

# Survey for small cats in Sanjay Gandhi National Park, Mumbai



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## SUMMARY

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Sanjay Gandhi National Park (SGNP), a 104 km<sup>2</sup> Protected Area is popularly referred to as the lungs of Mumbai. Despite the several services the Park provides to the metropolis, among the prime being water provisioning and recreation, the threat it faces from the rapidly expanding city encroaching into its fringes is grave. Urban ecology and citizen/voluntary participation in science and conservation are rapidly gaining prominence across the globe. The “Mumbaikars for SGNP” is one such active initiative focussed on the Leopard *Panthera pardus*, which introduced a new paradigm in conservation research and management in India. The current project took an example from that initiative, but focussed on the smaller cats that reside within and around SGNP. The project executed from March 2017 to October 2019 aimed to generate baseline information on their distributions, habitat requirements and diet with the help of volunteers trained in various aspects of field and laboratory methods.

Through a series of training workshops in March and April 2017, 35 volunteers were trained in various aspects of field research on small cats and their habitats. The training included scat collection, gathering information on vegetation parameters, using GPS units and Android GPS applications, monitoring water bodies and streams, camera trapping and basics of mapping using the Q-GIS software. A few of them were later trained in diet analysis, molecular analysis of scat for assigning scat to predators and analysis of camera trap data. Volunteers met over weekends and walked trails within SGNP and in adjoining areas, collected scat samples in vials and sprayed them with alcohol following a prescribed method of noting GPS locations, canopy cover measurements and date, among other relevant information. Data was uploaded through the online application Epicollect, which can be viewed and downloaded by the Investigators. Normalized Difference Vegetation Index (NDVI) for estimating vegetation cover was generated using Sentinel 2A data. Two volunteers were trained in scat analysis who followed standard methods of teasing apart scat samples and examining various contents under a microscope for assigning to prey species. Diet data was bootstrapped through 6,000 simulations, using the program R to generate confidence intervals around means. Scat samples were assigned to carnivore species using standardised molecular techniques. Camera trapping was carried out from November 2018 to June 2019 with 25 heat sensory camera traps that were deployed in randomly picked grids within the Park and in adjoining areas during five sessions.

The PA showed moderately dense (50–60%) to dense (>60%) canopy cover in most of the areas, and only hill tops and rocky outcrops were represented by sparse canopy cover. A total of 126 scat samples were collected from within the Park as well as from the Dahisar quarry and Aarey Milk colony areas adjoining the Park. Of the 78 scat samples visually assigned to cats, 30 were assigned to felids using felid primers and were sequenced. Five of the sequences did not belong to any felid, and results

indicated that these were most similar to a species of mongoose. Twenty-four samples were assigned to Rusty-spotted Cat *Prionailurus rubiginosus* from BLAST results, and these were from Yeur and Tulsi Ranges and from the Dahisar quarry area. A comparison of diets revealed a higher presence of rodents in the diet of Rusty-spotted Cat (mean: 95.45% samples, 95% CI: 91–100%, n=22) as compared to other small carnivores (mean: 78.84% samples, 95% CI: 69–90%, n=52) and a lower presence of insects (Rusty-spotted Cat: mean = 13.63% samples, 95% CI: 0–27; other small carnivores: mean = 38.46% samples, 95% CI: 25–51.92%) and plant matter (Rusty-spotted Cat: mean = 9% samples, 95% CI: 0–18%; other small carnivores: mean = 40.38% samples, 95% CI: 26.92–53.85%). Rusty-spotted Cat scat samples also had remains of reptiles (mean: 9% of all samples, 95% CI: 0–18%) not found in the other samples.

Camera traps were placed in 39 locations for a total of 1,056 camera trap days. Twenty taxa were recorded including domestic species. Rusty-spotted Cat was photographed at just one location outside the National Park. Jungle Cat *Felis chaus* was also photographed at a single location in Yeur Range bordering Tulsi Range. Leopard was recorded at 17 locations in all ranges, Asian Palm Civet *Paradoxurus hermaphroditus* at 12 locations in Yeur and Tulsi Ranges, but not in the Krishnagiri Upvan Range. The Small-Indian Civet *Viverricula indica* was recorded at seven locations in Krishnagiri Upvan and Yeur Ranges. The Ruddy Mongoose *Herpestes smithii* was the most photographed carnivore in SGNP, recorded at 20 locations in Yeur and Tulsi Ranges.

Our project demonstrated that volunteer/citizen participation in field studies can generate important information but requires time, ample training and regular supervision. Camera trapping and molecular analysis of scat should be used in tandem to obtain reliable information on the presence of rare and elusive species such as small carnivores. Preliminary results of the first estimation of the diet of the Rusty-spotted Cat indicate that rodents form its chief prey, suggesting a role in pest control and hence regulatory services. Our results show that the fringes of the Park and areas outside and adjoining the Park such as Aarey Milk Colony, Film City and Dahisar Quarry harbour small carnivores. Since these areas are contiguous with the National Park, they should be protected as well.