

## A Long-Term Age-Specific Survival Analysis of Reintroduced Tiger (*Panthera tigris tigris*) in Panna Tiger Reserve, Central India

Tiger populations have declined worldwide due to poaching, prey depletion, habitat loss and other anthropogenic interferences. Panna Tiger Reserve (PTR) is the north-easternmost typically isolated source population in Central Indian landscape. Such populations are likely to have undesirable demographic parameters and most vulnerable to extinction due to demographic or environmental stochasticity. However, PTR lost its native population due to high degree of poaching activities. We have studied the population dynamics of tigers in PTR since the reintroduction took place in 2009. Capture-recapture (CR) models have become a popular tool in population ecology for estimating demographic parameters; using combination of techniques and tools including radio-telemetry, camera trap and direct observations, we used data of 82 individuals from 2009 to 2021 in maximum likelihood-based Cormack-Jolly-Seber (CJS) to investigate the survival rate of the overall population. Mortality trajectory analysis provides the opportunity to understand age-specific impact in species' life history. We used Bayesian survival trajectory analysis (BaSTA) to analyze age-specific CR based survival analysis. We obtained the grid-based camera trap data to understand the change in tiger density pattern in closed population framework under spatially explicit capture-recapture (SECR) from 2015-2020. The survival rate of the population was 86% (SE 0.04); it was higher for females (89%, SE 0.24) than the males (83%, SE 0.03). Moreover, time had no significant impact on the change of survival rate of the population. We observed non-constant mortality trajectories for both the sexes and U-shaped hazard curve indicated higher risk of death in younger and older individuals. The survival probability of the male tigers from 0-4 years of age varied from 55%-100%, while for females 75%-100%; that reduced to 20%-55% for males and 35%-75% for females for the age class of 4-10 years. At the age of 16; trajectory decreased up to 5% for males and 20% for females. Density of the tigers have raised from  $3.18 \pm 0.7$  to  $6.05 \pm 0.9/100\text{Km}^2$  from 2015-2020. Low cubs' mortality and high survival rate helped to recover the reintroduced population. Prioritization of conservation efforts for such source population can be proposed as a strategy for recovering the tiger population.