V. SUMMARY

The present study is on the population dynamics of the endangered Asian elephant (*Elephas maximus*) across three populations in southern India, Viz., Nagarahole National Park, Mudumalai Wildlife Sanctuary, and Periyar Tiger Reserve, with different levels of ivory poaching pressures. Data on age-sex structure through visual observation and photography method were collected for a period of three years in these study areas. The age structures of elephants were constructed and it was found that percentages of adult females were high in all three study sites. The adult segments constituted 43.2% in Nagarahole, 43.7% in Mudumalai, and 48.4% in Periyar. The proportion of adult males in Nagarahole was stable across the study period from 7% in 2001 to 6.8% in 2003, that in Mudumalai more or less similar across the study period from 1.3% in 2001 to 1.7% in 2003, and that in Periyar increased slightly from 0.6% in 2001 to 1.3% in 2003. This increase was due to the sighting of single additional male and possibly does not represent a significant increase in adult males as the number of males in Periyar is very low and an increase or decrease of a single male can alter the overall the adult male population dramatically.

The adult sex ratio (number of males to females) in Nagarahole, which has a low level of poaching pressure, was 1:5.8 that in Mudumalai with medium poaching pressure was 1:27.7, and that in Periyar with high poaching pressure in the past was 1:79.6. The mean calving interval, determined from three years of birth data (mean ± 95%CI), was found to be 5.1 (± 0.72) years.
in Nagarahole, 5.3 (± 0.43) years in Mudumalai, and 6.9 (± 0.65) years in Periyar. The fecundity rate was 0.20 births per mature female per year in Nagarahole, 0.19 in Mudumalai, and 0.15 in Periyar.

Based on the Leslie matrix model, the average growth rates (over a period of 25 years of simulation) observed were 0.67% per year for Nagarahole that shows an intercalving interval of 5.1 years, 0.41% per year for Mudumalai that shows an intercalving interval of 5.3 years, and -0.29% per year for Periyar that shows an intercalving interval of 6.9 years. The models showed indicated that the annual population growth rates are initially 1.3% at Nagarahole, 1.6% at Mudumalai and 1.2% at Periyar, will drop by about 0.5 – 1% within ten years. This could be a consequence of the female segment of the populations. The models showed the while population growth rates would stabilize at Mudumalai and Nagarahole beyond a decade, they will continue to drop at Periyar, eventually becoming negative. In spite of a high skewed sex ratio and a lowered birth rate, the population is either growing very slowly or stable in the short to medium term in Periyar.

To conclude the present study the ivory poaching has skewed the sex ratios both at Mudumalai (1:27.7) and Periyar (1:79.6), and marginally at Nagarahole. High birth rates have been maintained at Nagarahole and Mudumalai, but Periyar has showed a decrease, possibly as the result of too few adult males available for mating. The fecundity rate in Periyar also showed high variance, which may result in unstable age structure and dynamics of the population.
Based on the finding of this study, it is recommended (i) Strengthening of antipoaching measures within PAs and extending similar measures in areas outside PAs are essential for the long term survival of elephant population in these areas. Because elephants are wide ranging species. (ii) Establishing connectivity to or translocating adult males from the Anamalai population may help in reducing the skew in sex ratio in Periyar because both the populations are genetically similar based on genetic study of Asian elephants. (iii) The population structure in these study areas should be monitored on a regular basis to understand the long term dynamics of the population, particularly the possible changes in the ratio of tuskers: makhnas and the growth rate of the population, to assess the impacts of ivory poaching on natural selection of makhnas.