Pilot Leopard Survey

by Remote Photography in the Intermediate Zone of Sri Lanka

Introduction | Methods | Data | Field Notes | Photos | Camera Traps | Analysis | Literature Cited

Introduction

Research on the Sri Lanka sub-species of leopard (*Panthera pardus kotiya*) has largely focused on populations of Yala National Park (Kittle and Watson, in press) and Wilappatu National Park (Eisenberg and Lockhart 1972, Muckenhirn and Eisenberg 1973), representing dry climatic zones of the southeast and northwest extents of the country. In contrast, the status of the leopard in the central intermediate zone and the eastern dry zone is relatively unknown, although sightings are common among several non-contiguous forest reserves and national parks in the region.

In light of the proposed plan to create a biological corridor ranging over the central, north central and eastern provinces, encompassing a continuum from intermediate to dry climatic zones, we are proposing to conduct a leopard survey by remote photography **(using Camtracker systems partly sponsored by the company)** to estimate leopard populations across both protected parcels and areas of human habitation in this region. The proposed plan seeks to provide baseline information on leopard densities 1) in both protected and non-protected areas and 2) along a rainfall gradient across the Central, North Central and Eastern. Furthermore, this study will provide the first density estimates for the Sri Lankan leopard by use of statistically rigorous

mark-recapture methodologies.

Prior to conducting a complete camera survey, we will carry out a pilot project in the Himbiliyakade Forest Reserve, south of Wasgomuwa National Park, Sri Lanka during the monsoon season . In addition to providing a density estimate for the forest reserve, the pilot will provide needed information on trap success (number of leopard photographs per trap night), allowing an evaluation of the effort (number of cameras and length of trapping occasions) required for a complete survey. The results of the pilot will be used to reevaluate the methodology and to tailor the study design to a regional survey.

Visit Andrew and Anjali's Website for information about a national leopard survey.

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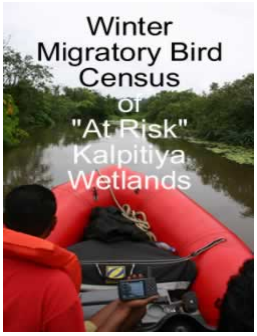

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Methods

Camera Array

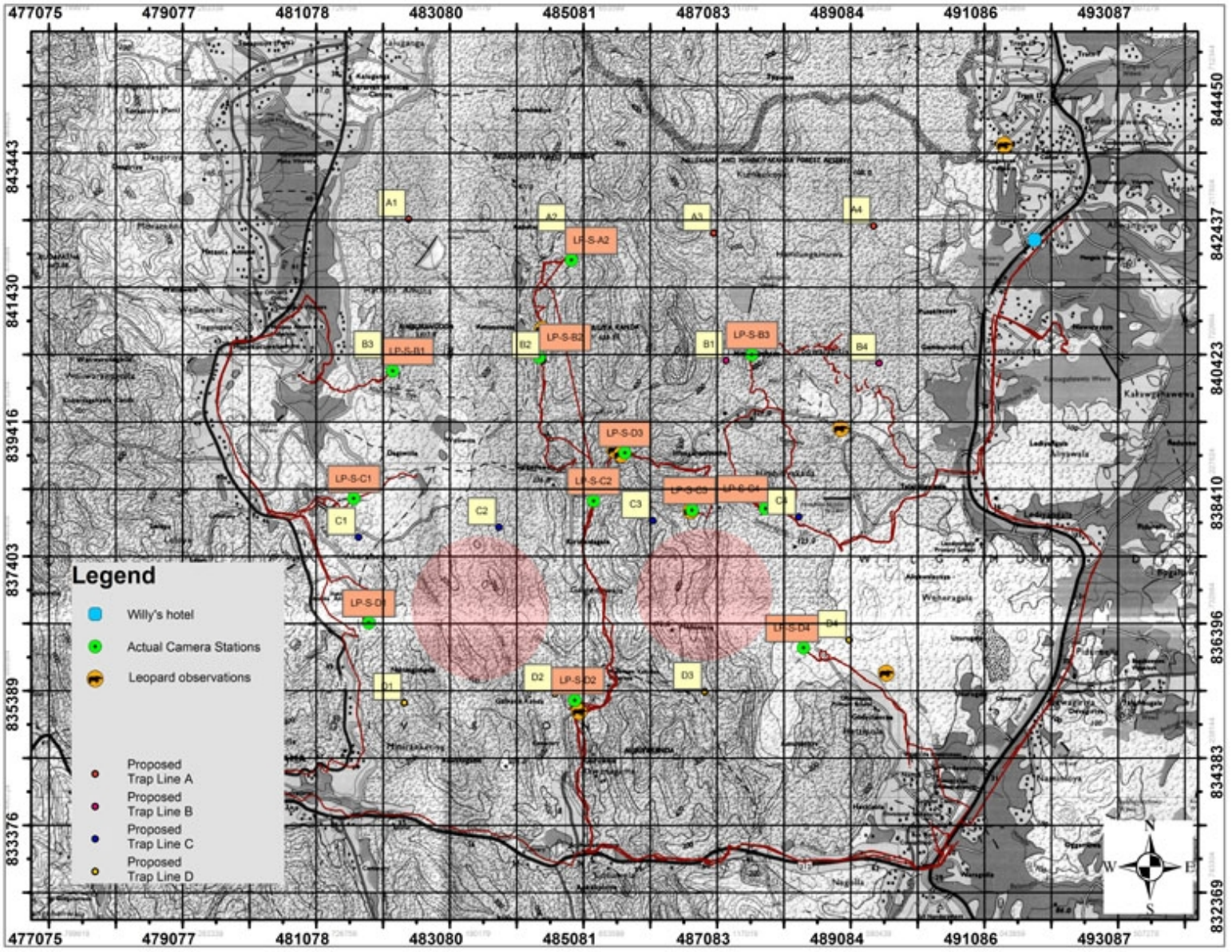
The camera array will consist of 4 trap lines oriented from the western edge of the Himbiliyakade Forest Reserve to the eastern edge of the peripheral cropland (Figure 1). Six passive infrared cameras (Rangers ATL; *Camtrakker*) will be used among four camera stations per trap line. Two stations will consist of a single camera each, while the remaining two stations per trap line – reference stations – will consist of two cameras placed on either side of the trail to document both flanks of a passing leopard. All stations will be placed on man-made or elephant trails, habitats frequently utilized by large cats (Sunquist 1981, Silver et. al 2004, Weckel 2004). In order to increase capture probabilities, camera stations will be placed near signs (scats and scrapes), indicating the presence of leopards (Karanth 1995). These locations will be scouted over a two month period (Novemeber – December 2004) prior to the start of the survey.

Adjacent cameras stations will be spaced at 2.5 – 3.0 km intervals to meet the model assumption that no individual has a zero probability of being captured (Otis et al. 1978). We assume that the smallest possible leopard home range is 8.0 km 2, corresponding to estimates of leopard densities derived from observations in Willapattu National Park, Sri Lanka (Eisenburg and Lockhart 1972). Home ranges ranging from 8-10 km 2 are conservative estimates for optimum leopard habitat across several ecotypes (Seidensticker 1976).

Do to the limited number of cameras; each trap line will be sampled separately, but continuously. Cameras will operate for 20 trap nights per trap line and then moved to the next randomly chosen trap line. For the purpose of data analysis, the first trap night for each trap line will be considered one day of trapping (Henschel and Ray 2003). In order to meet the model assumption of population closure, we have limited the study to less than 3 months, within the acceptable period defined by Karanth (1995)

Cameras will be placed at a height of approximately 0.3 meters off the ground and 0.5 to 1.0 m off the trail, aimed across the trail, to census passing animals. Each camera will be set for a 3 minute delay between successive captures. Approximately 10 g of silica packets will be placed in each unit to reduce damage to the camera or film caused by humidity. Film should be changed every week and silica should be when cameras are moved between trap lines.

In order to increase photographic captures, bait piles will be deployed at each camera station. Baiting is not believed to inflate density estimates of big cats do to their limited olfactory capabilities (Henschel and Ray 2003). Bait piles will consist of a coffee can, containing 100g of catnip, embedded into the ground and anchored by a 1-meter piece 1.0 cm rebar. Approximately 50 grams of catnip will be added to refresh the bait pile when film is changed.



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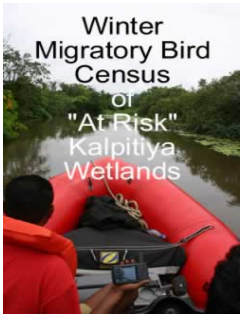

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Data Analysis

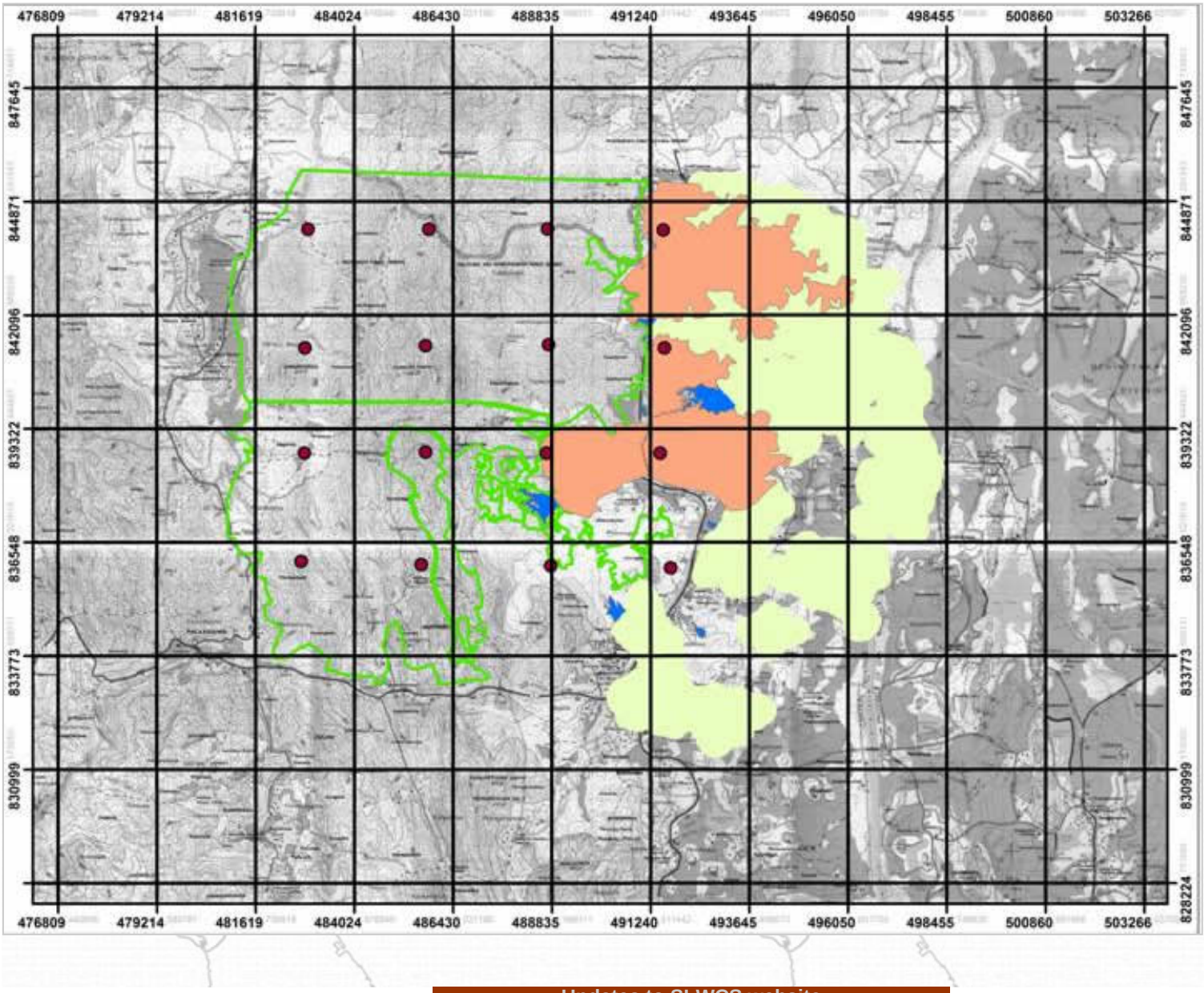
Individual leopards will be identified by their unique spot pattern adorning their flanks. Several of our camera stations have only a single camera producing a photograph of a single flank (right or left) per capture. Reference stations, providing simultaneous captures of opposing flanks, will be used to reduce identity ambiguity among discontinuous captures of opposite flanks. In the case that captures of opposing flanks cannot be confidently identified as a single individual, mark-recapture analysis will be preformed using captures from the flank where the most number of unique patterns are identified.

After all individual leopards are identified; leopard abundance will be estimated by the program CAPTURE (White et al. 1992). The program requires individual leopards' capture histories to be recorded in an x-y matrix, were rows represent individual leopards and columns represent trapping occasions. For each trapping occasion, only a 1 or 0 can be entered corresponding to the individual's presence or absence, respectively. The length of trapping occasion is to be chosen a prior; however, an objective of this pilot is to determine the most biologically and statistically sound occasion length. The program CAPTURE will be run several times with different trapping occasion lengths defined. The trapping length that produces the tightest confidence intervals will be used to generate density estimates, in addition to defining an a priori time interval for trapping occasions for the regional study.

The program CAPTURE can compute several abundance estimates, corresponding to various mark-recapture models, in addition to suggesting the most appropriate model fitting the data (White et al. 1982). The model M h, accounting for individual leopard capture probabilities, is assumed most biologically realistic in mark-recapture studies of big cats (Karanth and Nichols 1998), although all models will be tested and reported. Furthermore, CAPTURE will test if the assumption of population closure was met.

Density estimates will be determined by dividing leopard abundance by the effective sampling area, defined by the minimum convex polygon created by the outer perimeter of camera stations plus a buffer zone. The buffer zone is calculated as ½ mean maximum distance moved (1/2MMDM) (Wilson and Anderson 1985).

Figure 1. Proposed camera station array for pilot leopard survey of the Himbiliyakade Forest Reserve, Sri Lanka , 2005.



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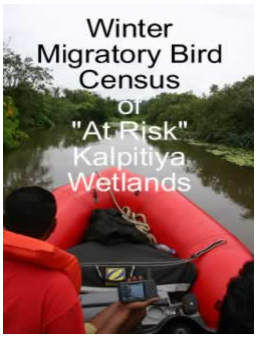

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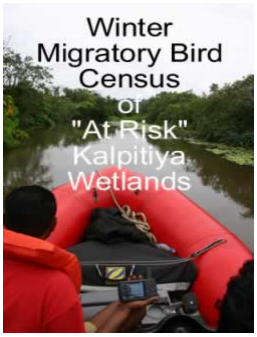

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