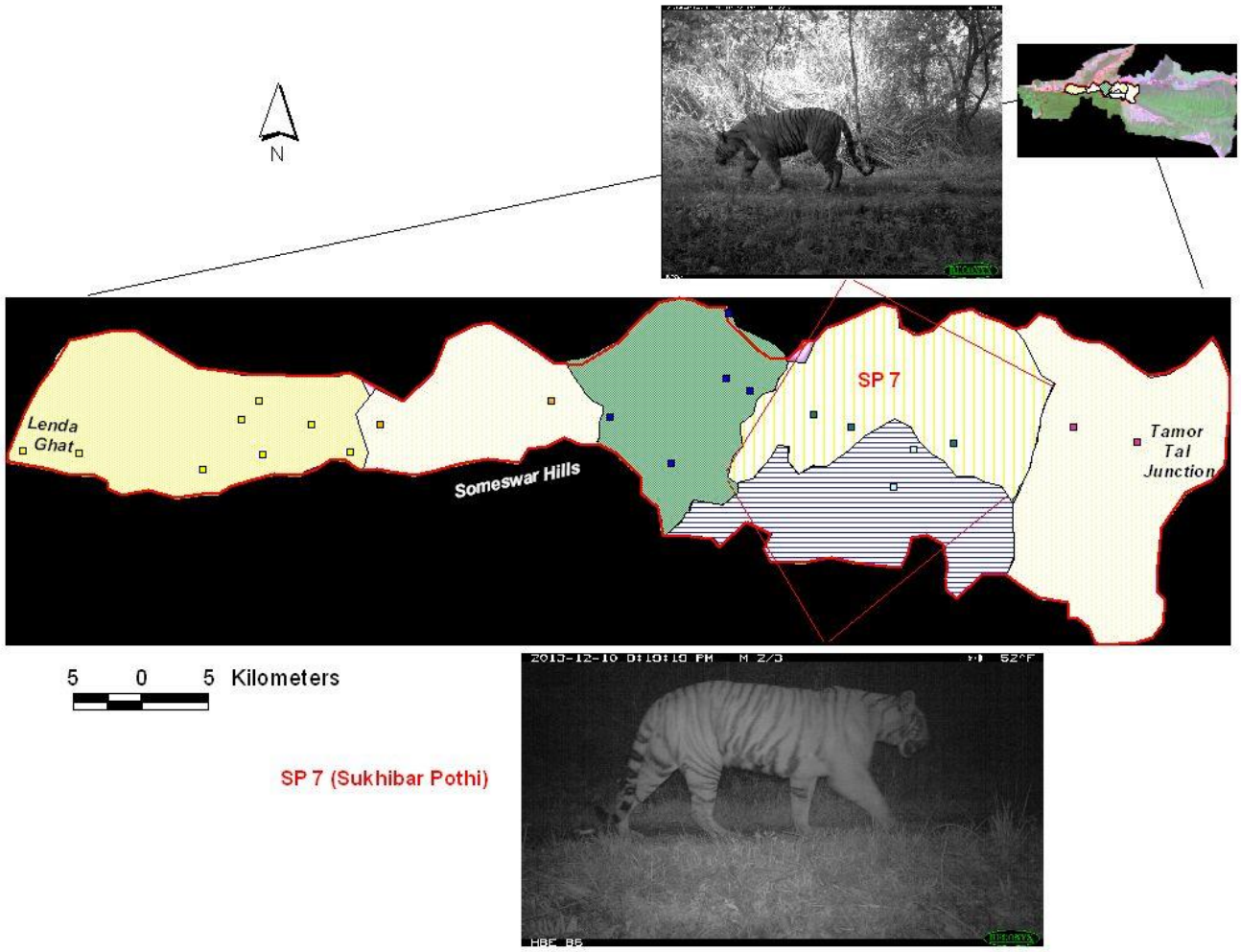


Appendix 1 (c): BP 5 (Baghmara Pothi) photographed locations and territory during 2013-14

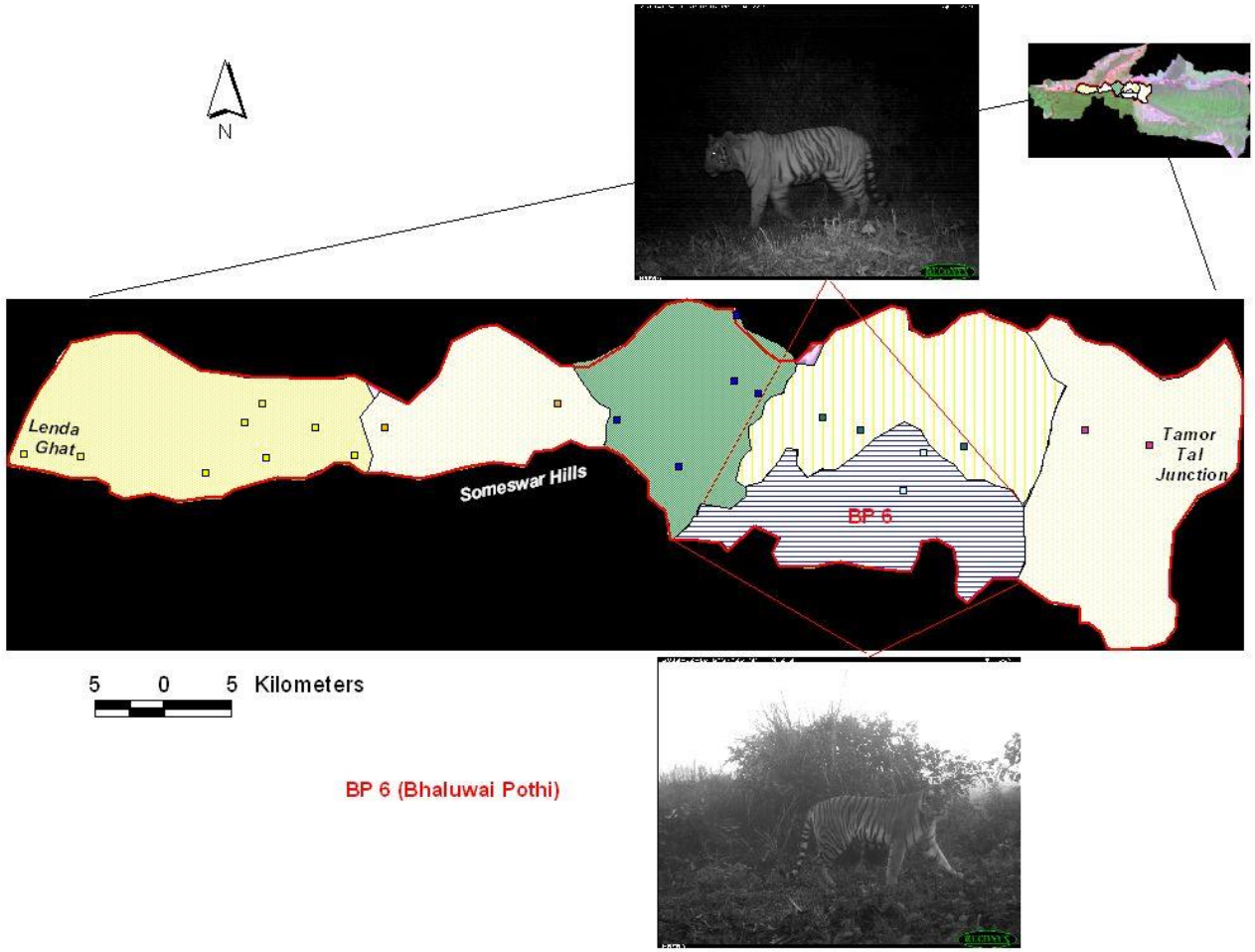


BP 5 (Baghmara Pothi)

Appendix 1 (d): SP 7 (Sukhibhar Pothi) photographed locations and territory during 2013-14



Appendix 1 (e): BP 6 (Bhaluwai Pothi) photographed locations and territory during 2013-14



Appendix 1 (f): DRP (Deorali Pothi) photographed locations and territory during 2013-14