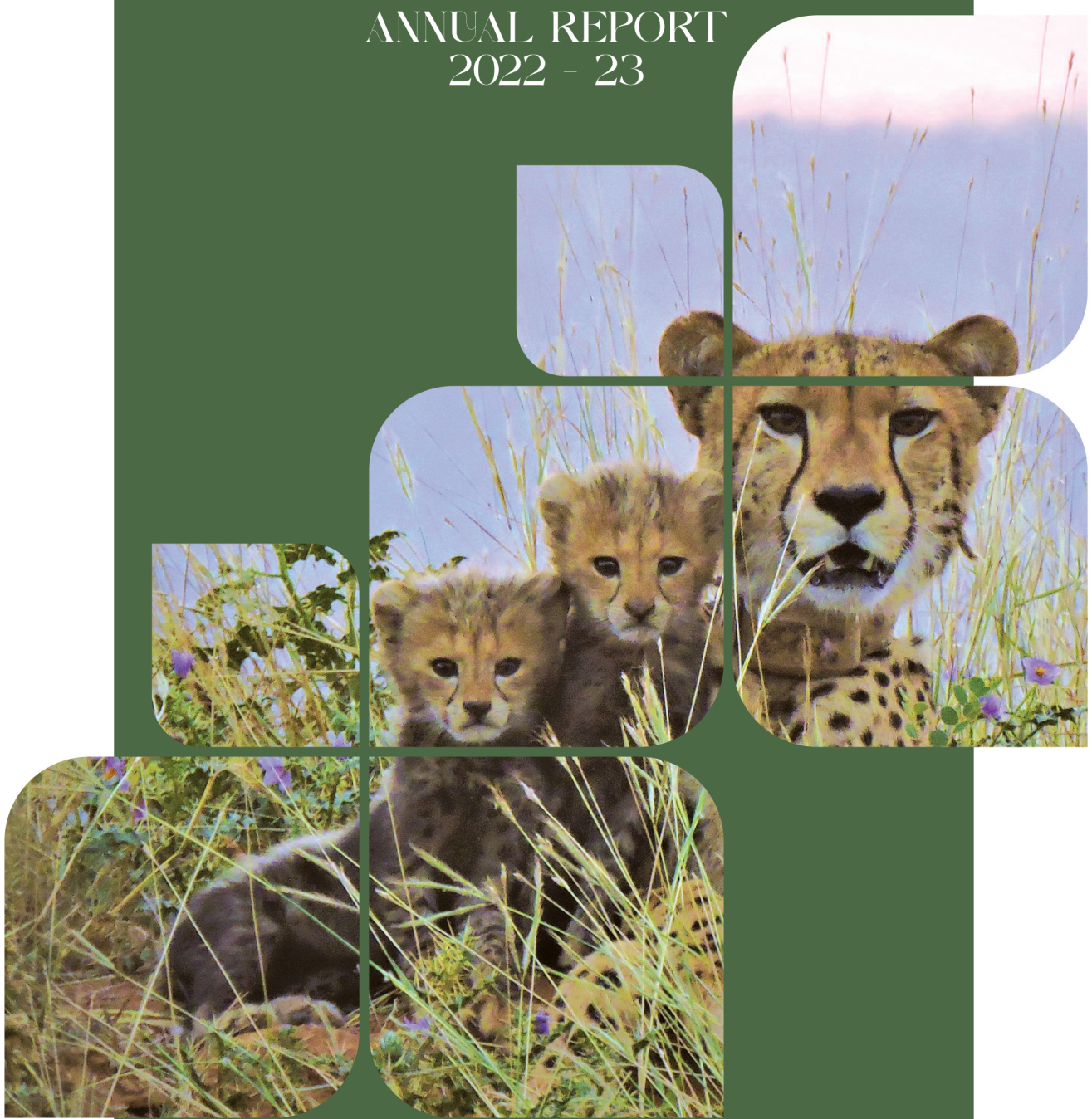
INTRODUCTION OF CHEETAH IN INDIA

ANNUAL REPORT 2022 - 23



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Content

1. Introduction

Worldwide concern for the conservation of large carnivores is grounded in their vital ecological roles. These apex predators play important role in maintenance of ecosystem structures and functioning. Beyond their ecological significance, these charismatic animals play a pivotal role in economies worldwide. They serve as flagship species, drawing tourists to regions for wildlife viewing, which, in turn, bolsters local economies through ecotourism. Furthermore, large carnivores often hold cultural and symbolic value for indigenous communities and societies. Nevertheless, most of the large carnivores face an array of threats. Habitat loss and fragmentation due to human activities isolate carnivore populations, while poaching and illegal wildlife trade pose grave dangers against their population persistence. Human-wildlife conflicts, often leading to livestock depredation and retaliatory killings, are prevalent almost globally. Climate change further complicates the situation by altering prey distribution and habitat conditions. The world is currently witnessing an unprecedented level of concern for the conservation of large carnivores and their ecosystems (Mech 1996, Schaller 1996, Weber & Rabinowitz 1996). However, despite these efforts, the numbers and range of most large carnivores are still declining (Dinerstein et al. 2007, Karanth & Chellam 2009). A significant endeavor to combat and possibly reverse this decline involves the reintroduction and conservation translocation of large carnivores that have disappeared from their historical ranges (Breitenmoser et al. 2001). Reintroductions/conservation translocations of large carnivores have increasingly been recognized as a strategy to conserve threatened species and restore ecosystem functions. However, reintroductions/conservation translocations are not easy tools to implement without robust scientific understanding since such efforts have seen both successes and failures (Smith & Bangs 2009, Johnsingh & Madhusudan 2009).

Recovery of wolves (*Canis lupus*) in the Greater Yellowstone Ecosystem, cheetahs (*Acinonyx jubatus*) in South Africa, tigers (*Panthera tigris*) in Sariska and Panna Tiger Reserves in India are some of the notable examples of successfully establishing carnivore populations. Scientific planning and management guided by the principles of conservation biology play a crucial role in enhancing the effectiveness of these small reintroduced populations in conserving top carnivores (Hayward & Somers 2009). Despite mounting demographic pressures, India stands out for having lost only one large wild mammalian species since gaining independence in 1947. Excluding the Javan (*Rhinoceros sondaicus*) and Sumatran (*Dicerorhinus sumatrensis*) rhinoceroses, which had only peripheral existence in the eastern extremity of the country, India has not lost any large mammalian species in historical times, except for one – the cheetah (*Acinonyx jubatus venaticus*). The cheetah holds a special place in India's national conservation ethos, and its name, "Cheetah," originates from Sanskrit, meaning "the spotted one". The animal finds mention in ancient texts and depictions in Neolithic cave paintings in central India as ancient as 10-20,000 years ago (Divyabhanusinh 2006).

Establishing cheetah metapopulation in India, a significant endeavor in its own right, carries significant conservation implications. The effort to bring back the cheetah entails safeguarding not only its prey base, which includes certain threatened species, but also other endangered species residing in grasslands and open forest ecosystems. Some of the species are teetering on the brink of extinction, such as the caracal (*Caracal caracal*), the Indian wolf (*Canis lupus pallipes*) and three endangered species of the bustard family- the Houbara *(Chlamydotis undulata macqueenii)*, the lesser florican *(Sypheotides indica)* and the most endangered of all, the great Indian bustard (GIB) *(Ardeotis nigriceps)*. Due to lack of appropriate policies, grassland and open forest-dependent species, both avian and terrestrial fauna, have experienced a more severe decline than species adapted to other biomes due to the qualitative and quantitative degradation of these habitats in the subcontinent.

2. History of Cheetah Introduction

The historical range of the cheetah in India (Figure 1) encompassed the entire country except the high mountains, coasts and the northeast region, from west of Bengal in the east extending all the way into Pakistan in the west and from Punjab in the north to north western Tamil Nadu in the South (Seshadri 1969, Divyabhanusinh 2006).

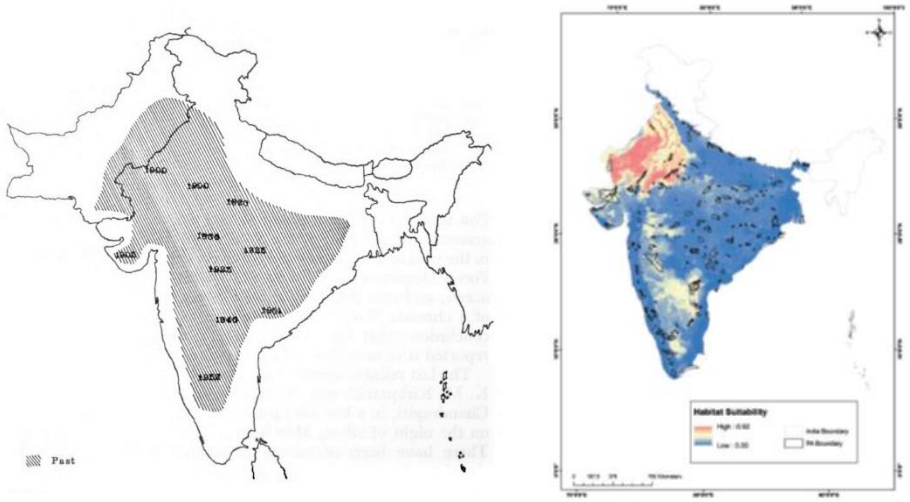


Figure 1: Historical distribution of the cheetah in India, Seshadri 1969 (left) and Maximum Entropy (MaxEnt) output probability map of cheetah habitat suitability in India (right)

The main reasons for the decline of cheetah in India were large scale capture of animals from the wild for coursing, bounty and sport hunting, extensive habitat conversion along with consequent decline in prey base (Divyabhanusinh 2006, Rangarajan 1998). The Mughal Emperor of India, Akbar had nearly 1,000 cheetahs in captivity at a particular time and had collected 9,000 cheetahs during his 50-year rule in the 15th century (Divyabhanusinh 2006). During the British colonial rule in India, other than trophy hunting of cheetahs, bounties were offered by the government for killing cheetahs (Rangarajan 1998). The cheetahs had already become rare in the 20th century (Divyabhanusinh 2006, Divyabhanusinh & Kazmi 2019). The last cheetahs in the wild were recorded in 1948 when three cheetahs were shot in the Sal (*Shorea robusta*) forests of Koriya District, current Chhattisgarh State and a few sporadic reports from central and Deccan regions were documented till mid 1970's (Divyabhanusinh 2006, Divyabhanusinh & Kazmi 2019). The cheetahs were initially extirpated from the grasslands and open forests following which they were eventually obliterated from the deciduous forests of central India, which were their last refuge in the country.

The precarious plight of the cheetah in India was acknowledged by the Government of India way back in 1952 during the first wildlife board meeting of Independent India "called for assigning special priority for the protection of the cheetah in central India" (Chaturvedi 1965, Divyabhanusinh 2006) and in the 1955 meeting "bold experimentation to preserve the cheetah" and further "some years ago, a proposal to import the African cheetah and settle it in the open dry tracts in central west and south India" was suggested (Seshadri 1969). Subsequently, negotiations had commenced with the Shah of Iran in 1970's for bringing the Asiatic cheetah to India in exchange for the Asiatic lions (*Panthera leo*) (Ranjitsinh 2017). During the same decade, the Wildlife (Protection) Act was enacted in 1972 outlawing all forms of hunting and capturing wild animals in India, except for scientific reasons or when they pose a threat to human life. Successively, with the establishment of a network of Protected Areas, implementation of effective wildlife legislation and a dramatic change in the conservation ethos and awareness in the country inter alia, the original cause for the extinction of the cheetah in India has been adequately addressed.

3. Process of Cheetah Introduction in India

The introduction of cheetahs in India is a complex and multi-stage process that involves careful planning, preparation, and coordination among various stakeholders. The general stages for the introduction of cheetahs in India followed as:

3.1. Feasibility Assessment and Site Selection

The Action Plan for introduction of cheetah to India (Jhala et.al. 2021), based on International Union for Conservation of Nature (IUCN) guidelines for reintroductions and conservation translocations (2013), has done comprehensive feasibility study to assess the suitability of potential reintroduction sites in India and identified Kuno as one of the potential sites. Habitat suitability, adequate prey availability, large contiguous landscape, human-wildlife conflict potential, and logistical support were assessed.

The efforts to bring the cheetah back to India were revived in September 2009 by the Wildlife Trust of India who organized a two-day international workshop at Gajner, Rajasthan, India, to deliberate the possible introduction of cheetah into India. This meeting was attended by experts from across the world and officials of the Government of India from the Ministry of Environment, Forest and Climate Change (MoEF&CC), National Tiger Conservation Authority (NTCA) and representatives of the state governments of Gujarat, Rajasthan, Chhattisgarh, Madhya Pradesh and Uttar Pradesh. The experts agreed that establishing cheetah populations in India was feasible, as proposed and elaborated by the Wildlife Institute of India (WII) and others. It was recommended that detailed surveys be carried out in the areas short-listed to confirm this and to determine the modalities as well as the suitability of possible release sites.

Considering the small population of Asiatic cheetah in Iran from which sourcing was not feasible and the genetic similarity between the Iranian and the African cheetah subspecies, the committee was of the opinion that the African cheetah should be used for introduction into India. Now with the advent of advanced molecular tools and full genome analysis carnivore geneticists are of the opinion that cheetah from any of the African populations are equally suited for introduction into India.

Other factors like (a) availability of an adequate number of cheetah for introduction (35-45 individuals over 5 years); (b) behaviorally suitable (able to hunt, avoid humans, yet not extremely skittish to make their management difficult) cheetah, (c) from a genetically diverse population, (d) disease free and of appropriate age and sex composition; would be the determining factors of choosing the source population. IUCN guidelines for reintroductions and conservation translocations (2013) prescribe that sourcing animals should not endanger the source (which would be the case for Iranian cheetah). All the above criteria are satisfied with cheetah being sourced from southern African countries (South Africa and Namibia cheetah populations).

The Wildlife Trust of India and the WII surveyed 10 potential sites in 2009-10: a. Chhattisgarh: 1. Guru Ghasidas National Park (NP), b. Gujarat: 2. Banni Grasslands, c. Madhya Pradesh: 3. Dubri Wildlife Sanctuary (WLS), 4. Sanjay NP, 5. Bagdara WLS, 6. Nauradehi WLS and 7. Kuno NP (formerly WLS), d. Rajasthan: 8. Desert NP WLS and 9. Shahgarh (Bulge) Grasslands, e. Uttar Pradesh: 10. Kaimur WLS (Figure 2) and recommended Kuno, Nauradehi and Shahgarh in Jaisalmer for further considerations for establishing cheetah metapopulation in India (Ranjitsinh & Jhala 2010).

Kuno National Park (NP) in the State of Madhya Pradesh was rated high on the priority list for introduction of the cheetah because of its suitable habitat, inviolate space, adequate prey base and large landscape. Additionally, a lot of restorative investments had already been made at Kuno NP for

reintroducing Asiatic lions. Kuno NP today is 748 km^2 that is devoid of any human settlements and forms part of the larger Sheopur-Shivpuri dry deciduous open forest landscape spanning an area of 6,800 km^2.

As per the directions of the Hon'ble Supreme Court of India in 2020, the cheetah introduction in India is being overseen by the National Tiger Conservation Authority (NTCA), Ministry of Environment Forest and Climate Change (MoEF&CC), Government of India guided and directed by the Committees (Appendix 1). Cheetah introduction phase 1 is for five (05) years with a budget of INR Thirty-nine (39) Crores (US$ 5 million).

Additional five (05) sites- Mukundara Hills Tiger Reserve, Shergarh WLS, Bhainsrorgarh WLS in Rajasthan and Gandhi Sagar WLS and Madhav NP in MP were assessed based on IUCN guidelines for reintroductions and conservation translocations (2013), by the WII on the request of the State Governments along with the reassessment of Kuno NP and Nauradehi WLS during 2020-21.

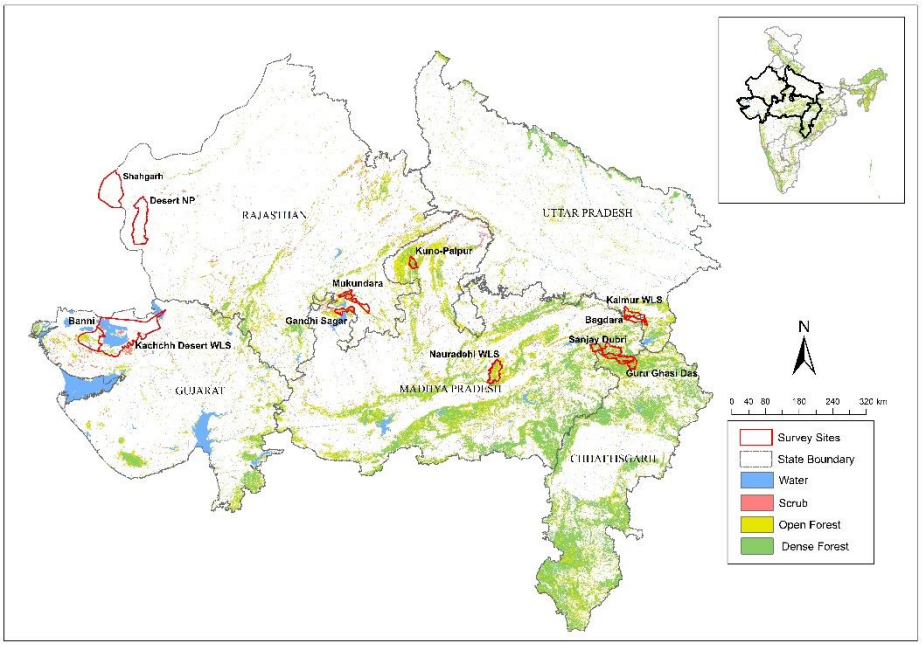


Figure 2: The location of potential cheetah release sites surveyed in the states of Rajasthan, Gujarat, Madhya Pradesh, Uttar Pradesh and Chhattisgarh in India

3.2. Identifying Source Population of Cheetah for Introduction to India

A lot of groundwork and research was carried out before cheetah could be brought to India. Genetic makeup of the founder population was the foremost consideration behind this ambitious first even inter-continental carnivore translocation project. Since few surviving Asiatic cheetah (*Acinonyx jubatus venaticus*) from Iran were unavailable for this project, renowned conservation geneticists across the globe were consulted for a solution. The considered opinion of cheetah geneticists from across the world after careful evaluation of all published scientific studies on cheetah genetics is that all subspecies of the cheetah are equally close to *A. jubatus venaticus* with the Iranian stock segregated in recent time scale and therefore genetic considerations do not play an important role in selecting a founding population. Therefore, South African subspecies of cheetah (*Acinonyx jubatus jubatus*) from Southern Africa and Namibia were chosen as suitable founder members for cheetahs in India since both the countries have sizeable cheetah populations to spare for Indian translocation program.

3.3. Eco-Climatic Niche Model for Cheetah in India

The suitable cheetah habitat in India was determined using Maximum Entropy models for which cheetah presence locations from Southern Africa (South Africa, Namibia, Botswana and Zimbabwe) were used along with relevant eco-climatic covariates (MaxEnt; Phillips et al. 2004). The extent was limited to southern Africa since this was the likely source for cheetah procurement to India. Cheetah presence locations (16,495) from southern Africa (Weise et al. 2017, van der Merwe unpublished data) along with data on land use & land cover (LULC) (2013, 250m, Moderate Resolution Imaging Spectroradiometer (MODIS), National Aeronautics and Space Administration-NASA), precipitation & temperature (1970-2000, 1000m, WorldClim Ver2- Fick and Hijmans 2017), elevation (2014, 30m, Shuttle Radar Topography Mission (SRTM), NASA and the National Geospatial-Intelligence Agency (NGA), Rodriguez et al. 2005, Farr et al. 2007), aridity (1950-2000, 1000m, WorldClim Global Climate Data, Zomer et al. 2007 & 2008) and human impacts (1000m, Kennedy et al. 2019) were used from both southern Africa and India.

Cheetah habitat suitability was best explained by grassland, scrub and open forest systems, semi-arid environments, low human impacts, and temperatures that tended to be hotter compared to cooler regimes (Figure 1). The niche prediction in India coincided with the historical strongholds of the cheetah in India (Figure 1). The analysis showed that the climatic niche of the cheetah in southern Africa exists in India with Kuno NP having a high probability of cheetah habitat suitability. If cheetah locations from across their range were used for this analysis, a larger extent in India was likely to be depicted as cheetah habitat niche.

3.4. Population Viability Analysis for Cheetah Introduction in India

A Population Viability Analysis (PVA) model was parameterized based on demographic parameters of cheetah obtained from literature (Caro 1994, Eaton 1974, Laurenson et al. 1995, Cristescu et al. 2018) for analysis in VORTEX 9.93 (Lacy et al. 2005). Probability of extinction of cheetahs was most sensitive to number and frequency of supplementation of cheetahs subsequently after the initial introduction of 20 individuals and carrying capacity (K) for cheetahs. PVA model analysis suggested that individual cheetah population that has carrying capacity over 25 individuals has a higher chance of persistence over the long-term with appropriate augmentation and management. There will be few potential sites that can hold that many cheetah and thus it is crucial to manage different site populations as a metapopulation, which will have enhanced their chances for long-term survival, as well as to maintain genetic diversity (Gusset 2009).

3.5. Habitat Restoration and Pre-release Preparation

Long-term commitment of resources and personnel have been obtained from the Central and State Governments with endorsement from the Union Government of India and State Government of Madhya Pradesh for successful implementation of the Project. The construction of soft release enclosure (predator proof solar powered electric fence enclosure of area 6 km^2; compartment size: 0.5- 1.5 km^2) for holding cheetah with adequate prey and free of competing large predators in Kuno NP was completed along with quarantine bomas by Madhya Pradesh Forest Department by September 2022. Associated management issues of the Park were addressed by the State Forest Department based on the technical recommendations of WII from additional financial support from Central Government provided by the NTCA. Additionally, grassland restoration, invasive removal, and other habitat management activities are regular activity of the Forest Department. Habitat assessments, ungulate population and carnivore population assessment was carried with collaborative efforts of WII and Forest Department. Awareness and outreach campaigns were conducted to sensitize local communities by Madhya Pradesh Forest Department. Involvement of local people as Cheetah mitras (friends of cheetah) were undertaken across the landscape to garner community support as well as spread the conservation message through these local ambassadors.

3.6. Sourcing of Cheetah and Translocation to Kuno National Park

For sourcing cheetahs from southern Africa, multiple meetings with various cheetah experts/ donor agencies (Dr. Laurie Marker Executive Director Cheetah Conservation Fund (CCF), Dr. Adrian Tordiffe, Veterinarian and Associate Professor, University of Pretoria, Mr. Vincent van der Merwe- Metapopulation Manager, Cheetah Metapopulation Initiative, Mr. Simon Naylor, Conservation Manager, &Beyond Phinda Game Reserve, Endangered Wildlife Trust, officials of India, South Africa and Namibia have been carried out from 2020 onwards to prepare the ground for cheetah translocation to India. To establish a founder population, it was proposed to bring at least 35-45 cheetahs to India over the next five years. An action plan for introduction of cheetah in India was developed in accordance with the IUCN guidelines on reintroductions and conservation translocation (2013) to implement the cheetah introduction program in Kuno and other cheetah introduction sites based on science and pro-active management jointly prepared by the WII, NTCA and MPFD (Jhala et.al. 2021) was released by the Hon'ble Minister of Environment, Forest and Climate Change Shri Bhupender Yadav in January 2022. Disease Risk Analysis (Tordiffe et.al. 2022) for introducing cheetahs to India with rigorous scientific assessment to establish prevalence of potential carnivore diseases in the founder cheetah stock, as well as the carnivore population at the release site, so as to better inform disease prevention and mitigation strategies as well as to manage other health related issues involved in a translocation project was prepared.

As part of Project Cheetah initiation, an Indian delegation headed by Dr. Amit Mallick IGF, NTCA, MoEF&CC, Shri J. S. Chauhan, Chief Wildlife Warden, Madhya Pradesh, Shri Ashok Barnwal, Principal Secretary, Forest and Wildlife, Madhya Pradesh, Dr. Y.V. Jhala, Scientist, WII and Shri Rakesh Jagenia, DIG (Wildlife), MoEF&CC visited Namibia from 18th-21st February 2022 with the facilitation extended through the High Commission of India, Windhoek to discuss and negotiate modalities of sourcing cheetah in consultation with the Namibian Authorities from Cheetah Conservation Fund (CCF) and other Parks in Namibia. The deliberations concluded with a positive note from the Executive Director, Ministry of Environment, Forestry and Tourism, Government of Namibia, to consider finalization of the draft Agreement after the consultation with Attorney's office was completed and commented upon. The Executive Director assured of necessary assistance and cooperation for sourcing cheetah through CCF and other sources in Namibia.

Further, bilateral consultations with South Africa was initiated, and a two member Indian delegation headed by Dr. Amit Mallick IGF, NTCA, MoEF&CC, and Dr. Y.V. Jhala, Dean, WII visited South Africa from 12th -17th April 2022 to discuss modalities of sourcing cheetah in consultation with the South African Authorities, Endangered Wildlife Trust and other Parks in South Africa. The two member Indian delegation held bilateral consultation meetings with representatives from Department of International Relations and Cooperation (DIRCO), South African National Biodiversity Institute (SANBI), Department of Forest, Fisheries & Environment (DFFE), Government of South Africa and officials of Indian mission to discuss the modalities of introduction project with authorities in South Africa and for selection of appropriate cheetah from South Africa apart from field visits to understand cheetah translocation, management aspects and related issues.

The bilateral deliberations during the visit of the Indian delegation was very useful with the facilitation extended through the High Commission of India, Pretoria. The presence of South African authorities from DFFE, SANBI, DIRCO during the delegation level bilateral talks were decisive and enabled first-hand opportunity to discuss issues of mutual concern and modalities of engagement apart from sourcing and importing cheetahs. Subsequently, training and exposure of team of managers, veterinarian and wildlife biologist from India were carried out in Namibia and South Africa on cheetah management and conservation. The team was headed by Dr. Rajendra Garawad, AIGF, NTCA and included Mr. Prakash Verma, DFO, Mr. Amritanshu Singh, SDO & Mr. Onkar Anchal, Veterinary Officer, -Kuno NP and Mr. Bipin C.M., Wildlife biologist, WII.

Further, Agreement between the Government of the Republic of Namibia and the Government of the Republic of India on wildlife conservation and sustainable biodiversity utilization was signed by Shri Bhupender Yadav, Hon'ble Minister of Environment, Forest and Climate Change Government of India and Ms. Netumbo Nandi-Ndaitwah, Hon'ble Deputy Prime Minister and Foreign Minister, Government of Namibia on 20th July 2022. Subsequently, nationwide campaign on cheetah conservation was undertaken by the MoEF&CC during the days leading to the arrival of cheetahs in India.

Image 1: Signing of Memorandum of Understanding (MoU) between the Governments of India and Namibia on biodiversity conservation with emphasis on cheetah conservation by the Hon'ble Minister of Environment, Forest and Climate Change Government of India and Hon'ble Deputy Prime Minister and Foreign Minister, Government of Namibia in July 2022 at New Delhi

Healthy cheetahs from suitable donor populations were identified in Africa for sourcing to India, ensuring genetic diversity. Quarantine and health check of the cheetahs was undertaken as per standard protocols to prevent the introduction/ transmission of diseases. After a month of quarantine at Cheetah Conservation Fund (CCF) facility in Otjiwarongo, Namibia, first batch of eight cheetahs (five females and three males) accompanied by a team of Scientists and Veterinarians from India, Namibia and South Africa along with Shri Prashanth Agrawal, Hon'ble High Commissioner of India to Namibia were transported in a chartered aeroplane and Indian Air Force helicopters to Kuno NP. The cheetahs were released into the quarantine bomas for mandatory seclusion in Kuno NP by the Hon'ble Prime Minister of India on 17th September 2022.

Image 2: The chartered flight and the Indian Air Force helicopter for transporting Namibian cheetah to India in September 2022

Image 3: Cheetahs from Namibia being shifted from Indian Air force helicopter to the release site in Kuno National Park

Image 4: Hon'ble Prime Minister of India releasing the cheetah in Kuno National Park, Madhya Pradesh on 17th September 2022

As per the action plan for introduction of cheetahs to India, for augmenting the founder population, formalities, discussions and procedures for procurement of cheetahs from South Africa were continued. Officials from DFFE, SANParks & SANBI, South Africa visited Kuno NP to assess the site and preparations underway. MoU on cheetah and biodiversity conservation with South African Government was signed by Shri. Bhupender Yadav, Hon'ble Minister of Environment, Forest and Climate Change Government of India and Ms. Barbara Creecy, Hon'ble Minister, Department of Forestry, Fisheries and the Environment, Government of South Africa in January 2023. A dozen suitable cheetahs were identified from various private game reserves in South Africa for translocation to India. Additional quarantine bomas for holding these animals in Kuno NP were prepared by the Madhya Pradesh Forest Department. On February 18, 2023, 12 cheetahs from South Africa comprising of seven males and five females were transported to India after completing their mandatory quarantine in the source country by Indian Air Force cargo plane and helicopters and released into quarantine bomas in Kuno NP.

Image 5: Transport of Cheetah from South Africa to India in Indian Airforce plane during February, 2023

The cheetahs were released into quarantine bomas by Shri Shivraj Singh Chauhan, Hon'ble Chief Minister of Madhya Pradesh and Shri Bhupender Yadav, Hon'ble Minister of Environment, Forest and Climate Change, attended by a host of dignitaries including, Shri Narendra Singh Tomar, Hon'ble Union Minister of Agriculture, Shri. Ashwini Kumar Choubey, Hon'ble Minister of State, Environment, Forest and Climate Change, Shri. Kunwar Vijay Shah, Hon'ble Minister of Forest, Government of Madhya Pradesh and Shri Chandra Prakash Goyal, Director General of Forests & Special Secretary to Government of India, MoEF&CC and Shri Satya Prakash Yadav, Member Secretary, National Tiger Conservation Authority & Additional Director General, Project Tiger & Elephant, MoEF&CC.

Image 6: Release of cheetah from South Africa by Shri Shivraj Singh Chauhan, Hon'ble Chief Minister of Madhya Pradesh and Shri Bhupender Yadav, Hon'ble Minister of Environment Forest & Climate Change, Government of India

3.7. Quarantine, Soft-release and Monitoring

The eight Namibian Cheetahs were kept in predator proof Quarantine bomas (QBs) measuring 25 m × 25 m to 55m × 30m with provisions for water, shade and cover for two and a half months and shifted to Soft Release Bomas (SRBs) in November 2022 , while the 12 South African Cheetah were moved to SRBs or hunting bomas during April 2023. In accordance with the protocols, a monitoring team comprising of a veterinarian, Forest Department field staff, and research personnel from WII, conducted regular observations of cheetahs' health and behavior twice daily during the quarantine period. A feeding schedule was implemented inside the QBs to prevent any opportunity for live hunting by the cheetahs. To minimize human interference and the risk of disease transmission, the monitoring team kept their interaction with the cheetahs to a minimum. Stringent restrictions were implemented and followed within the quarantine area. Continuous 24-hour monitoring from a distance was conducted by another team stationed at strategically placed observation points, including machans/watch towers and high mast cameras, to collect data on the daily routines of the cheetahs and ensure their safety. Daily updates on the cheetahs' status, known as the 'khariat/well-being report,' were communicated to senior officers overseeing the project at the headquarters. The quarantine period passed successfully without any issues, such as injuries, diseases, or fatalities, and all the cheetahs fared exceptionally well.

Following the completion of the mandatory quarantine period in QBs and on receiving clearance/ "OK report" from the Department of Animal Husbandry and Dairy (DAHD), New Delhi, the cheetahs were shifted into SRBs as the next step towards their final release into free ranging environment in Kuno NP. SRBs are large forested areas, averaging around 80-90 hectares, enclosed with predator-proof fencing. These areas allow the cheetahs to acclimatize to their natural surroundings and provide opportunities for hunting. There are nine SRBs of varying sizes, ranging from a maximum of 153 hectares to a minimum of around 50 hectares. Prey species such as chital or spotted deer (*Axis axis*), nilgai (*Boselaphus tragocamelus*), sambar deer (*Rusa unicolor)*, wild pig (*Sus scrofa*), and hare (*Lepus nigricollis*) are available within each SRB. Additionally, each SRB has water facilities, including water saucers and water guzzlers, with refilling arrangements from overhead tanks constructed outside the enclosure.

All the cheetahs adapted comfortably to their new wild surroundings in the SRBs and successfully hunted without difficulty. They were visually monitored twice daily by two separate teams consisting of field staff, WII researchers, and veterinarians. Each individual cheetah was fitted with satellite and GPS radio collars for tracking and monitoring within the SRBs. Cheetah experts from Namibia were stationed at Kuno right from the beginning and assisting the project in various ways such as monitoring, training and knowledge sharing.

A few controlled and guarded interactions were allowed between few cheetah males and females within the SRBs by opening the gates gradually in between the compartments. The monitoring team made several observations of mating instances between the males and females. One female brought from Namibia, Jwala/Siyaya gave birth to four cubs inside the SRB during March 2023.

Image 7: Female cheetah Jwala/Siyaya with cubs in Kuno National Park

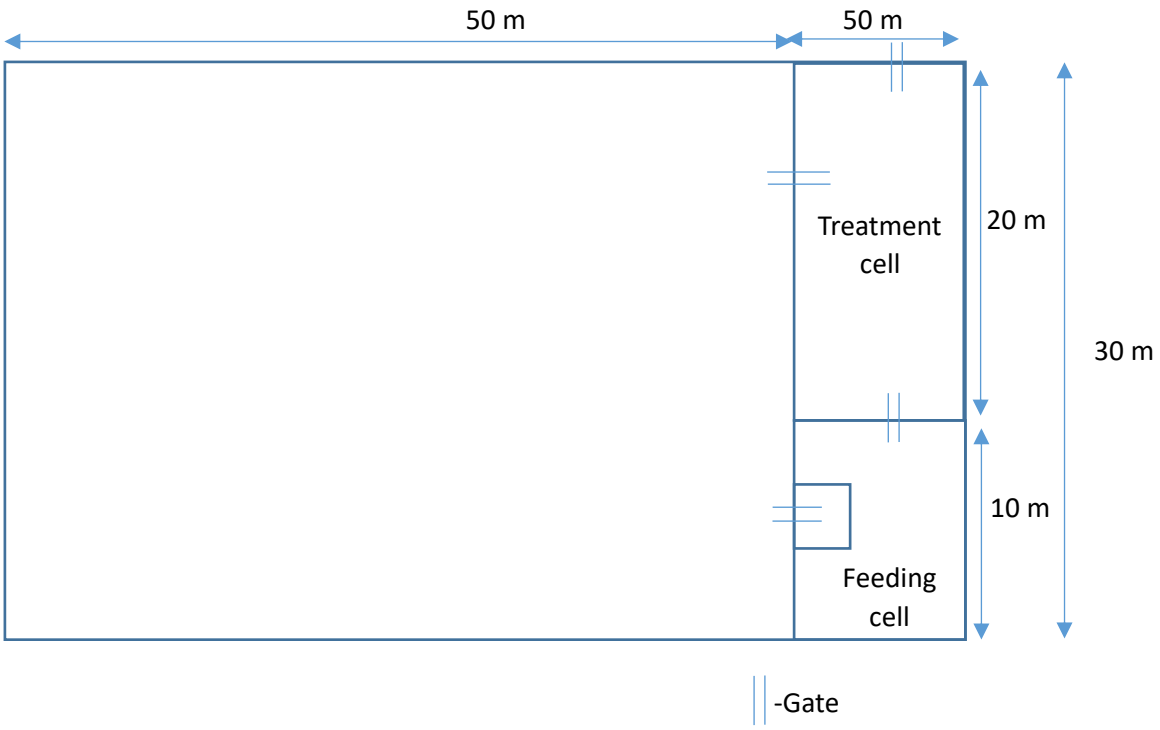


Figure 3: Design of cheetah quarantine boma

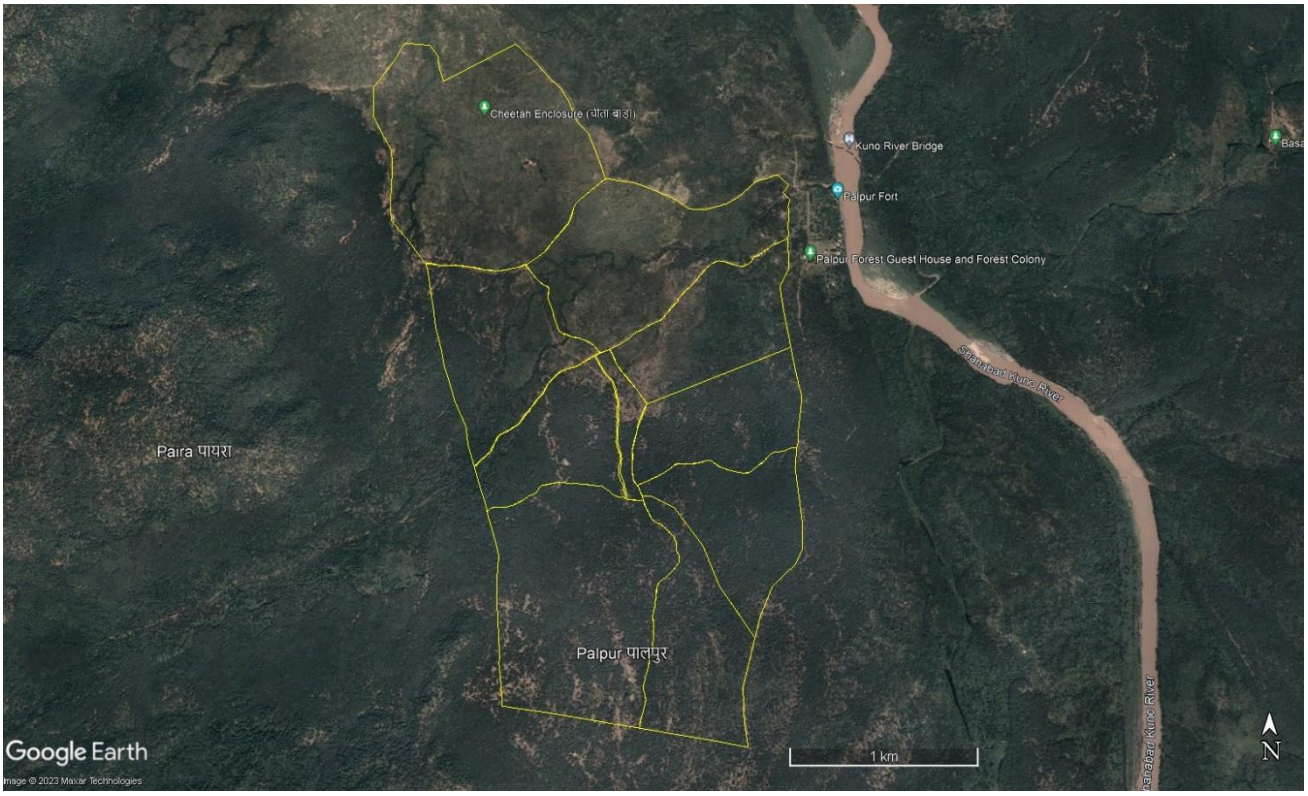


Figure 4: Map of soft release enclosure (Boma)

3.8. Release into the Wild, Research and Adaptive Management

Cheetahs were released into the SRBs in a staggered manner, first the Namibian animals were shifted from 5th to 30th November 2022 and the South African cheetahs from 5th to 18th April 2023 and into free ranging environment from 11th March to 10th July, 2023 (Table 1). All the released cheetahs were continuously monitored and tracked 24x7. After the cheetahs were released into the natural habitat, teams of four-five members each, comprising of a driver, forest watcher, forest guard, and WII researcher were assigned to monitor their movements. These teams maintained continuous surveillance using vehicles or walking when necessary, for 24-hour shifts before being replaced by another team. Each cheetah had three dedicated monitoring teams, totaling 12 to 15 individuals for each animal, with each team working for 24 hours or more as required. On any given day, following the release of all 12 cheetahs, an average of approximately 60 people monitored their activities, and in total, there were 144-180 dedicated personnel monitoring cheetahs in the wild. Communication with authorities was facilitated by wireless messaging and telephone conversations, providing real-time updates on cheetah movements and ground observations. A dedicated vehicle equipped with radio antennas and other accessories was provided to each tracking team. The teams' responsibilities included keeping the cheetahs within radio signal range, documenting visual observations at least once a day, while noting any changes in behavior, signs of injury, limping, and the cheetahs' belly score, which indicates their level of satiety. Cheetahs exhibited varying levels of tolerance to human presence, with a few individuals allowing closer proximity than others. Special training was provided to tracking teams for monitoring skittish cheetahs.

Table 1: Details of cheetah arrival and release in Kuno National Park

Sl No	Name	Place of origin	Date of arrival and into QB	Release Date into SRB	Date of release into free ranging	Recapture date	Released Back	Captured for quarantine date/ Death*	Total days in free ranging conditions
1	Asha	Namibian adult female	17-09-2022	27-11-2022	11-03-2023	12-06-2023	12-06-2023	20-07-2023	131
2	Pawan	Namibian adult male	17-09-2022	18-11-2022	11-03-2023	22-04-2023	02-07-2023	14-07-2023	54
3	Gaurav	Namibian adult male coalition	17-09-2022	05-11-2022	22-03-2023	-	-	19-07-2023	119
4	Shaurya	Namibian adult male coalition	17-09-2022	05-11-2022	22-03-2023	-	-	19-07-2023	119
5	Jwala	Namibian adult female	17-09-2022	28-11-2022	Not Released			01-06-2023	-
6	Sasha	Namibian adult female	17-09-2022	28-11-2022	Not Released			27-03-2023*	-
7	Dhatri	Namibian female	17-09-2022		02-06-2023	-	-	31-07-2023*	59
8	Nabha	Namibian adult female	17-09-2022	28-11-2022	Not Released			-	-
9	Gamini	Tswalu female	18-02-2023	18-04-2023	19-05-2023	-	-	21-07-2023	63
10	Agni	Phinda adult male coalition	18-02-2023	18-04-2023	19-05-2023	-	-	26-06-2023	38
11	Vayu	Phinda adult male coalition	18-02-2023	18-04-2023	19-05-2023	-	-	27-06-2023	39
12	Nirva	Mapesu sub-adult female	18-02-2023	18-04-2023	28-05-2023	-	-	13-08-2023	77
13	Dheera	Waterberg biosphere adult female	18-02-2023	18-04-2023	01-07-2023	-	-	20-07-2023	19
14	Prabhas	Waterberg biosphere adult male coalition	18-02-2023	18-04-2023	10-07-2023	-	-	26-07-2023	16
15	Pavak	Waterberg biosphere adult male coalition	18-02-2023	18-04-2023	10-07-2023	-	-	22-07-2023	12
16	Veera	Tswalu sub adult female	18-02-2023	18-04-2023	23-06-2023	-	-	26-07-2023	33
17	Uday	Waterberg Biosphere adult male	18-02-2023	18-04-2023	Not Released			23-04-2023*	-

Sl No	Name	Place of origin	Date of arrival and into QB	Release Date into SRB	Date of release into free ranging	Recapture date	Released Back	Captured for quarantine date/ Death*	Total days in free ranging conditions
18	Daksha	Phinda adult female	18-02-2023	18-04-2023	Not Released			09-05-2023*	-
19	Suraj	Tswalu sub-adult male	18-02-2023	18-04-2023	24-06-2023			14-07-2023*	20
20	Tejas	Tswalu adult male	18-02-2023	18-04-2023	Not Released			11-07-2023*	-

The tracking teams continuously updated important observations to the Control Room at Palpur, a remote location in the centre of Kuno NP. Palpur serves as the central hub for monitoring and controlling all activities related to the cheetahs. Four veterinarians were stationed at Palpur 24x7 to care of the cheetahs, along with a Sub Divisional Officer (SDO), a Range Forest Officer, field staff, tracking teams, WII researchers, and administrative personnel. The Control Room in Palpur facilitates the flow of information, logistical support and monitoring.

3.8.1. Monitoring of Cheetah in Kuno National Park

The cheetahs were regularly monitored by dedicated teams from the day they arrived in Kuno NP. The wild released cheetahs were monitored 24X7 by tracking teams and their activity was recorded. These animals were fitted with satellite collars that provided additional information. Cheetah in SRBs (predator proof soft release/ acclimatization) were monitored during the daytime and, as and when needed, the night vigil was also carried out.

3.8.1.1. Monitoring (health) of cheetah during quarantine period- Post arrival in India, animals were quarantined in isolated and secure predator proofed bomas to identify any disease/pathological condition if present. Nutritious diet was provided to cheetahs mimicking the natural feed starvation cycle. The condition of the animals was checked every day visually early morning and late evening by a small team of caretakers and veterinarians. Round the clock monitoring of the animals by observer(s) were undertaken concealed in watchtower and from a distance for their water intake, urination, and defecation. Routine cleaning activities to maintain hygiene were carried out when the cheetahs were busy feeding. Caretakers would carefully enter the enclosures and maintain a safe distance from the animals and removed any bones, cleaned the water trough, refilled the water and collected faecal matter. Training on all aspects of cheetah care and behaviour were imparted by the Namibian team to the Indian cheetah team at Kuno. Strict measures and protocols were followed to ensure that human interaction was very minimal as stress can be lethal to these animals.

Image 8: Monitoring of cheetahs by the tracking team from the forest department and the Wildlife Institute of India in Kuno National Park through radio telemetry

3.8.1.2. Monitoring (health) of cheetah after release into the larger soft release enclosure- All the cheetahs were fitted with radio collars which provided information on the locations of cheetahs in the SRBs. The animals were visually observed twice a day by the tracking teams for assessing fitness, activity, health, body condition, behaviour, predation patterns, habitat use, visible injuries, belly scores and any other abnormal signs or symptoms. All the daily observations were systematically recorded. Abnormalities if any, were immediately attended to by the entire veterinary team and a mobile capture unit was kept on standby throughout, in order to minimise the response period.

Image 9: Veterinary health check-up in the soft release acclimatization bomas

3.8.1.3. Monitoring (health) of cheetah after release into the wild (free ranging)- Since all the cheetahs were deployed with radio collars, their movement were monitored 24 hours a day. The tracking teams visually observed the animals throughout to assess their health, fitness and body condition. The veterinary team visited the animals at least once in two days for visual health examinations and a mobile

veterinary unit was kept on standby throughout for field treatments, if necessary. Radio telemetry based monitoring enabled active management interventions whenever cheetahs were venturing into unfavourable habitats, allowed for quick compensation dispensation in case of livestock depredation (one instance), and determine causes of cheetah mortality. If any animal was likely to get into undesirable situation/location, it was brought back through immobilization that was carried out by qualified trained personnel.

Image 10: Rescue and veterinary health check-up of cheetahs in the free-ranging environment of Kuno landscape

4. Ecology of Cheetahs in Kuno

Large carnivores exert cascading effects across tropic levels by shaping the species interactions in lower trophic levels (Ripple & Beschta 2012) and they also act as an important evolutionary force of natural selection (Fortin et al. 2005). The behaviour of the predators has an important role in shaping the structure and distribution of prey populations in an ecosystem (Khater et al. 2016). Since the evolutionary time scale, both the predators and prey are co-evolving in a game of acquiring themselves, either getting better at capturing the prey (for predators) or better at escaping predators (for prey) (Brown & Vincent 1987). The cheetahs, one of the most unique among all the extant big cat species, in both behaviour and morphology, have a distinct evolutionary history. The lineage of cheetahs is more closely related to the lineages of puma (*Puma concolor*) and jaguarundi (*Herpailurus yagouaroundi*) than other pantherine cats, which diverged from other felids more significantly around 2-4 million years ago. The earliest known fossil record suggests an old-world origin of the ancestors of the modern-day cheetahs (Christiansen & Mazak 2009). The modern-day cheetah is the only extant representative of the genus *Acinonyx*. It is the only sprinting specialist of all the extant large cat species that not only acquired special morphological adaptations for its speed but is also believed to have shaped the evolution of many herbivore species it preys on.

There are five extant subspecies of the cheetah in the world (Northwest African cheetah *Acinonyx jubatus hecki,* East African cheetah *Acinonyx jubatus fearsoni*, South African cheetah *Acinonyx jubatus jubatus*, Northeast African cheetah *Acinonyx jubatus soemmerringi* and Asiatic cheetah *Acinonyx jubatus venaticus* (Caro 1994; Hunter & Hamman 2003) and all of them are listed in the CITES (Convention on International Trade of Endangered Species) Appendix 1 and classified as Vulnerable (*A.j. jubatus*, *A.j. fearsoni, A.j. soemmerringi)* and Critically Endangered (*A.j. hecki and A.j. venaticus*) by the IUCN (Marker et al. 2003a; Friedmann & Daly 2004).

There are some popular misconceptions about the general ecology of cheetahs and these are mostly due to the fact that the very initial studies of cheetah biology were undertaken in the Serengeti, and as a consequence, the cheetah is known as a highly specialized felid of the open savannah habitats with very wide home-ranges where it kills medium to small sized prey after a high-speed chase (Schaller 1972; Caro & Collins 1986; 1987; Durant et al. 1988; Fitzgibbon 1990; Caro 1994; Laurenson 1994; 1995; Laurenson et al. 1995; Durant 1998; 2000a; 2000b). However, historically, cheetahs occurred across a wide range of habitat types from Africa, the Middle East and up to southern Asia (Caro 1994; Sunquist & Sunquist 2002; Hunter & Hamman 2003), suggesting that this species should be able to tolerate and hunt in a relatively wide range of environmental conditions and habitats. Indeed, cheetahs currently inhabit a wide range of bush, scrub and woodland habitats in southern Africa (Purchase & du Toit 2000; Broomhall et al. 2003; Marker et al. 2003a). Perhaps it is debated and suggested that thicket vegetation may be the key to the survival of cheetahs as the survivability of cubs in such habitats is high (Durant 1998).

Across the distribution range of the cheetahs, there is considerable variation in their home ranges. Female cheetahs generally have larger home ranges than males (Caro 1994; Hunter 1998; Purchase & du Toit 2000; Broomhall et al. 2003; Marker et al. 2003a) and home ranges of territorial males often overlap with home ranges of several females (Caro & Collins 1986; 1987; Sunquist & Sunquist 2002; Broomhall et al. 2003). Availability and density of prey are also known to influence the home range size of cheetahs. For example, in the Serengeti NP the female cheetah which follows the migratory movements of the Thomson's gazelles (*Eudorcas thomsonii*) has larger home ranges (833 km^2) than the resident males (37.4 km^2) (Schaller 1972; Durant et al. 1988; Caro 1994). In Kruger NP and Phinda Resource Reserve where prey is non-migratory

(126-195 km^2 for males and 150-171 km^2 for females), and in Matusadon NP (70.5 km^2 for females and 74.3 km^2 for males) where the density of prey is high, male and female cheetahs have smaller overlapping ranges that are similar in size (Hunter 1998; Purchase & du Toit 2000; Broomhall et al. 2003). Cheetah's home range and space use are also known to be influenced by the presence of superior predators like leopards (*Panthera pardus*) and lions.

4.1. Prey Selection by Cheetah

Cheetahs are predators that chase their prey and kill by suffocating. They have special modifications of their claw into semi-retractile condition to help them grip on the ground during the high-speed chase. The strong and sharp curved large dewclaw (first digit of the forepaw) plays a very important role in hooking the prey during high-speed chases and throwing them off balance. The slenderness of their body gives an added advantage in reducing their overall weight and facilitating their incredible acceleration and speed. Elongated hind limbs provide longer stride lengths, leveraging in the accelerations. The long muscular tail helps in maintaining balance during high-speed chases and maintaining the directions. They also have enlarged nasal passages, allowing higher inhalations of air during chase.

They mostly prefer small to medium-sized prey such as gazelles, impalas, springboks, and young wildebeests in the African forests (Mills et al. 2004). These prey species typically weigh between 20 to 80 kg (44 to 176 lbs). They rely on their speed to catch up to and capture the prey. Unlike other stalking predators, cheetahs rely on stealth and their speed to surprise and chase down their prey. After catching the prey, they try to quickly finish their meals and seldom cache their kills to avoid interference competition from other co-predators such as hyena, leopard and lions.

4.2. Prey Selection by Cheetah in Kuno

All the cheetah individuals were monitored continuously to understand their predation pattern both within the soft release/ acclimatization boma (SRB) and in the free-ranging environment. The reported predation rate is based on detected events on actual predations and there might be many missed predation events that were undetected by the field team due to various reasons. They were observed to predate on a wide range of species in the landscape including Indian hare, chital, sambar, chousingha or four-horned antelope (*Tetracerus quadricornis*), chinkara (*Gazella bennettii*), blackbuck (*Antilope cervicapra*) and nilgai. It was observed that within the acclimatization boma, where majority of the prey species is chital, the average kill rate of cheetahs was observed to be 5.84 (SE 1.14) days. Details of the kill rates of individual cheetahs that were detected by the observers are in Table 2. In free ranging environment, about 67% of the detected kills were chital, followed by chousingha (15%), blackbuck (8%), sambar (4%), chinkara, hare and nilgai (2% each). The average observed kill rate of the free ranging cheetahs was 6.68 (SE 0.98) days. There was a possibility of missing some kills and especially small kills were reported less, may be a detection bias. Future protocols will address these issues in monitoring of kills.

Table 2: Kill rate and details of herbivores predated by the cheetah inside the soft release boma

Sl	Individuals	Detected Kill Rate	Chital	Sambar	Chousingha	Chinkara	Blackbuck	Hare	Nilgai
1	**Asha**	5.83	Yes	-	-	-	-	-	Yes
2	**Pawan**	5.14	Yes	Yes	-	-	-	-	-
3	**Gaurav _Shaurya**	6.14	Yes	-	-	-	-	-	-
4	**Gamini**	4.25	Yes	-	-	-	-	-	-
5	**Agni_Vayu**	2.5	Yes	-	-	-	-	-	-
6	**Nirva**	2.83	Yes	-	-	-	-	-	Yes
7	**Suraj**	3.14	Yes	Yes	-	-	-	-	Yes
8	**Dheera**	3.14	Yes	Yes	-	-	-	-	-
9	**Daksha**	2.5	Yes	-	-	-	-	-	-
10	**Dhatri**	6.55	Yes	-	-	-	-	-	-
11	**Jwala**	4.35	Yes	-	-	-	-	-	-
12	**Nabha**	6.78	Yes	-	-	-	-	Yes	-
13	**Sasha**	2.71	Yes	-	-	-	-	Yes	-
14	**Prabhas_ Pavak**	13.75	Yes	-	-	-	-	-	-
15	**Tejas**	18	Yes	-	-	-	-	-	-
16	**Uday**	-	-	-	-	-	-	-	-
17	**Veera**	-	-	-	-	-	-	-	-

Table 3: Kill rate and details of herbivores predated by the cheetahs in free ranging environment

Sl	Individuals	Detected Kill Rate	Chital	Sambar	Chousingha	Chinkara	Blackbuck	Hare	Nilgai
1	**Asha**	5.33	Yes	-	Yes	Yes	-	Yes	-
2	**Pawan**	3.2	Yes	-	-	-	Yes	-	-
3	**Gaurav_Shaurya**	9.44	Yes	Yes	-	-	-	-	Yes
4	**Gamini**	6.75	Yes	-	-	-	-	-	-
5	**Agni_Vayu**	9.33	Yes	-	-	-	-	-	-
6	**Nirva**	6	Yes	-	Yes	-	-	-	-
7	**Veera**	-	Yes	-	-	-	-	-	-

4.3. Home Ranges and Movement Patterns of Cheetahs in Kuno Landscape

All cheetahs brought to India were fitted with satellite collars manufactured by African Wildlife Telemetry (AWT). The collars also have both VHF (Very High Frequency) and UHF (Ultra High Frequency) transmitters for ground tracking and ground data downloading using specialized receivers. The frequency of data logging was set according to the necessity of the monitoring processes for each individual differently. The data were remotely accessed and downloaded using the online panel of AWT. All the wild-released cheetahs were monitored 24/7 by trained personnel from the Madhya Pradesh Forest Department and researchers from the WII. Cheetahs were followed at a safe distance without causing any discomfort to the animals and affecting their 'normal' behaviour. A couple of cheetahs showed exploratory behavior and travelled long distances and had to be captured and shifted back by the veterinary team into the National Park.

The movement pathways and home ranges of individual cheetahs were generated using MCP (Minimum Convex Polygon) method in ArcMap. To estimate the average daily movement of wild released cheetahs, R package adehabitatHR (Calenge, C. 2006) was used. The average daily movement of all the wild released cheetah was found to be 4.28 (SE 0.78) km, range 1.26-9.41 km in Kuno landscape. The home range size of individual animals using MCP method varied from 3- 5441 km^2.

Table 4: Movement and home range of cheetahs in Kuno National Park

Animal Unit (& Days)	Distance moved- km	Average daily distance moved- km	Home range (MCP)- km^2
Coalition males-2# (14-119)	7-185	1.26-4.54	3-172
Solitary male-2# (20-54)	40-523	1.81-9.41	44-2739
Solitary female-5# (19-131)	34-983	1.99-7.09	16-5441

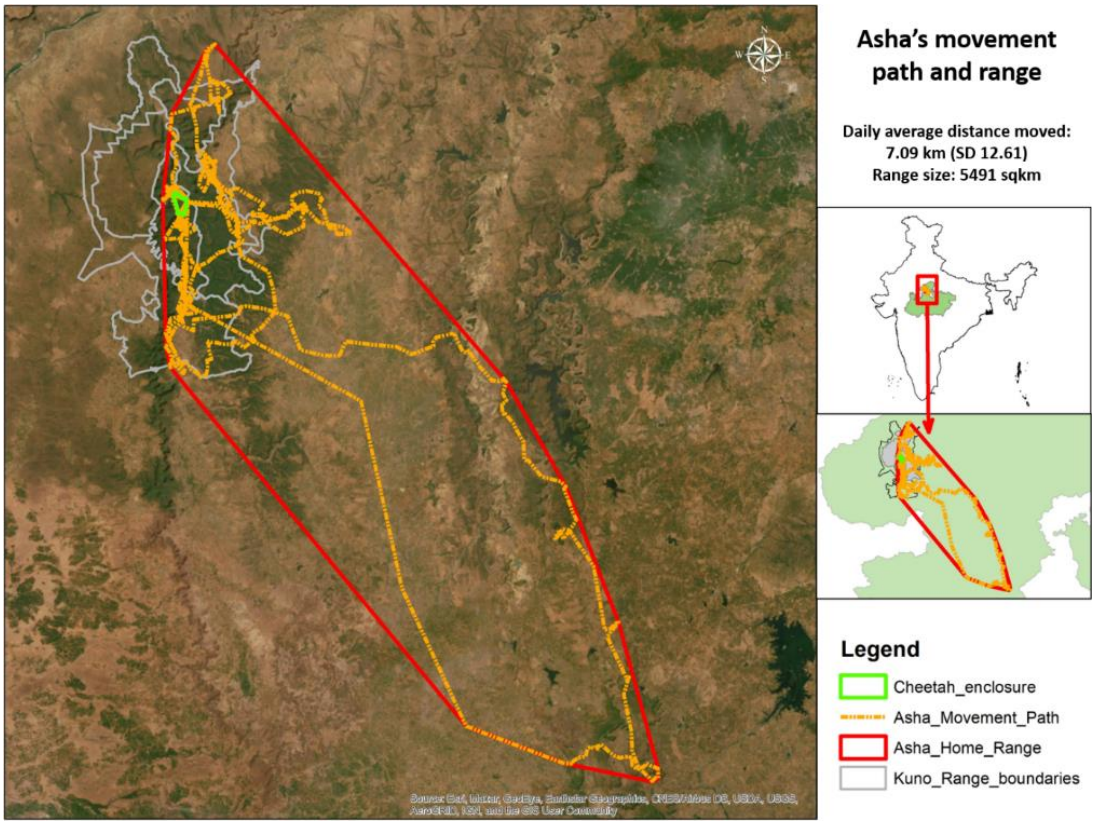
Table 5: Average daily distance moved and home range size (minimum convex polygon) of individual cheetahs

Sl No	Individual	Place of origin	Source Country	Average daily distance moved (km)	Home-range (km^2)
1	Agni	Phinda adult male coalition	South Africa	4.54 (SD 9.85)	172
2	Asha	Namibian adult female	Namibia	7.09 (SD 12.62)	5491
3	Daksha	Phinda adult female	South Africa	In soft release enclosure	NA
4	Dhatri	Namibian female	Namibia	3.64 (SD 6.34)	334
5	Dheera	Waterberg biosphere adult female	South Africa	2.36 (SD 3.84)	16
6	Gamini	Tswalu female	South Africa	4.08 (SD 7.49)	450
7	Gaurav	Namibian adult male coalition	Namibia	3.39 (SD 6.46)	30
8	Jwala	Namibian adult female	Namibia	In soft release enclosure	NA
9	Nabha	Namibian adult female	Namibia	In soft release enclosure	NA
10	Nirva	Mapesu sub-adult female	South Africa	4.53 (SD 10.22)	93
11	Pavak	Waterberg biosphere adult male coalition	South Africa	1.26 (SD 1.49)	3

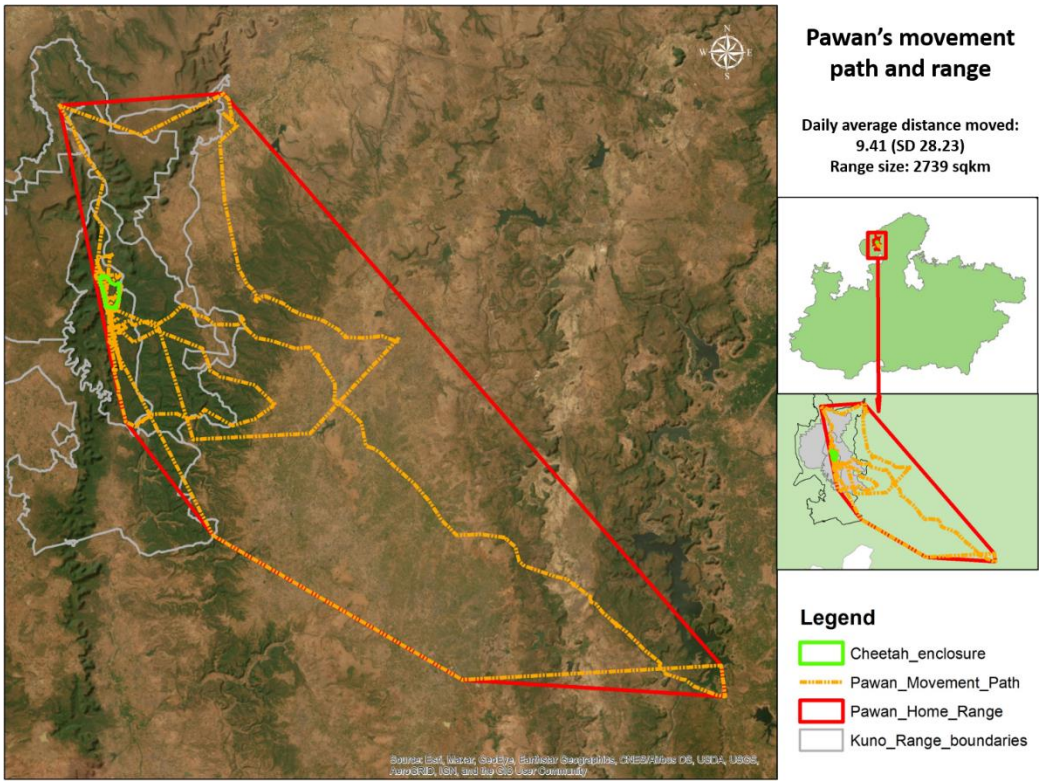
Sl No	Individual	Place of origin	Source Country	Average daily distance moved (km)	Home-range (km^2)
12	Pawan	Namibian adult male	Namibia	9.41 (SD 28.23)	2739
13	Prabhas	Waterberg biosphere adult male coalition	South Africa	4.09 (SD 6.37)	31
14	Sasha	Namibian adult female	Namibia	In soft release enclosure	NA
15	Shaurya	Namibian adult male coalition	Namibia	2.96	27
16	Suraj	Tswalu sub-adult male	South Africa	3.22	44
17	Tejas	Tswalu adult male	South Africa	In soft release enclosure	NA
18	Uday	Waterberg Biosphere adult male	South Africa	In soft release enclosure	NA
19	Vayu	Phinda adult male coalition	South Africa	3.97 (SD 7.69)	172
20	Veera	Tswalu sub adult female	South Africa	1.99 (SD 4.21)	89

4.4. Movement and Home Range Maps of Individual Cheetahs Released into the Wild

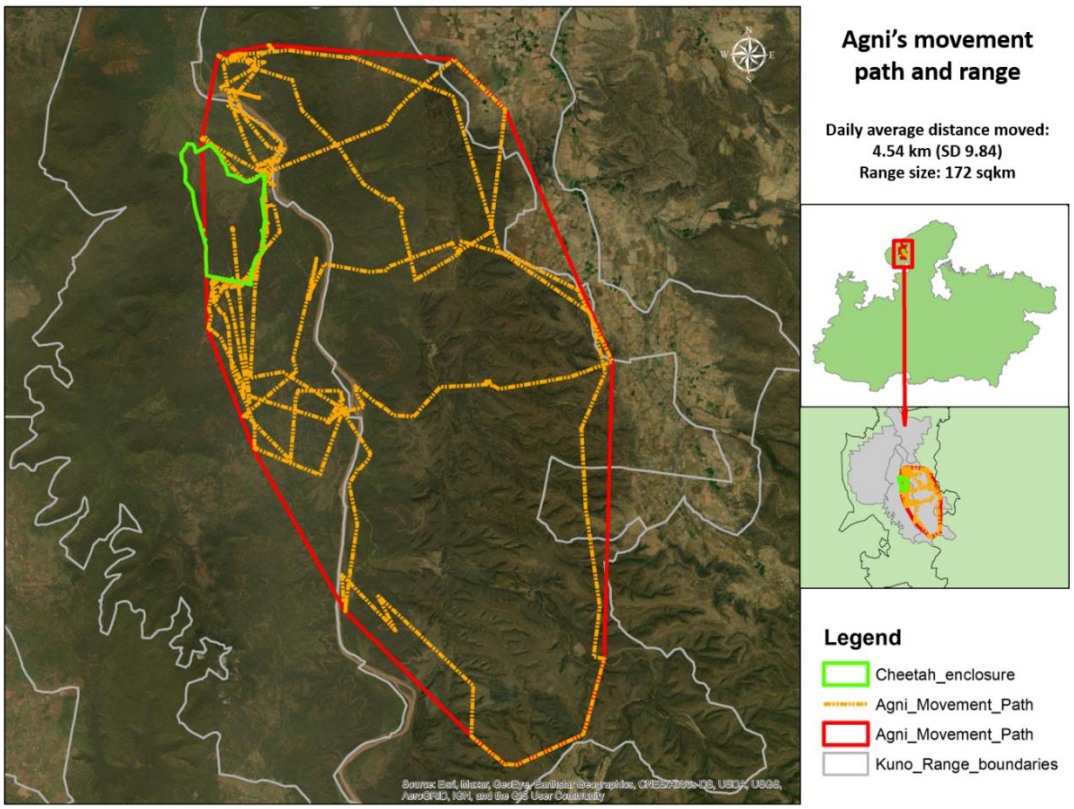
1. Asha



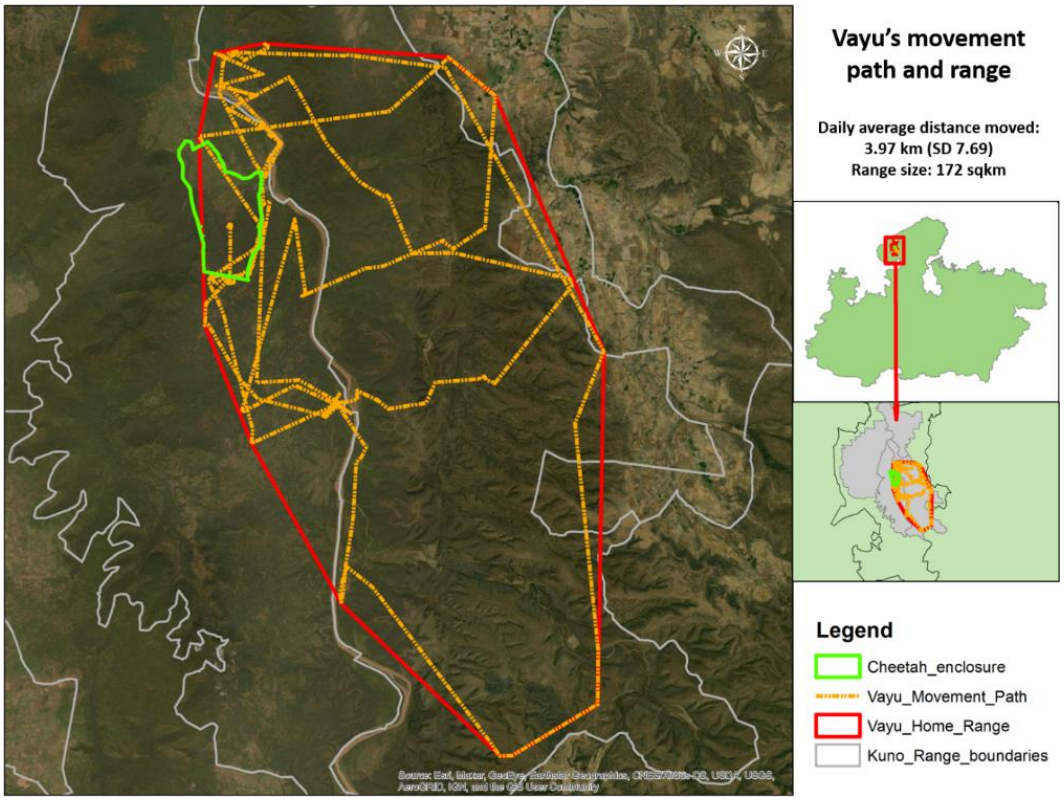
2. Pawan



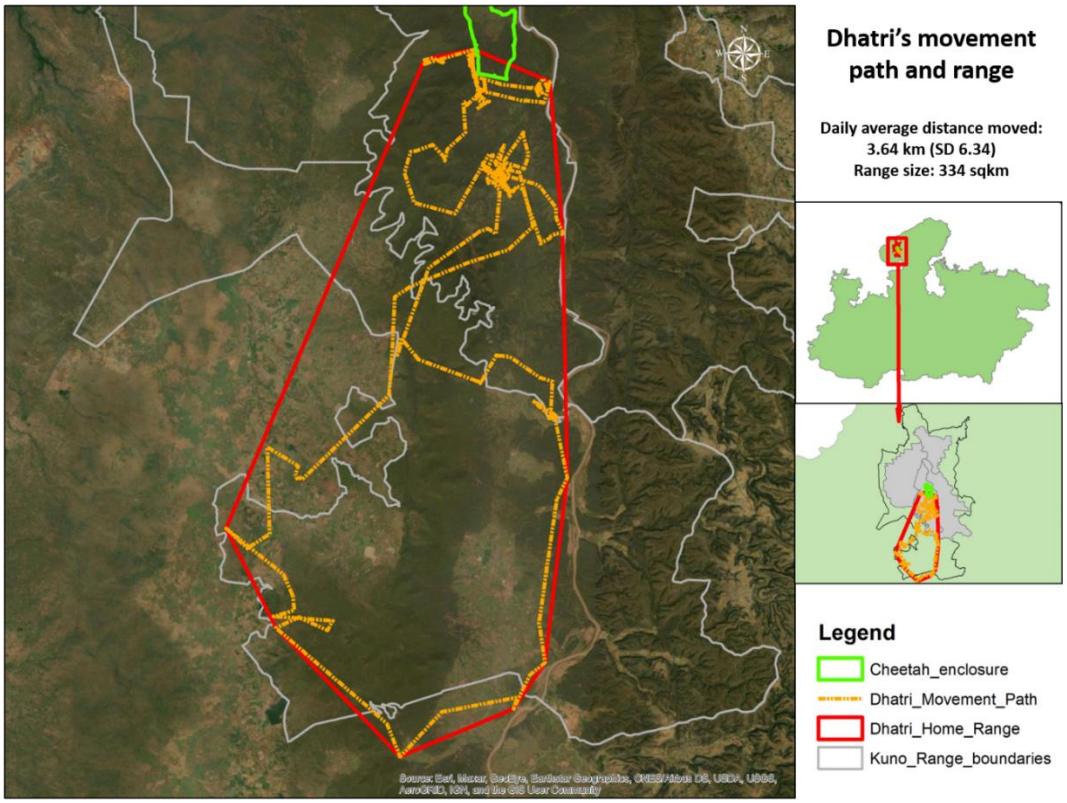
3. Agni


Agni's movement path and range
Daily average distance moved: 4.54 km (SD 9.84)
Range size: 172 sqkm
Legend
Cheetah_enclosure
Agni_Movement_Path
Agni_Movement_Path
Kuno_Range_boundaries

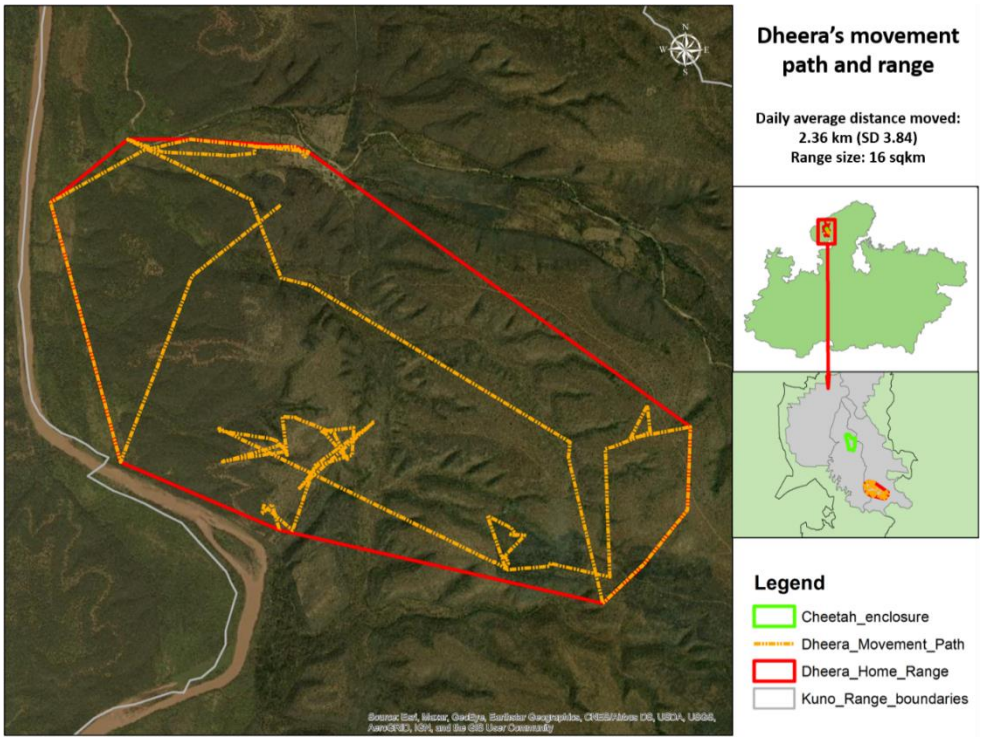
4. Vayu


Vayu's movement path and range
Daily average distance moved: 3.97 km (SD 7.69)
Range size: 172 sqkm
Legend
Cheetah_enclosure
Vayu_Movement_Path
Vayu_Home_Range
Kuno_Range_boundaries

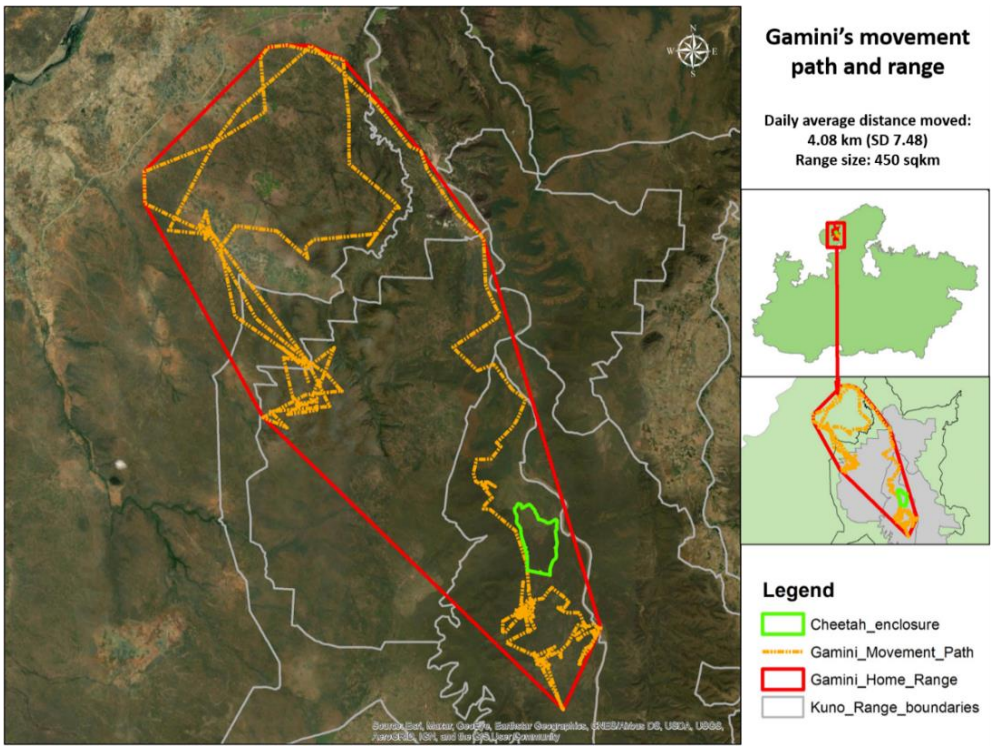
5. Dhatri



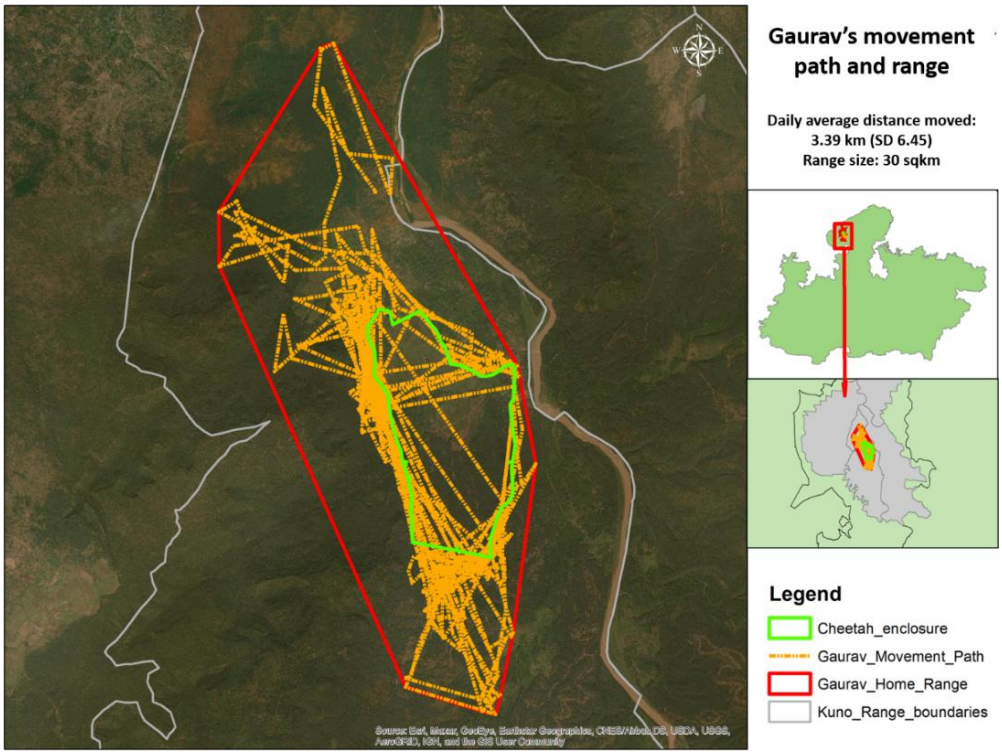
6. Dheera



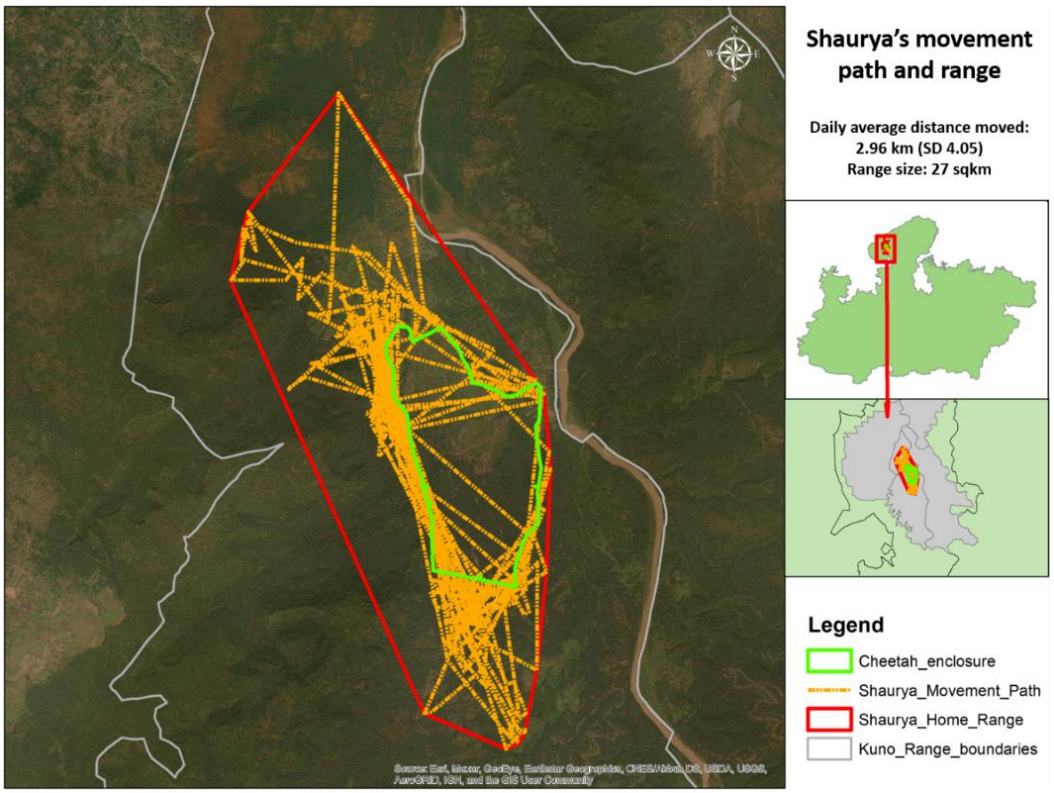
7. Gamini



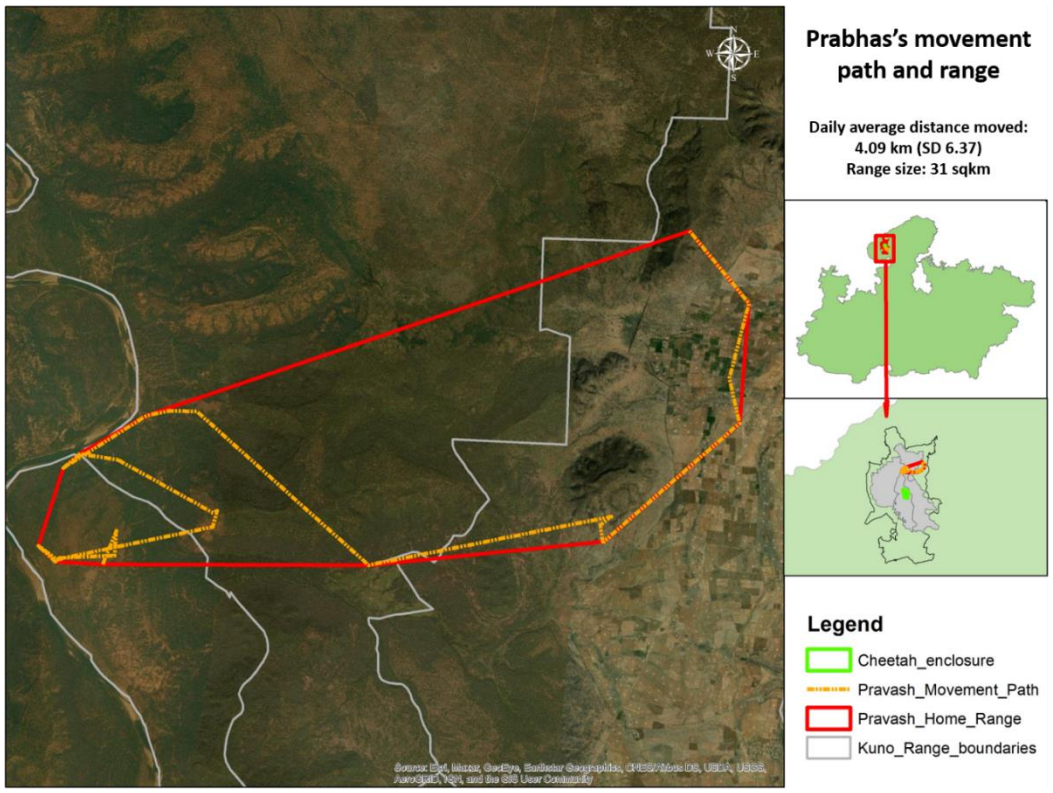
8. Gaurav



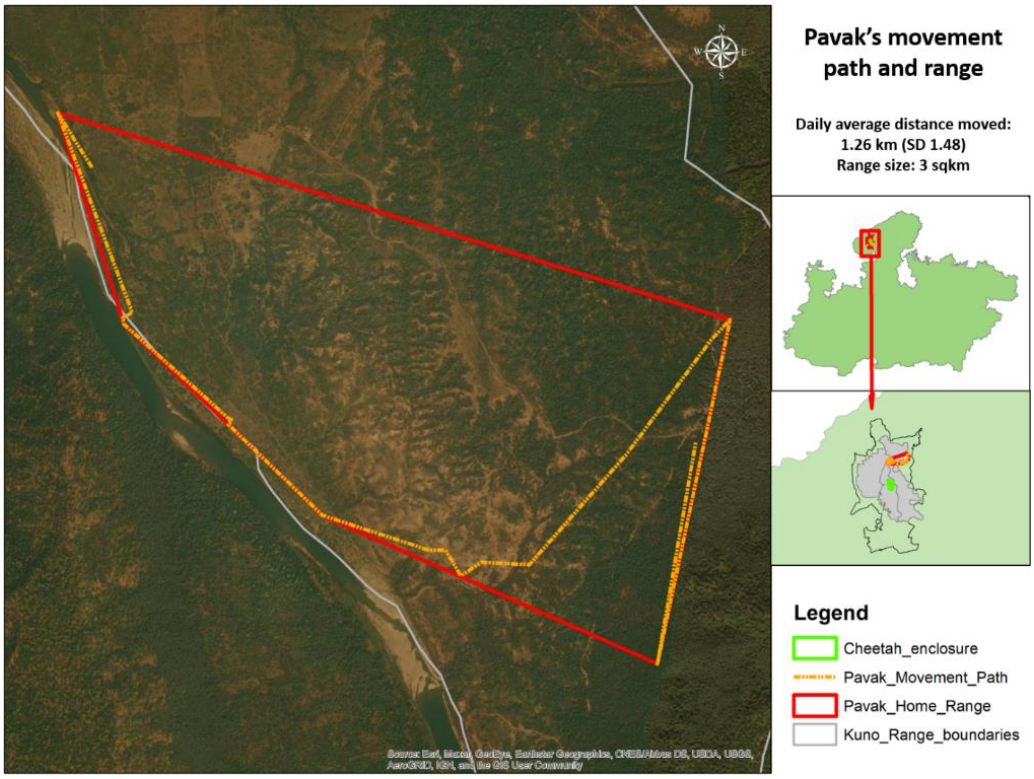
9. Shaurya



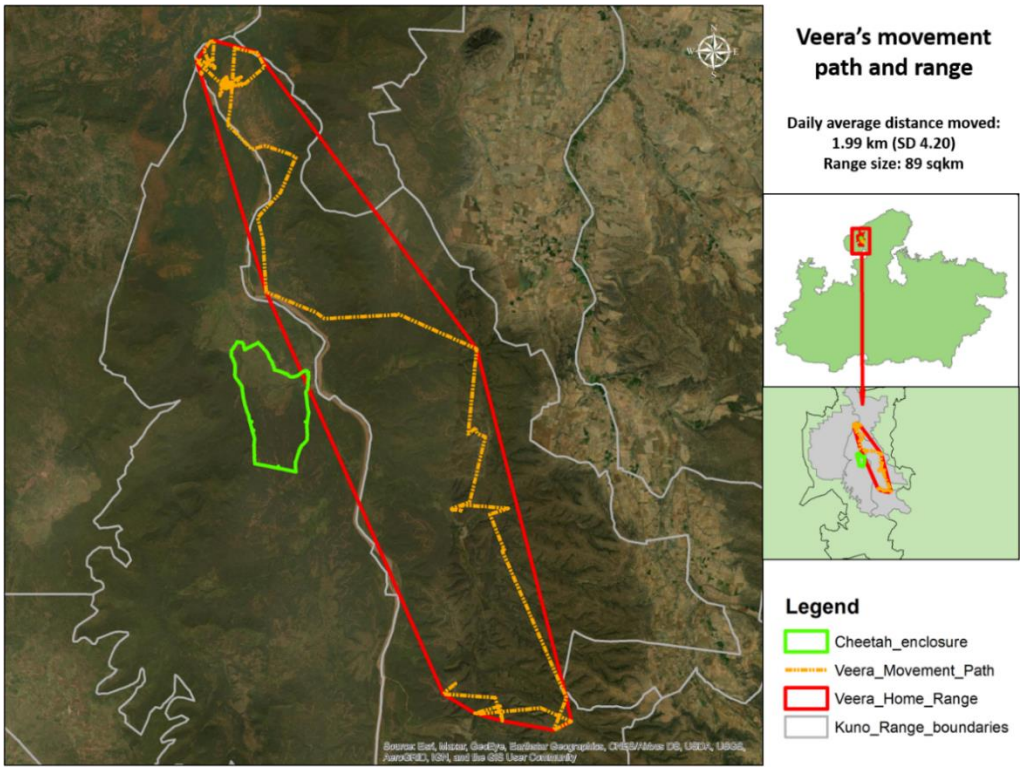
10. Prabhas



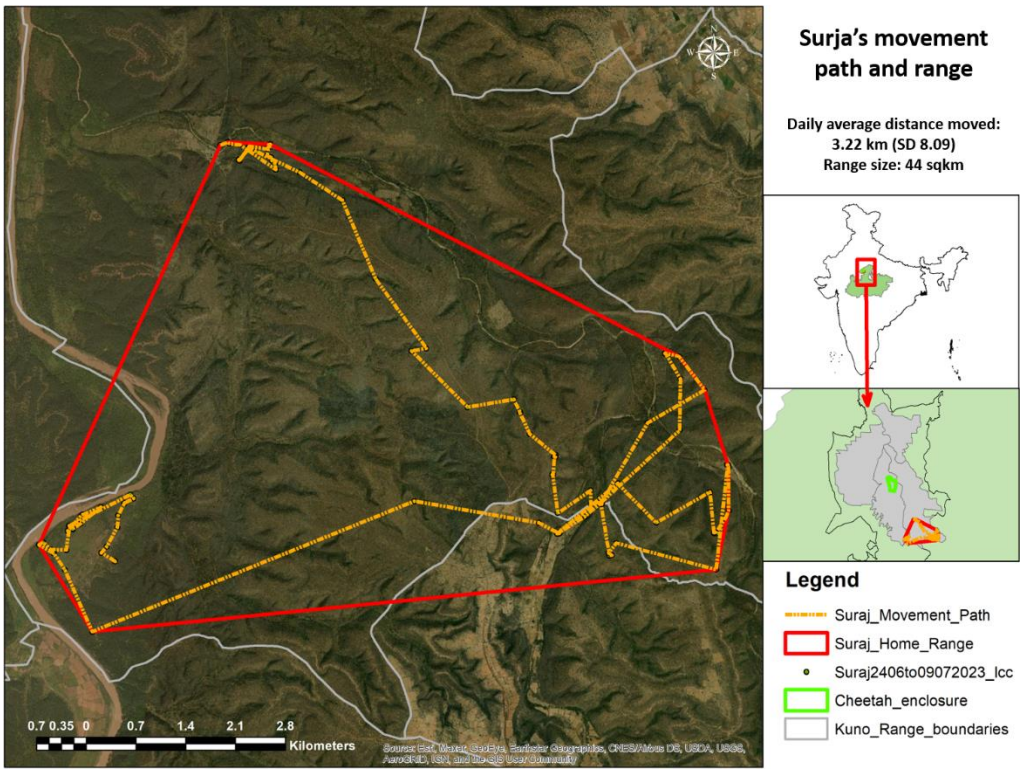
11. Pavak



12. Veera



13. Suraj



14. Nirva

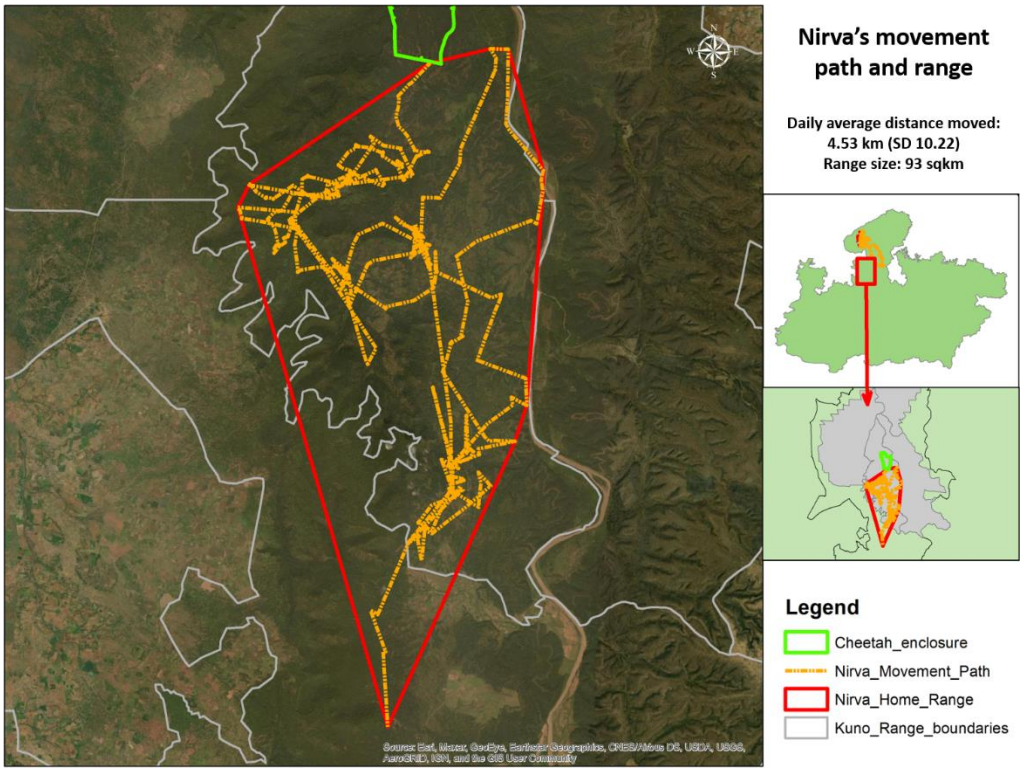
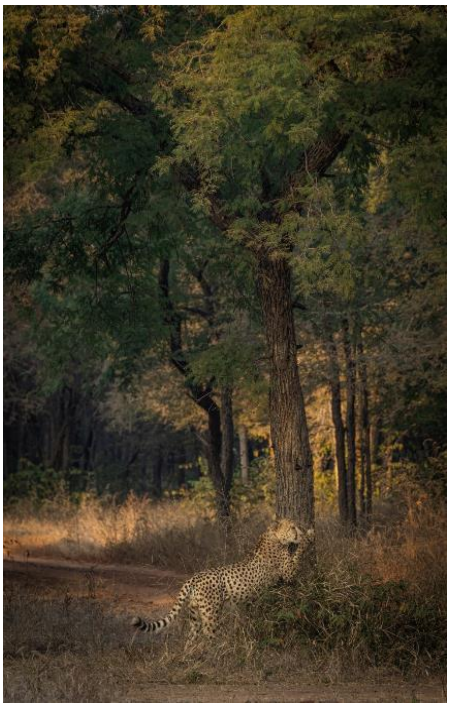


Figure 5: Movement path and ranges of Cheetahs introduced to India

4.5. Habitat Use of Cheetahs in Kuno National Park

From the locations obtained from radio collars deployed on the cheetahs, habitat preference based on availability and use was calculated using Ivlev's index. The analysis was conducted for free ranging cheetahs and only the locations of the animals within the boundary of National Park were used. Though majority of the cheetah locations were obtained from mixed deciduous forests, the preference was for open habitats such as grasslands and to lesser degree mixed deciduous forests.



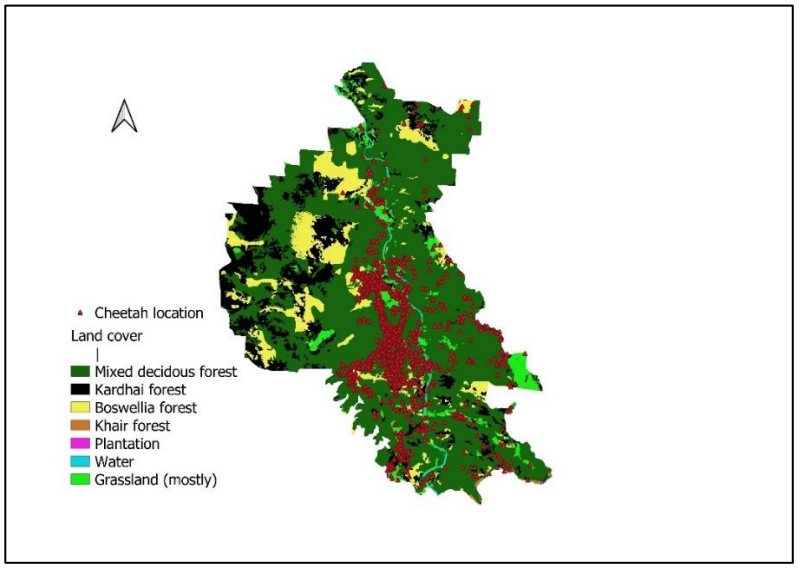


Figure 6: Locations of free ranging cheetahs obtained from radio collars in Kuno National Park

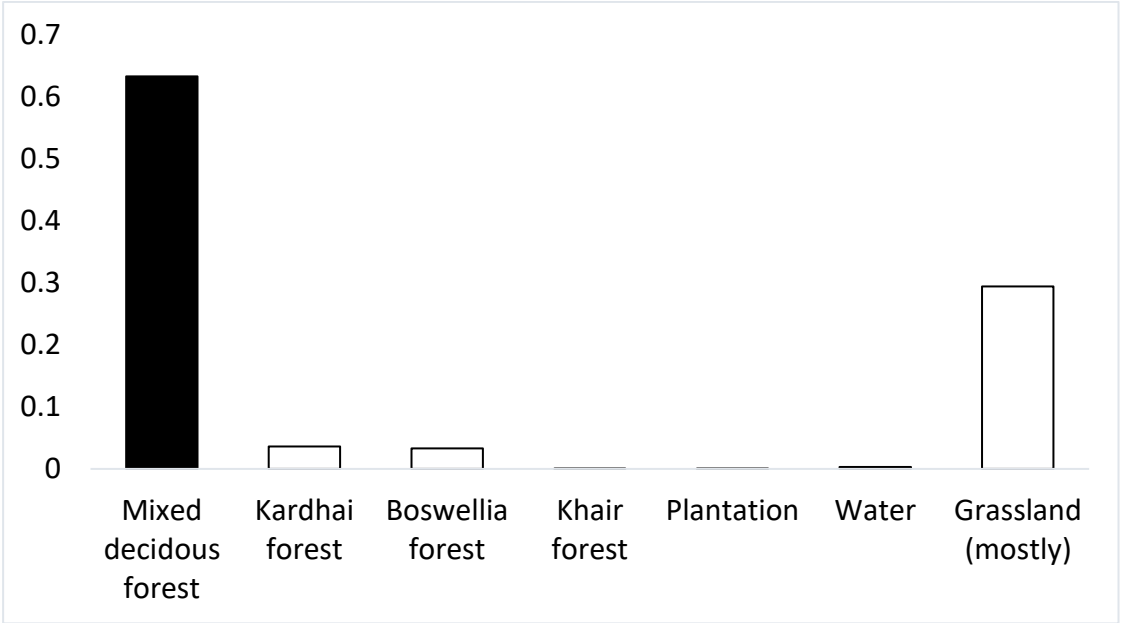


Figure 7: Proportion of locations obtained from radio collared cheetahs in various habitats in Kuno National Park

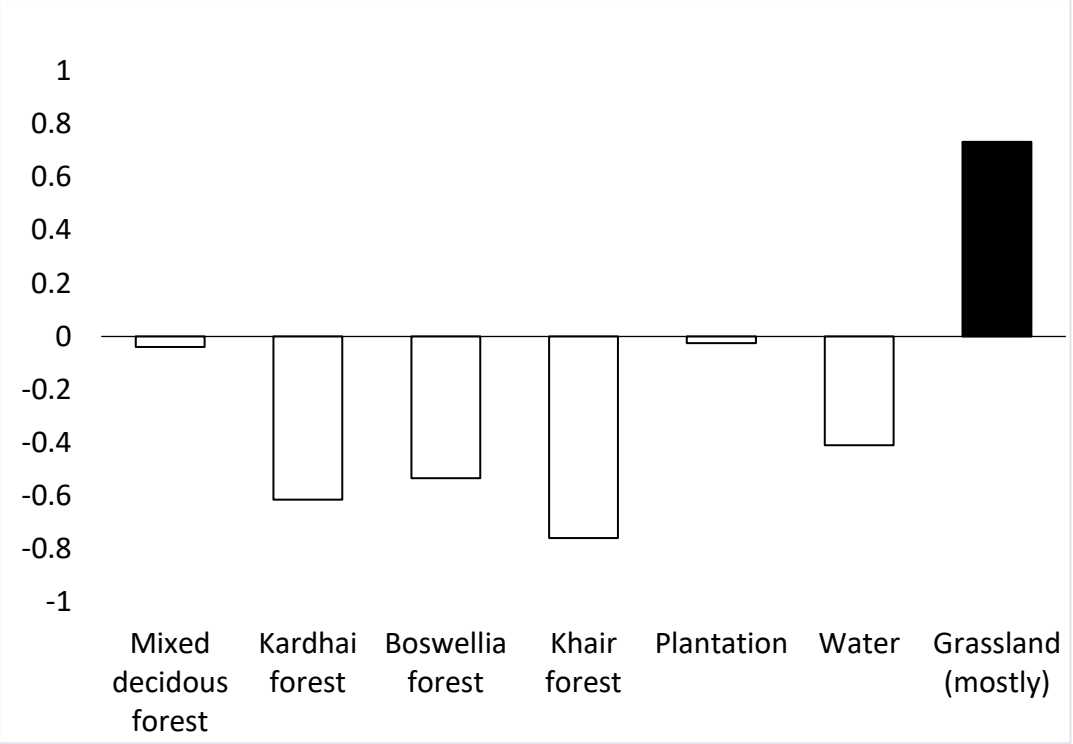


Figure 8: Habitat preference of cheetahs using Ivlev's index in various habitats in Kuno National Park

5. Veterinary Care and Management of Cheetah in Kuno National Park

Veterinary involvement holds a pivotal role within initiatives focused on the conservation translocation and management of wildlife, such as the current cheetah introduction program. Reintroduction science is still relatively new, and both past and recent experiences have highlighted the necessity for continued and sustained veterinary care. The veterinary team's primary duty in such initiatives is to safeguard the well-being and health of animals, encompassing both the introduced ones, as well as the coexisting species within the recipient habitat. This responsibility extends across the entire continuum, from pre-introduction preparations to the intervention procedures, and post introduction phase. One of the foremost duties in this regard is also averting the introduction of foreign diseases into the recipient environment.

Despite sharing numerous characteristics with other members of the felid family, cheetahs boast unique adaptations that render the veterinary management of the species more complex. They exhibit heightened susceptibility to diseases triggered by stress, particularly when compared with other species. Notably, cheetahs subjected to stress seem to be more vulnerable to infectious diseases, some of which have been initially attributed to their limited genetic diversity, as documented in numerous studies. Effectively managing any cheetah populations thus necessitates the implementation of an encompassing veterinary care and husbandry, with the overarching aim of maintaining a thriving and robust cheetah population.

In this context, the NTCA, along with WII and the Kuno NP administration, has made concerted efforts to establish a strong veterinary infrastructure capable of meeting all the requirements of the project. Currently, Kuno benefits from the dedicated services of four full-time veterinarians, comprising two from the Madhya Pradesh Forest Department, one each from NTCA and WII. Moreover, there is a concerted effort to elevate the veterinary facilities within the Park to align them with international standards. A panel of international experts and specialists from countries where cheetahs are native are also being consulted. While this effort not only helps in filling the knowledge gaps in day-to-day care of cheetahs, this

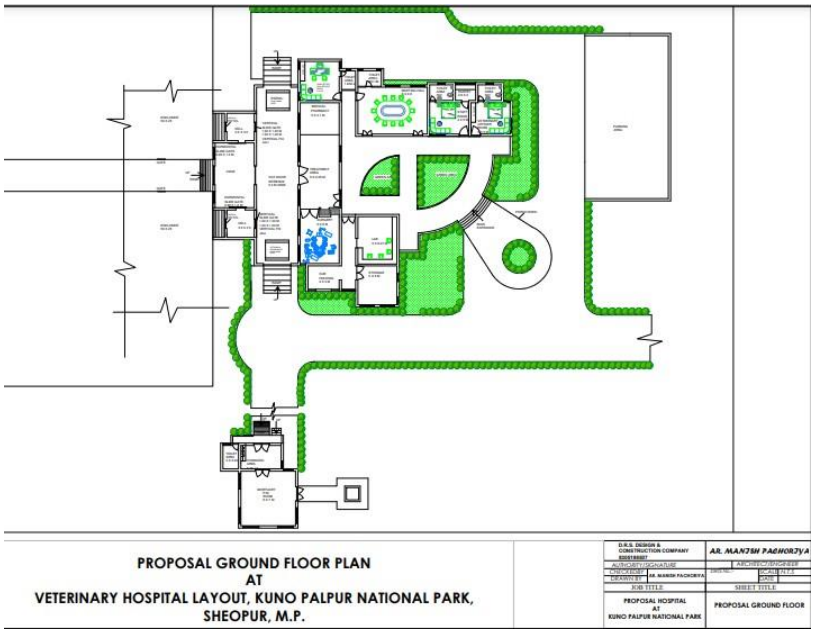


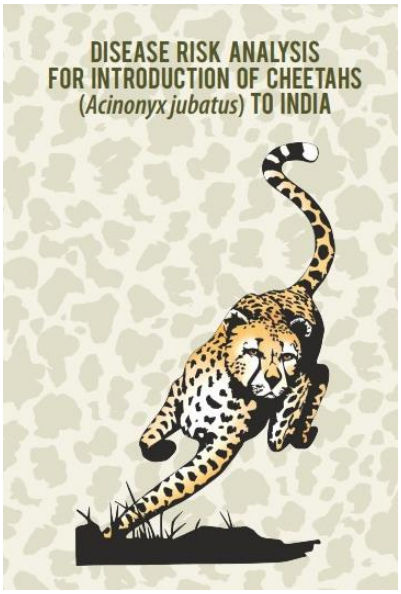
Image 11: Proposed ground floor plan of Veterinary hospital at Kuno National Park

collaborative approach also aims to provide comprehensive training to the project veterinarians and staff in the monitoring of cheetah health.

Numerous veterinary-related initiatives have been implemented at various stages of the cheetah project, and the essence of these endeavours is elaborated in the subsequent sections.

5.1. Veterinary Activities Prior to the Arrival of Cheetah

5.1.1. Disease Risk Analysis: During conservation introductions such as current project, the management of health risks, both communicable and non-communicable, are extremely important to maximise the survival of translocated animals and to minimise the risk of introducing a novel health hazard to the destination country. To analyse and manage the possible outcomes of situations involving health risks in projects like this, a process known as disease risk analysis has been adopted by World Organisation for Animal Health (OIE) & IUCN. On similar lines, a detailed "Disease Risk Analysis for Introduction of Cheetahs (Acinonyx jubatus) to India", was carried out well in advance prior to actual translocations of cheetahs to India. The team involved in the said process consisted of various stakeholders and cheetah health experts both from host countries (South Africa and Namibia) and India including the veterinarians from the University of Pretoria, South Africa; CCF, Namibia; NTCA, MoEF&CC, GoI; Kuno NP, Madhya Pradesh Forest Department; College of Veterinary Sciences, Jabalpur; and WII. The document was reviewed and vetted by one of the lead authors of aforementioned disease risk analysis procedures by OIE & IUCN and has been published in the public domain. The main objective of the document was to identify all possible health risks of concern, while providing an evidence-based analysis of the risks to the cheetahs translocated from southern Africa to reserves in India and vice-versa.



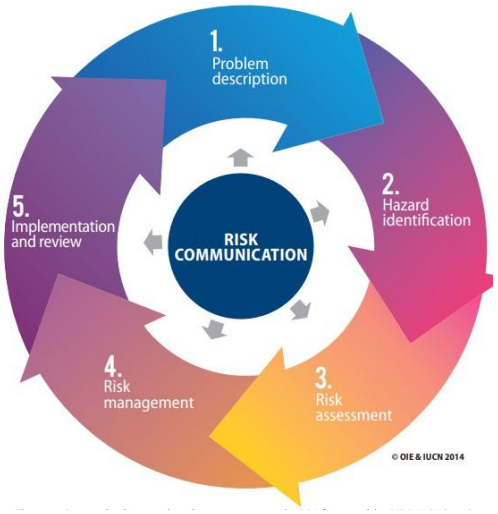


Image 12: Disease risk analysis for introduction of cheetah was carried out as prescribed by World Organisation for Animal Health (OIE) & International Union for Conservation of Nature (IUCN)

As prescribed in the document, prior to the actual translocation, all the cheetahs to be translocated (founder stock) to India were sampled and screened in the country of origin using appropriate molecular diagnostics/ seroprevalence methods and results of the same were communicated to the Department of Animal Husbandry & Dairying (DAHD), Ministry of Fisheries, Animal Husbandry & Dairying, Government of India (GoI). Additionally, all founder cheetahs were kept under observation in a quarantine facility in the host country for a mandatory period not less than 30 days. Necessary vaccinations and health checks/ treatments as per the Indian government norms were also carried out in the country of origin before cheetahs were transported to India. As per the domestic requirements for the import of felids (tiger, lion, snow leopard, leopard, cheetah, puma, jaguar, other large & lesser cats) into India by DAHD 2021, observations were made during pre-import quarantine period to ascertain absence of following diseases/disease symptoms: Rabies, Feline enteritis, Feline pan leukopenia, Leptospirosis, Distemper, Scabies, Pseudorabies (Aujeszky's disease), Blood parasites (protozoan diseases) including Babesiosis, Anaplasmosis, Trypanosomiasis and Toxoplasmosis. A certification for the same was obtained from the government designated veterinarian from the host country and communicated to the Animal Quarantine and Certification Services (ACQS), DAHD, GoI prior to the import.

5.1.2. Seroprevalence of Major Carnivore Diseases in Kuno: In order to ascertain seroprevalence of major carnivore diseases in Kuno, 56 free-ranging feral dog samples from the vicinity of Kuno NP were analysed for seroprevalence of major diseases as part of the current cheetah introduction project. Serum samples were analyzed for the presence of IgG antibodies against canine distemper virus (CDV), canine parvovirus (CPV), canine adenovirus (CAV), Feline panleukopenia virus (FPLV), Feline herpes virus (FHV), Feline calici virus (FCV) using dot-ELISA kits (BioGals Immunocomb kit, Bio Galed, kibbutz Galed, Israel, 192400). Antibodies against Feline corona virus (FeCoV), Feline immunodeficiency virus (FIV), *Ehrlichia canis*, *Borrelia burgdorferi*, *Anaplasma phagocytophilum*/ *A. platys*, *Toxoplasma gondii* as well as for the antigens of *Dirofilaria immitis* and Feline leukemia virus (FeLV) were tested using immunochromatography assay kits (Antigen Rapid Test Kit, Bionote Inc., Gyeonggi-do, 18449, Republic of Korea). The results showed presence of canine distemper, canine parvovirus, canine adenovirus, Ehrlichia and Anaplasma antibodies in test subjects, indicating the presence of these diseases in the Kuno

ecosystem. The results of the same were also incorporated in above disease risk analysis process and suitable risk management strategies, including mass vaccination of feral dogs were carried out in vicinity of Kuno.

5.2. Veterinary Activities Post Arrival of Cheetah in India

5.2.1. Veterinary Interventions during Quarantine Period

Image 13: Veterinarians checking the conditions of the cheetah on arrival to Kuno National Park

Upon their arrival in India, the cheetahs were accommodated within a secure double-fenced enclosure designed to prevent any contact with the resident wildlife during a mandatory quarantine period lasting over 30 days. During this quarantine period, each animal underwent daily visual assessments from a distance, during which their behavior, physical condition, and appetite (on feeding days) were carefully documented.

In accordance with directives from the DAHD and guidance from the Regional Quarantine Officer, the cheetahs were subjected to necessary laboratory tests as determined by the AQCS. A team of trained veterinarians stationed at Kuno performed biological sampling on the cheetahs, with the collected samples submitted to the College of Veterinary Sciences in Jabalpur and The National Institute of High Security Animal Diseases (NIHSAD) in Bhopal for essential disease prevalence studies.

Furthermore, in adherence to the department's Order of Ministry (OM) L-110102(I)/135/2022-Trade (E-22395) dated 8.09.2022, a committee conducted inspections of the Quarantine Facility for Imported Live Cheetahs overseen by the NTCA at Kuno NP on two occasions: 10.09.2022 and 01.02.2023 (prior to the arrival of each set of cheetahs). Numerous recommendations were put forth by this committee, and these recommendations were promptly implemented within the quarantine area.

The quarantine facility was constructed as per the recommendations of inspection committee and consisted of 10 individual quarantine bomas, which are separated from each other by access roads. Each boma also have a feeding and treatment cubicle as seen below.

Image 14: Quarantine bomas for cheetahs in Kuno National Park

5.2.1.1. Procedures Carried out during Quarantine Period:

1. Two dedicated vehicles, one each for routine health assessment & feeding and sanitation respectively were assigned exclusively for use in quarantine facility. A tyre dip of 12 inches was installed at the only entrance to QBs as per the recommendations. The above vehicles were also disinfected on daily basis at the quarantine entrance with an electric sprayer, both before entering and after exiting the quarantine area.

Image 15: Biosafety measures implemented in quarantine bomas for cheetahs in Kuno National Park

2. All the equipment used in quarantine area were used exclusively for the specified purpose and necessary arrangements were made to maintain them within the quarantine premises in a makeshift tent.

3. A dedicated team of handling staff was identified by the Forest Department and assigned exclusively for cheetah quarantine related work.
4. Routine health screening camp for the dedicated staff was also periodically organised by Chief Medical Officer, Sheopur and also in association with NGO's such as Wildlife Conservation Trust, Mumbai.
5. The meat being fed to the cheetahs were procured from authorised slaughter house and animals were slaughtered in presence of at least one veterinarian from Forest Department. Both ante-mortem and post-mortem examinations of carcasses were done as per the standard norms.
6. A designated area was identified within the quarantine premises for conducting necropsy, as well as for incineration of dead cheetah during quarantine, if any.
7. A burn pit was created next to the QBs for disposal of animal and feed waste on daily basis. Vector control was done by regular weeding and avoiding presence of tall grass inside the enclosure. However, trees and some vegetation were being maintained in the QBs for providing natural shade to the animals during the hot days.
8. All relevant SOP's and guidelines issued by GoI and the competent authority were adhered to as per the norms.
9. Nutritious diet was provided to cheetahs mimicking the natural feed starvation cycle.
10. Every day the condition of the animals was checked visually in early morning and late evening by a small team of caretakers and veterinarians.
11. Round the clock monitoring of the animals by observer(s) were undertaken concealed in watchtower and from a distance for their water intake, urination, and defecation.
12. Routine cleaning activities to maintain hygiene were undertaken when the cheetahs were busy feeding, caretakers would carefully enter the enclosures and maintain a safe distance from the animals and removed any bones, cleaned the water trough, refilled the water and collected faecal matter.
13. Training on all aspects of cheetah care and behaviour were imparted by the Namibian team to the Indian cheetah team at Kuno.
14. Strict measures and protocols were followed to ensure very minimal human interaction as stress can be lethal to these animals.
15. After 27 days in quarantine, the designated veterinary team from Kuno submitted the health status report of each cheetah to the Regional Quarantine Officer, along with all the supporting laboratory reports from aforementioned labs for obtaining Quarantine Clearance Certificate. The cheetahs were released into larger soft release enclosure only after receiving the clearance and ascertaining negative laboratory results for diseases in each cheetah.

Image 16: Predator proof fenced quarantine bomas for cheetahs in Kuno National Park

5.2.2. Feeding of Cheetahs during Quarantine:

Feeding large carnivores within a controlled environment is a complex process that necessitates careful planning, a focus on safety, and a deep understanding of the natural behaviours and dietary requirements of the species. These practices are meticulously designed to ensure the health and well-being of the animals. The QB for cheetah consists of two distinct compartments: the primary open enclosure, spanning approximately 50 × 30 meters, and the feeding chamber, measuring around 5 × 30 meters. Feeding the cheetahs within the designated feeding chamber involves a systematic approach aimed at ensuring the safety of both the animals and their caregivers. To habituate the cheetahs to limited human presence and make more approachable to them, only a set number of people were permitted inside the boma during feeding, and a structured feeding schedule was adhered to. These measures help reduce stress and behavioral issues in the animals.

During the feeding process, the food was typically prepared in a specially designated area, where it was carefully portioned, weighed, and occasionally supplemented or medicated as required. This preparation zone was maintained in a sanitary condition to mitigate any risk of contamination. Approach to the animals was gentle and soothing, promoting a calm and stress-free environment. Once the meat pieces are prepared, they were placed inside the feeding chamber for the animals. Caregivers would then step back to minimize distractions, allowing the cheetahs to approach the food at their own pace. Sometimes, food pieces were scattered within the enclosure, stimulating the animals mentally and physically. Close observation was maintained upon the animal's entry into the feeding chamber to ensure healthy eating behavior and monitor overall health. Any changes in behavior were promptly noted and addressed.

Simultaneously, a separate team tended to the open enclosure area, performed cleaning and maintenance tasks such as inspection of the surroundings, removed any remnants from previous feedings, and replenished the water trough to maintain a hygienic environment. Following the completion of these essential tasks, the gate connecting the feeding chamber to the open enclosure was reopened, granting the cheetahs unrestricted access to the enclosure once again.

5.2.3. Veterinary Management of Cheetah after Release into the Larger Soft Release Enclosure: Each of the cheetahs was equipped with radio collars, which provided valuable information regarding their locations within the soft release enclosure. Teams dedicated to tracking observed the animals twice daily, meticulously assessing their fitness, activity levels, health, physical condition, general behavior, hunting behaviours, habitat preferences, visible injuries, belly scores, and any signs or symptoms that appeared unusual. All of these daily observations were diligently documented in appropriate datasheets.

In the event of any abnormalities, the entire veterinary team was promptly alerted, and a mobile capture unit remained on standby throughout the observation period to ensure rapid response as and when required. While the period spent in larger enclosures was largely uneventful, there were instances that necessitated veterinary interventions for three Namibian cheetahs and three South African cheetahs. The specific details of these interventions are elaborated in the table given below:

Table 6: Details of veterinary treatment administered to cheetahs in soft release enclosure

Name	Country of Origin	Veterinary history	Period in Treatment boma	Outcome
Sasha (Female, 5 years)	Namibia	Renal insufficiency	22/01/2023 to 27/03/2023	Mortality
Nabha (Female, 5 years)	Namibia	Eye infection, oral ulceration	27/03/2023 to 02/04/2023	Recovered, released back to larger enclosure
Uday (Male, 6 years)	South Africa	Unknown, found with neurological symptoms	23/04/2023	Mortality
Daksha (Female, 3 years)	South Africa	Found dead; injuries throughout body and blood loss. Killed by coalition.	09/05/2023	Mortality
Jwala cubs (Approx. 2 months; 4 nos.)	India	Cubs found in very weak and dehydrated state	23/09/2023	03 mortality, 1 survived and under human care
Tejas (Male, approx. 5 years)	South Africa	Found in weak condition, wound under the collar and rump area.	11/07/2023	Mortality

5.2.4. Veterinary Management of Cheetah after Release into Free Ranging Conditions: The tracking teams continuously engaged in visual monitoring of the animals to assess their overall health, fitness, and body condition. Additionally, the veterinary team conducted visual health examinations of the animals at least once every two days, and a mobile veterinary unit remained on standby in the field to provide necessary treatments if required.

The use of radio-telemetry-based monitoring allowed for proactive management interventions when cheetahs ventured into unfavourable habitats or to investigate the causes of cheetah mortality. If any cheetah was found in an unsuitable environment, a qualified and trained team immobilized and safely relocated the animal. This was exemplified in the successful cases of female Asha and male Pawan, who

were brought back into the Park after straying far from the Park boundary into human-inhabited areas. Likewise, when two male coalitions engaged in a violent territorial dispute, the veterinary team promptly attended to the injured males, Agni and Vayu. Both males were successfully captured, treated, and subsequently transferred to treatment bomas, where they recovered from their injuries.

Since their arrival in India, a total of 34 cheetah immobilizations or chemical captures were conducted for various veterinary and management interventions. Despite the cheetahs' high susceptibility to the physiological effects of capture, a cautious and well-coordinated capture process ensured that there have been no cases of capture-related morbidity or mortality in Kuno.

5.2.5. Cheetah Mortalities in Kuno: The Cheetah project experienced a few casualties, which is an unavoidable occurrence in any reintroduction effort or even within natural populations. Out of the 20 cheetahs imported from Southern Africa and Namibia, a total of 6 animals unfortunately passed away. Each deceased cheetah underwent necropsy procedures in accordance with the existing policies of the NTCA, with participation of external experts from veterinary universities and nearby zoological parks.

The first mortality was that of a Namibian female cheetah named Sasha, attributed to chronic renal insufficiency. Sasha developed kidney problems after her arrival and received continuous care for two months, but unfortunately, she did not respond positively to the treatment and passed away. The second death was of a South African male cheetah named Uday, who suddenly died within the larger acclimatization enclosure without displaying any prior symptoms. The third casualty was a South African female cheetah named Daksha, whose death resulted from a violent encounter with a male coalition during a mating attempt.

In more recent cases, the deaths of one female named Tbilisi (from Namibia) and two South African males named Tejas and Sooraj were attributed to septicaemia. This condition arose from wounds beneath their dense winter coat on the back and neck regions, which became infested with maggots and subsequently led to septicaemia. These occurrences were unprecedented for the species and were also not anticipated by international cheetah experts.

The remaining three mortalities were cubs born within Kuno itself. They perished due to extreme heat.

5.2.6. Disease Surveillance Activities in Kuno: While conducting cheetah captures, whether for release or other interventions, a deliberate effort was made to collect and store biological samples. These samples were carefully maintained in a repository to facilitate potential future studies or as points of reference when needed. Additionally, during captures of other carnivore species like leopards, hyenas, jackals, and jungle cats, samples were also collected for the purpose of disease surveillance studies. These collections are carried out by the WII as part of their radio-collaring initiatives for these species to understand the ecosystem response.

6. Cheetahs under Observation in the Quarantine Boma

Following a few unfortunate incidents of cheetah mortality in the Kuno NP during July 2023, all individuals that were free ranging were captured by 13th August 2023 and individuals within SRB were captured and transferred to various QBs and kept under intensive observation for their health and behaviour. A team of trained researchers and trained personnel from Madhya Pradesh Forest Department and WII has been monitoring their health and behaviour 24/7. Behavioural observations were carried out only during the day.

Currently, 15 Cheetah (7 males, 7 females, 1 cub) are kept in the quarantine bomas. All the cheetahs in QBs are healthy and being continuously monitored day and night by the forest department. Behavioural observation of cheetahs is also carried out daily for 4 hours during the day by a team of researchers from WII. Health check-up and medication is administered regularly by team of veterinarians from Forest Department, NTCA and WII.

Table 7: Current placement of cheetahs in the QBs and detailed dates of their capture from the free-ranging environments or within boma

Sr. No	Name of Cheetah	Captured from	Date of capture from free-ranging environment/ Boma	Time	Current placement within enclosure
1	Pawan	Free ranging environment	14-07-2023	Evening	QB 12
2	Gaurav & Shaurya	Free ranging environment	19-07-2023	Evening	QB 1 (Gate 3)
3	Nabha	Within Boma	19-07-2023	Morning	QB 11
4	Asha	Free ranging environment	20-07-2023	Morning	QB 2 (Gate 3)
5	Dheera	Free ranging environment	20-07-2023	Morning	QB 9
6	Gamini	Free ranging environment	21-07-2023	Morning	QB 6
7	Pavak	Free ranging environment	22-07-2023	Morning	QB 13
8	Prabhas	Free ranging environment	26-07-2023		QB 14
9	Agni	Free ranging environment	26-06-2023	Evening	QB 8
10	Vayu	Free ranging environment	27-06-2023	Morning	QB 8
11	Nirva	Free ranging environment	13-08-2023	Evening	QB 5
12	Veera	Free ranging environment	26-07-2023		QB 7
13	Jwala and cub	Within Boma	01-06-2023		QB 10

7. Behavioural Observation on Individual Cheetahs in the Quarantine Boma

Cheetahs were monitored 24/7 within the QBs. A team of trained researchers observe the behaviours of the individual cheetahs during the day for 4 hours daily from machans. Scan and focal behavioural observations were carried out at an interval of 10 minutes. Observed behavioural states were noted separately for each individual, and any unusual patterns observed were informed immediately to the veterinary team. Belly scores of the individuals to understand the hunger state and satiation of the individuals were noted down periodically and reported back to the veterinary team for food supplements.

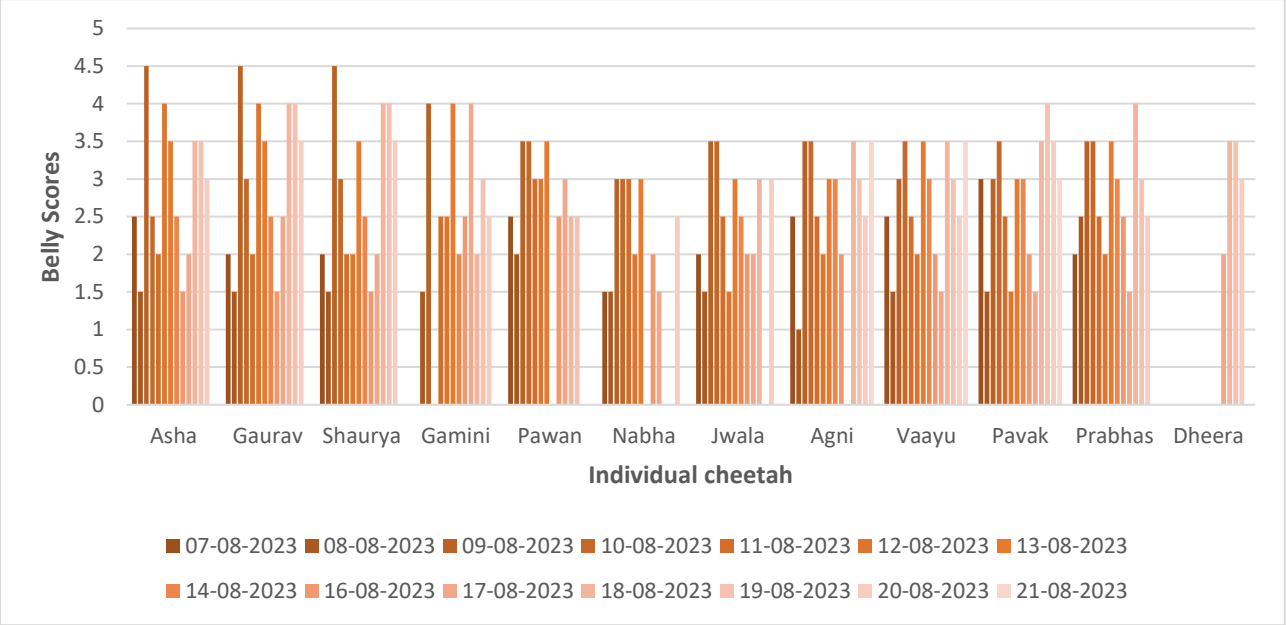


Figure 9: Bar plot of belly scores of individual cheetahs in the quarantine bomas during August 2023

Table 8: Belly scores of cheetahs kept in the quarantine bomas (Low depicted as red and high as green)

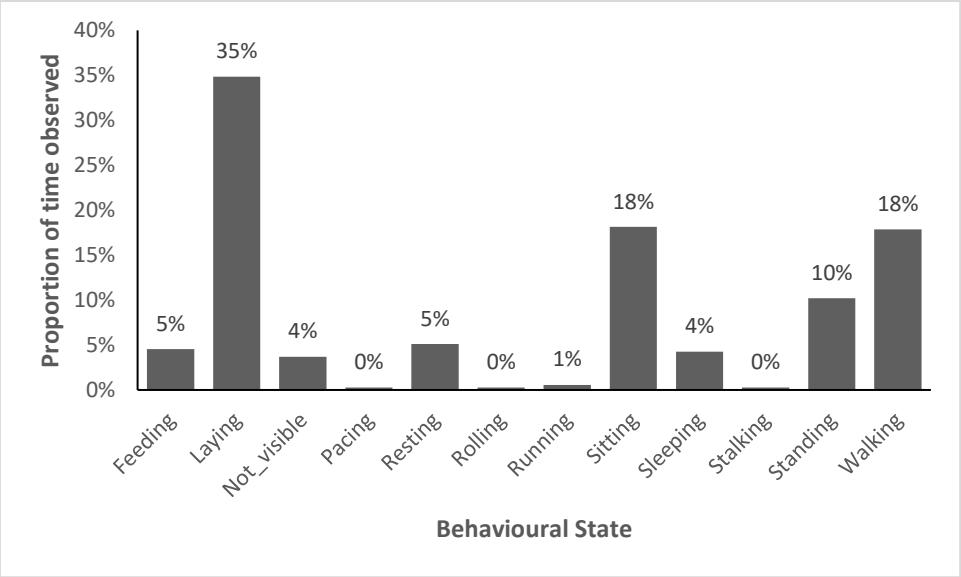
Date	Belly Scores of each Cheetah											
	Asha	Gaurav	Shaurya	Gamini	Pawan	Nabha	Jwala	Agni	Vaayu	Pavak	Prabhas	Dheera
07-08-2023	2.5	2	2	NA	2.5	1.5	2	2.5	2.5	3	2	
08-08-2023	1.5	1.5	1.5	1.5	2	1.5	1.5	1	1.5	1.5	2.5	
09-08-2023	4.5	4.5	4.5	4	3.5	3	3.5	3.5	3	3	3.5	
10-08-2023	2.5	3	3	NA	3.5	3	3.5	3.5	3.5	3.5	3.5	
11-08-2023	2	2	2	2.5	3	3	2.5	2.5	2.5	2.5	2.5	
12-08-2023	4	4	2	2.5	3	2	1.5	2	2	1.5	2	
13-08-2023	3.5	3.5	3.5	4	3.5	3	3	3	3.5	3	3.5	
14-08-2023	2.5	2.5	2.5	2			2.5	3	3	3	3	
16-08-2023	1.5	1.5	1.5	2.5	2.5	2	2	2	2	2	2.5	
17-08-2023	2	2.5	2	4	3	1.5	2		1.5	1.5	1.5	2
18-08-2023	3.5	4	4	2	2.5		3	3.5	3.5	3.5	4	3.5
19-08-2023	3.5	4	4	3	2.5			3	3	4	3	3.5
20-08-2023	3	3.5	3.5	2.5		2.5	3	2.5	2.5	3.5	2.5	3
21-08-2023								3.5	3.5	3		

7.1. Activity Budget of the Cheetahs in the Quarantine Bomas

Based on the continuous behavioural monitoring data collected by trained research personnel from the WII with assistance from the Forest Department staff of Kuno, activity budgets of the cheetah individuals in QBs are depicted below. The animals spent most of the time relaxing either laying followed by sleeping or sitting.

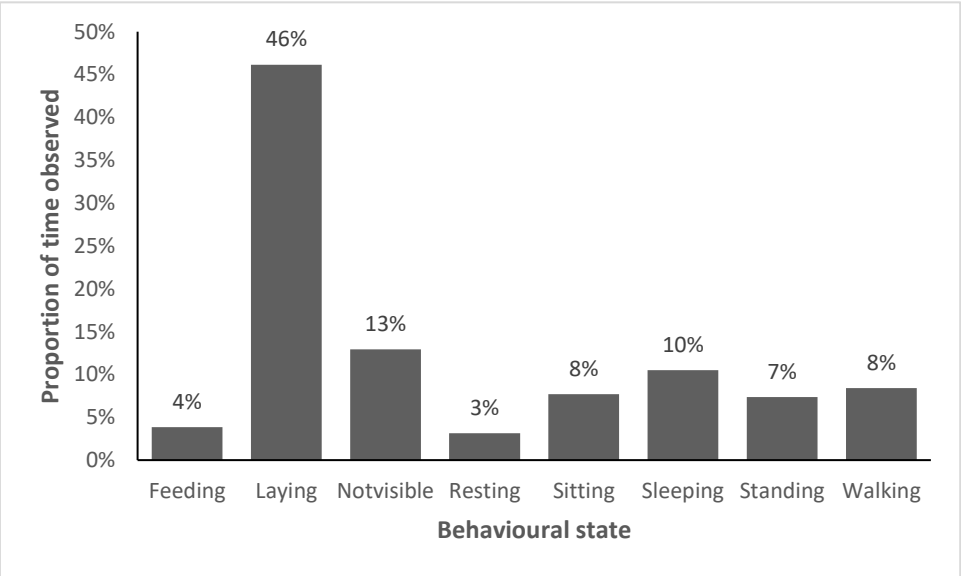
(i) **Asha**:

Inside the QB, Asha was observed laying (35%), followed by sitting and walking.



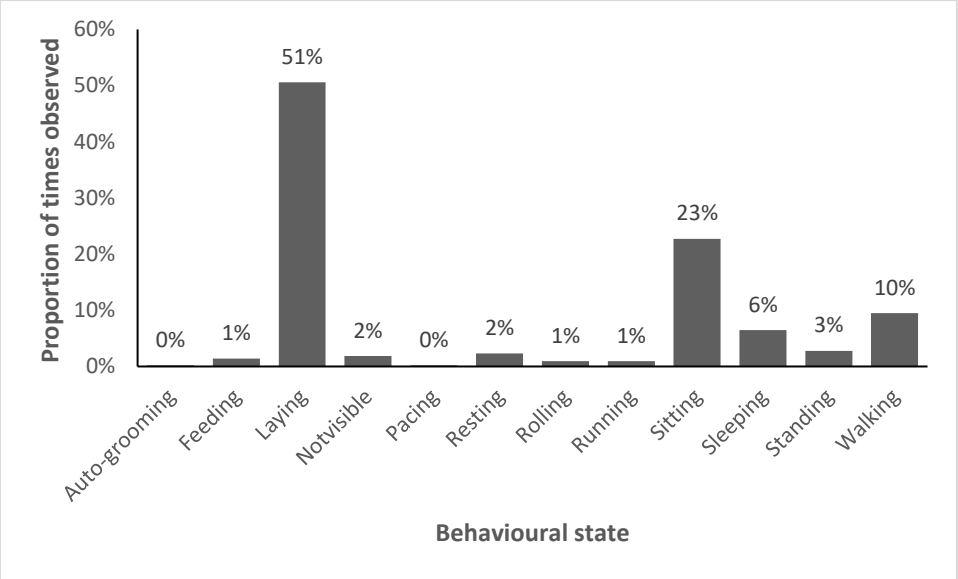
(ii) **Shaurya**:

Shaurya was observed to be quite relaxed, spending most (46%) of the time laying inside the QB followed by sleeping, walking and sitting.



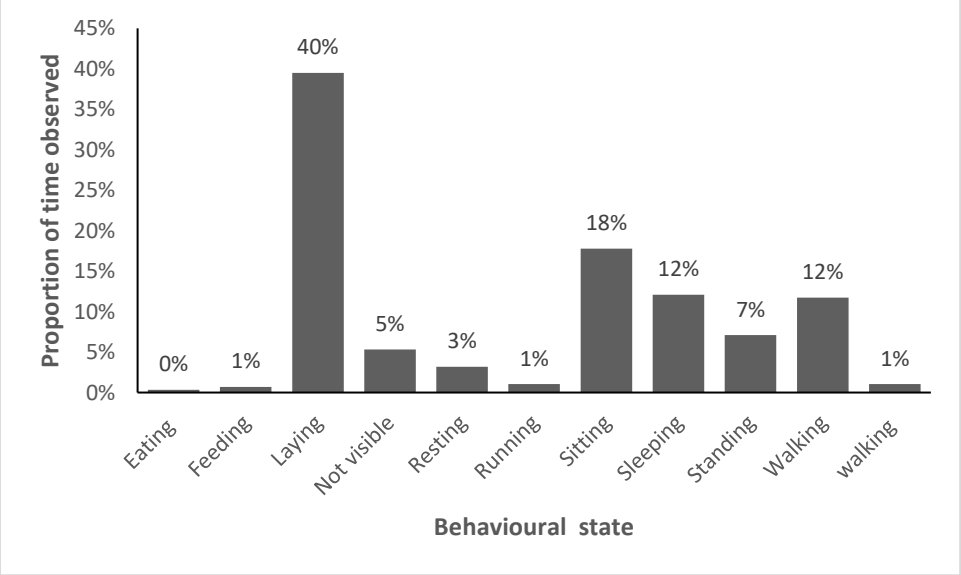
(iii) **Gamini**:

Gamini was observed laying most (51%) of the time followed by sitting and walking in the QB.



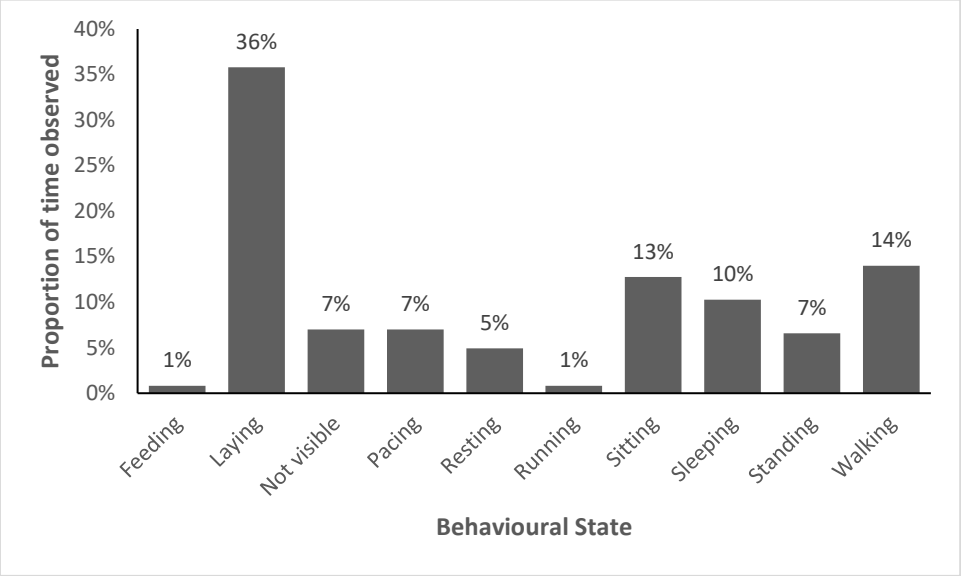
(iv) **Pawan**:

Pawan was observed laying (40%) followed by sitting, sleeping and resting.



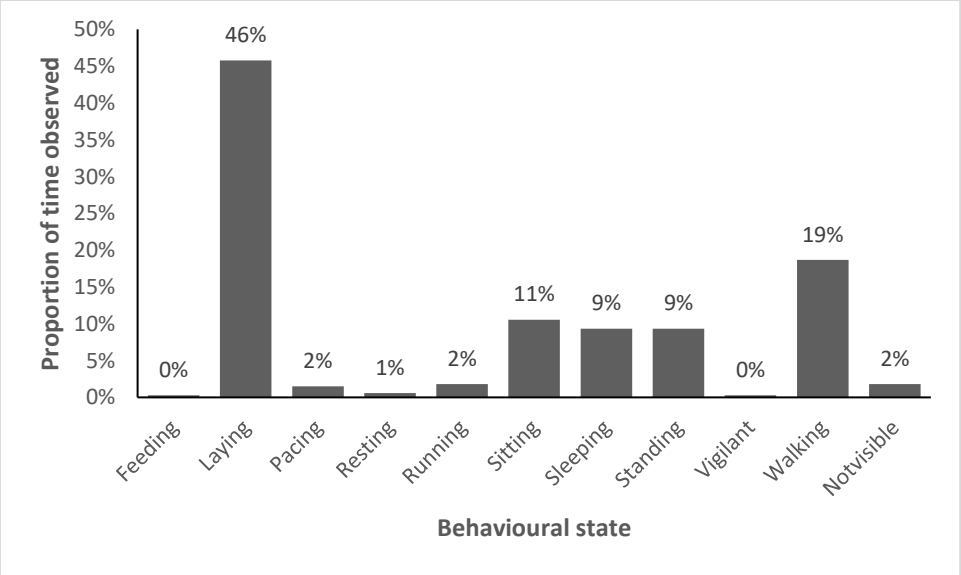
(v) **Nabha**:

Nabha was observed laying (36%), followed by walking, sitting and sleeping.



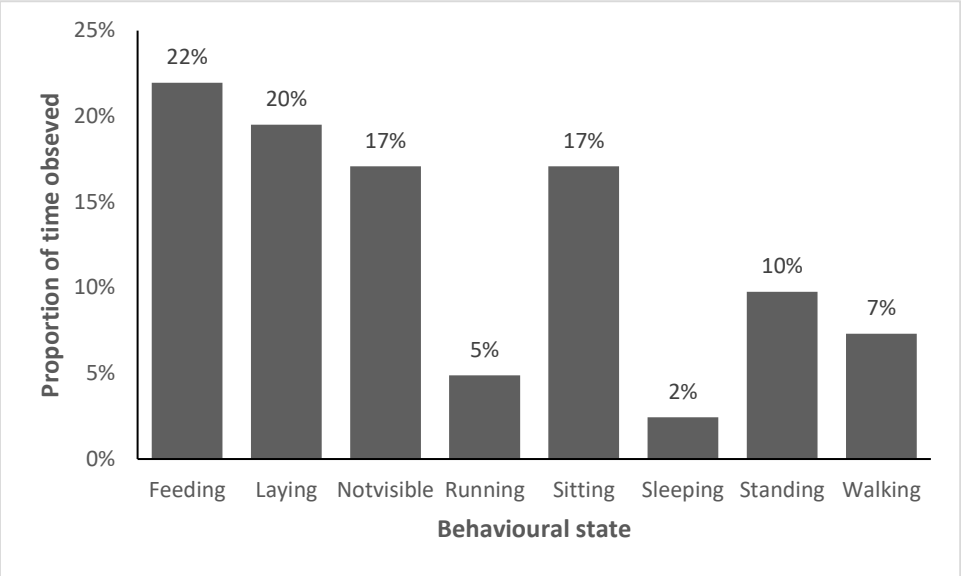
(vi) **Jwala**:

Jwala was observed spending most of the time laying (46%) followed by walking and sitting.



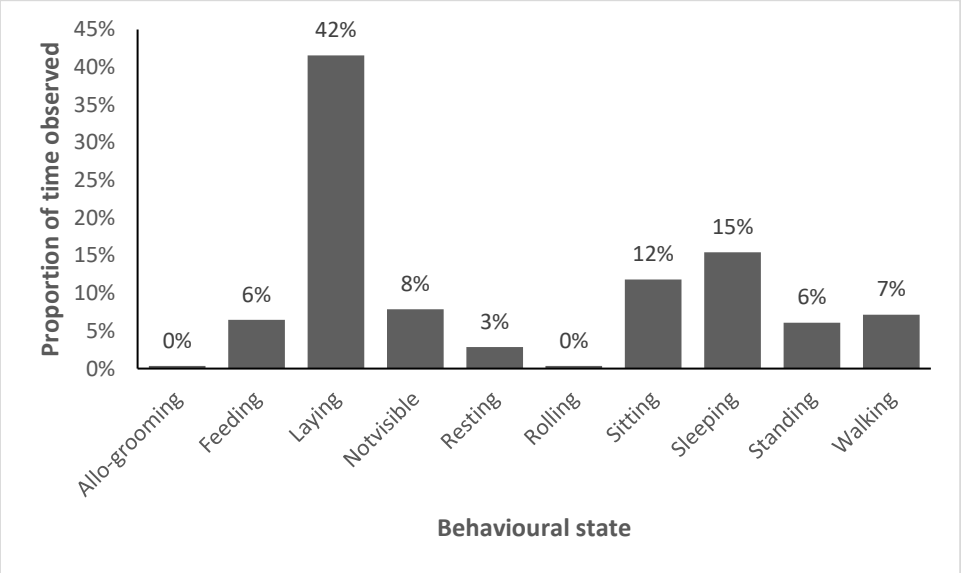
(vii) **Cub**:

The cub was observed feeding (22%) closely followed by laying and sitting.



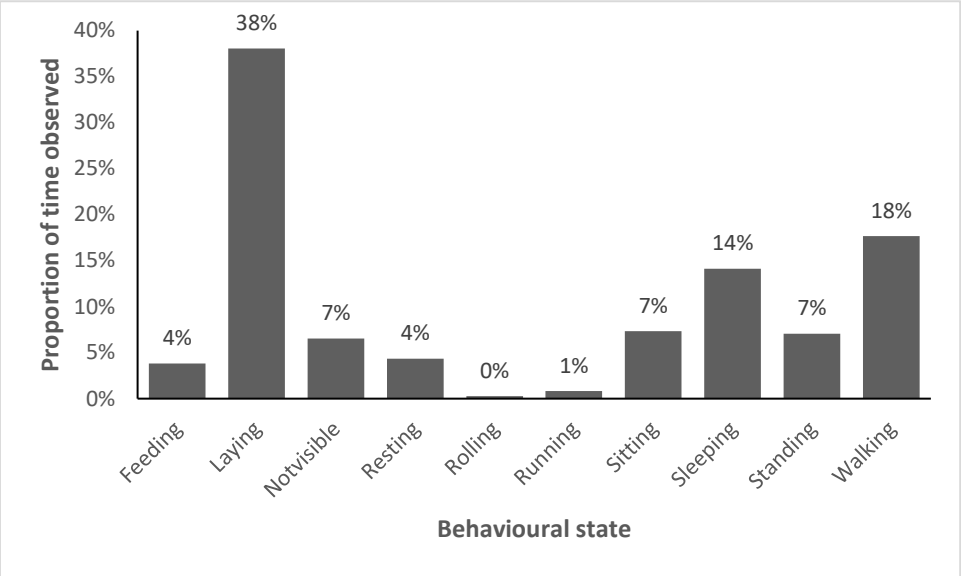
(viii) **Gaurav**:

Gaurav was observed laying (42%) followed by sleeping and sitting.



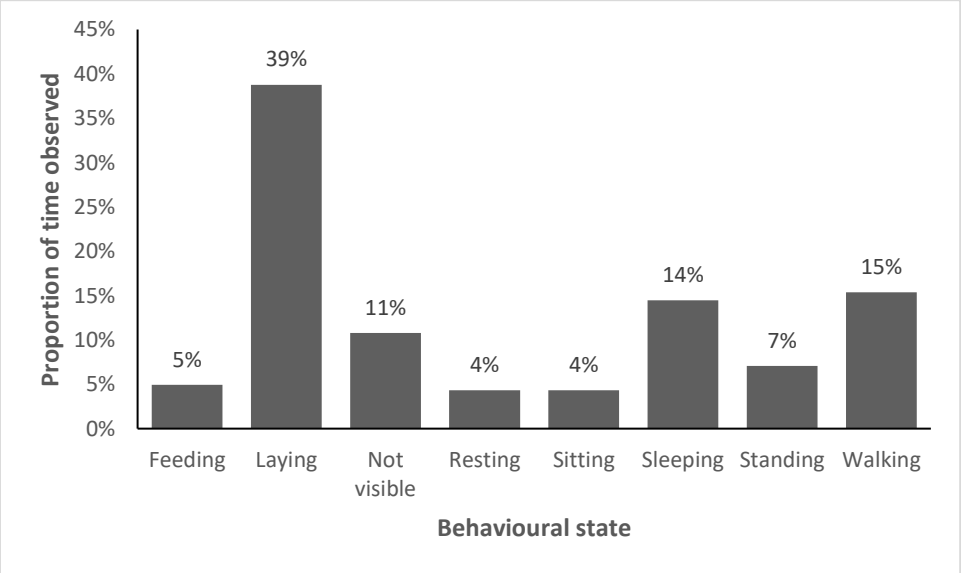
(ix) **Agni**:

Agni was observed laying (38%) followed by walking and sleeping.



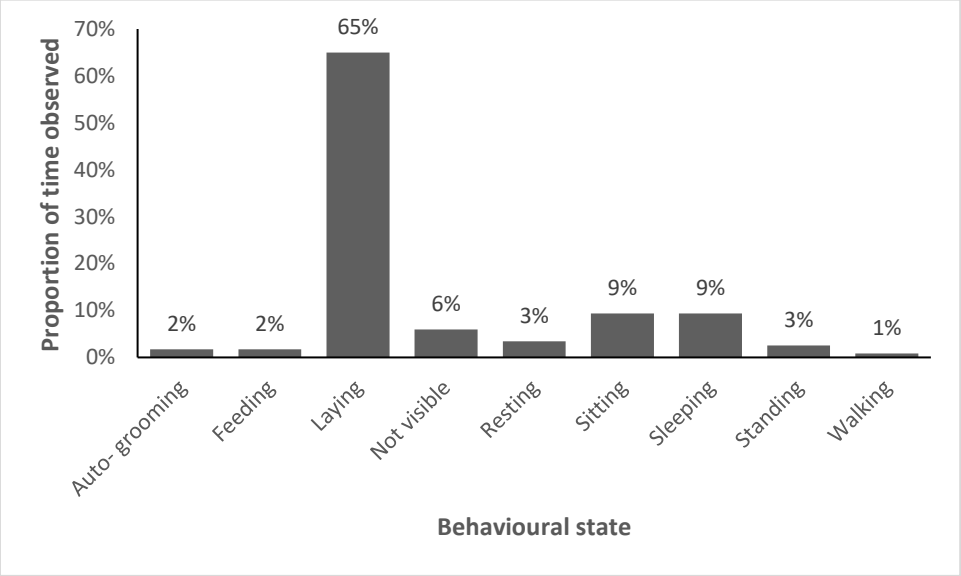
(x) **Vayu**:

Vayu was observed laying (39%) followed by walking and sleeping.



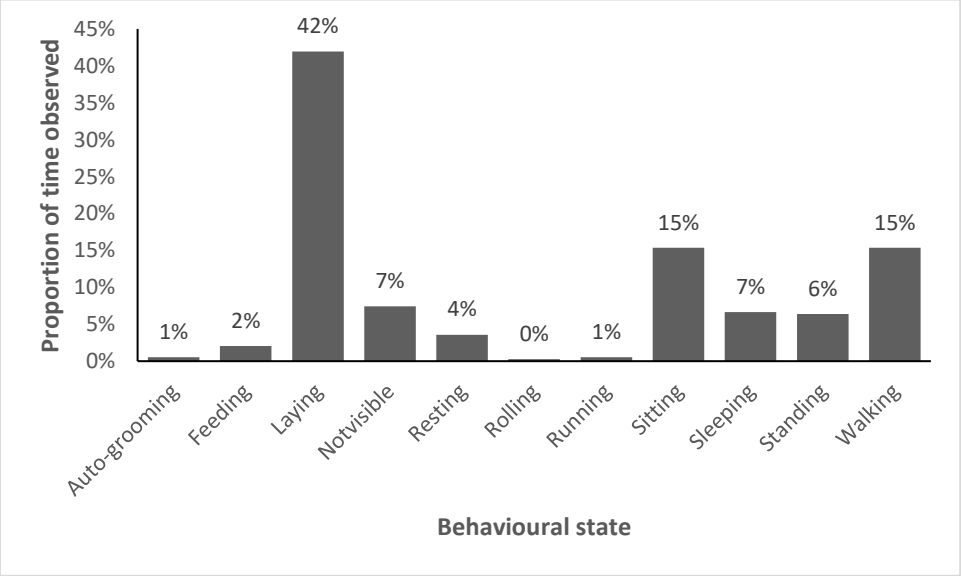
(xi) **Dheera**:

Majority (65%) of the time, Dheera was observed laying followed by sleeping and sitting.



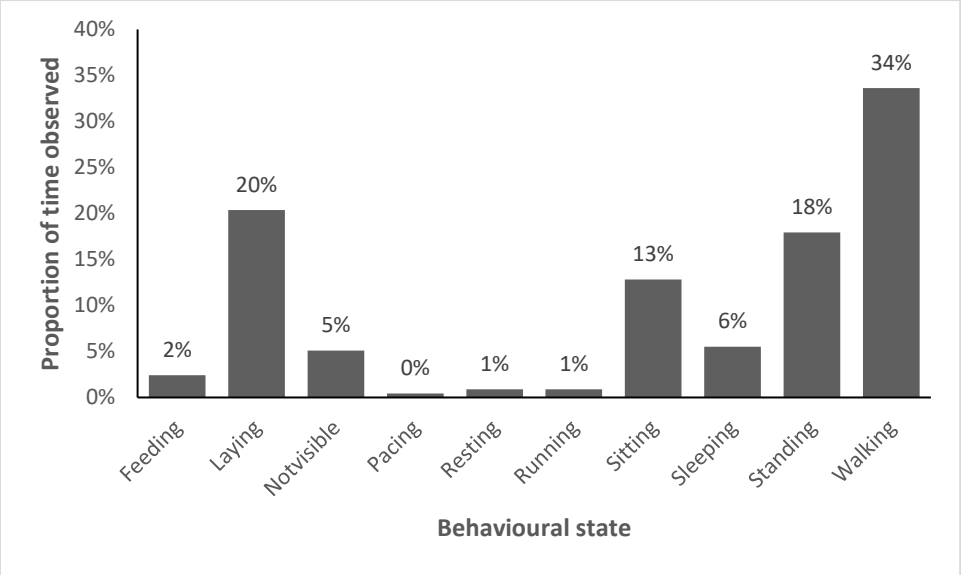
(xii) **Pavak**:

Pavak was observed laying (42%) followed by sitting and walking.



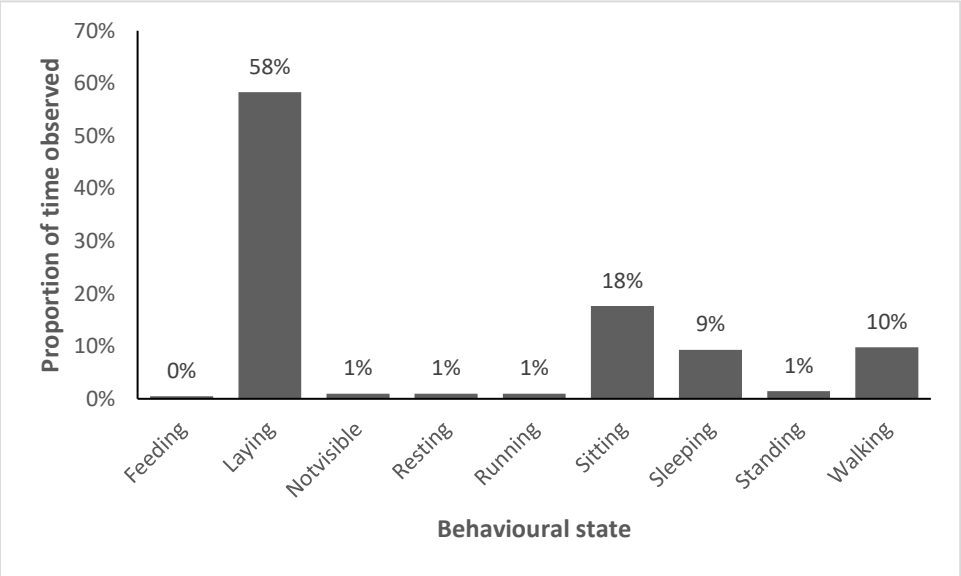
(xiii) **Prabhas**:

Unlike other cheetah individuals, Prabhas was observed walking (34%) followed by laying, standing and sitting.



(xiv) **Nirva**:

Nirva was observed laying most (58%) of the time followed by sitting and walking.



(xv) **Veera**:

Veera was observed laying (35%) followed by walking and sitting.

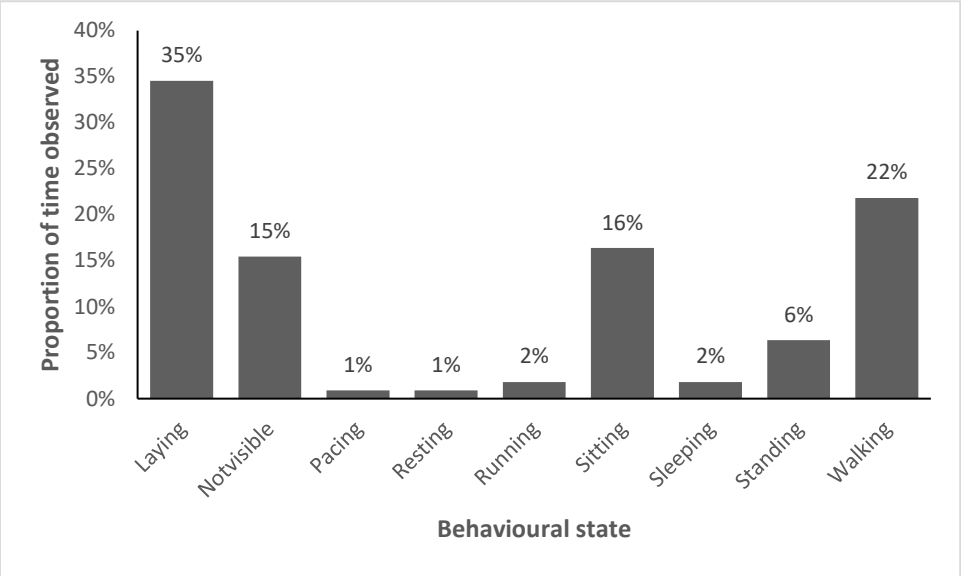


Figure 10: Time activity budget of cheetahs introduced to India

8. Monitoring Co-predators in Kuno National Park

The main mammalian carnivores inhabiting Kuno NP are leopard, striped hyena (*Hyaena hyaena*), jackal (*Canis aureus*), Indian fox (*Vulpes bengalensis*) and jungle cat (*Felis chaus*).

8.1. Leopard

Understanding the ecology and movement patterns of elusive and enigmatic predators such as leopards has been a subject of extensive research over the past few decades. These studies provide valuable insights into the behavior, habitat preferences, and conservation needs of these apex predators, ultimately aiding in the formulation of effective management and conservation strategies. A combination of employing various advanced techniques including camera trap surveys, habitat use analysis, ranging pattern assessments, radio/satellite telemetry, demography and diet studies can help understand the intricate lives of leopards.

The importance of studying co-predators cannot be understated, as these interactions can shape predator communities and have cascading effects throughout the food web (Ripple et al. 2014; Winterbach et al. 2013). Examining the dynamics between leopards and cheetahs in Kuno NP, can help elucidate the mechanisms that regulate their coexistence, competition for resources, and potential impacts on prey species (Palomares and Caro 1999; Clements et al. 2014; Swanson et al. 2014). This holistic approach provides a comprehensive understanding of ecosystem health and functioning. A particularly intriguing aspect of predator interaction lies in the relationship between leopards and cheetahs in regions where their ranges overlap. Despite both being formidable predators, they exhibit distinct behaviors that minimize direct competition and promote coexistence. Cheetahs, renowned for their exceptional speed and agility, possess adaptations that allow them to hunt mostly in open habitats (Hunter 1998; Cornhill et al. 2021). In contrast, leopards are renowned for their adaptability to a wide range of habitats and have a more versatile diet (Nowell and Jackson 1996; Henschel 2008). As a result, cheetahs tend to avoid direct confrontation with leopards by selecting habitats and periods when leopards are less active, thereby reducing the risk of encounters (Caro 1994; Durant 1998; Cornhill et al. 2023). In Kuno, it was observed during a couple of encounters with cheetah coalitions, leopard was chased away.

By exploring the temporal and spatial habitat use of cheetahs in relation to leopards, we can gain insights into the mechanisms that facilitate their coexistence. Understanding how these two large felids partition resources and habitats contributes to our knowledge of ecological strategies that minimize competition and maximize survival. (Durant 1998; Hayward & Slotow 2009). In order to understand differences in movement ecology and spatial habitat use of leopards in relation to cheetahs, five leopards were captured using double door walk-through trap cages and fitted with AWT satellite collars.

We used ArcMap to generate home ranges, movement pathways and average daily movement of the collared leopards using movement ecology tools (ArcMET) in ArcGIS. Average daily movement of all the collared leopard individuals was estimated to be 2.3 km (SE 0.3) in Kuno ranging between 1.7-3.2 km.

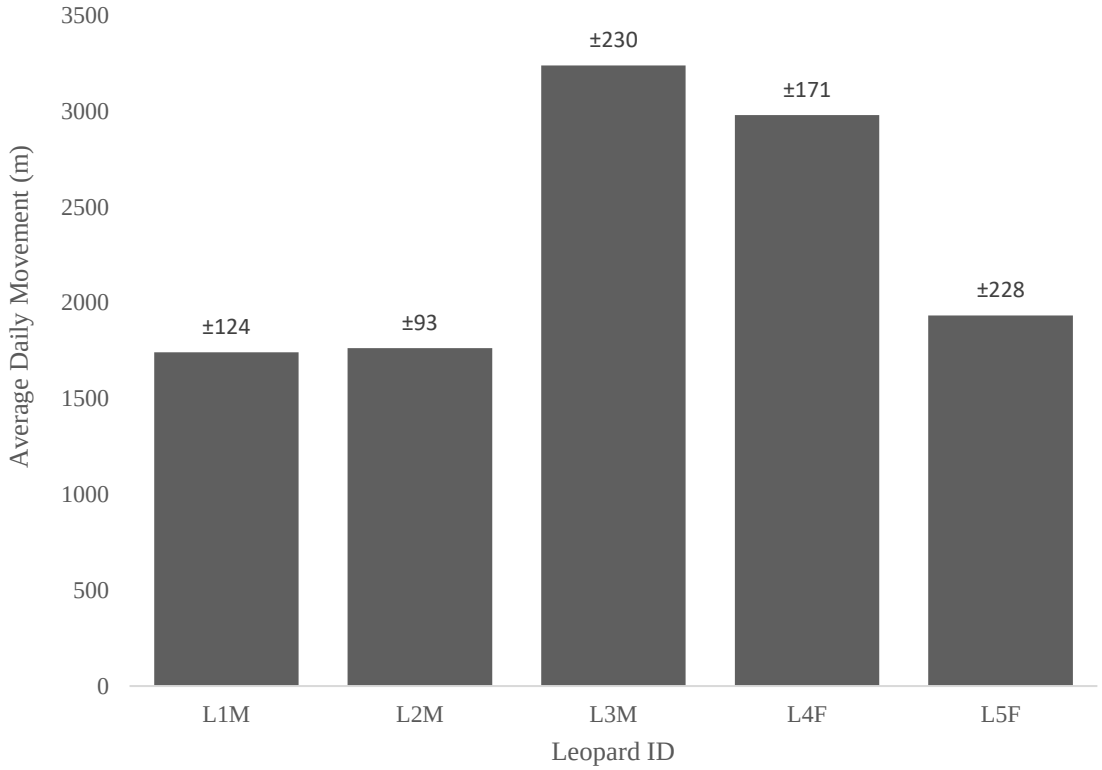


Figure 11: Average daily distance moved (in metres) by radio collared leopards in Kuno National Park

The average home range of all the collared leopards was estimated to be 79 (SE 34) km² (99% Kernel Density Estimation-KDE). Two subadults (L2M and L5F) were found to have considerably larger home ranges (140 km² and 185 km² respectively) as compared to other individuals. This could be because these individuals are in their dispersing phase marked by a lot of exploratory movements which reflects in the increased estimate of home range size. The home ranges sizes of the leopards using kernel density estimates (50%, 95%, 99%) and 95% Minimum Convex Polygon (MCP) method are listed in Table 9.

Table 9: Home range sizes of radio collared leopards in Kuno National Park

Collar ID	95% MCP (km²)	50%KDE (km²)	95%KDE (km²)	99%KDE (km²)
Leopard 1 Male	17.60	3.11	10.45	15.78
Leopard 2 Male	64.94	27.49	99.29	140.67
Leopard 3 Male	13.49	4.05	18.65	28.78
Leopard 4 Female	7.50	5.50	20.02	25.96
Leopard 5 Female	70.30	8.06	83.50	185.01
Average home range	**34.77**	**9.64**	**46.38**	**79.24**

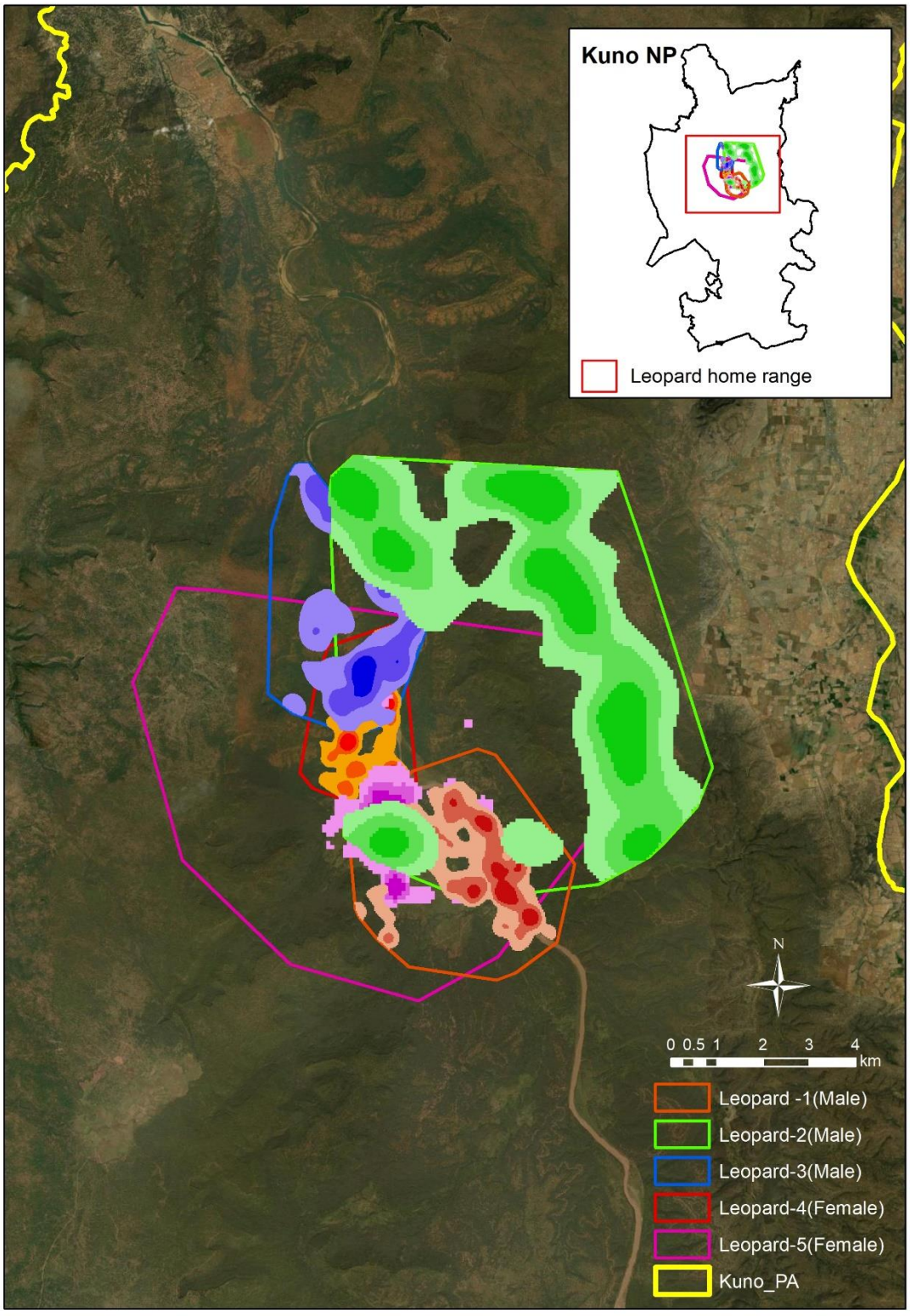


Figure 12: Minimum Convex Polygon (MCP) and 95% Kernel Density Estimate (KDE) home range of the radio collared leopards in Kuno National Park

8.2. Striped Hyena and Jungle Cat

One male striped hyena was radio collared to understand their habitat use, movement patterns and resource use. The home range size of the hyena was 18 km^2 and average daily distance moved was 4.46 km over a period of two months. Additionally, two male jungle cats were also radio collared.

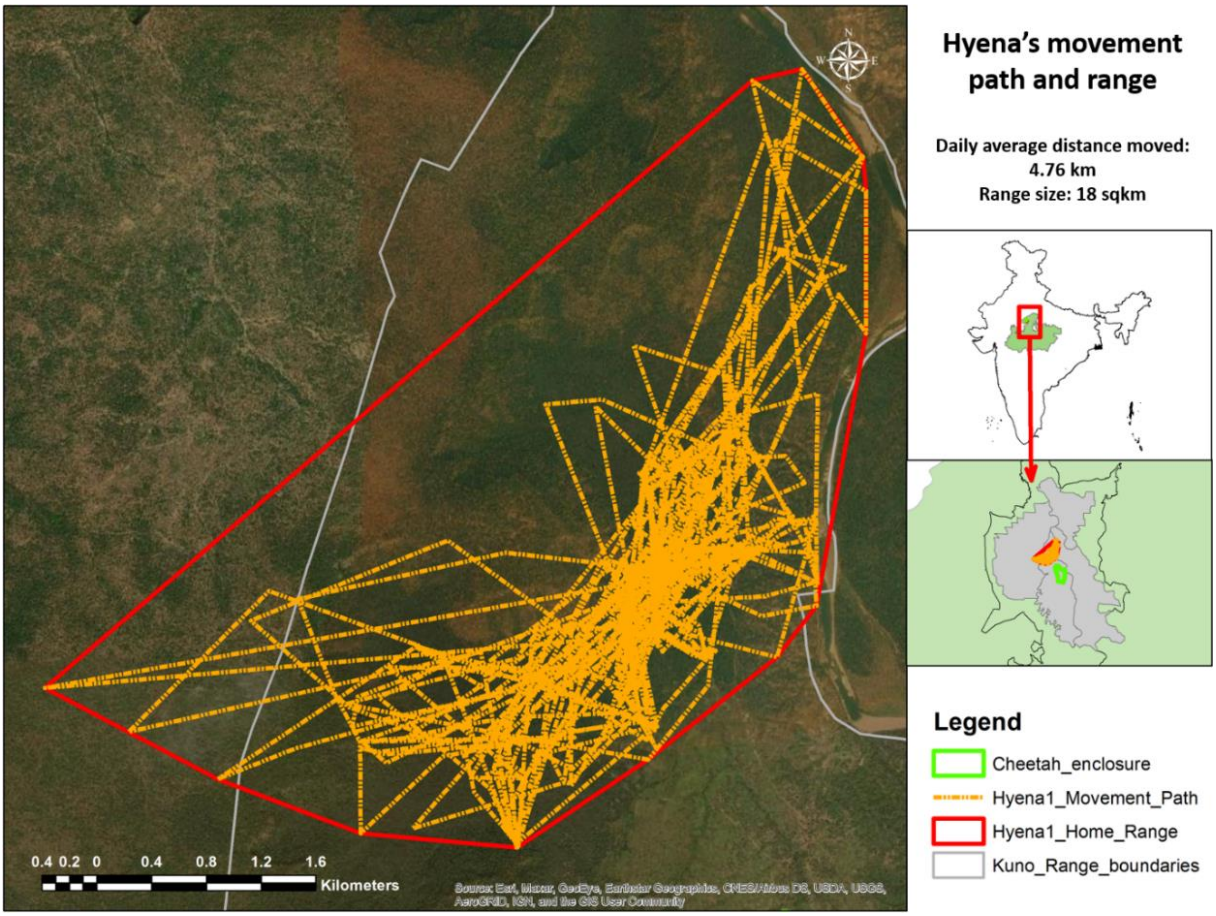


Figure 13: Home range map using Minimum Convex Polygon method of striped hyena in Kuno National Park

8.3. Monitoring of Mammalian Carnivores using Camera Trap Surveys

Terrestrial mammals play an important role in conservation decisions but their rarity and elusive nature impede conventional assessment techniques. Camera trapping and related analytical approaches that can capture ecological information on such elusive species are thus becoming a mainstream tool in conservation status assessments (Rowcliffe and Carbone 2008). We used camera traps that are automatically triggered by an animal crossing the device to capture its photograph and to use it to assess distribution and relative abundance of terrestrial mammals. Passive infrared motion and heat sensor Cuddeback C1 camera traps were deployed across the study area.

As part of the All India Tiger Estimation 2021, camera trap sampling was conducted in Kuno to estimate the density of leopards. The former Wildlife Sanctuary area of Kuno NP was systematically sampled using 2 km^2 grids. Within each grid, a pair of camera traps was deployed on either side of the trail or road. A total of 86 locations were sampled, resulting in the capture of photographs of terrestrial mammals (refer to Figure 1). The total effort involved 2695 camera days.

During the sampling period, a total of 1336 photographs of leopards were obtained. Among these photographs, 506 records of individually identified 92 adult leopards were selected for further analysis using spatially explicit capture-recapture (secr) models (Efford et al. 2019). By applying the secr models, the estimated density of leopards in Palpur East and West (formerly Kuno Wildlife Sanctuary) was determined to be 26.35 (with a standard error of 2.79) per 100 km^2, using a sex-specific heterogeneity model. The latest estimate of population densities of leopards is under process.

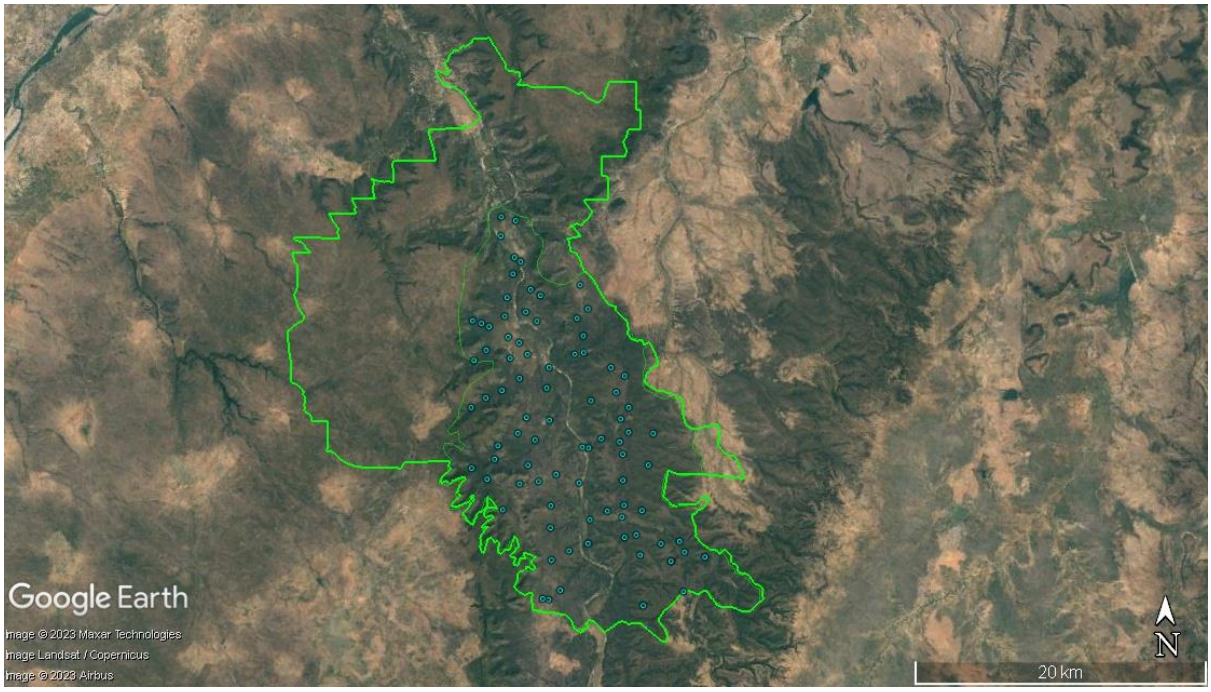


Image 17: Camera trap locations depicted as blue dots to monitor mammalian carnivores in Kuno National Park

8.3.1 Relative Abundance Indices of Mammalian Carnivores

Relative abundance indices are used to characterize spatial distribution and abundance of species with the assumption that these indices scale linearly with actual abundance (Güthlin et al. 2014). To estimate relative abundance of terrestrial mammals, data obtained from camera traps that were placed along the animal trails and forest roads optimizing for species photo-captures were used. The study area was divided into sampling grid comprising 2 km^2 cells, and each cell was sampled by a pair of camera traps deployed on either side of a track/road/trail.

The number of trap-days for each camera trap was calculated from the time it was mounted until the time it was retrieved. For every animal detection, species identity, date and location of photo-capture were recorded. The number of independent photo-captures of a species was used to calculate relative abundance indices (RAI) for terrestrial mammals. This index was used to delineate species hotspots for leopard, striped hyena and golden jackal in the sampling area using graphical and interpolation approaches since these three species have the highest degree of possible interactions with cheetahs resource wise. Additionally, hotspot maps for other small carnivores in found in the area were generated and are provided below.

Table 10: Photo captures of mammalian carnivores obtained during camera trap survey in Kuno National Park

S No	Species	No of Photo captures
1	Leopard	1336
2	Striped hyena	1149
3	Golden jackal	2443
4	Sloth bear	274
5	Honey badger	143
6	Indian fox	184
7	Jungle cat	776
8	Small Indian civet	521
9	Common palm civet	166
10	Rusty-spotted cat	4
11	Indian wolf	1

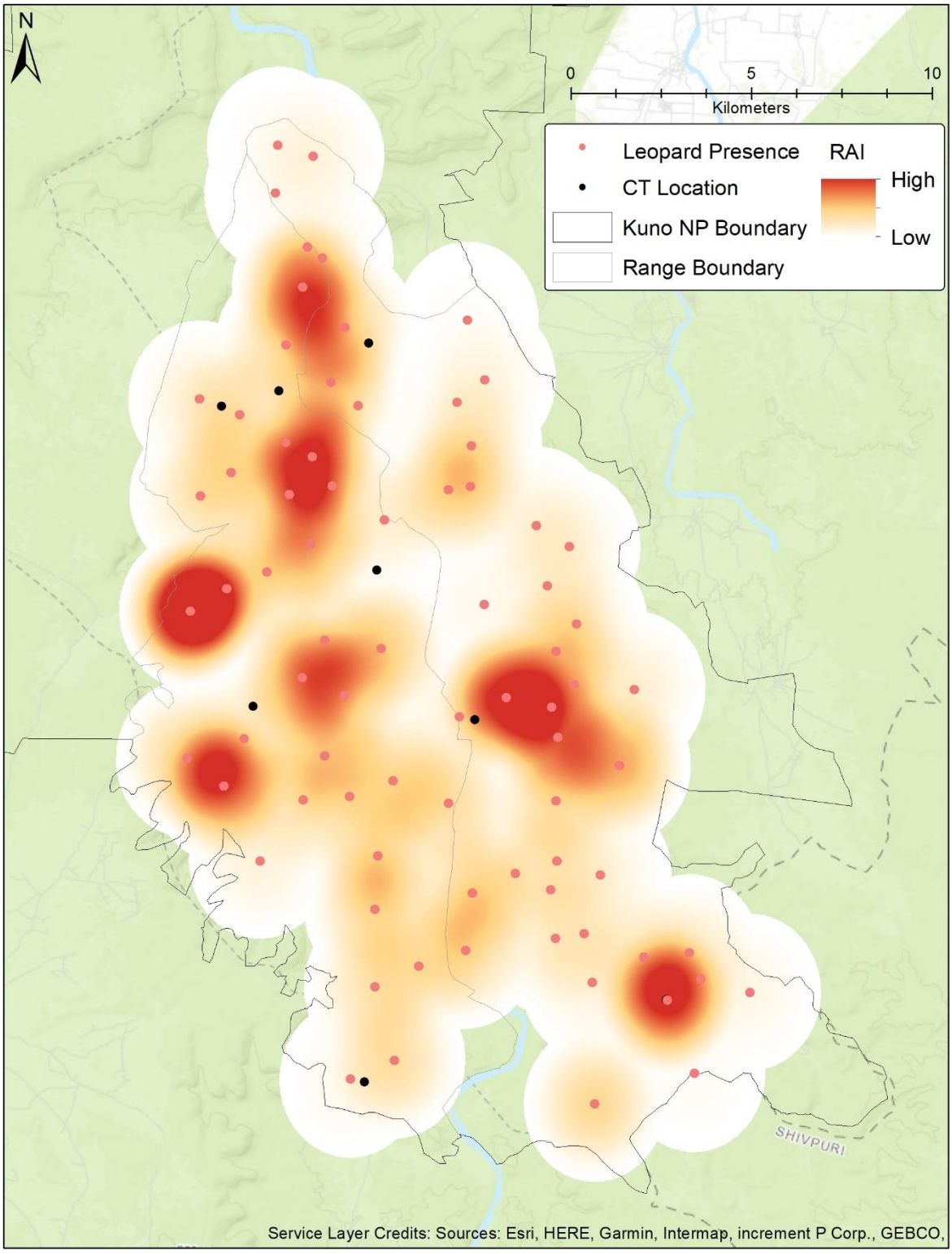


Figure 14: Relative abundance index map of leopard in Kuno National Park

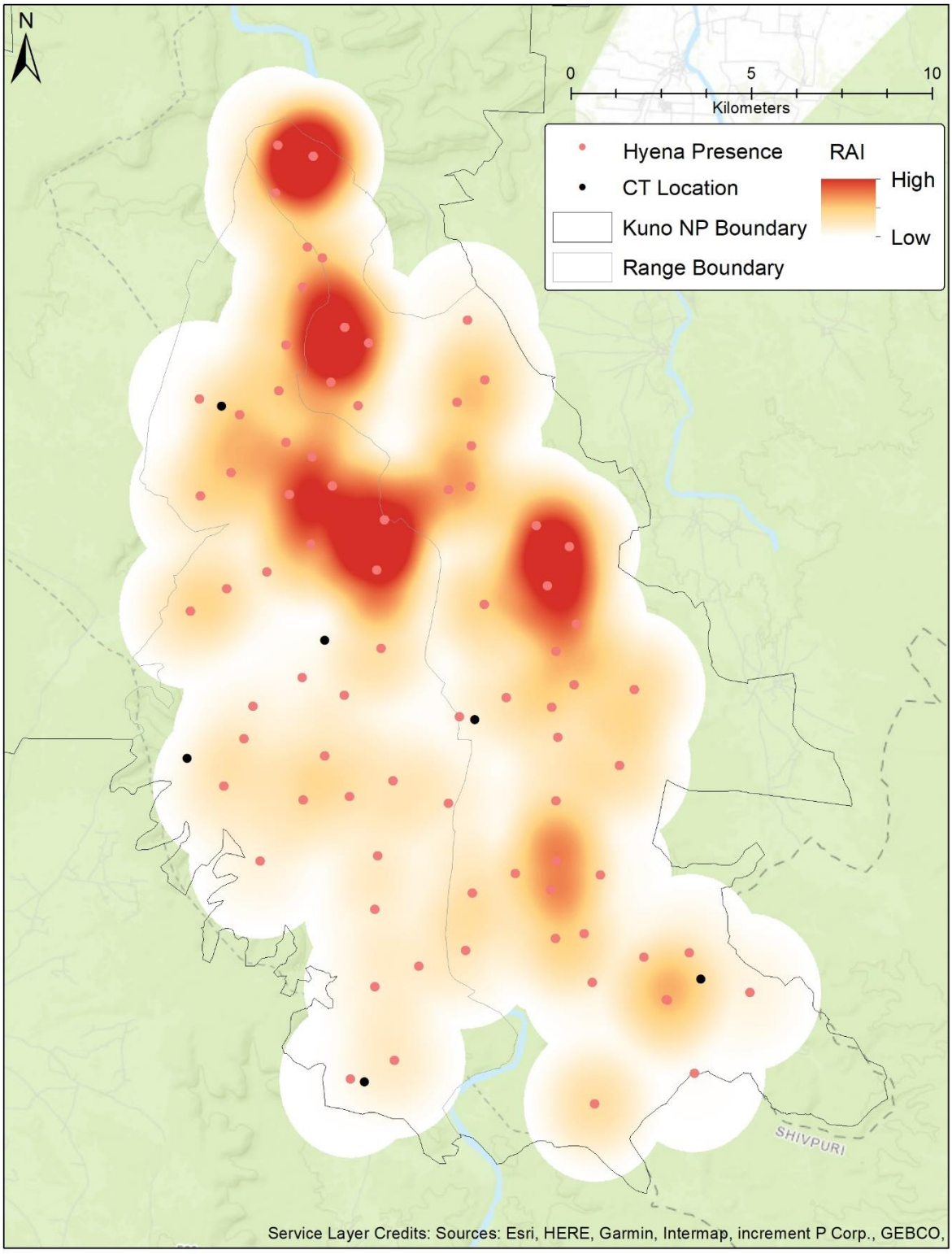


Figure 15: Relative abundance index map of striped hyena in Kuno National Park

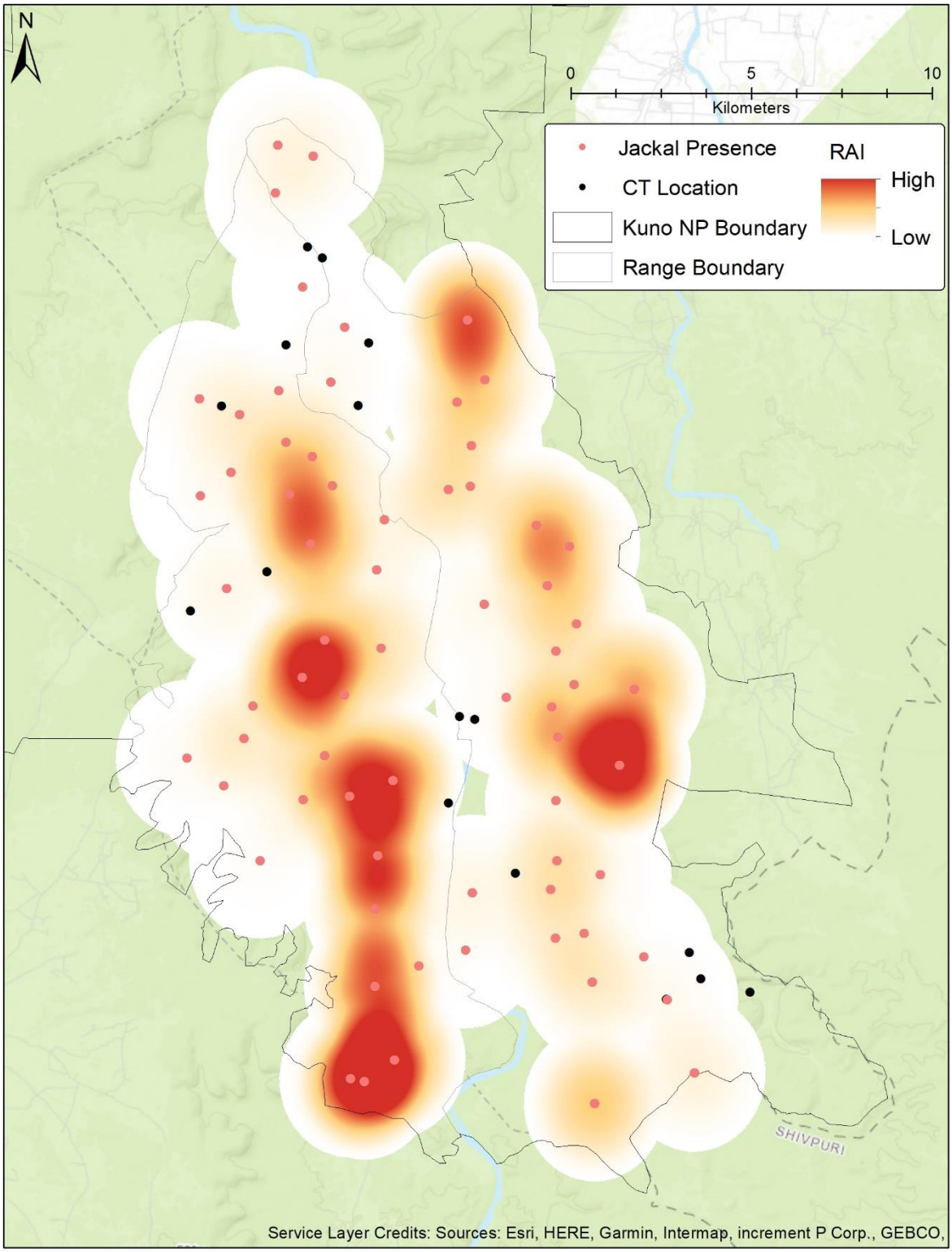


Figure 16: Relative abundance index map of golden jackal in Kuno National Park

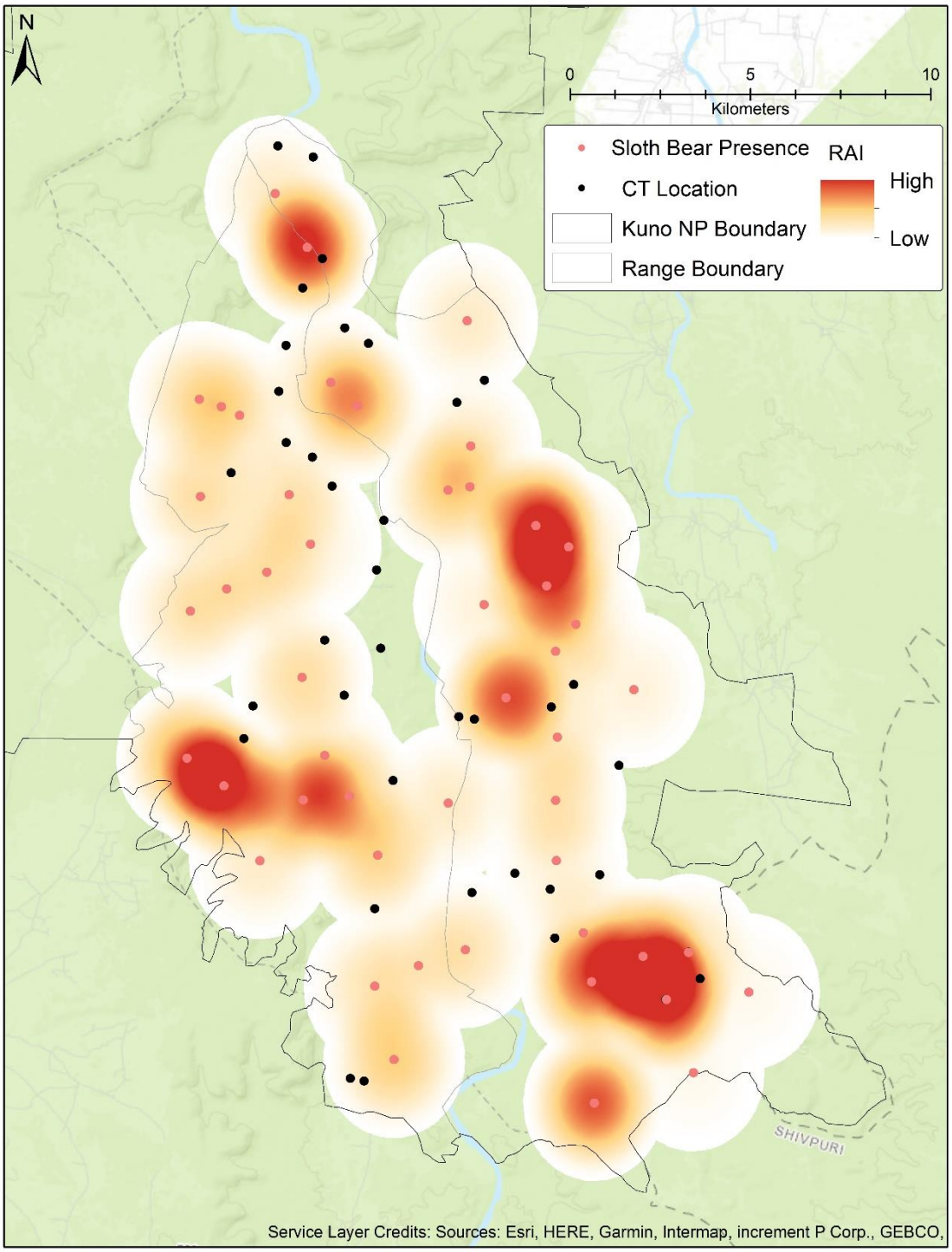


Figure 17: Relative abundance index map of sloth bear in Kuno National Park

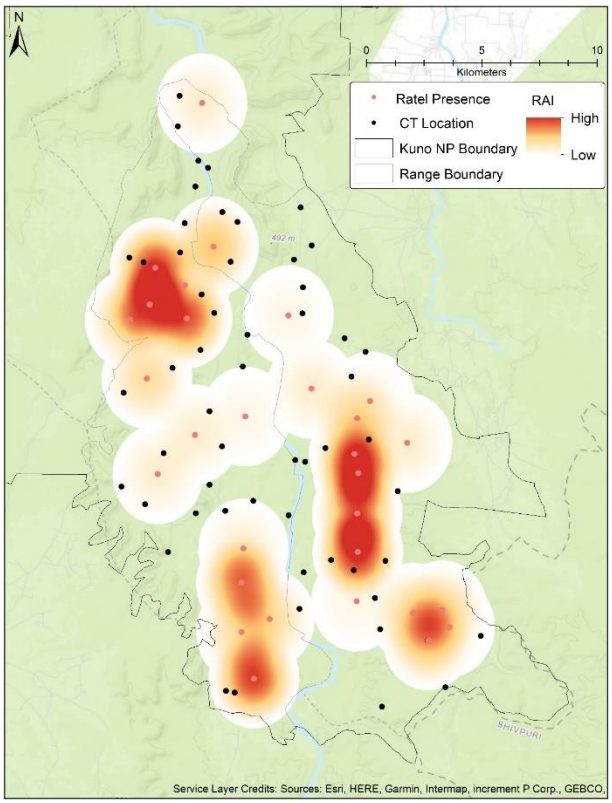


Figure 18: Relative abundance index map of honey badger in Kuno National Park

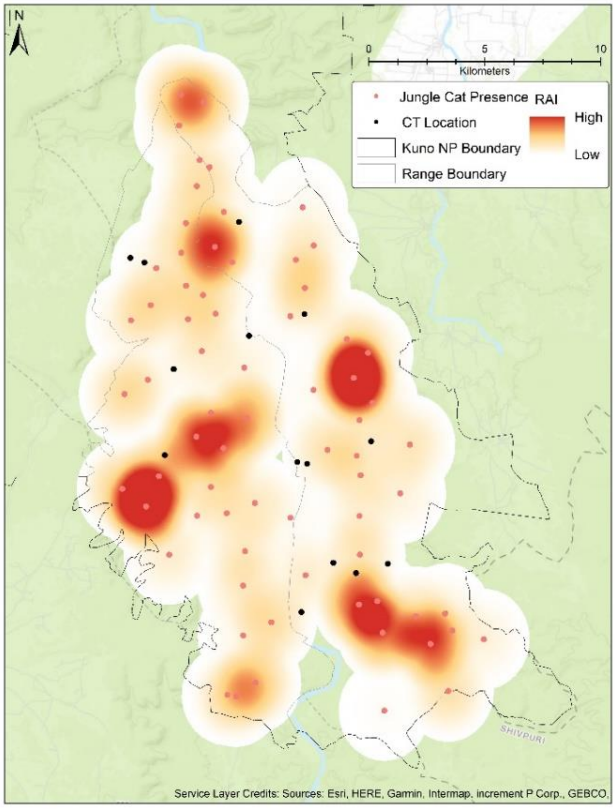


Figure 19: Relative abundance index map of jungle cat in Kuno National Park

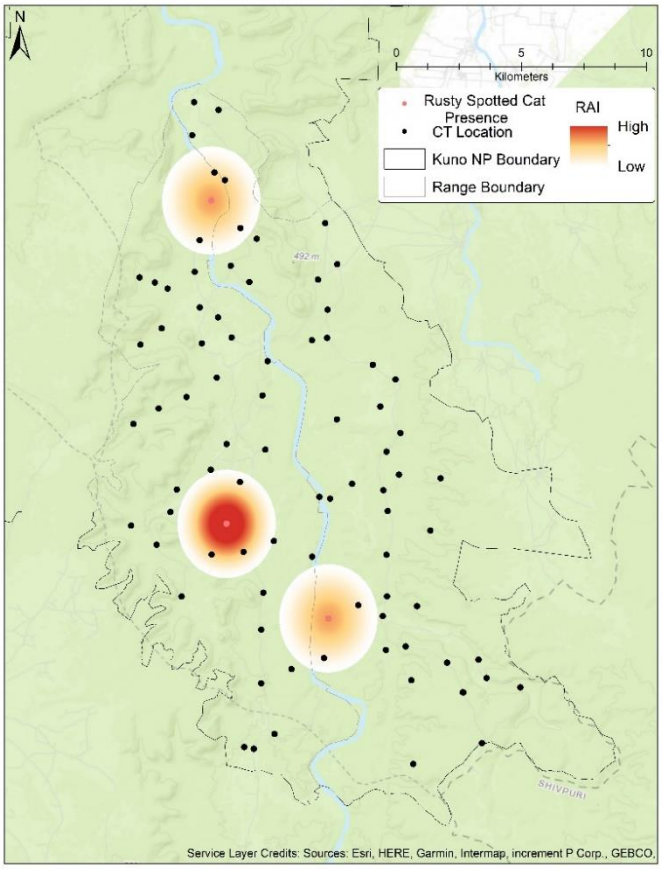


Figure 20: Relative abundance index map of rusty-spotted cat in Kuno National Park

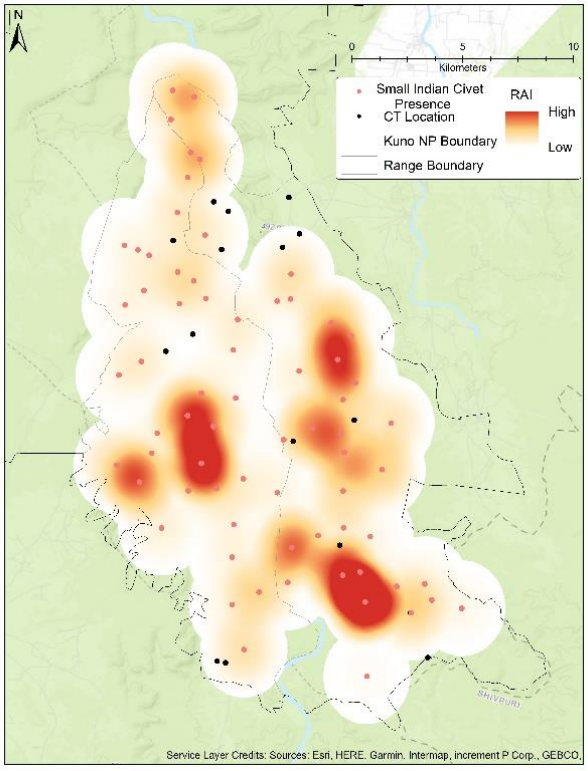


Figure 21: Relative abundance index map of small Indian civet in Kuno National Park

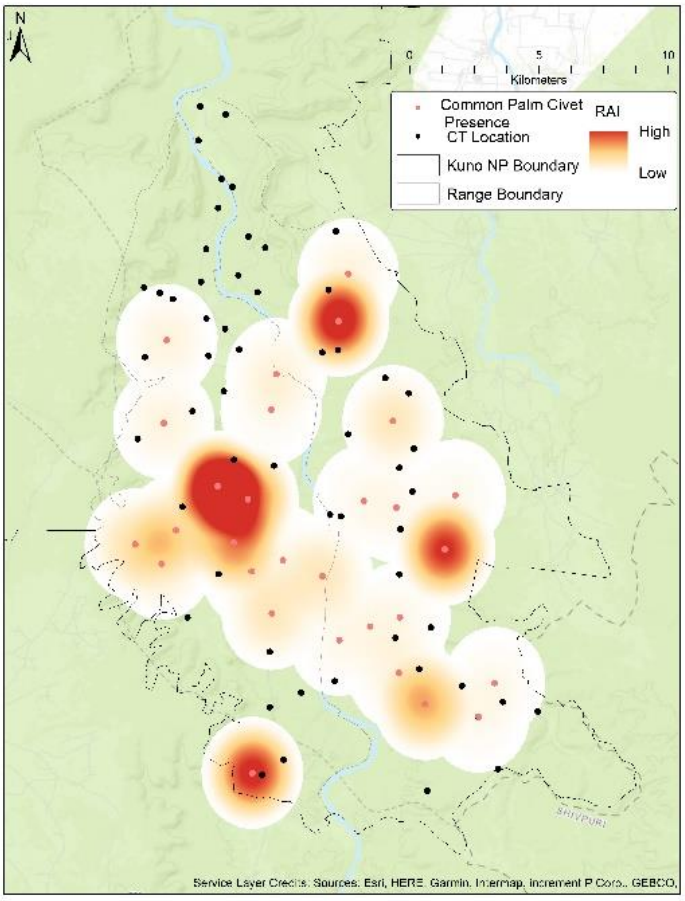


Figure 22: Relative abundance index map of common palm civet in Kuno National Park

9. Monitoring Prey Species in Kuno National Park

The main herbivores found in Kuno NP are chital, sambar deer, nilgai, chousingha, chinkara and wild pig.

To estimate the population density of the prey species, distance sampling based line transect method was carried out (Buckland et al. 1993). A total of 70 line transects were sampled and each line transect was walked thrice. The total sampling effort in Kuno NP by foot was 478 km. The analysis was conducted separately for the erstwhile Wildlife Sanctuary area (Palpur East and West ranges) and rest of the National Park (Ochhapura and Dhaurent range) since the latter areas were added in 2018 and had very different management regimes earlier. The density of chital, the most abundant prey species was 19.03 (4.6 SE) individuals per km^2 in erstwhile Kuno Wildlife Sanctuary and 1.15 (1.13 SE) individuals per km^2 in rest of the National Park (Table 2)

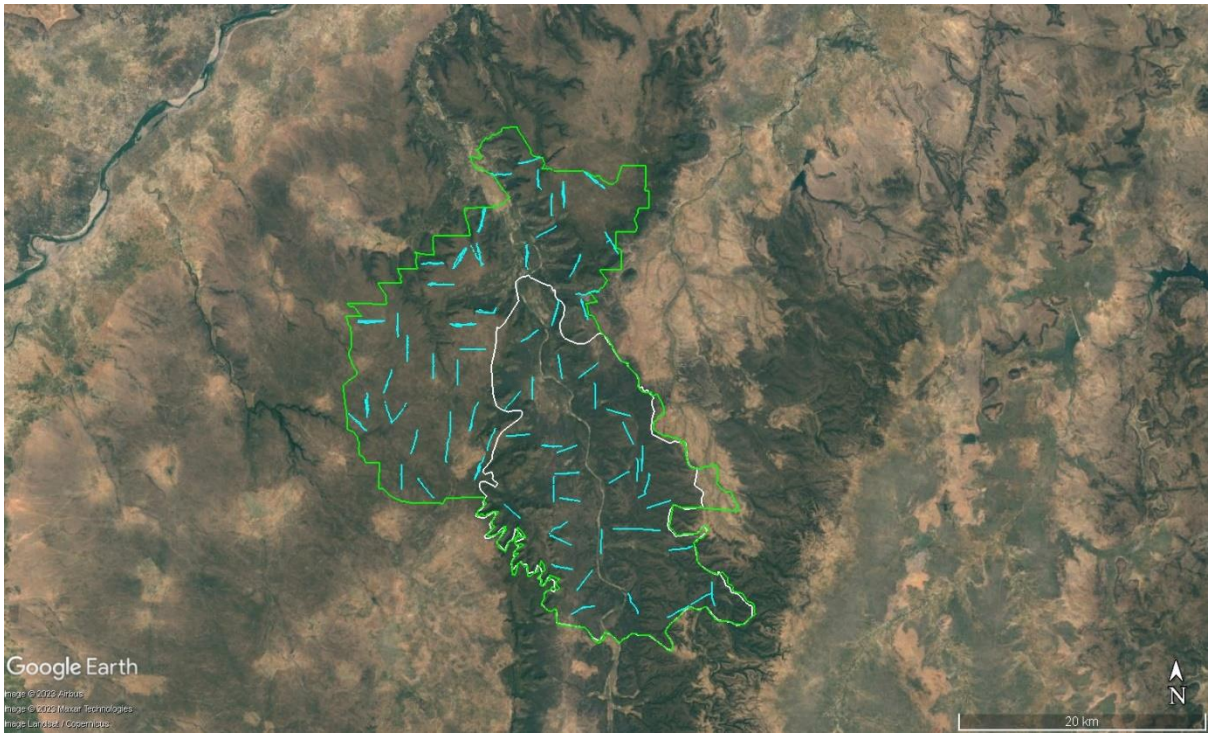


Figure 23: Line transect sampled (depicted as blue lines) to assess prey density in Kuno National Park. The boundary of erstwhile Kuno Wildlife Sanctuary is depicted in white colour.

Table 11: Prey density in Kuno National Park obtained using distance sampling based line transect method.

Species	Group encounter rate (per km)		Density (SE) - individuals per km^2	
	Erstwhile Kuno Wildlife Sanctuary	Rest of National Park area	Erstwhile Kuno Wildlife Sanctuary	Rest of National Park area
Chital	0.42	0.01	19.03 (4.62)	1.15 (0.82)
Sambar	0.1	0.01	1.25 (0.4)	0.15 (0.14)
Nilgai	0.08	0.05	0.85 (0.36)	1.06 (0.4)
Hare	0.05	0.03	2.27 (0.83)	1.47 (0.55)
Peafowl	0.13	0.03	2.27 (0.82)	0.44 (0.2)
Grey langur	0.07	0.05	3.23 (1.39)	2.92 (1.84)
Wild pig	0.04	0.02	0.84 (0.4)	0.14 (0.07)
Feral cattle	0.16	-	2.11 (0.69)	-
Chinkara	No sighting	0.02	-	-
Chousingha	0.005	0.004	-	-

9.1. Monitoring of Ungulates using Camera Trap Surveys

9.1.1. Relative Abundance Indices of Ungulates

The number of independent photo-captures of a species obtained from camera trap survey was used to calculate relative abundance indices (RAI) for ungulates. Similar to creating maps for mammalian carnivores as described above, the index was used to delineate species hotspots for chital, sambar, nilgai, chousingha and wild pig in the sampling area using graphical and interpolation approaches.

Table 12: Photo captures of ungulates obtained during camera trap survey in Kuno National Park

S No	Species	No of Photo captures
1	Chital	39,067
2	Sambar	6243
3	Nilgai	5257
4	Chousingha	397
5	Wild Pig	3357

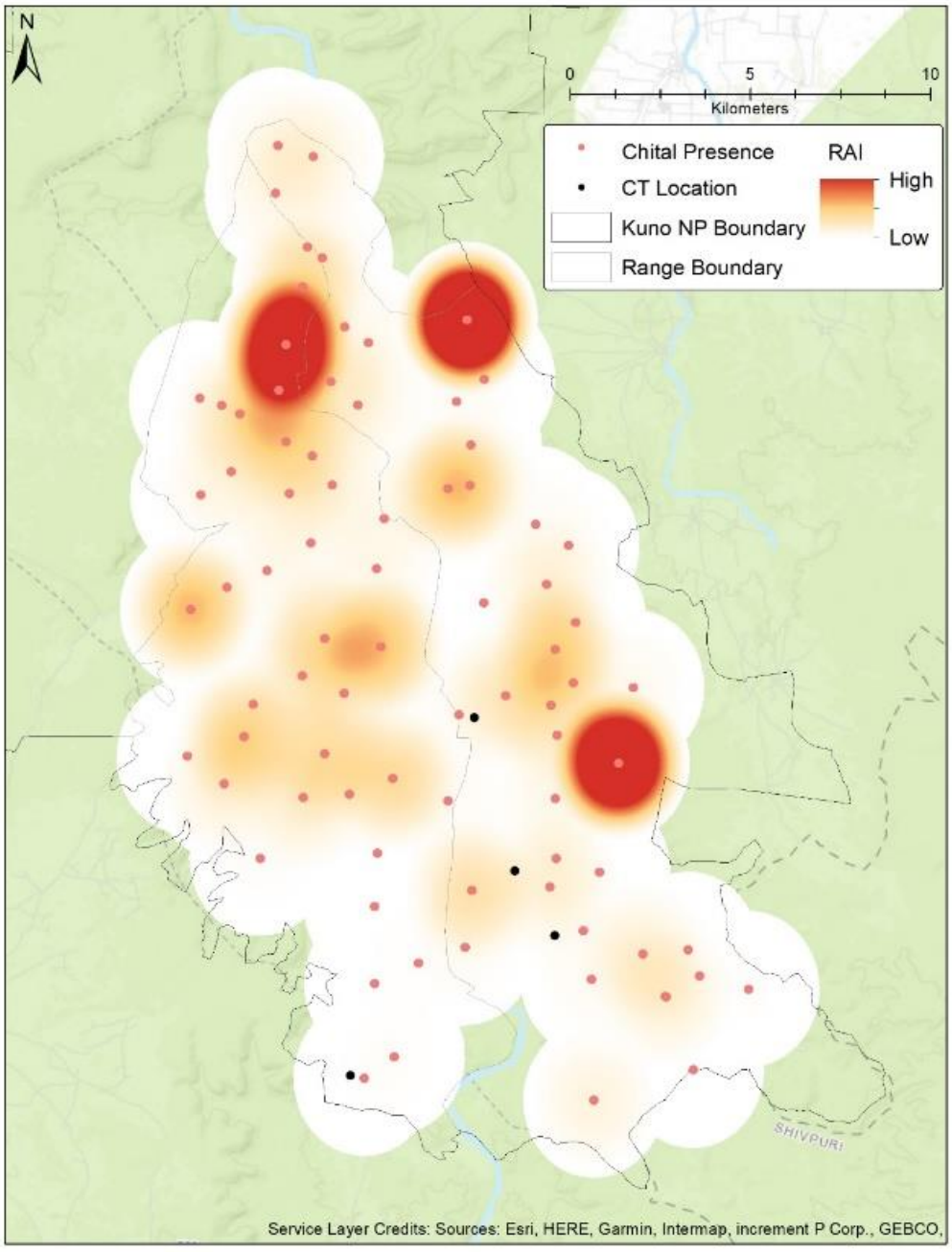


Figure 24: Relative abundance index map of chital in Kuno National Park

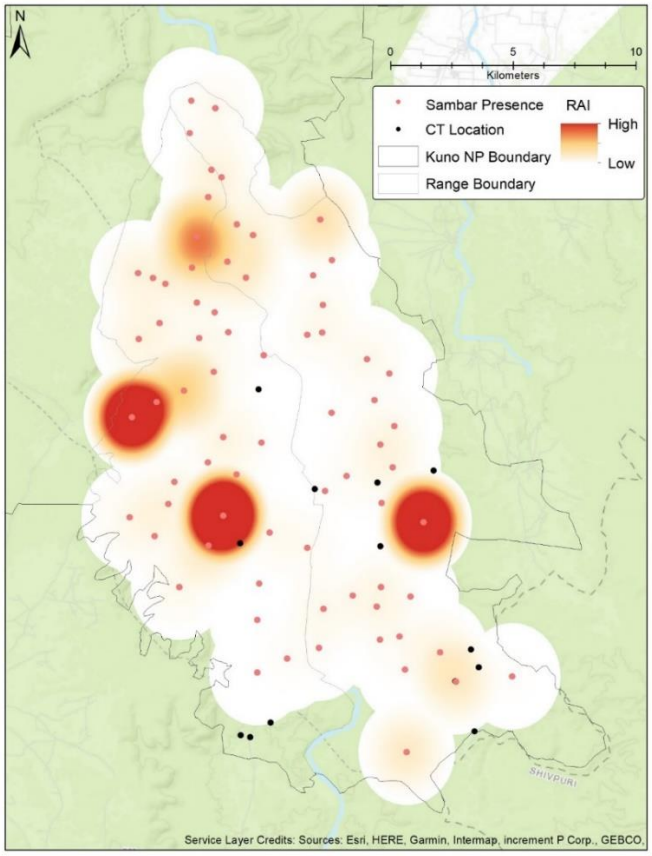


Figure 25: Relative abundance index map of sambar in Kuno National Park

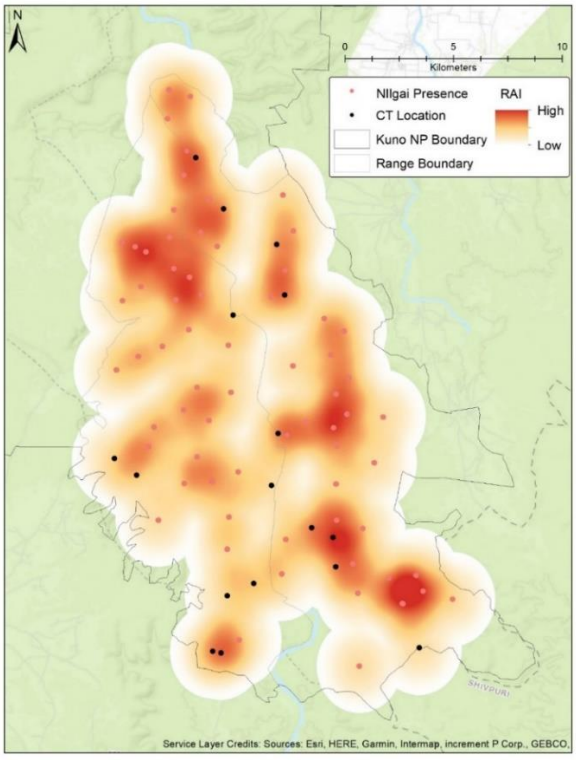


Figure 26: Relative abundance index map of nilgai in Kuno National Park

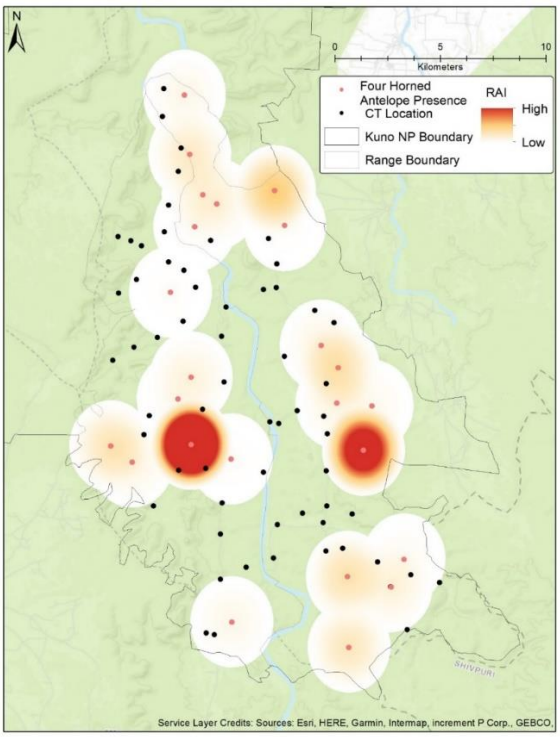


Figure 27: Relative abundance index map of chousingha in Kuno National Park

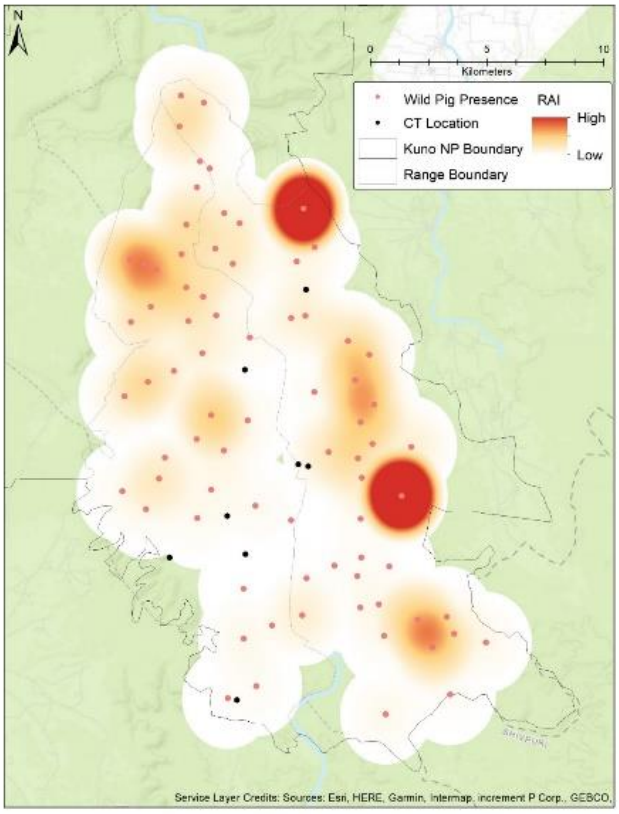


Figure 28: Relative abundance index map of wild pig in Kuno National Park

Additionally, four female chital were radio collared to understand their behaviour, habitat use, movement patterns and resource use.

10. Stakeholder Engagement and Public Awareness

Kuno NP management started to engage with local communities, government agencies and conservation organizations to build support for the cheetah introduction project before the arrival of cheetahs. During the release of cheetahs, the local community representatives were given an audience and encouraged by Hon'ble Prime Minister of India, Hon'ble Chief Minister of Madhya Pradesh and Hon'ble Minister of MoEF&CC, which enthused people and boosted their morale to participate and assist in cheetah conservation. Following activities were taken up

(a) Creating Cheetah Mitras: More than 450 Cheetah Mitras in 80 villages were engaged in conservation work, including cheetah tracking and sharing protection information.

(b) Awareness Campaign: Conducted more than 150 Cheetah Mitra Sammelans in 80 peripheral villages and organized 16 Anubhuti camps for 2,200 schoolchildren.

(c) Providing Livelihood Options: Madhya Pradesh Forest Department provided direct employment to over 80 locals as cheetah trackers. Additional direct employment was offered to more than 200 locals in protection work as 'Suruksha Sramik.'. Local youth were provided training on skill development to work as nature guides or wildlife safari drivers for future tourism needs. Habitat improvement projects were undertaken within Kuno NP, generating employment for locals. There has been increased economic activities around Kuno NP due to the potential for cheetah tourism, creating more local employment opportunities.

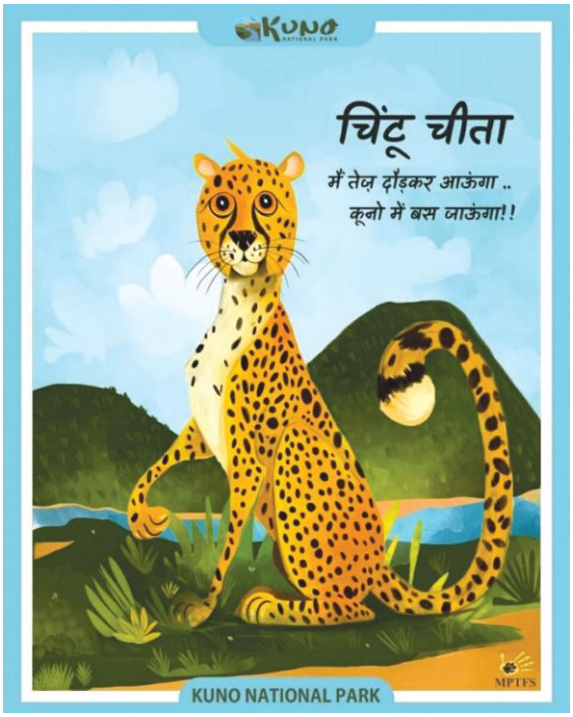


Image 18: Poster of cheetah mascot named as "Chintu Cheetah" as part of awareness and outreach campaigns conducted by Madhya Pradesh State Forest Department

Image 19: Awareness campaigns in villages around Kuno National Park

Engagement of locals in the cheetah project was achieved through cheetah awareness camps and training workshops for local youth as nature guides and for hospitality services to tourists. Over 150 cheetah awareness camps were organized in 80 villages, and more than 100 youngsters received initial training for guiding tourists. The response from locals towards cheetah conservation has been highly positive.

Image 20: Celebration of International Cheetah Day 4th Dec 2022

Image 21: Anubhuti Camps conducted for local community around Kuno National Park

As cheetahs have (and may) venture beyond the boundaries of Kuno NP, there are several concerns that require careful attention. Foremost among these concerns is the safety of the cheetahs. When cheetahs roam outside Kuno NP, they become vulnerable to various threats posed by humans such as poaching, the use of snares, electrocution, poisoning, and road accidents. Another significant concern is the potential for antagonism towards cheetahs by local villagers, particularly if cheetahs prey on small livestock like cattle and goats (so far only one such

depredation event occurred and compensation was immediately disbursed). Cheetahs have garnered significant popularity in the area, which might lead people to follow and approach cheetahs when they are spotted, unintentionally causing distress to the animals. Managing these situations in a timely manner and effectively is crucial.

To address these challenges, it is imperative to bring various administrative and authoritative entities onto a unified platform. This includes involving local village and revenue authorities in raising awareness and maintaining order in case a cheetah enters village boundaries. Additionally, police intervention may be necessary to ensure law and order in the event of any untoward incidents involving cheetahs. The local forest department outside Kuno, responsible for safeguarding forests and wildlife in their jurisdiction, should also be kept informed about the presence of cheetahs in their area to coordinate protection efforts effectively. To facilitate all these aspects, it is essential to provide basic awareness and training about cheetah behavior to all stakeholders.

In the initial stages of the project, awareness programs were organized in nearly all peripheral villages, covering more than 100 villages. Over 400 "Cheetah Mitras," or friends of the cheetah, were appointed in these villages. Being a Cheetah Mitra is not a government position but rather a voluntary commitment to the cause of cheetah protection and spreading awareness. It is a selfless act driven by a sense of pride and responsibility. In short, a Cheetah Mitra is a local individual dedicated to cheetah protection, promoting awareness, and readiness to assist whenever needed, without expecting any material rewards, except for pride and appreciation. This role, although challenging, has brought out the best in the people of Kuno and Sheopur. Furthermore, training has been conducted for field staff in adjoining territorial forest divisions where cheetahs might roam after leaving Kuno NP boundaries. Local officials in adjoining Panchayats have been briefed about the do's and don'ts regarding cheetah encounters in villages. District authorities from the Police and Administration have also expressed their unwavering support for the cause of cheetah conservation.

Determining when to intervene and rescue a cheetah found in areas distant from its intended location is a question that the project managers address. Cheetahs brought to India have a specific purpose: to establish a viable cheetah metapopulation in the country. When a cheetah roams alone in distant areas, exploring the landscape without difficulty, it is considered a positive sign, indicating the cheetah's natural exploratory instincts. However, other challenges arise, such as protecting cheetahs when they approach villages, cross highways, or enter another State. The field staff of the Forest Department and local communities in these distant areas may not have received the same level of training and awareness as those in the proximity of Kuno NP. Additionally, situations like Asha's location near the border of another State present administrative and management complexities that require careful consideration and coordination.

Workshop was conducted in Gwalior for District’s Civil and Forest administration of those units which are surrounding Kuno NP including neighbouring states like Uttar Pradesh. The workshop was well received and was able to sensitize people for dealing with cheetah venturing in these areas when they move out of Kuno NP.

Image 22: Consultative workshop on cheetah ecology and management held in Shivpuri, Madhya Pradesh during February 2023

A consultative workshop on cheetah ecology and management attended by national and international wildlife/ cheetah experts, managers, scientists, researchers and field staff was held in February 2023 to appraise project partners/collaborators as well as to share expertise and knowledge. As the project progressed and expanded, a Cheetah Steering Committee of 11-member domain experts comprising of carnivore biologists, managers, wildlife veterinarians, botanist, ecologist, sociologist and international cheetah experts was constituted in 2023 by the NTCA to monitor, advise and oversee the cheetah project. In a phased manner after thorough consultations, discussions and planning, cheetahs were released from quarantine into soft release bomas and subsequently into free ranging conditions, monitored regularly and interventions undertaken as and when required as per the recommendations of the action plan and guidance of experts.

11. The Landscape Approach

-with inputs from **Dr. Rajesh Gopal** Secretary General- Global Tiger Forum (GTF), **Dr. Himmat Singh Negi** Senior Advisor- GTF, **Mohnish Kapoor** Head, Programme and Partnerships- GTF, **Pramod Yadav** Technical Consultant- GTF

The vegetation in Kuno NP can be classified into thirteen categories, viz. Very Dry Teak Forest, Dry Teak Forest, Southern Dry Mixed Deciduous Forest, Northern Dry Mixed Deciduous Forest, Dry Savannah Forest, *Anogeissus pendula* Forest, *Anogeissus pendula* Scrub, *Boswellia* Forest, Khair Sissoo Forest, Ravine thorn Forest, *Butea* patches, *Zizyphus* Scrub and Plantations. The larger Kuno landscape envisaged for cheetah in the action plan for introduction of cheetah in India is around 6800 km^2(Jhala et al. 2021), which includes four forest divisions, two PAs, subsumed within two revenue districts (Sheopur, and Shivpuri). However, considering the movement pattern of the species vis-à-vis the human-cheetah interface, it is prudent to include contiguous forestland parcels of contiguous districts (Sheopur, Shivpuri, Gwalior, and Morena), resulting in a larger landscape of 11128.61 km^2 as indicated below:

Table 13: Land use of greater Kuno landscape

S No	Landuse	Area in km^2	Percentage
1	Forest Cover	3744.29	33.65
2	Scrub Land	5543.17	49.81
3	Agriculture Land	1662.13	14.94
4	Water Bodies	136.75	1.23
5	Built-Area	42.26	0.38
Total		**11128.61**	**100**

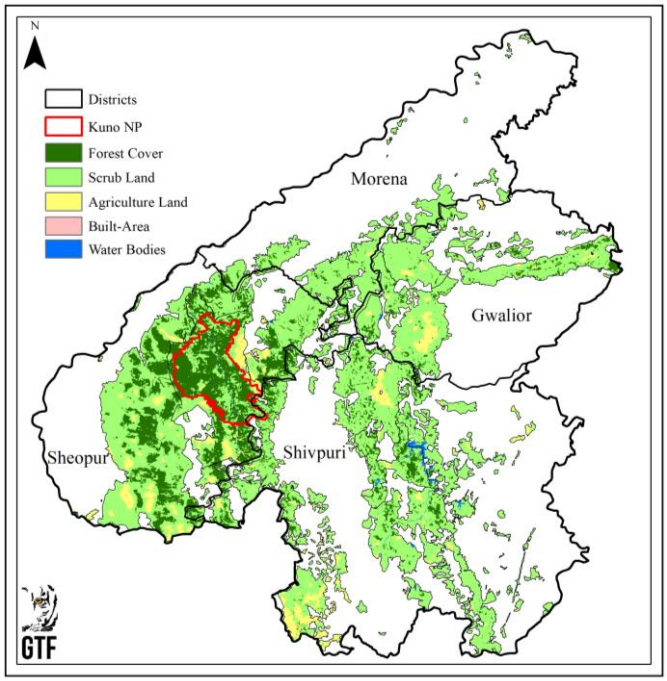


Figure 29: Envisioned greater cheetah landscape around Kuno spanning 11128 km^2

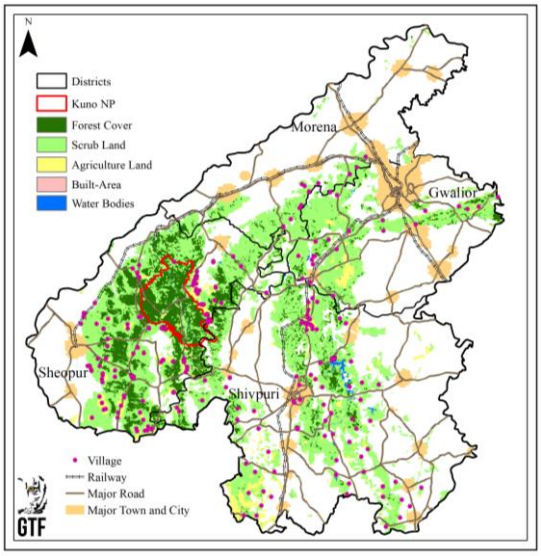


Figure 30: Linear infrastructure in envisioned greater cheetah landscape around Kuno

The cheetah's hunting strategy largely comprises of initial stalking and bringing down the prey through a targeted high-speed chase. Given the heterogeneous habitat of Kuno with scrubland and woodlots, the cheetah would adapt for both stalking as well as chasing its prey, while avoiding niche clash with the leopard. This necessitates availability of gregarious ungulates in the habitat with a high relative abundance, in view of the leopard being sympatric in the area.

The woodlots comprising of dry deciduous scrub patches, *Anogeissus pendula* scrub and relocated village sites harbor heterogeneous grasses, congenial for fostering ungulates. This amounts to almost 34% of land use categories within the larger landscape. The degree of protection as well as monitoring would vary within the landscape (between PAs and other land parcels). Thus, Kuno NP needs to be fostered as a cheetah source area to supplement declining sink populations of cheetah in areas beyond.

The overall prey density of larger gregarious ungulates (chital, sambar etc.) in Kuno is presently around 22 individuals per km^2. In view of the co-occurring leopard population (around 91), an overall ungulate density of 35 to 40 individuals per km^2 is required. The prevailing prey density in the comparable PA of Panna (with around 5% core area as scrub/woodlots) in the neighboring region may be considered for guidance in the context towards field interventions, since the said habitat has sympatric populations of tiger as well as leopard, with a prevailing overall ungulate density of about 38 individuals per km^2. Thus, there is a need for an ongoing, in-situ, as well as active, prey augmentation action in Kuno habitat and the landscape.

The cheetah translocation has been largely successful, providing lot of hope for such active ventures in the future. While it may be too early to gather insights on cheetah ecology within a year, the experience has provided valuable understandings for its field management. Broadly, this can be highlighted as below:
A) Managing the source population of cheetah in Kuno for generating a reproductive surplus, in-situ prey augmentation, field protection, state-of-the-art monitoring, use of technology, habitat management vis-à-vis the inherent biological carrying capacity of the habitat for cheetah, and related managerial themes (as per Jhala et al. 2021)
B) Putting in place preventive and control measures for addressing human-cheetah interface situations with Rapid Response Teams
C) Building up protection infrastructure, monitoring capabilities, and improving prey base in other habitats – Gandhi Sagar and Nauradehi Wildlife Sanctuaries (as per Jhala et al. 2021)
D) Adopting a centrifugal landscape approach for cheetah management with gainful community stewardship and stakeholder engagement, based on a multisectoral masterplan for the cheetah landscape, with due legitimacy for implementation and monitoring through an administrative mechanism, based on multidimensional, sustainable indicators.

The landscape approach in the context needs to focus on multistakeholder engagement. The concerns of cheetah, as well as other wild animals, need to be factored in all sectors/land uses/practices of stakeholders. The said engagement needs to be mutually gainful, based on agreed actions. The planning process needs to evolve at the district level, vis-à-vis the extant procedure of bottoms up planning, viz. at gram panchayat for rural-forest interface areas, and ward levels/local bodies for urban scape, and linkages with wildlife/PA management plan for notified

PAs. The integration at district level assumes importance so as to enable funding support for actions prescribed for the regional plan, apart from implementation and monitoring.

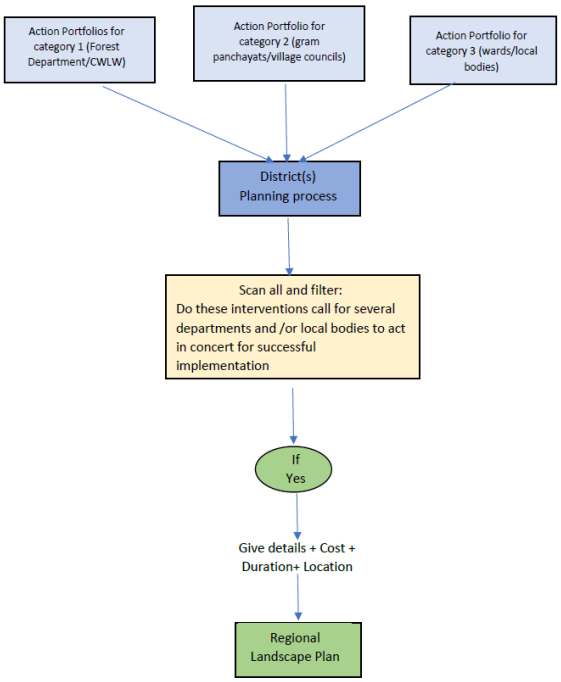


Figure 31: Regional landscape planning process (Conceptual)

The initial allocation needs to start at the district level for all proposed actions. However, some may necessitate extra allocation warranting a complementary funding strategy. The resource mobilization strategy needs to be aimed towards leveraging funding from multiple source, based on the identified action portfolio across three categories for each planning unit (gram panchayat/urban wards/PA) in a district or portions of more than one district within the envisaged greater landscape. An abstract of available financial outlay needs to be prepared for mapping of available sources of funding, and incorporated in the Annual Plan of Operations (APO), and conveyed to every planning unit.

Indicative list of funding sources

- State and Central Government Scheme/funds
- Central/State Finance Commission grants
- Member of Legislative Assembly (MLA)/Member of Parliament (MP) funds
- Local revenue (receipt through tax, cess for local use)
- Incidental receipts
- Special projects and donor grants
- Investments from public enterprises

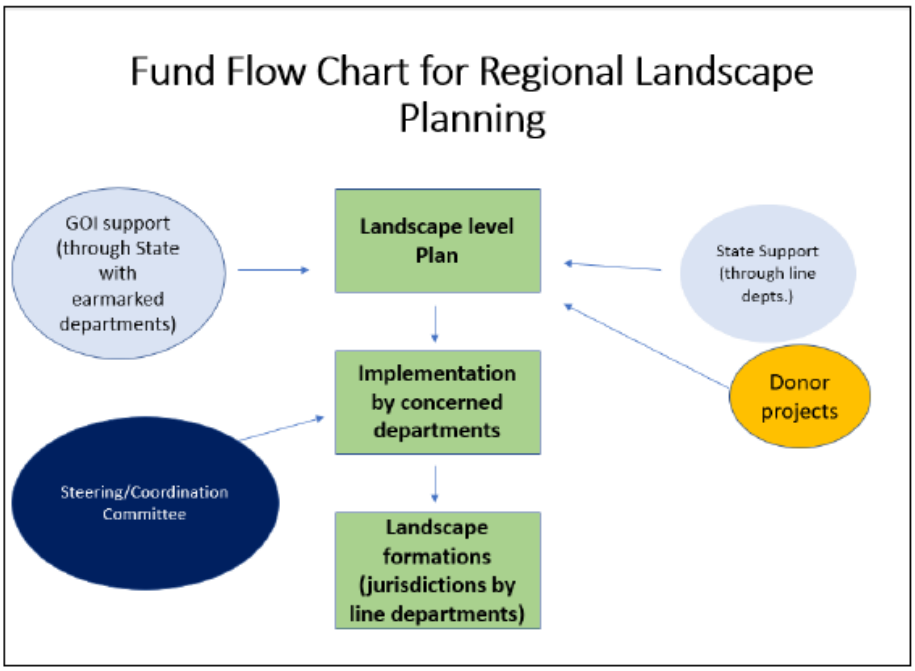


Figure 32: Fund flow for regional landscape planning

The cheetah reintroduction effort is ecologically significant and timely. With more than five decades of tiger experience, India is well poised in the context for managing the species as a surrogate, multidimensional indicator of biodiversity and human well-being through a landscape approach. Kuno PA, with an "exclusive" cheetah agenda will complement the "inclusive" co-occurrence agenda of the larger landscape, while addressing the source-sink dynamics of the cheetah.

12. Conclusion and way ahead

As prescribed in the action plan for the introduction of cheetah in India (Jhala et al. 2021), the project has achieved the targets in one year such as 50% survival of introduced cheetahs, home range establishment, birth of cubs. Additionally, contribution of revenue to the local communities and livelihood enhancement with direct benefits through engagement of cheetah trackers and indirect benefits by way of appreciation of land value in the surrounding areas of Kuno. Milestones worth mentioning are that this project is the world's first intercontinental translocation of a large carnivore and birth of cheetah cubs in the first six months. This translocation from southern Africa was carried out by air nonstop without casualties in a short span of time with almost no stress to the animals. The biggest boost to the project was birth of cheetah cubs in Indian soil after 75 years. The initial progress so far has been largely on a favorable trajectory well within the envisioned limitations and on the right path towards becoming a successful large carnivore conservation translocation and population establishment endeavour.

Cheetah as a species are constrained by space across their range, protected landscapes of India offer to extend the range of the cheetah and contribute to global efforts in conserving them. Additionally, cheetah introduction in India would greatly enhance local community livelihoods

through eco-tourism prospects. India could also assist the Government of Iran and the world conservation community with conservation efforts of the Iranian cheetah. The restoration of cheetah in India must be viewed not simply as an introduction of a species, however charismatic it may be, but as an endeavour to better manage and restore some of country's most valuable yet most neglected open natural ecosystems and the species dependent upon them.

All cheetah individuals released in the wild fared well and showed no aberrations in their natural behaviour. A few mortalities of cheetah occurred from bacterial infection, maggots, renal failure, injuries and heat. It is encouraging to observe that no unnatural deaths happened to any of the cheetah released in free ranging conditions despite they had traversed long distances in human dominated areas. As observed with cheetah reintroductions in Africa, such post-release mortalities are common in a project of this magnitude. Cheetahs transported from the African continent have to overcome multiple impediments like the difference in biological clock, terrain, climate and local availability of prey base before they are completely settled in a new landscape. Acting promptly on this front, all released cheetahs have been captured and currently under intensive monitoring within enclosures before their release being planned in winter.

With near completion of a year, Project Cheetah in India has been a great learning experience for the conservation practitioners of India, Namibia and South Africa; especially in terms of collaborative governance. Deliberations are underway for selecting and preparing other potential alternative sites for cheetah introduction in India. It cannot be overemphasized that challenges are formidable. However, with concerted efforts by the officials and managers of India, Namibia and South Africa and with support from the highest offices in all three countries, the project is in its assured path of recovery. With Government of India launching an International Big Cat Alliance aiming at securing the future conservation needs of seven endangered big cats across the globe, the Project Cheetah in India is likely to benefit immensely from such endeavour.

Kuno NP is the first site for the cheetah introduction with the required level of protection, prey and habitat. Once a cheetah population establishes itself within Kuno NP, dispersers would colonize the larger landscape and potentially accommodate more individuals. Simultaneously, restorative investments in other selected areas (Gandhi Sagar and Nauradehi Protected Areas) have commenced in the form of incentivized voluntary relocation of human settlements, prey supplementation, habitat management through weed removal, livestock grazing control and enclosure construction.

Once a successful reintroduction has been demonstrated and a metapopulation established at the above mentioned sites, cheetah could then be considered for release in suitable sites within other states. This would achieve the full potential of Project Cheetah in restoring the ecosystem services from these cheetah conservation landscapes, enhance local livelihoods and restore the lost natural heritage of India.

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Appendix 1

Cheetah Project Steering Committee-

1. Dr. Rajesh Gopal, Secretary General, Global Tiger Forum, New Delhi - Chairman
2. Shri R. N. Mehrotra, former Principal Chief Conservator of Forests & HoFF/CWLW, Rajasthan: Member
3. Shri P. R. Sinha, former Director, Wildlife Institute of India, Dehradun: Member
4. Dr. H. S. Negi, former APCCF Wildlife: Member NTCA
5. Dr. P. K. Malik, former Faculty at WII: Member NTCA
6. Shri G. S. Rawat, former Dean, Wildlife Institute of India/ Member WII Society, Dehradun: Member
7. Ms Mittal Patel Social Worker, Founder Vicharta Samuday Samarthan Manch (VSSM), Ahmedabad: Member
8. Principal Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden, Madhya Pradesh – Member
9. Prof. Qamar Qureshi, Scientist, Wildlife Institute of India, Dehradun – Member
10. Inspector General, NTCA, New Delhi: Member
11. Shri Subhoranjan Sen, APCCF- Wildlife: Member Convener

Cheetah Task Force-

1. Principal Secretary (Forests), Madhya Pradesh
2. Principal Secretary (Tourism), Madhya Pradesh
3. Principal Chief Conservator of Forests & Head of Forest Force, Madhya Pradesh
4. Principal Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden, Madhya Pradesh
5. Shri Alok Kumar, Retd. Principal Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden, Madhya Pradesh
6. Dr. Amit Mallick, Inspector General, NTCA, New Delhi
7. Dr. Vishnu Priya, Scientist, Wildlife Institute of India, Dehradun
8. Shri Abhilash Khandekar, Member MP SBWL, Bhopal
9. Shri Subhoranjan Sen, APCCF- Wildlife – Member Convener

Expert Committee Constituted by the Hon'ble Supreme Court-

1. Dr. M.K. Ranjitsinh (IAS Retd.), Former Director of Wildlife Preservation, India.
2. Dr. Dhananjai Mohan, Chief Conservator of Forests, Wildlife Admn. Protection & Intelligence, Nainital, Uttarakhand.
3. DIG (Wildlife), Ministry of Environment, Forest & Climate Change, Government of India, New Delhi.

INTRODUCTION OF
CHEETAH
IN INDIA

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सत्यमेव जयते

Nature Protects if She is Protected

National Tiger Conservation Authority

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

project cheetah