

Comparative Study of Wild Elephant Social Behavior in Sri Lanka

Final Report

PIs: Dr. Shermin de Silva, Trustee EFECT & Director, Udawalawe Elephant Research Project (Sri Lanka) ;
(shermin@elephantresearch.net) ; tel: +1.925.639.1585

Dr. Nilmini Jayasena, Faculty of Veterinary Medicine and Animal Science, Peradeniya University
(nilminijayasena@gmail.com)

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Summary

The Uda Walawe Elephant Research Project studies the behavior and ecology of wild Asian elephants in Sri Lanka, with its primary field site based in Udawalawe National Park and a secondary site at Minneriya National Park. The aim of this program period was to continue with basic long term monitoring of elephants at Udawalawe National Park and to conduct a short-term study of elephants in Minneriya National Park as a comparative population. We are interested in the population dynamics and social behavior of elephants in both populations. Our work in Udawalawe builds on work from the previous 9 years. In Minneriya we were largely engaged with individual identification, to serve as the basis further study in the future.

For Udawalawe we report that the preceding year was fairly average in terms of births. We also recorded multiple deaths. We have been able to use population variables measured over previous years to construct predictive models which show how sensitive elephants are to small changes in female survival and birth rates. We also show seasonal difference in space use for males and females. We also report on some interesting, if anecdotal, behavioral observations concerning a bull who is infamous for begging along the fence line and maternal behavior in a young female who was an orphan previously released from the Elephant Transit Home. At Minneriya National Park we shifted our visit to one month earlier than the previous year and observed that although some individuals were observed again, many individuals had not previously been identified. Garbage from local communities and massive visitation rates from tourists remain a perennial issue. To combat this we are translating poster, to be distributed throughout local schools. We intend to follow up with further studies of the garbage problem in particular.

Overall objectives

Our eventual aims are to compare the behavior and demography of elephants in the two populations occupying Udawalawe National Park (UWNP) and Minneriya National Park (MNP) respectively, both of which are popular tourist destinations and likely host a combined total of more than 2000 elephants. The study at Udawalawe builds on research ongoing over almost ten years whereas the elephants in Minneriya had never formally been studied prior to our work in 2014. The conservation needs being addressed are that Asian elephants are poorly studied in the wild thus basic data on population numbers, behavior and demographic dynamics throughout Asia are lacking.

Specific objectives

Our aims during this period were 1) continue long-term monitoring of the elephant population in Udawalawe National Park, 2) to conduct a follow up investigation of Minneriya National Park to continue with our individual-identification catalogue similar to what we have established in Udawalawe as a basis for future demographic and behavioral studies and 3) to conduct a workshop for personnel of the Department of Wildlife Conservation, with consultation from them on topics relevant to scientific management of elephants. We expended 135 field days in UWNP (mornings and/or afternoons) and 21 field days in MNP (afternoons), with the remaining workdays spent on photo cataloguing, data entry, and processing as well as logistical activities such as vehicle repair and maintenance, trips to Colombo to the Department of Wildlife Conservation etc. This breaks down into approximately 60 % of week days per year in the field and >35 % of time in office or other supporting activities and <5% on staff time off.

Activities

1. Monitoring at Uda Walawe

We continued observations at UWNP as in previous years, following individually recognized animals, recording their positions and demographic condition as well as any mortalities witnessed.

Findings and conservation outcomes

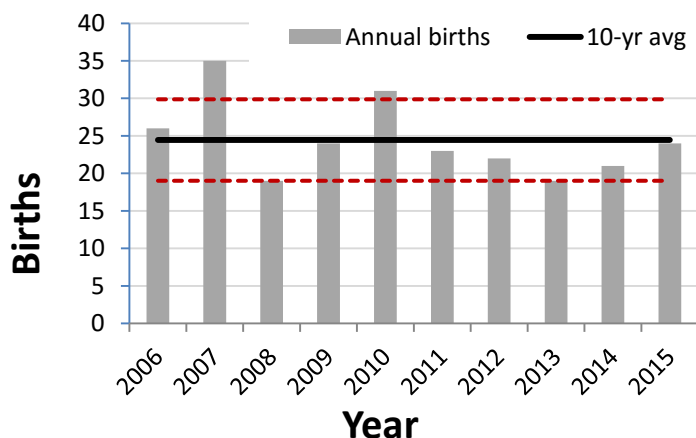


Figure 1 - 28 Births were observed during this reporting period (24 in 2015). 2015 was an average year based on ten years of records. Dashed lines indicate one standard deviation. Despite 2015 being a very wet El Nino year, we do not observe more births. This may be because conceptions would have had to occur two years earlier.

Of the known calves born in 2015, three died (see below for one story). Seven other mortality events were documented in and around UWNP. Five of these were males 20 years or older and all except one were due to gunshots. The fifth was ruled to be infected with liver flukes. One death was a juvenile or sub-adult female who reportedly had a belt (i.e. collar) around her neck for study purposes, the circumstances of death are unclear. The last death was of a juvenile or sub-adult of unknown sex.

Demographic data are useful for modeling population dynamics. I am currently using these data to predict how elephant populations could do in the future and understand the degree of extinction risk for elephant populations throughout Asia. As an example below are predictions based on data from the period 2006-2012. Here we see that elephant populations are extremely sensitive to interbirth-intervals, or the average time between consecutive calves a female has. Increasing the IBI from 5.5 years to 5.9 years (a difference of only 4 ½ months) can completely change a population's trajectory. In Uda Walawe this is 6 years or more for 50% of the known females. We see that, unsurprisingly, the slower the reproductive rate and the smaller the population the more likely it is to go extinct.

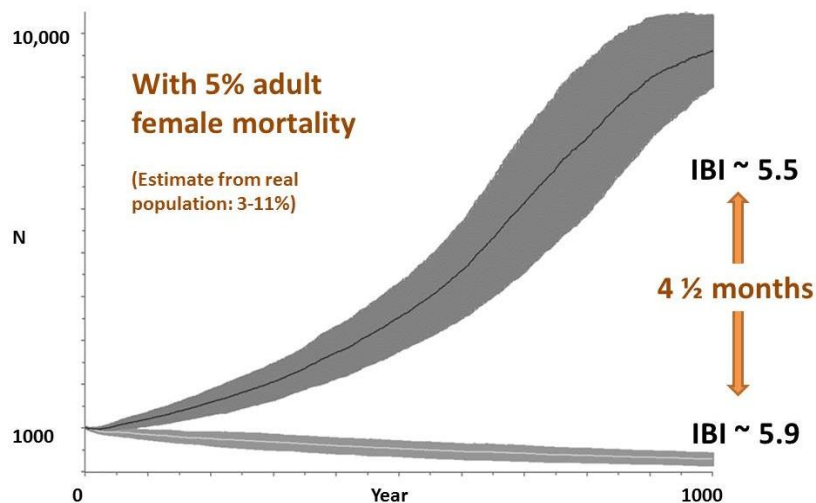


Figure 2 – Sensitivity of elephant population to small changes in birth rates.

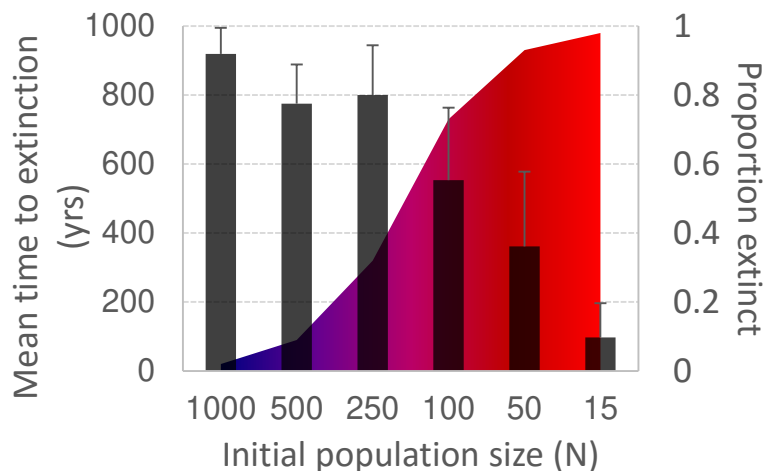


Figure 3 – Dependence of extinction risk on population size.

While the conclusions may seem obvious, these figures provide concrete boundaries within which to make management decisions. For instance even large populations, such as Uda Walawe's which number upwards of 1000 individuals, may be in decline if reproductive rates and mortality rates (currently not well known) are as modelled. The Uda Walawe population is in fact poised on a threshold where it could be either increasing or decreasing, within the window of uncertainty in our estimates. It would be preferable to have data on age-specific mortality rates, however mortality is extremely difficult to observe directly. We can infer death from the disappearance of frequently seen and well-known adults, or nursing calves. It is not possible to distinguish death from dispersal for individuals of other age/sex classes. These findings will be used to motivate the Department of Wildlife Conservation to share their mortality data so that our assessments can better reflect reality and allow authorities to plan accordingly, e.g. by taking measures to enhance survival and reproduction if it is found that the population is in decline. We can use similar models to anticipate how elephant populations may respond to scenarios of climate-driven land cover change and use



Figure 4

A. Rambo at his customary spot along the reservoir, awaiting hand outs.

these to develop guidelines for landscape management in range countries.

Some interesting behavioral observations were made last year.

First, Rambo is an adult male who is (in)famous for begging along the electric fence line and receiving food from tourists, and was probably one of the first individuals in the park to do so. He has never caused any

problems for people as far as we are aware, aside from an accidental injury to a tourist in 2013 when she attempted to cross the fence. This individual is perceived as a nuisance and possibly non-reproductive by wildlife



B. Rambo inside the park alongside females during his musth period, 2015.



C. Rambo testing out a female during his musth period in 2016.

managers. There is a possibility that he may be removed to a bull detention facility. The conservation value of this observation is that it shows him to be reproductive. While the removal of a few reproductive bulls is likely to be inconsequential, Rambo's charismatic, calm temperament and therefore benign genetic make-up is valuable in an elephant population prone to HEC (human-elephant-conflict), and could potentially be used to argue non-intervention.



Figure 5

A. [208] with her newborn calf in June 2015.

B. [208]'s calf is in very poor condition by three months of age.

Another interesting observation is that a female calf known as Sandamali, which was among one of the early cohorts of calves released by the Elephant Transit Home program, was seen accommodating the calf of a wild adult female, identified as [208]. We had observed that Sandamali and [208] were associated in 2005, 2006 during the early days of our study but they had not been associated for a long time, especially as Sandamali had her own first calf in 2008. However [208]'s calf, born in June 2015, was thin and malnourished and was seen attempting to nurse from Sandamali in the presence of [208]. Sandamali tolerated this and [208], if not encouraging it, seemed attentive to the fact. Sandamali was very permissive, owing to her own temperament. Because the calf was doing so poorly the ETH veterinarian Dr. Vijitha Perera decided to take custody



Figure 5 - Sandamali with [208]’s calf.

of it in September 2015 however it died shortly thereafter. This observation reveals that bonds among females, including those reared partially in captivity by the ETH program, can maintain social bonds even with intermittent levels of association to the extent that one individual nurses the calf of another, unrelated female. While purely anecdotal, these observations provide some surprising insight into the depth of social relations possible in this population. It also provides an encouraging follow up of the work of the ETH itself with their rehabilitated and released orphans, despite the regrettable death of [208]’s calf.

We next briefly illustrate spatial patterns in observations at Udawalawe for males and

females. Udawalawe has two monsoon periods, in April-May and October-December. There is generally no shortage of water and green vegetation during the short inter-monsoon in January-February whereas the longer inter-monsoon constitutes the dry season proper, when water is in short supply. Accordingly observe that both males and females tend to approach closer to the open areas near the main Udawalawe reservoir during the second inter-monsoon but not the first. Males are also more likely to be out in the open than female and calf groups (Figure 6). The difference between times of year is more striking than any difference between sexes.

A final observation of management relevance is the use of electric fences for containing elephants. UWNP has had electric fencing for many years and since 2012 managers had implemented a double-line of fencing to prevent roadside begging by individuals such as Rambo. This measure did appear to be working, evidenced by the regeneration of tall grass and teak trees within the double-fence boundary. However, periodic breaks in the fence line bordering the road and sugar cane plantation south of the park did occur, especially since the translocation of a crop-raiding tusker from elsewhere. This year, elephants have also broken into the protected zone surrounding the park museum and ticket counter at the entrance, demonstrating that as suspected, electric fences are costly mitigation technique with low long-term viability given the ability of elephants to habituate and find ways to work around them. We hope to consolidate our observations of fence breaches, witnessed by the field team and also gathered from the surrounding community which informs us, to create a timeline of the efficacy of fencing from its initial creation.

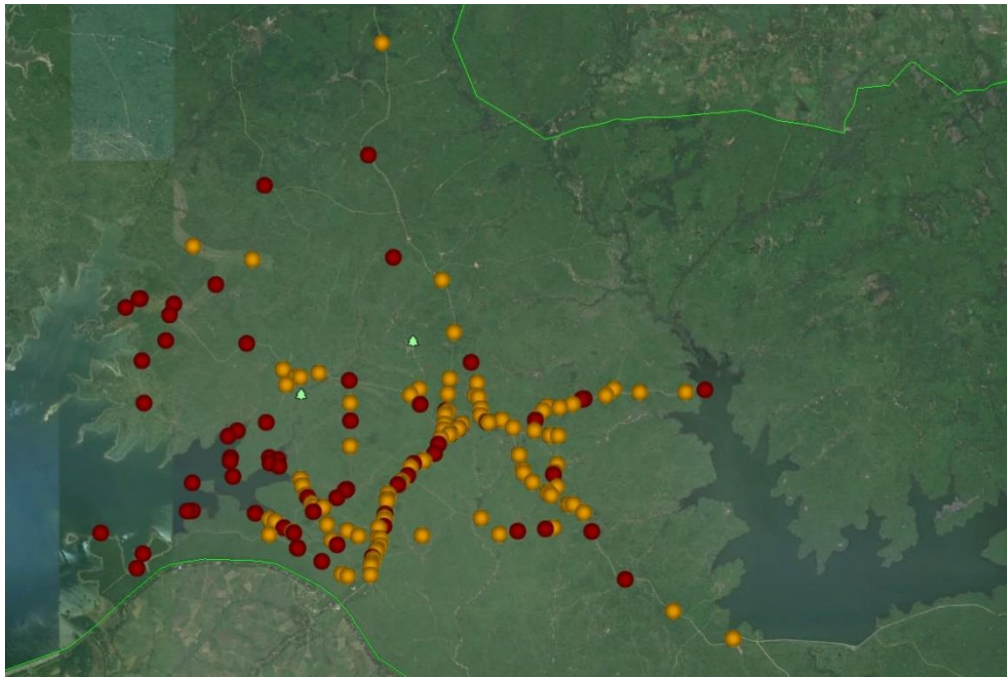
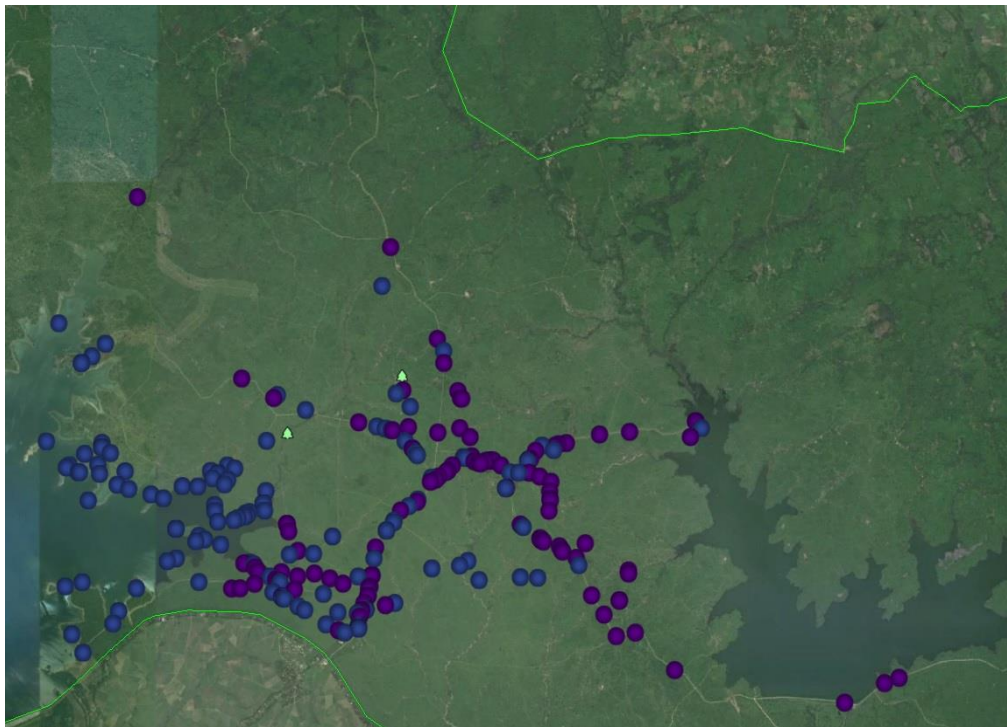


**Figure 6 –
Seasonality in
space use,
2015.**

A. Females

**Orange:
February**

**Red:
June**



B. Males

**Purple:
February**

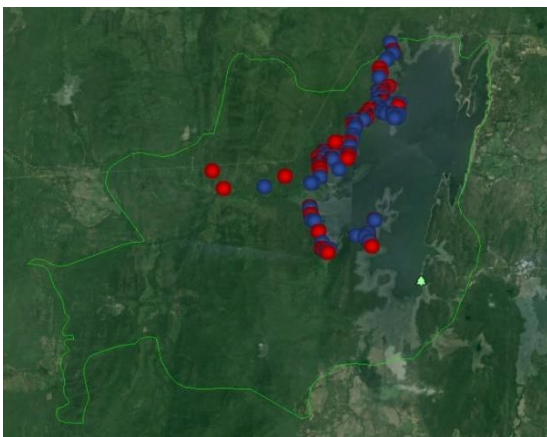
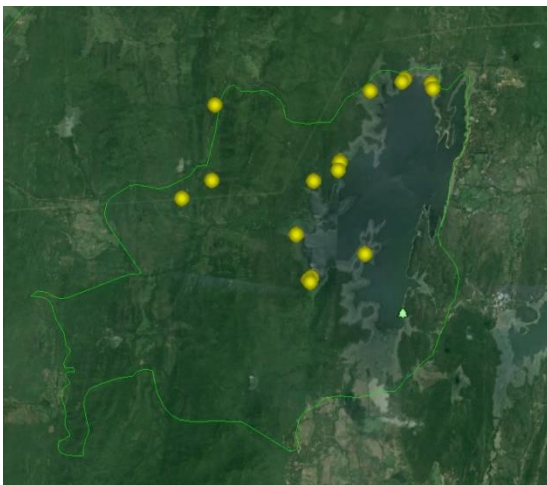
**Blue:
June**

2. Follow up visit to Minneriya National Park

Our aim in 2015 was to again identify individuals seasonally appearing in Minneriya National Park as a basis for studies of social behavior and demography in comparison to Uda Walawe. We expected to see many of the same individuals observed the previous year. However because we were partially rained out the previous year, observations were performed in July instead of August. This was effective in increasing the number of productive field days (21 in 2015 vs. 16 in 2014).

Findings and conservation outcomes

Figure xx Below we show the spatial locations of sightings in 2014 and 2015. In 2015 we have separated observations of bulls from observations of females, illustrating that they are largely seen in the same areas in MNP. In contrast some observers of African elephants as well as our observations in UWNP show some areas are preferentially used by bulls at certain times of year. Because MNP is not large enough to support elephants year-round, and their dry season occurrence is largely centered on the reservoir, such segregation is not evident.



As expected we did have some repeat sightings, however, we also documented many new individuals. Based on these brief observations, we believe that there must be a flow of individuals in and out of MNP over the course of the season. We are still far from quantifying this flux however as there were so many individuals to identify that it has taken months to follow up with creating individual identification photographs as well as update our notes with these IDs. As we have only two full time staff, and they must also keep up with working at UWNP the rest of the year, this has proved challenging. As mentioned in a previous report, we had expected to train a team dedicated to MNP however this was deemed to be financially impractical as there is no way to maintain a dedicated and skilled staff with short term seasonal work. Because we also did not have the opportunity to request funding for 2016 from IEF, we will refocus our efforts toward UWNP in 2016 and return to MNP if funding allows personnel capacity to be expanded in the future such that data collection at MNP does not have to be done at the expense of data collection at UWNP.

3. Capacity building workshop for the Department of Wildlife Conservation Sri Lanka

SdS planned to overlap time in Sri Lanka in with the planned IEF conference in September, however due to the cancellation of this, life events and other professional engagements this trip was postponed. We therefore did not arrange a workshop for DWC personnel in 2015 as initially thought but have scheduled one for 2016 on the theme of “Evidence Based Conservation and Management”. We have confirmed a panel of guest researchers who will present their expertise in an interactive and engaging 2 day period. As it is outside of this program period, the workshop itself will be supported by other means. We will however present observations from the past two years of IEF supported work to personnel of the DWC and acknowledge its role in our work.

Evaluation of success

As a research project, we are observers of nature documenting what is happening to it, in this case elephants. On a day to day basis we have small successes when we assist in finding and rescuing animals that have been adversely impacted by human activities, such as those with human-caused injuries from snares. But this alone is not sufficient for the long term survival of elephants.

Another measure of success is that the data we have collected form the basis for gaining a deeper understanding of the biology of this species. Being able to model elephant populations and obtain unexpected, if worrying, insights is useful if these insights can be used to draw attention to the threats facing elephants. Our next step is therefore to do just this, and bring attention to the slow acting, hidden, but ultimately severe demographic threats elephants are facing. The issue problem of population viability captive elephants is acutely felt and there are vast resources directed toward their maintenance. A similar awareness of the vulnerability of wild elephants does not seem to exist. A deeper success would be to foster this awareness among stakeholders who have the capacity to make a difference to the situation.

We consider efforts successful if our observations are ultimately used in guiding the management of elephants and their habitats, which will necessarily take time to implement.

Thank you for supporting our work.