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Original contributions and short notes about wild cats are welcome
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Collaborative research and conservation reveal a larger tiger population in Nepal

Through a collaborative approach and sharing of data, new Bengal tiger individuals were detected in the Terai Arc Landscape of Nepal in Bardia and Chitwan National Park's community buffer zones. The Living with Tigers Project conducted camera trapping research in 2017–2018, finding nine new individuals in total. In Bardia, five new individuals were detected, one male, three females and one of unknown sex. In Chitwan, we detected four new individuals, one male and three females. These new individuals were discovered from surveying the community buffer zone habitats. The findings have implications for human-wildlife conflict, as both the tiger and human population continues to increase in the Terai, and with local people depend heavily on forest resources resulting in frequent incidents of conflict. Our findings highlight the pressing need to survey areas outside protected areas and develop and implement strategies promoting coexistence.

Globally, the tiger *Panthera tigris* remains in decline with populations in some countries on the verge of extinction (Goodrich et al. 2015). As part of the Global Tiger Recovery Programme, all thirteen tiger range countries were working towards doubling their tiger population by 2022 (GTRP 2012). Nepal is the one of the few countries that achieved this target, which has increased by 94.2%, from 121 individuals in 2009 to 235 in the latest survey of 2018 (DNPWC & DSFC 2018). With increasing tiger population in Nepal, human-tiger conflict is also rising. The 'Living with Tigers' project LWT, funded by the Darwin Initiative, aimed to reduce human-felid conflicts and alleviate poverty in two national park community buffer zones, Bardia and Chitwan, located in lowland Nepal within the Terai Arc Landscape that borders India. This collaborative project involved Chester Zoo, University of Oxford's Wildlife Conservation Research Unit WildCRU, the Department of National Parks and Wildlife Conservation DNPWC of the Nepalese Government, National Trust for Nature Conservation NTNC, Nepal Tiger Trust NTT, Green Governance Nepal GGN and eight communities across both parks. DNPWC, NTNC and other conservation partners in Nepal conduct the national tiger survey every four to five years through camera trapping in all national parks, and corridor forests in the Terai Arc Landscape, where majority of the tigers are known to occur in Nepal (baring a recent discovery of tigers in Eastern Nepal, at a record altitude of 3,165 m; Kathmandu Post 2020). The LWT project focused on surveying areas outside the national park in the community buffer zones, as well as the national park areas close to communities that suffer from human-felid conflicts, to understand big cat movements, human-felid co-occurrence and risk of encounters and conflict with big cats. In this article we report the tigers recorded during the survey of LWT project, especially in the community areas.

Methods

To investigate biodiversity and risk of wildlife encounters that could lead to conflict, we conducted paired camera trapping using Cudeback Models RedGlow 1279 and Attack IR 1156 cameras every 2 km^2 grids for 15–25 days in two research blocks in each national park in 2017 and 2018. Research blocks consisted of grids inside the national park and the community buffer zones, 196 km^2 (98 grids; February–April) and 212 km^2 (106 grids) (October–December) for Bardia and Chitwan respectively. Camera trap data was saved at the camera station level, and using DigiKam (V.7.0), tags were added to the metadata. This metadata was then extracted in R using the R package CamTrapR (V.2.0.3; Niedballa et al. 2020). All images of tigers were assessed and identified as individuals using their stripe markings by eye. Three independent researchers agreed on the final individual identification of each tiger. All tiger individuals were then compared to the tiger photographs from national tiger survey.

Results

The LWT project collected data from 204 camera trap locations, with a total of 11,220 camera trap nights accumulated, yielding 22,149 detections of 36 mammals (total excludes humans and livestock). This research detected 53 and 44 tiger individuals in Bardia and Chitwan, respectively, whereas 77 and 85 known tiger individuals (Mt+1) to occur in BNP and CNP, respectively, based on the national survey conducted during January-February 2018 (DNPWC & DFSC 2018). By comparing

Fig. 1. Some examples of the new individual tigers detected in Bardia during the LWT project (Photo A. Fitzmaurice/Living with Tigers Project).

Fig. 2. Some examples of the new individual tigers detected in Chitwan during the LWT project (Photo A. Fitzmaurice/Living with Tigers Project).

the stripe patterns of tigers detected during the LWT project to tigers of Nepal's national tiger survey, nine new individuals were identified. In Bardia, we detected five new individuals, one male, three females and one of unknown sex (Fig. 1 and SOM F1). In Chitwan, we detected four new individuals, one male and three females (Fig. 2 and SOM F2). These totals only include adult and sub-adult tigers, not cubs. LWT project also recorded cubs (n=6) in both national parks, important signs of breeding.

Discussion & Conclusion

Through a collaborative approach and comparing the tiger photographs, new tiger individuals were detected. This is positive news for this endangered species. The population estimate is likely to change as the 2022 tiger survey results are published. Our research indicates a larger tiger population in Nepal, especially in community buffer zones. Both the parks surveyed by LWT are part of the Terai Arc Landscape and have transboundary connectivity. The transboundary movement of animals including tigers occur frequently supporting tiger recovery (Chanchani et al. 2014, Thapa et al. 2017). Tiger surveys are also conducted in a coordinated way between Nepal and India to ensure that tiger individuals are not double counted. Therefore, to our knowledge, these new tiger individuals not previously known to the tiger survey database are in fact new individuals and not vagrant individuals from India. Our findings highlight the importance of collaborative conservation and sharing data for endangered species management. The findings also have implications for human-wildlife conflict. Both the tiger and human population continues to increase in the Terai (MFSC 2015) and local people depend heavily on forest resources resulting in frequent incidents of conflict, which will likely increase in the future (Fitzmaurice et al. 2021). This highlights the pressing need to monitor tigers in community buffer zone and outside protected areas, while empowering local communities to develop and implement strategies promoting coexistence.

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Supporting Online Material SOM 1 & 2 are available at www.catsg.org

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