

Technical Manual

# PHASE III CAMERA TRAPPING PROTOCOL



 भारतीय वन्यजीव संस्थान  
Wildlife Institute of India



# Phase III Camera Trapping Protocol

## Technical Manual (TR 2018/01)

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## **Introduction:**

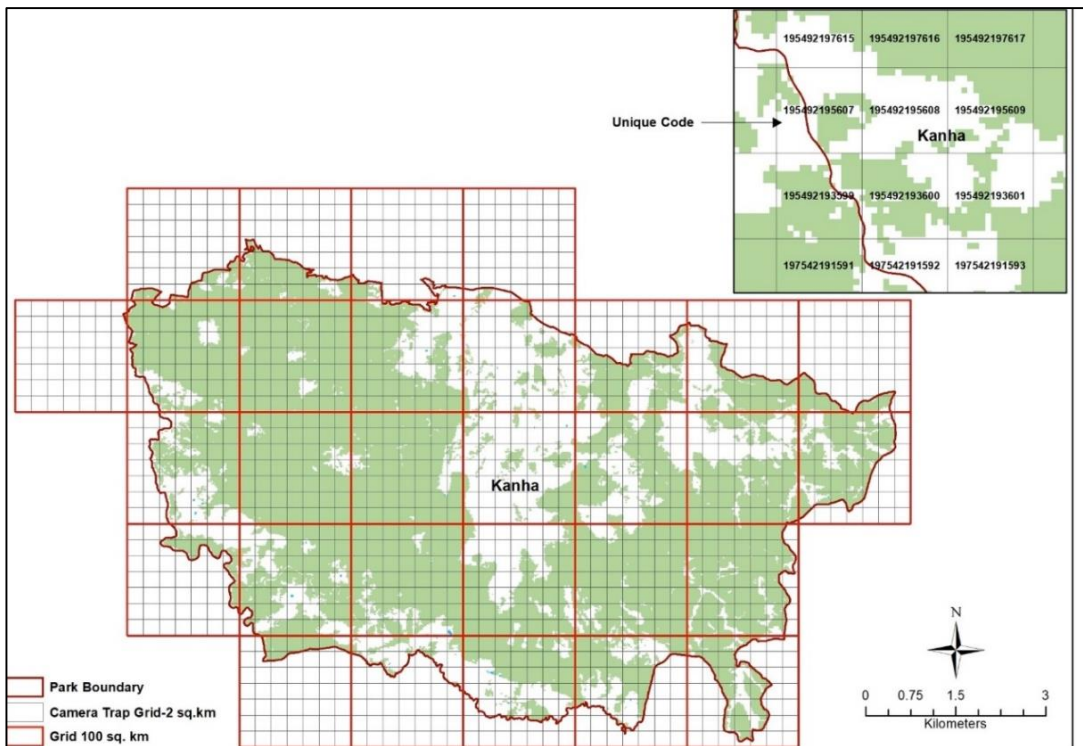
Camera trap surveys are a well-established methodology for abundance/density estimation of elusive carnivores such as tigers and leopards using Capture-Mark-Recapture framework. Camera trapping methodology involves photographing individuals which are uniquely identifiable by their pelage patterns; although there is a growing interest in broad-scale camera trap surveys of unmarked species as well. Development of Spatial capture-recapture methods have led to greater clarity in density estimation by integrating the spatial or “location” information of animal photo-captures and camera deployment. The data is also amenable to analysis in a non-spatial framework and can be used for conventional mark-recapture analysis.

Similar to the previous three cycles of country wide assessment of tigers and other co-predators by the Wildlife Institute of India (WII) and the National Tiger Conservation Authority (NTCA) in 2006, 2010 and 2014; camera trapping will be used during 2018 (Phase III) cycle of country wide tiger estimation to arrive at abundance of tigers, leopards and other species. In this manual, we intend to highlight some important guidelines for design and deployment of camera traps, archiving images and collating data in an easily analyzable format by GIS analysts, park managers and research biologists.

## ***Designing Camera Trap survey:***

- Area to be camera trapped should be based on shape criterion (ideally as close as possible to square/circular) and the size should be minimum **400 km<sup>2</sup> or full protected area e. g Tiger Reserve.**

- Sampling needs to be carried out simultaneously in a minimum block of 200 km<sup>2</sup>. If more number of camera traps are available to cover > 200 km<sup>2</sup> then sampling should preferably be done in larger size blocks.
- Use a grid of 2 km<sup>2</sup> (1.415 km X 1.415 km) provided by WII as a guide to deploy camera traps. Each grid has a uniquely code (**Fig. 1**). This 2 km<sup>2</sup> grid is set within the 100 km<sup>2</sup> country wide grid that has been fixed since first cycle of National Tiger Status Estimation in 2006 so that subsequent inferences can be compared on the same spatial scale and extent.



**Figure 1 Camera Trap grids (2 km<sup>2</sup>) from Kanha Tiger Reserve, Madhya Pradesh**

- In each grid, double-sided camera-trap should be operated for 25 days (**Annexure 1**).
- The distance between two adjacent trap stations should ideally be between 0.8 to 2 km.
- Shifting of cameras between the blocks should ideally be done in <5 days.
- The sampling of the entire contiguous area (PA, or two or more blocks ~400 km<sup>2</sup>) should be completed in 60 days. If entire tiger reserve is being sampled at a scale of ~800 km<sup>2</sup>, then the sampling period may span for 120 days.

## ***Implementing a Camera Trap Survey***

### **Trap site selection**

- Tigers are known to use animal trails, nullahs, riverbeds, cart tracks, etc. Camera trap sites should be selected based on cues of use at sites by tigers such as presence of scats, scrapes, spray marking, rake marks and pugmarks.
- Select more locations than are actually required for sampling, so that you can choose the best sites after plotting the locations in a GIS domain.
- Send these potential location geo-coordinates to Division office before commencing sampling. **The Division office will overlay the location on the given 2 km<sup>2</sup> grid (make sure the grid used is provided by NTCA-WII).**

- The GIS technician/research biologist will select the location within each grid and ensure that there should be no large gaps and distance between the trap locations are appropriate as mentioned in the earlier section.

### **Deploying camera traps**

Once you have selected the best sites, you need to deploy camera trap units as per the sampling protocol. The following points should be kept in mind:

- Remove grass blades, leaves or any object that can be a potential interference to the camera sensors and flash.
- Check that the camera is aligned properly else you may miss a tiger or leopard that would pass as cameras would not trigger at the right time. For details on alignment, refer to the camera trap manual user guide and use the test mode.
- Place the camera-trap at knee height (1.5 feet) from the ground level (to target flanks of a tiger as well as cubs and get pictures of small mammals).
- Use the test beam to ensure camera detection zone is well adjusted. You can also request a colleague to walk on the trail on all four limbs to have a rough idea of framing the picture. Each camera should be kept at suitable distance (~3 meters in case of Cuddeback) from the center of the trail to get a full frame picture of a tiger.
- Make sure that **Date**, **Time** and **Camera ID** are **correctly set** in the cameras. Time (**AM** and **PM**) should be double-checked. These fields

should be rechecked during battery replacements.

- Camouflage the camera trap properly so that it merges with the surroundings and minimize disturbance at the site where the camera is deployed.
- Make sure that the all the functions in the unit has been set properly (Trigger speed (Rapid or Instantaneous), camera delay (minimum setting), time period for units to operate (24 hrs), flash/strobe power (depending on distance from the trail), image quality (high), etc.).
- Try to ensure that you deploy all the units before sunset.
- Camera can be switched on for recording data as soon as they are deployed. There is no need to wait for complete deployment of all the units in a block.
- Keep a record on the dates cameras were operating and not operating.

### **Monitoring Camera Units and Recording Data**

- Camera trap units should be checked every three to four days to see that all the units are functioning properly, the cameras have memory cards with frames to spare and the batteries in the units are not exhausted. Any exhausted batteries and data cards should be removed and replaced with fresh ones.
- On regular inspection of camera trap stations, if you observe that tigers are avoiding the trap station, then move that unit to a new location (50-

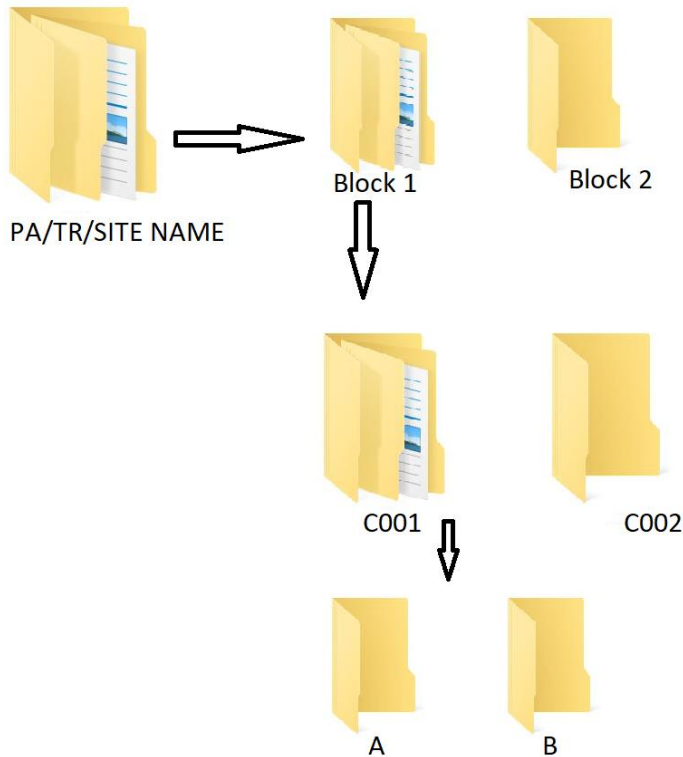
100 meters away). Cameras should be camouflaged to avoid trap shyness.

- In areas having good protection, camera trap units should be checked at least every third day and the units can be operated continuously (day and night). In case of disturbed areas, you should check the units every day and if there is fear of theft, remove and re-deploy units on a daily basis (remove in the morning and redeploy in the evening).
- Copy each memory card data into folders as per the pro-forma; replace the memory card with a fresh one that is appropriately labeled with camera and location information.
- Clean the camera lens, if it is dirty or is blocked by water droplets accumulating on it. Remove any debris that might have accumulated and thus may be blocking the infrared beam. Use a soft felt cloth for this purpose to avoid scratches on lens.
- Before you leave, make sure that the units are aligned properly and are functioning properly. In case of slightest doubt, perform a mock test by crawling in front of the unit, to check if the units record the event and the cameras fire.
- When cameras are moved from one block to another, this should be noted down in the datasheet and the field notebook as well. Always insert a fresh memory card when camera units are moved to another location. Do not forget to record the new GPS coordinates and ID for the camera unit when redeployed.



### **Data Submission to NTCA/WII**

- Camera trap images need to be arranged as described in the schematic diagram **Fig. 3**.



**Figure 3 Camera trap images folder hierarchical order**

- Trap operation details need to be arranged as in **Table 1**. This is vital for subsequent analysis of the data.
- The storage and data organization can be done as described in **Annexure 2** of Camera trap data repository and analysis tool (CaTRAT) interface of program MSTRIPES.

**Table 1 Block wise Trap operation Matrix**

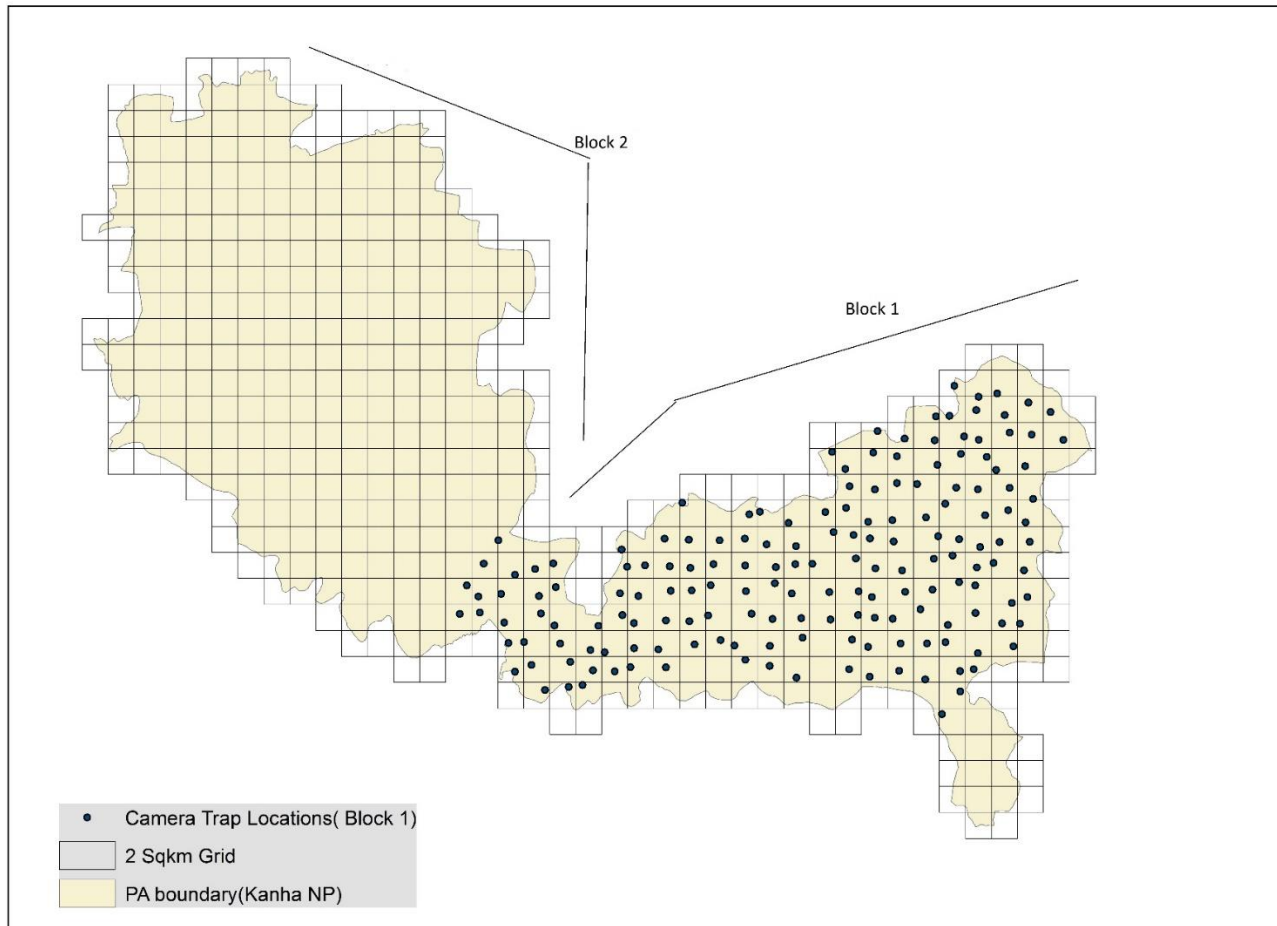
Camera Traps Information				Latitude			Longitude			Date of operation 01 Jan 2018 - 10 Jan -2018									
Block ID	Block Name	Trap ID	Trap name	Degree	Minute	Second	Degree	Minute	Second	01-01-2018	02-01-2018	03-01-2018	04-01-2018	05-01-2018	06-01-2018	07-01-2018	08-01-2018	09-01-2018	10-01-2018
1	Khatiya-Kisli	C001A	Chuhi Nala sangam	22	12	32.1	80	51	38.2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1	Khatiya-Kisli	C001B	Chuhi Nala sangam	22	12	32.1	80	51	38.2	N	N	Y	Y	Y	Y	Y	Y	Y	Y
1	Khatiya-Kisli	C002A	Ronda chaupati	22	10	59.8	80	52	52.1	N	Y	Y	Y	Y	Y	N	N	N	Y
1	Khatiya-Kisli	C002B	Ronda chaupati	22	10	59.8	80	52	52.1	N	Y	Y	Y	Y	Y	N	N	N	Y
1	Khatiya-Kisli	C003A	Jamuntola camp Sarhi	22	9	52.8	80	53	3.1	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
1	Khatiya-Kisli	C003B	Jamuntola camp Sarhi	22	9	52.8	80	53	3.1	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
1	Khatiya-Kisli	C004A	Magarnala Sonf Road	22	7	10.3	80	55	12.2	Y	Y	Y	N	Y	N	Y	Y	Y	Y
1	Khatiya-Kisli	C004B	Magarnala Sonf Road	22	7	10.3	80	55	12.2	Y	Y	Y	N	Y	N	Y	Y	Y	Y
1	Khatiya-Kisli	C005A	Urnakhera Road Sulkum	22	12	48.5	80	54	9.8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1	Khatiya-Kisli	C005B	Urnakhera Road Sulkum	22	12	48.5	80	54	9.8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Y = Operational

N = Not Operational

Annexure 1

Schematic diagram of grid wise deployment of camera traps

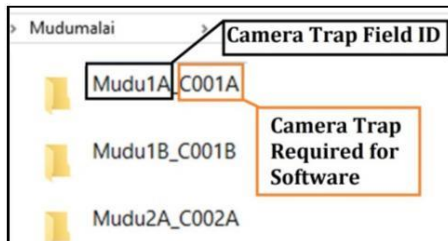


## Annexure 2

### CaTRAT: Camera Trap Data Repository & Analysis Tool (MSTripES)

#### A. Storage of Camera Trap Photographs:

Give unique IDs to each camera trap station. A camera trap station consists of a pair of camera traps; name them A & B.



**Example:** This is how camera trap folders should be named while storing raw data: "Field ID\_Software ID" → **Mudu1A\_C001A**

Under each camera trap folder all the photographs should be stored (While copying images with same name please copy and save both the files with duplicate names, e.g., Cdy001, Cdy001(2), etc.)

**Do not replace images with same names.**

#### B. Setting working directory (WD): STEP 01

Select '**New**' working directory (while initiating the work), or the '**Existing**' one (to resume ongoing work).

Create one **Blank** folder as new working directory (Browse → Chose desired drive → Click on 'Make New Folder' → name the folder with Protected Area name and Year of operation).

**Example:** "Protected Area Name\_WD\_Year" → **Mudumalai\_WD\_2017**

#### C. Enter Survey Details: STEP 02

Enter Country (India), Study Area (e.g., Mudumalai), Time of Commencement – Month (e.g., December), Year (e.g., 2017), Team members (e.g., Yogesh, Peter), Tentative date of operation of block: Start date (e.g., 01-12-2017) End date (e.g., 25-12-2017), Total Blocks (e.g., 02), Current Block (e.g., 01), Cameras in Current Block (e.g., 100).

Please note, 'Cameras in current block' will include both A & B side cameras of a camera trap station, i.e. 50 stations, will have 100 stations.

**Example:** If you have 50 camera trap stations & each station contains a pair of camera traps (A & B side), 'Cameras in Current Block' will be 100.

Click '**Ok to Continue**' & go to '**Create Species List**'.

**Select & delete** the species which are **not present** in your area **carefully**.

**Add** species (found in your area but not listed) by clicking the **last row** of the **species list**.

**Example:** You mistakenly deleted 'Tiger' from the species list, and also want to add 'Patrolling Vehicle' in the species list:

Species Type	Scientific Name (two words)	Common Name	Folder Name (will be automatically generated)
Carnivore	<i>Panthera tigris</i>	Tiger	pant_tigr
Others	Patrolling vehicle	Patrolling vehicle	patr_vehi

'**Save**' the species list and click '**Back**'.

Enter camera ID, GPS location, camera trap field ID, & operational days **manually** in the software.

**Example:** Columns you need to **enter manually** (D1, D2... days of operation; Y: Camera on, N: Camera off):

Camera ID	Long_D	Long_M	Long_S	Lat_D	Lat_M	Lat_S	Remark	D1	D2	D3	D4	D5	D6	D7
C001A	76	31	54.3	11	33	44.9	Mudu1A_C001A	Y	N	Y	Y	Y	Y	Y
C001B	76	31	54.3	11	33	44.9	Mudu1B_C001B	Y	Y	Y	Y	N	N	N
C002A	76	31	02.5	11	32	25.7	Mudu2A_C002A	Y	Y	Y	Y	Y	Y	Y

Click '**Save**' to continue. Click 'Show on map' to see the location of camera traps in your study area (internet needed).

Click '**Next**' to go to the next step for geo-tagging of camera trap images.

#### D. Geo-tagging of camera trap images: STEP 03

**Select Folder:** A camera trap folder with raw data (e.g.,  
C:\Mudumalai\_WD\_2017\Mudu1a\_C001A).

**Select Camera:** Select the camera ID for that camera trap folder (for the above example it is **C001A**).

**Camera chip start date:** Start date of that particular camera (or memory card), (e.g., 01-12-2017).

**Camera chip end date:** End date of that particular camera (or memory card), (e.g., 27-12-2017).

Click **'Add'** → **'Start Process'** --Process done **successfully** → Click **'Main Page'** → **'Close'**.

**[\*N.B. You can add multiple folders for geo-tagging, repeat the above process for each folder]**



Check the destination folder (**Working directory/Working\_Photo**) for geo-tagged images. Apart from geo-tagged images, **'OutDate\_Folder'** **'No\_Exif\_Pics'** could be there in **'Working\_Photo'**, note down those Camera trap folder names communicate while sending the data.

**Once you are done with geo-tagging, please make a copy of the WORKING DIRECTORY containing all the folders intact (see the picture on your right), & send it to Wildlife Institute of India for further processing**





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