



# Securing the future of Nepal's tigers

**Final project report**



21st CENTURY TIGER  
giving wild tigers a future

**ZSL**

**LET'S WORK  
FOR WILDLIFE**

**Project Title:** *Strengthening anti-poaching measures and tiger monitoring in newly extended area of Parsa Wildlife Reserve*

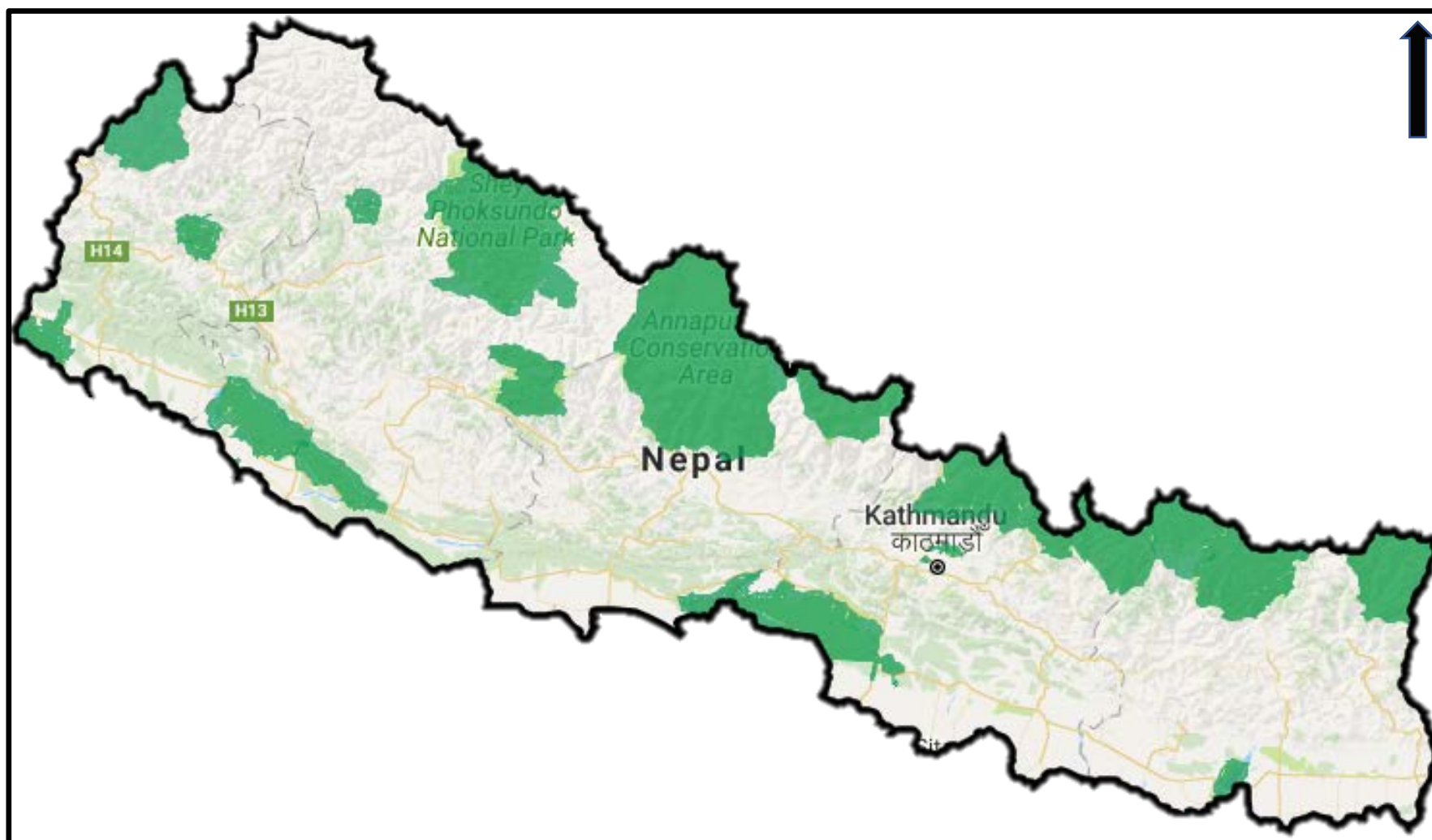
**Project start date:** 1 September 2016

**Project End Date:** 31 August 2017

**Reporting Period:** 1 September 2016- 31 August 2017.

## List of Abbreviations

CNP	Chitwan National Park
DNPWC	Department of National Parks and Wildlife Conservation
GPS	Global Positioning System
NTNC	National Trust for Nature Conservation
PNP	Parsa National Park
SECR	Spatially Explicit Capture Recapture
SMART	Spatial Monitoring and Reporting Tool
TCL	Tiger Conservation Landscape
ZSL	Zoological Society of London



Map 1: Protected areas of Nepal

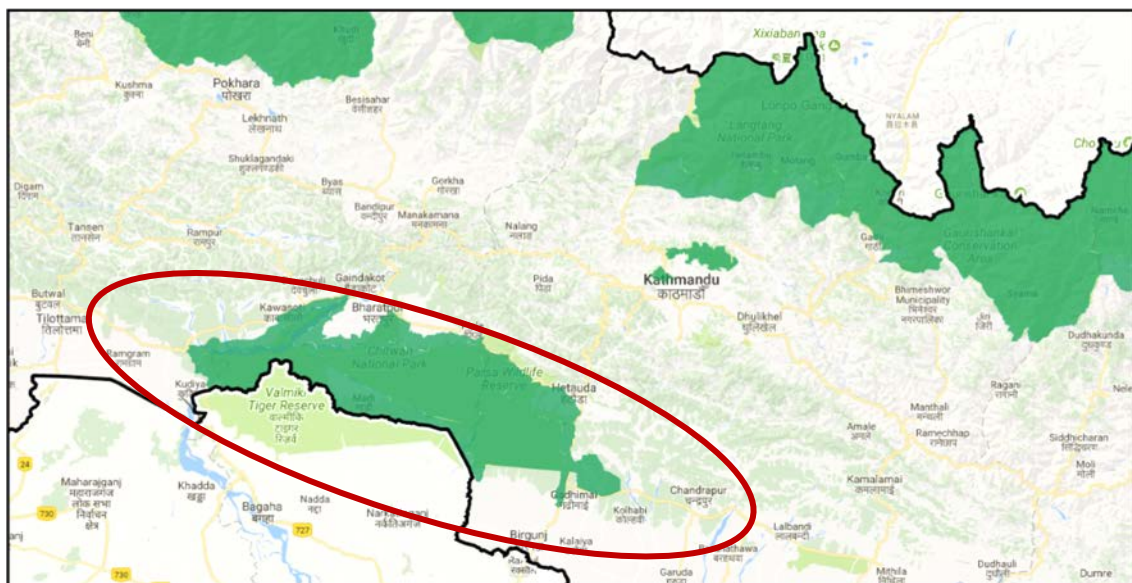
Final Report Submitted to  
21<sup>st</sup> Century Tiger



## A. Project Background

Habitat loss and fragmentation, poaching and the decline of prey species populations are the primary global threats to tigers (Karanth and Gopal, 2005). In 2010, thirteen tiger range countries, including Nepal, signed a declaration to double the global tiger population by 2022 at the Global Tiger Summit held in St. Petersburg, Russia. Nepal committed to double its tiger population from 121 tigers to a breeding population of 250 adult tigers by 2022 (Karki et. al., 2011). Since, then efforts have been made by the Government of Nepal to meet this goal. ZSL has been supporting these ambitions through its tiger conservation programme.

In Nepal tigers are restricted to five protected areas and their surrounding forests in the lowland Terai (Lamichhane et al., 2017). According to the national survey carried out in 2013 using the camera trapping method, the tiger population was estimated to be 198 individuals which is a 63% increase from 121 individual tigers estimated from the study carried out in 2008-09 (Dhakal et. al., 2014). Chitwan National Park (CNP) in the central lowlands has the largest tiger population in Nepal. CNP adjoins Parsa National Park (PNP), previously Parsa Wildlife Reserve, in the east and forms a contiguous tiger habitat covering more than 2000 km<sup>2</sup> of forest area. This landscape (the Chitwan–Parsa Tiger Complex) is one of the highest priority landscapes for biodiversity conservation in Nepal, and has been assessed as a Level 1 Tiger Conservation Landscape (TCL) (Wikramanayake, 1998).



Map 2: Chitwan-Parsa Tiger conservation landscape

The tiger population in PNP has increased dramatically since 2013 (Lammichhane et al., 2017; Dhakal et al., 2014). Increased protection and effective habitat management interventions are the key factors allowing tiger numbers to increase in PNP. The Government of Nepal's firm commitment and indefatigable efforts, supported by ZSL, have started to show promising results in PNP. Support provided by 21st Century Tiger to strengthen law enforcement through regular patrolling by the Nepal Army

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and Park staff; and to conduct regular monitoring of the tiger population has been vital in increasing tiger numbers. However, the current tiger population of PNP (including the recent extension) is still below the estimated carrying capacity (47 adult tigers). It is therefore important to extend tiger habitat, particularly in the Bara-Rautahat forest landscape, and control poaching to support a viable tiger population for the future.

## B. Objectives

- 1. Reduce poaching threats to tigers by strengthening anti-poaching measures within the new core through effective implementation of SMART.**
- 2. Monitor the status of tigers and their prey in Bara Forest through camera trapping and transect surveys.**

## C. Project Summary

SMART (Spatial Monitoring And Reporting Tool) training was provided to 365 staff in PNP, field equipment and ongoing patrolling support was also provided. This supported over 4,500 SMART conducted in PNP, recording a 50% reduction in human observations and the destruction of three illegal camps. Camera trapping and line transect surveys were conducted in accordance with the National Tiger and Prey Base Monitoring Protocol. 167 2x2km grid cells were camera trapped and nine 5km line transects were conducted. The first tiger cubs in almost a decade were recorded and tiger density was similar to that recorded last year; 2.13 prey animals per km were recorded through the transect surveys with Chital being recorded most frequently.

## D. Project activities

- 1. Reduce poaching threats to tigers by strengthening anti-poaching measures within the new core through effective implementation of SMART.**
  - a. Provide training and equipment to protection units of new guard posts**

SMART training was conducted for a total of 365 staff in PNP (from the Nepal Army and the PNP administration). The training covered GPS handling, wildlife identification, record keeping, and map reading and reporting. These skills strengthen the capacity of frontline staff to conduct anti-poaching patrols, collect high quality data and report efficiently to PNP management.



*Photo 1: Participants (Nepal Army and protected area staff) and trainers from the SMART training course organised in Parsa National Park.*

Equipment was provided for the three newly constructed guard posts in the extension area and field clothing; torches; water bottles; bicycles; cameras; GPS devices; and medical kits were provided to the Nepal Army and PNP staff deployed there. The equipment, and regular support for SMART operations provided by ZSL staff, has facilitated SMART patrolling being conducted in the extension area.



*Photo 2: Chief Conservation Officer jointly with ZSL and NTNC senior managers handing over a medical kit for SMART patrol teams to Nepal Army staff.*

## **b. Conduct regular patrols**

4,514 patrols have been conducted by protection units in PNP from 1 September 2016 - 31 August 2017.

Monthly patrol planning was conducted by the Chief Conservation Officer of PNP and the Head of the Nepal Army Protection Unit based in PNP, in coordination with ZSL field staff. Logistical support, such as food and fuel for patrol teams, was provided by ZSL through this project.





*Photo 3 : A Nepal Army SMART patrol in Parsa National Park.*

Of 4,514 patrols conducted, 66 patrols (1.46%) recorded illegal activities. Details of recorded illegal activities are presented in the table below:

Types of Threats	Count of Observation
People - direct observation	10
People - indirect sign	6
Camp destroyed	3
Cutting tools confiscated	3
Fishing tools confiscated	1
Transportation seized	6
Timber smuggling detected	11
NTFPs collection detected	2
Domestic animals	20
Rocks & minerals extraction	4

*Table 1: Records of illegal activities and human signs recorded on SMART patrols in Parsa National Park (1 September 2016 - 31 August 2017)*



## c. Produce monthly SMART reports

Monthly SMART reports were produced at the end of each month, with the support of ZSL staff, and submitted to the Chief Conservation Officer of PNP and the Head of the Nepal Army Protection Unit posted in PNP during a monthly discussion meeting. The monthly reports included information on patrol intensity, coverage, average length of patrols, and illegal activities recorded



*Photo 4: ZSL staff facilitating a debrief of the SMART monthly report to Nepal Army and protected area staff in Parsa National Park*

during each patrol. Crucial information was presented in maps, generated in the SMART software, to support adaptive management. This process has helped strengthen law enforcement and habitat management within PNP, especially in the extension area.

## 2. Monitor the status of tigers and their prey in Bara forest through camera trapping and transect surveys.

### a. Develop camera trap and transect survey proposal based on national guidelines and receive DNPWC approval

A series of meetings was held by technical staff from ZSL and the National Trust for Nature Conservation (NTNC) to develop a plan for camera trap and transect surveys following the National Tiger and Prey Base Monitoring Protocol, which was then approved by the Department of National Parks and Wildlife Management (DNPWC). A total of 167 grid cells (2km x 2km each) were defined in the 628 km<sup>2</sup> core area of PNP. The survey was planned for two phases with a minimum deployment period of 21 days per camera station. Nine 5km line transects, following the methods of Anderson et al., 1979 and Buckland et al., 2005, were planned to assess prey density in the extension area.

### b. Deploy camera traps

#### i. Camera Trapping Orientation

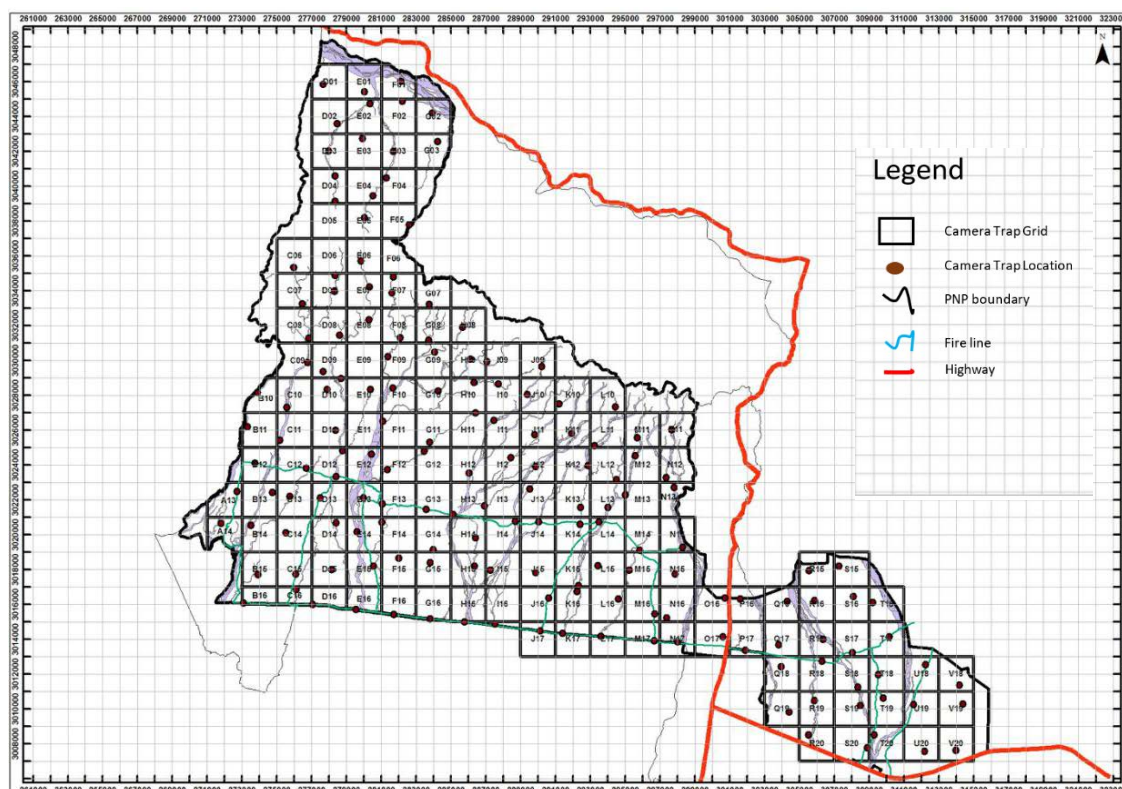
Orientation training was provided to field technicians before camera trap deployment. The training covered tiger and prey base monitoring techniques including the camera trapping protocol, prey base monitoring techniques, occupancy surveys, tiger and prey sign identification, selection of camera trap locations, operation of camera traps, GPS and map reading, systematic data collection, and record keeping. Thirty-five participants comprising wildlife technicians, rangers, game scouts, community youths and university students undertook the training and the same trained personnel were mobilised for the survey. The training and field survey were facilitated by biologists from ZSL Nepal and NTNC.



*Photo 5: ZSL Nepal Staff in Parsa National Park providing training on camera trap operation.*

## **ii. Reconnaissance Survey**

A reconnaissance survey was conducted by experienced wildlife technicians to identify potential camera stations within each of the 167 grid cells. They were then ranked according to the presence of tiger and prey signs, the suitability of camera deployment and other key variables. The locations in each grid cell with the highest rank were selected as the camera stations.



*Map 3: Showing the camera trap grids (2 km X 2 km) in Parsa National Park with camera trap locations in each grid.*

### iii. Camera Deployment

Camera trapping was conducted between November 2016 and February 2017. A pair of camera traps (Panthera V5/V6 models) were deployed at each of the camera stations identified through the reconnaissance survey in the 167 grid cells. Cameras were placed at the optimum height of 45-60 cm from the ground with a distance between the two-cameras of 6-8 meters.

The survey lasted approximately 3,700 camera trap nights. Though the survey was initially designed to be completed in 2 phases, the limited number of available camera traps and the high loss of camera trap units during Phase I, led to the survey period being extended into 3 phases. In total, 45 camera trap units were lost during Phase I of the survey of which 11 were damaged by elephant and 34 units were stolen. At the request of ZSL and NTNC, PNP increased the patrolling in the buffer zone boundary which helped to reduce the loss of camera traps in subsequent phases. Each camera trap station was visited once every two days and photos were downloaded from the camera traps. A systematic database of all photos collected from camera traps in each grid was prepared.

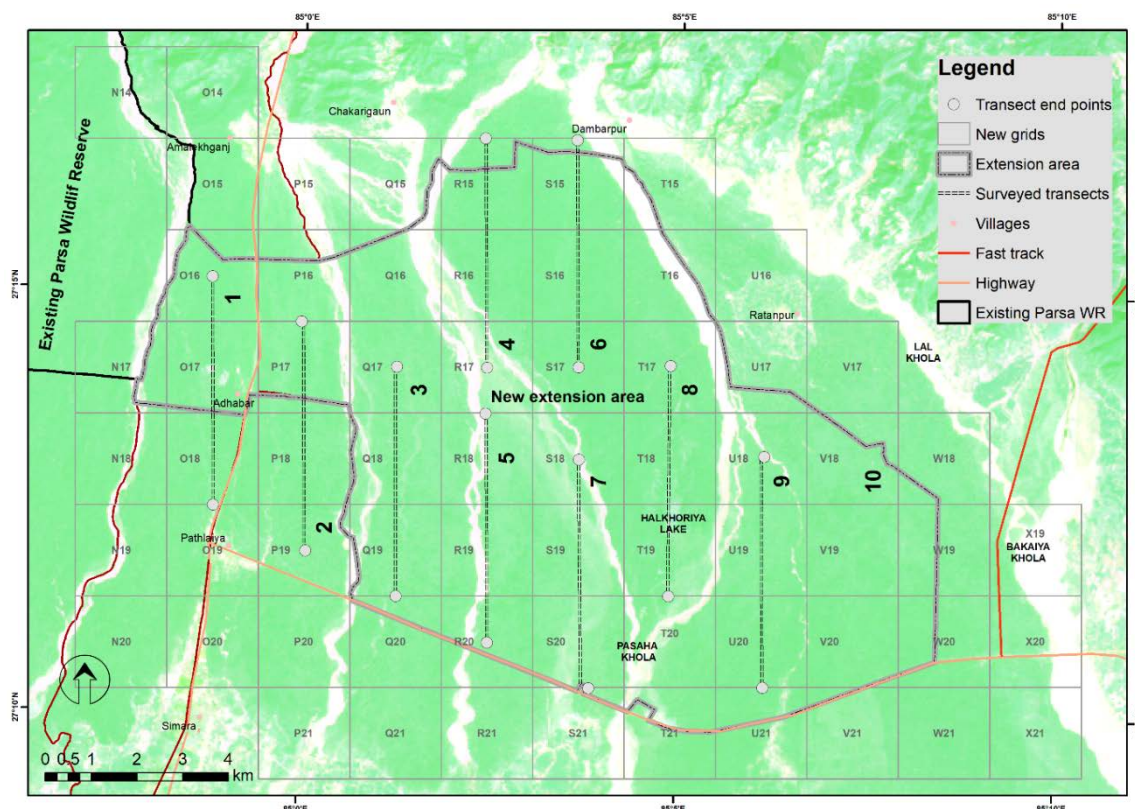




*Photo 6: A Wildlife Technician setting up a camera trap during the Tiger and Prey Base Monitoring Survey in Parsa National Park.*

**c. Conduct transect surveys (prey base monitoring)**

Nine line transects were conducted for prey base monitoring in the extension area. Two field technicians rode an elephant in a straight line along the transect. Prior to the survey GPS locations of the start and end points of each line transect were entered into GPS devices. The straight line was navigated following the actual bearing by using a magnetic compass and GPS device. Species information (species, cluster size, age, sex and distance from observer), GPS information and other environmental information were recorded on a standard datasheet.



Map 4: Location of line transects surveyed in 2017. The squares in the map represent the camera trapping grids.

## d. Data analysis and report writing

### i. Camera trap data analysis

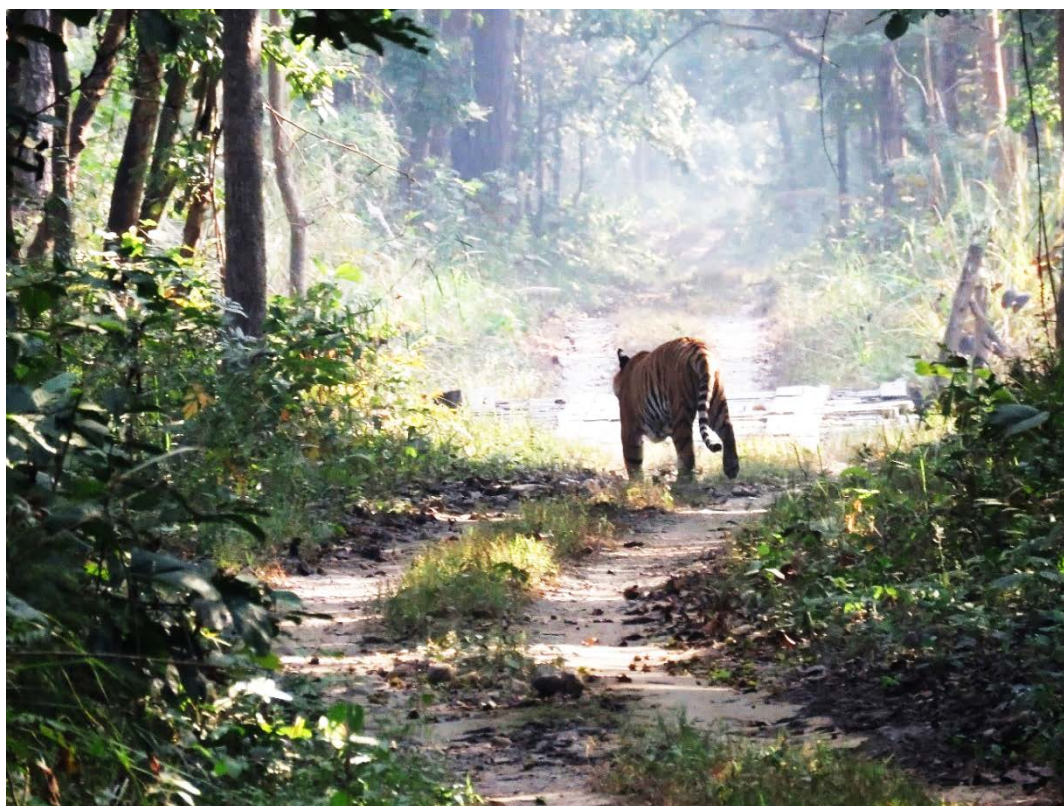
Camera trap images were stored in a dedicated camera trap file manager, and a joint workshop was conducted to manage and sort them. A total of 767 images of tigers captured during the survey were identified, 664 of these images were suitable for use in estimating the tiger population and density. Biologists from DNPWC, PNP, NTNC and ZSL thoroughly analysed the photos to identify individual tigers through their unique stripe patterns.

After the identification of individual tigers, a Spatially Explicit Capture Recapture (SECR) model was used to estimate the tiger population and density in PNP. The SECR model estimated the density to be similar to that recorded in last year's survey. However, losses of camera trap units this year due to elephants, fire and theft in the Churia region may have affected detection rates. Also, the results have shown that the Female: Male sex ratio in PNP is 1.83 and the annual turnover is 10.1%. The higher number of resident female tigers compared to males is a positive indicator of the potential for ongoing population growth. The relatively low turnover value indicates the stability of the tiger population in PNP. Images of tiger cubs were also captured suggesting that tigers are breeding in PNP.





*Photo 7: Chief of NTNC Biodiversity Conservation Centre briefing Parsa National Park's Chief Conservation Officer on the results from the Tiger and Prey Base Monitoring Survey 2016-17*



*Photo 8: A Tiger walking along a forest road in Parsa National Park*



## ii. *Line transect data analysis*

96 wild prey animals of six species were detected in 17 sightings (Table 2). The average detection rate was 2.13 animals per km (Table 5).



*Photo 9: A group of Chital observed during a survey in Parsa National Park extension area*

Species	Transects where detected	Number of sightings	Number of animals sighted
Barking deer	1, 2	2	2
Chital	1,2,4,7	6	45
Langur	6	1	7
Rhesus macaque	3,4,7,8	5	38
Sambar	3	1	2
Wild boar	9	1	2
<b>Total</b>	<b>1, 2,3,4,6,7,8,9</b>	<b>17</b>	<b>96</b>

*Table 3: Animal sighting details during the line transect survey (February 2017, extension area of Parsa National Park)*

Transect Number	Barking deer	Chital	Langur	Rhesus macaque	Sambar	Wild boar	Total
1	0.20	4.80	-	-	-	-	5.00
2	0.20	0.60	-	-	-	-	0.80
3	-	-	-	1.20	0.40	-	1.60
4	-	1.40	-	1.00	-	-	2.40
5	-	-	-	-	-	-	-
6	-	-	1.40	-	-	-	1.40
7	-	2.20	-	1.00	-	-	3.20
8	-	-	-	4.40	-	-	4.40
9	-	-	-	-	-	0.40	0.40
<b>Total (Average)</b>	<b>0.04</b>	<b>1.00</b>	<b>0.16</b>	<b>0.84</b>	<b>0.04</b>	<b>0.04</b>	<b>2.13</b>

Table 4: Detection rate (animals/km) of wild prey species during the line transect survey (February 2017, extension area of Parsa National Park)



Photo 10: A Sambar deer photographed in Parsa National Park during Tiger and Prey Base Monitoring Survey.

## E. Project outputs and achievement

Objectives	Outputs	Progress made
Reduce poaching threats to tigers by strengthening anti-poaching measures within the new core through effective implementation of SMART	At least 30 protection unit staff of PWR trained and equipped.  Decrease in human observation by 50% within extension area. Baseline month 1 SMART data.	365 frontline staff (Nepal Army and PNP staff) trained in SMART patrolling.  Equipment provided to 82 frontline staff (Nepal army) deployed in three newly constructed guard posts in the extension area of PNP.  Baseline September 2016: 2 human observations in extension area.  Reporting period: 1 human observation (October) recorded by PNP in the extension area.  No firearms detected in 2016-17.  Three illegal camps inside PNP destroyed.  Only 6 cases of bicycle confiscation reported by PNP.  4,514 SMART patrols conducted inside PNP, including the extension area, covering over 35,000km in 2016-17.  12 monthly SMART reports prepared and submitted to PNP management
Monitor the status of tigers and their prey in Bara Forest through camera trapping and transect surveys.	Status of the tiger population and prey base (Sambar, Chital, Wild Boar and Barking Deer) established for year 2.	Tiger density estimated to be similar to last year's survey.  Average detection rate for tiger prey was 2.13 animals per km in the extension area of PNP

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