Nepalese Journal of Zoology

ISSN: 2705-4403 (Print) & 2705-4411 (Online)
www.cdztu.edu.np/njz

Volume 8 | Issue 1 | June 2024

https://doi.org/10.3126/njz.v8i1.67115

Short communication

The fishing cat: New insights on distribution in the northern sector of Chitwan National Park, Nepal

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Suggested citation: Maharjan R., Mishra R. and Karki J.B. 2024. The fishing cat: New insights on distribution in the northern sector of Chitwan National Park, Nepal. Nepalese Journal of Zoology, 8(1):81–85.
https://doi.org/10.3126/njz.v8i1.67115

Article history:
Received: 16 February 2024
Revised: 20 May 2024
Accepted: 06 June 2024

Publisher's note: The statements, opinions and data contained in the publication are solely those of the individual author(s) and do not necessarily reflect those of the editorial board and the publisher of the NJZ.

Abstract

Fishing cat *Prionailurus viverrinus* (Bennett, 1833) is an elusive and medium-sized feline species with distinguished marking patterns on their head and body separating them from other feline species. Despite being distributed widely among diverse geographic locations, their abundance has declined due to significant habitat loss and human disturbances. There exists a substantial research gap regarding their abundance and distribution in Nepal. In this article, we presented the updated documentation of the fishing cat distribution in the northern sector of Chitwan National Park through our species-focused camera trapping survey. The study was carried out between April and May 2021 with a total of 130 camera trap nights. We obtained images of fishing cats from three camera trap sites, less than one kilometer of aerial distance from the human settlements, indicating that the species could also be extensively using human-dominated landscapes within and around the parts of CNP. Our research also found that fishing cats are residing close to the Rapti riverbed where seasonal shallow water holes are more common, allowing them to hunt their prey easily.

Keywords: Camera trap; Chitwan National Park; Fishing cat; Wetlands

1 | Introduction

In Nepal, there exists 13 recorded feline species ranging from large, Bengal tiger (*Panthera tigris tigirs*) to small, rusty-spotted cat (*Prionailurus rubiginosus*) (Lamichhane et al. 2023). Among them, the fishing cat *Prionailurus viverrinus* (Bennet, 1833) is an elusive and medium-sized feline species that has somewhat resemblance with other cat species but differentiates through its distinguished marking patterns in their head and body. This medium-sized feline species is pervasive in marshy lowlands and wetlands of most Southeast Asian nations including Nepal, India, Bangladesh, Pakistan, Sri Lanka, and Cambodia (Mukherjee et al. 2016).

Despite being distributed widely among diverse geographic locations, their abundance has declined substantially due to habitat loss and human disturbances. This makes them a perfect species to be listed in the vulnerable category of the IUCN Red List of threatened species (Mukherjee et al. 2016). In Nepal, the occurrence of fishing cat has been established in almost all the national parks and wildlife reserves of lowlands such as Chitwan National Park (CNP), Shukhlaphanta National Park, Bardiya National Park (Yadav et al. 2018), Koshi Tappu Wildlife Reserve (KTWR) (Mishra et al. 2021, 2022), and Parsa National Park (Paudel et al. 2019). Moreover, their presence has not only been limited to the national parks of Nepal but also has been documented outside the protected areas, where >65% of fishing cat potential habitats are located (Mishra et al. 2022). Research has demonstrated that wetlands are the prime habitats of fishing cats existence, but deterioration and encroachment have led to a serious decline in the wetland areas (Khadka et al. 2015, Mishra et al. 2018).

Although there has been progress in the research on fishing cats within the lowland region of Nepal, they are still one of the least studied feline species when compared to other species of the same family including Bengal tiger and snow leopard (*Panthera unica*) (Poudel et al. 2019). The detailed site-wise study is still lacking due to which there exists a substantial research gap regarding their actual abundance and distribution in their habitat range (Poudel et al. 2019). To keep things in perspective, few researchers have only been able to put forth the records of its status, distribution, and habitat patterns within the wetlands of CNP (Mishra et al. 2018; Mishra et al., 2022). Even though the research

Table 1. Details of camera trap sites along with its survey effort in the northern sector of Chitwan National Park.

Grid ID	Camera ID	GPS location		Date		Habitat type	Number of images captured
		Latitude	Longitude	Installed	Removal		
FC1	FC1A	27.55102	84.1824	25-Apr-21	5-May-21	Wetland, near Rheu river	954
	FC1B	27.55102	84.1824	25-Apr-21	5-May-21	Small Ghol, grassland with Kaas Jhadi	60
FC2	FC2A	27.55557	84.20566	27-Apr-21	7-May-21	Wetland (Nanda Bhauju taal)	426
	FC2B	27.55381	84.20299	27-Apr-21	7-May-21	Wetland (Nanda Bhauju taal)	159
	FC2C	27.55488	84.19907	27-Apr-21	7-May-21	Wetland (Nanda Bhauju taal)	4422
FC3	FC3A	27.54834	84.22271	28-Apr-21	8-May-21	Near Rapti river, riverbed	257
	FC3B	27.54774	84.22289	28-Apr-21	8-May-21	Near Rapti river, riverbed	4422
FC4	FC4A	27.56327	84.21109	25-Apr-21	5-May-21	Near Rapti river, riverbed	105
	FC4B	27.56158	84.22329	28-Apr-21	8-May-21	Near Rapti river, riverbed	879
FC5	FC5A	27.55394	84.23733	26-Apr-21	6-May-21	Wetland (Jamuna Ghat)	-
	FC5B	27.55354	84.23541	26-Apr-21	6-May-21	Wetland (Jamuna Ghat)	3415
FC8	FC8A	27.54199	84.19791	28-Apr-21	8-May-21	Riverine forest	875
	FC8B	27.54199	84.19791	28-Apr-21	8-May-21	Riverine forest	107

conveys records of the fishing cats, this information is collected as an anecdotal record to the surveys carried out within the protected areas specific to other larger felid species (Poudel et al. 2019). Also, the identification of fishing cats through sign surveys (scat, pugmark, and scratch) is still debatable which in turn can impair our judgment when it comes down to the identification of this species with other similar feline species. So, the use of a camera trap with in-built motion detection is one of the rational means to get verifiable records of these elusive species (Lama et al. 2019). Thus, in this article we provide updated information on the fishing cats distribution in the northern sector of CNP.

2 | Materials and methods

This study was conducted in the northern wetlands of CNP which is close to a major river (Rapti) that separates the core CNP with its buffer zone. For management purposes, the CNP

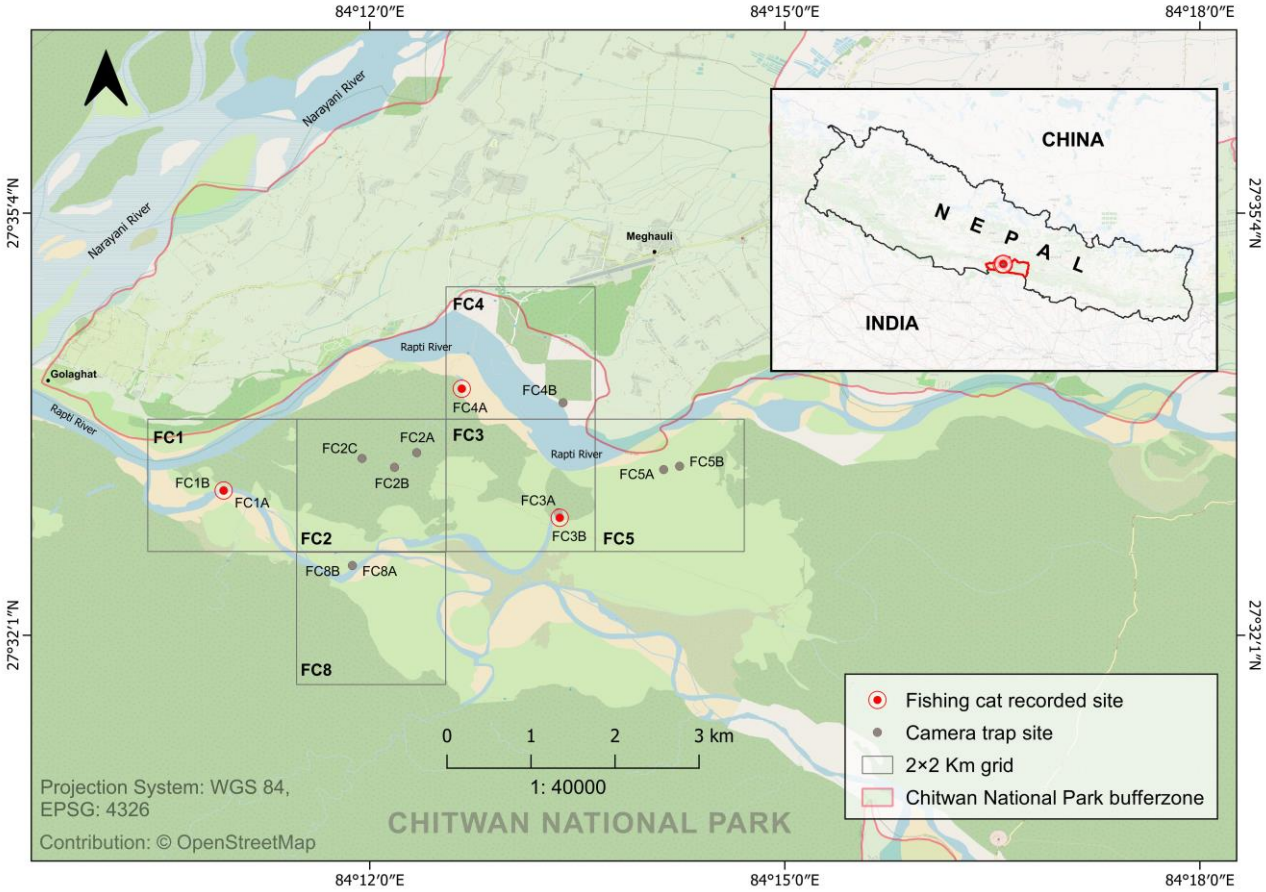

Figure 1. Map illustrating the camera trap sites, and fishing cat recorded sites in the northern sector of Chitwan National Park in 2021.

is divided into four administrative sectors: Northern (Kasara), Southern (Madi), Eastern (Sauraha), and Western (Amaltari). The study was primarily focused on the Northern (Kasara) sector of CNP due to the presence of shallow lakes and small water bodies which makes it an ideal habitat for fishing cat research.

were close to the Rapti River and had small stagnant water holes formed from the seepage of the river. The majority of these fishing cat detections were from camera trap stations located in grassland formed in an alluvial floodplain (FC1B, FC4A). All these locations occur between 0.6–0.8 km aerial distance from the human-dominated buffer zone area.

Table 2. Details of fishing cat recorded events in the northern sector of Chitwan National Park.

S.N.	Location	Coordinates		Date	Time	Habitat type
		Latitude	Longitude			
1	FC1B	27.55102	84.1824	5/2/2021	1:25	Grassland/Riverbed
2	FC3B	27.54774	84.22289	5/4/2021	11:47	Riverbed
3	FC4A	27.56327	84.21109	4/25/2021	23:36	Grassland/Riverbed

The study was carried out by deploying camera traps in 2×2 km^2 grid cells based on preliminary sign surveys and informal interviews with park authorities, local fishermen, and wildlife technicians. Since our objective was just to record the presence of fishing cats in those study sites, we used a varied number of single cameras in each grid cell rather than in a pair (Fig. 1, Table 1). This was done to optimize our survey area with the limited number of cameras we had for our use. The camera trap survey was conducted in the year 2021 between the months of April and May in six of those grid cells. A total of 13 camera traps were installed in six grid cells with a minimum of two cameras in each cell. All our camera traps were active on site for 24 hours for 10 days with a revisit period of every three consecutive days. It was done to ensure that camera traps were working in perfect condition as we had our camera traps placed close to the shallow water bodies which could get inundated by rivers after heavy rainfall.

3 | Results

With the 130 camera traps night effort, we captured 16,081 images. We obtained images of fishing cats from three camera trap locations (Fig. 2, Table 2). All three locations

Figure 2. Fishing cat images: A) captured in grid ID:FC1 through FC1B camera at a shallow water hole near Rheu River, B) captured in grid ID: FC3 through FC3B camera at a shallow water hole near Rapti River, and C) captured in grid ID: FC4 through FC4A at a shallow water hole near riverbed of Rapti River.

4 | Discussion

In this study, we updated the documentation of the fishing cat distribution in the northern sector of CNP through our species-focused camera trapping survey. Unlike previous documentation of fishing cat distribution in CNP, which were only based on opportunistic data collected from national tiger survey (Timilsina et al. 2021), we gathered and presented the most recent data from fishing cats research carried out after Mishra (2013). Moreover, this study plays a crucial role in filling the information gap regarding their distribution for potential habitat studies.

All our fishing cat records (n=3) were documented from wetland sites in Rapti Riverbed, whose proximity is close to the nearby human settlements, indicating that fishing cats could also be extensively using human-dominated landscapes within and around the parts of CNP.

Although the presence of fishing cats in buffer zones or human settlements near CNP has not been documented in the existing literature, there have been reported instances of these small felids preying on poultry and livestock in the buffer zone areas of Meghauli (Bir Bahadur Kumal Pers. Comm., March 25, 2021). Residents, however, may lack familiarity with the specific identification of small cat species, leading to potential confusion between fishing cats and other small cat species that visit their communities. Also, the proximity fishing cats observed in our study were extremely close to the human settlements (less than 1 km), which raises suspicions about the movement of these cats in its vicinity.

Furthermore, a recent radio-collaring study conducted by Mishra et al. (2024) in Koshi Tappu in eastern Nepal revealed that adult male fishing cats have an average home range (95% AKDE) of 58.03 km^2, while female fishing cats cover approximately 21.72 km^2. These home ranges encompass both protected areas and human-dominated communities. Therefore, it is plausible that fishing cats in our study sites could also have been inhabiting areas both inside and outside the park boundaries.

Furthermore, our study found that the species frequently visits seasonal water holes, formed from the rise in rivers during the monsoon season and dry in the winter season, trapping the fishes in it. This makes it easier for the species to catch larger fish with less effort. Similar behavior was also recorded by Yadav et al. (2020) in their study of fishing cats in Shukhlaphanta National Park where they had

photographic evidence of the species wandering near shallow waterholes. However, alteration of habitat and rapid drying of wetland areas are severely causing negative impacts on the distribution and abundance of the species (Mishra et al. 2018). Khadka et al. (2015) have also described the situation of such wetland areas being lost and having been converted into grassland at present.

Climate change impact and human disturbances in the wetlands are somehow inevitable, however, there are measures that can be devised to control it. It can be done by strengthening and promoting the local communities to take part actively in the habitat conservation of the fishing cat species. Wetland restoration, pollution, and uncontrolled fishing should be of primary concern in retarding the habitat loss of fishing cats. Targeted research on the fishing cat should be initiated primarily in fishing cat recorded sites to verify if these species are residents to that habitat or just transiting through it (Paudel et al. 2019). Also, focusing more on education and raising awareness about the importance of fishing cats can be a great way to inform villagers, who perceive fishing cats as a threat to their livestock, about their status and significance in the natural ecosystem.

5 | Conclusions

Our research found out that fishing cats are residing close to the riverbed of Rapti River where seasonal water holes are more common. They are drawn more towards shallow water holes with large fishes making them easier to hunt. All the fishing cat presence locations were close to the riverbed of Rapti River, which separates buffer zone areas from the core part of CNP, so it can be attributed that the species might also be using human-dominated landscape more actively within and around CNP.

Acknowledgements

We would like to thank the Rufford Foundation for providing us with the funding for the research work (R.M.) and the Department of National Park and Wildlife Conservation and CNP for giving us permission to carry out field surveys. We are also thankful to Nepal Tiger Trust, Idea Wild, and the National Trust for Nature Conservation for providing us with technical and research equipment support. Moreover, we are grateful to Terai Fishing Cat Project and Kathmandu Forestry College for academic support.

Authors' contributions

R.M.*, R.M. and J.B.K. conceptualized the study. R.M.* conducted the field survey, analyzed data and prepared the first manuscript draft. All authors reviewed and gave their inputs and approved the final manuscript.

Funding information

This work was funded by the Rufford Foundation, UK (Grant Number RSG-34117-1).

Conflicts of interest

The authors declare no conflict of interest.

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