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Prey Base Analysis in Kuno National Park, Sheopur, Madhya Pradesh

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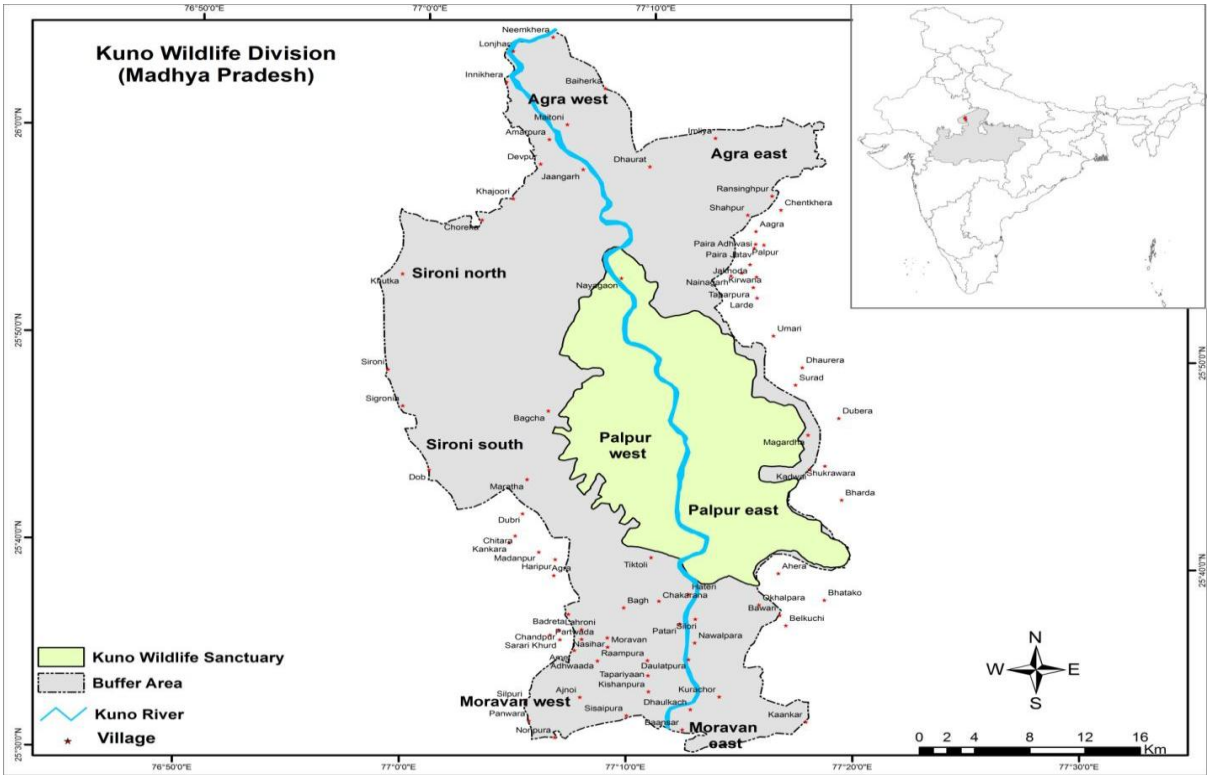
Abstract: ***Kuno National Park is spread over an area of 748.7618 km^2 and is situated in Sheopur district of Madhya Pradesh. The National Park is part of the Kuno National Park division which covers an area of 1235.39 km^2. Kuno River, one of the major tributaries of Chambal River flows through the entire length bisecting the National Park division. The division comprises of eight ranges, with Palpur west and Palpur east ranges forming the Sanctuary. The six ranges in the buffer area are Moravan east and west, Sironi north and south, Agara west and east The area is classified as Semi-arid zone (4b), Gujarat- Rajputana bio-geographic region (Rodgers et al. 2002).***

Keywords: Tributaries, Flows, Bisecting, Bio-geographic, Reserve

1. Introduction

Kuno park is legendary for tigers, Jackal, Chinkara and now this park getting to become unique because Asiatic lions can now be relocated from Gir to the Kuno park . There are large scale deaths within the population annually as a result of ever increasing competition due to animal overcrowding. Wildlife Institute of India and Wildlife Trust of India has shortlisted Palpur-Kuno park as habitats of Cheetahs and Asiatic lion. Cheetah, which once roamed much of northern plains of India, became extinct in 1948. Plans to reintroduce them from Iran are underway. Madhya Pradesh's Palpur-Kuno park may soon become a second home for Asiatic lions as majority members of a central team have favoured their translocation from Gujarat's Gir. The last wild population of the Asiatic lion is found within the Gir Forest region of the state of Gujarat. The only population faces the threats of epidemics, natural disasters and other anthropogenic factors. The project aims to determine a second independent population of Asiatic lions at the Kuno Park within the Indian state of Madhya Pradesh. The recent development has brought a ray of hope for the Madhya Pradesh government and wildlife lovers who are awaiting the shifting of the lions after a Supreme Court judgement in this regard in April 2013. Now Lions are getting relocated from Gir Park Gujarat. The Kuno has the potential to carry populations of all four of India's big cats the tiger, the leopard, the Asiatic lion and also cheetah, all four of which have coexisted within the same habitats historically before they were exhausted thanks to over hunting and habitat destruction. Kuno is currently home to tiger, Indian wolf, jackal, leopard, langur monkey, blue-bull, chinkara and spotted deer[10].

Wildlife: The herbivores found in this area are Axis axis (Chital), Rusa unicolor (Sambar), Boselaphus tragocamelus (Nilgai), Sus scrofa (Wild pig), Gazella bennetii (Chinkara), Tetracerus quadricornis (Chousingha or Four-horned antelope), Antilope cervicapra (Blackbuck), Semnopethicus dussumieri (Southern plains gray langur), Hystrix indica (Indian crested porcupine) and Lepus nigricollis (Indian hare). Carnivores include the Panthera pardus (Leopard), Ursus melursinus (Sloth bear), Hyaena hyaena (Striped hyaena), Canis lupus (Gray wolf), Canis aureus (Golden jackal), Vulpes bengalensis (Indian fox) and Mellivora capensis (Ratel). One male Panthera tigris (Tiger) which has migrated from Ranthambhore Tiger Reserve is seen moving in and around the Sanctuary since December 2010. Small carnivores such as the *Felis chaus* (Jungle cat), *Herpestes edwardsii* (Indian grey mongoose), *Herpestes smithii* (Ruddy mongoose) and *Herpestes javanicus* (Small Asian mongoose) are found here. *Gavialis gangeticus* (Gharial) is also sighted in Kuno River. To assess the prey base in Kuno National Park, Wildlife Institute of India (WII) and World Wildlife Fund for Nature (WWF) – India was requested to conduct a survey in June 2013 by the Madhya Pradesh Forest Department (MPFD).The survey was jointly carried out by WII, WWF and MPFD [11].



Temperature and Humidity
Temperature ranges between 38°C - 47.4°C and the minimum winter temperature through the months of November to February ranges between 0.6°C - 12.4°C .The average annual rainfall is 760mm.

2. Methods

Field based survey of wild prey species
Distance sampling on systematic line transect technique was used (Buckland et al. 2001) to estimate population density of prey. Mounted line transects distributed across Kuno National Park of length starting from 2-3 metric linear unit were sampled (Fig. 2). A complete of 24 line transects within the National Park were sampled. All the road transects were walked 3 times. On each walk, prey species (chital, sambar, nilgai, chinkara, blackbuck, wild pig, grey catarrhine, Indian hare, bird of Juno and savage cattle) discovered beside their cluster sizes was four recorded. Observation distance and observation angle to the prey was measured employing an optical device vary finder (Bushnell pro800) and hand-held compass (Suunto) severally. The whole sampling effort was 211.05 metric linear unit and 144 man-days.(Status of Prey in Kuno Wildlife Sanctuary Madhya Pradesh 2013)

Analysis
Using software DISTANCE 6.0 (Thomas et al. 2009), the density of prey species that embrace chital, sambar, nilgai, wild pig, chinkara, four-horned bovid, grey catarrhine, bird of Juno and savage oxen were calculable. DISTANCE allows the computation of detection likelihood for the sightings of prey species obtained throughout transect walks (Buckland 1985; Buckland et al. 1993; Karanth & Nichols 2002). This detection likelihood allows estimation of animal abundances by correcting for the biases in detection of animals.

Figure 2: Map of 24 transect lines sampled to estimate prey population density in Kuno National Park

3. Results

Prey density estimates
In Kuno National Park, chital is the most abundant prey with density estimate of 52.5/km^2 ±8.The density estimates of sambar, nilgai, wild pig and chinkara are 6.6 /km^2± 1, 3.5 /km^2± 1, 4.3 /km^2± 0.9 and 0.6 /km^2± 0.3 respectively (Table 1). During sampling blackbuck and hare were also sighted, but due to low sample size, density could not be estimated. The group encounter rate for blackbuck and hare are 0.005/km and 0.03/km respectively.

Table 1: Estimates of population density and biomass of prey species in Kuno National Park- 2014

Species	3/4 of Female Body Weight(kg)	Population Density/km^2 ±Standard Error	Biomass (kg/km^2)
Chital	30	52.5 ± 8	1575 ± 240
Sambar	120	6.6 ± 1	792.0 ± 120
Nilgai	120	3.5 ± 1	420.0 ± 120
Wild pig	27	4.3 ± 0.9	116.10 ± 24.3
Chinkara	12	0.6 ± 0.3	7.2 ± 3.6
Feral cattle	40	1.4 ± 0.7	56 ± 28
Total			2966.3 ± 535.9

Biomass estimate: Using 3/4 of the adult body female body weight and density estimates of prey species, the biomass in Kuno National Park for the year 2014 was estimated as 2966.3 kg /km^2 ± 535.9 (Table 1).

Discussion: - Since 2005, WII has been conducting population estimation in Kuno National Park and the data suggests an exponential increase in chital population (Table 2). The natural log transformed population density estimates when regressed against time provide an estimate of the realized rate of increase - r (Caughley, 1977). Chital population grew at a realized growth rate (r) =0.35 (Fig.3) and finite rate of population change (λ) =1.42, where $\lambda=e^r$.

Table 2: Chital Population in Kuno National Park since 2005

S. no	Year	Chital population density/km2± Standard Error
1	2005	4.63 ± 1.03 (Banerjee, K. 2005)
2	2006	5.3 ± 1.78 (Jhala & Qureshi, 2006. Unpub.)
3	2011	35.87 ± 11.7 (Jhala *et al.*, 2011)
4	2012	51.59 ± 8.84 (Jhala *et al.*, 2012)
5	2013	69.36 ± 10.51 (WII, 2013)
6	2014	52.5±8 (WII, 2014)

The observed r is exceptionally high suggesting a growth rate close to intrinsic growth rate (r_m). The intrinsic growth rate for chital population is 0.44 using the equation $r_m=1.5W^{-0.36}$ (Caughley and Krebs, 1983) where W is 3/4 of the adult body female body weight. The recovery of chital population could be attributed to the good management practices and protection measures implemented by the forest department in Kuno National Park.

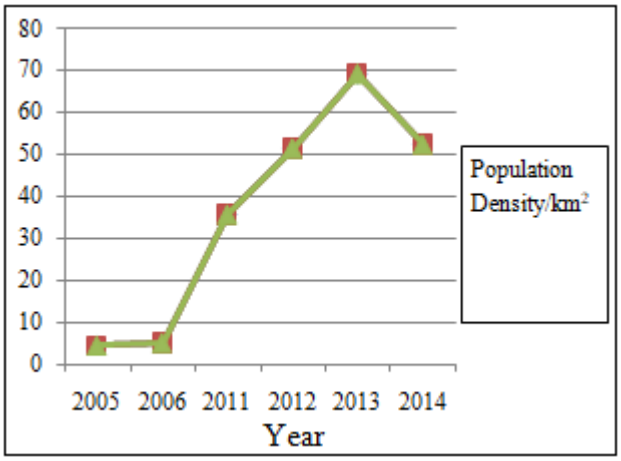


Figure 3: Chital Population in Kuno National Park since 2005

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