

Ruling of the IUCN SSC Standards and Petitions Committee on the Listing of the African Savanna Elephant (*Loxodonta africana*)

13 October 2022

The Standards and Petitions Committee (SPC) received a petition on the listing of African Savanna Elephant (*Loxodonta africana*) on 5 July 2022. The species was assessed as EN A2abd on 13 November 2020, and the assessment was published in 2021.

There are two main issues raised in this petition: the reliability of the calculated 60% reduction from 1965 to 2015 (last 2 generations), and the assumption that there was no population change from 1940 to 1965 (3rd previous generation). Other issues raised by the petitioners were considered to be irrelevant to the petition. This includes their concluding remark that “with a population of more than 400,000 savanna elephants the risk of global extinction is extremely low,” which is not consistent with the full set of the Red List Criteria.

Population Reduction since 1965

For the first main issue, the objections of the petitioners include the possibility of pseudo-replication, a lower amount of reduction implied by a simpler calculation, and lack of transparency.

The assessors acknowledge the potential for pseudo-replication of some site trends, but they argue that this would have limited effect and alternatives would be more problematic. The SPC finds the assessors’ justification in this regard adequate.

The petitioners point out that an alternate, simpler calculation suggests a lower reduction, stating that “Table 2 of the Supplementary Information in the Assessment ... shows an overall decline of 37% between 1965 and 2015.” It is correct that if the numbers given in Table 2 for all sites are summed up for 1965 and 2015, the two sums would suggest a 37% decline. However, the information in Table 2 cannot be used to calculate an overall decline in this particular case for the following reason: the data in the table are model outputs, giving the median of the estimated distribution of population size for each site. The median is calculated over 2,000 replicate runs of the model (i.e., 2,000 samples from the posterior distribution). The model does not estimate the population size at each site as a single number, but as a distribution. For a given site, the median is a reasonable summary statistic of this distribution. However, the correct way to determine the overall (species) reduction in this case is to calculate—separately for each of the 2,000 samples from the posterior distribution—the total (for both 1965 and 2015) over all sites, and hence the overall (species) reduction for each sample. This gives a distribution of the 2,000 overall reduction amounts. The average of this distribution is 60%, which is the estimate of reduction used in the assessment (the median of the distribution of the 2000 reductions is about 59%).

So, why does the mean/median reduction over 2000 replicates differ so much from the reduction in the sum of medians of the sites? (In other words, median reduction based on replicate sums vs. reduction in sum of medians.) This is because the large uncertainties result in model predictions for each site that are highly variable and skewed. If the variances were lower and the distributions more symmetric, the two calculations would match more closely.

The petitioners claim that the model is not transparent. It is true that the assessment cannot be replicated without the rather complex code and the database used by the assessors. A simpler model would have been preferable. However, a review by SPC (as well as an outside expert) when the assessment was first submitted found nothing that would result in a biased estimate of reduction.

In general, Red List assessors are encouraged to make the simplest and clearest calculations that are consistent with the criteria and guidelines. However, in some cases there is an unavoidable trade-off between robustness and simplicity. In this case, perhaps the analysis could have been simpler, but this does not invalidate its results. The SPC encourages the assessors to develop a short document or tool (e.g., a ShinyApp) that would allow those interested in the listing to better understand what could be considered an unclear (if not incorrect) result.

Population Reduction from 1940 to 1965

The petitioners challenge the assessors' assumption of no change between 1940 and 1965. They argue that if this assumption is accepted, "the same logic could be extended back to the 4th and 5th generations (i.e., back to 1915 and 1890)." They conclude that the fact that elephant numbers have not been stable since 1890 shows that the assumption is invalid.

The assumption of no change can be reasonable for the 3rd previous generation, even if it does not hold for the 4th and 5th previous generations. The argument about extending the "logic" farther back than 1940 is not relevant to this assessment because the assessment only considers the last three generations. Considering the uncertainty of historical numbers, the assessors have assumed no change from 1940 to 1965. This assumption can be challenged, but the SPC rejects the argument that the assumption necessitates that a similar assumption of no change be applicable to times before three generations ago.

On the other hand, even if the available data do not allow the model to be taken back further than 1940, information from 1940 to 1965 should be considered, even if it cannot be used in the same model as the later data.

So, the question is whether the available information for 1940–1965 is sufficient to calculate an overall growth rate. On this point the petitioners and the assessors disagree. In other words, although both the assessors and the petitioners apply the Red List Criteria and Guidelines correctly, they differ in how they treat this uncertainty.

The issue is complicated because the assessors and the petitioners have not agreed on the facts. The SPC requires that factual disputes be clarified (or reasons for disagreements be clearly identified) by dialogue between the petitioners and the Red List Authority ([see SPSC 2001](#)) as the SPC does not have detailed knowledge of the data and how they were collected to select the best data set; this is something that needs to be done by the specialists.

The petitioners give examples of possible elephant population growth from 1940 to 1965. However, they do not provide a comprehensive table that would allow population change over this period to be calculated. Without a comprehensive accounting of available information for all parts of the species' range during this period, the SPC is unable to judge the validity of the claims of population growth. In some of their examples, the petitioners assume a growth rate of 2.5% per year from 1940 to 1965, based on an assumption of a 5% "biological maximum" growth rate. Global human population has grown at a rate of 1.1% to 2.2% per year since 1950. Considering that elephants and

humans have similar generation lengths, 5% (or even 2.5%) appears to be a high, and possibly unrealistic, estimate. Also, a species' growth rate is different from a population growth rate. One elephant population can certainly grow at this or a much higher rate, but this could be due to factors such as unusually suitable environmental conditions at one or few locations or for a few years at many locations, age distribution away from the stable age distribution, and positive net immigration. However, for a whole continent of populations to grow at an average rate of 2.5% per year over a sustained period of 25 years would be quite unusual. (For comparison, note that the 60% reduction from 1965 to 2015 corresponds to about a 1.8% annual decline; and populations can decline much faster than they can increase). On the other hand, as the petitioners point out, even a smaller rate (e.g., 1% per year growth sustained over 25 years) could decrease the 3-generation reduction to under 50%.

The assessors point out that the evidence from different parts of Africa indicates different amounts of growth and decline over this period, that even the uncertain and conflicting trends are available only for a few localities, and that upon examining all records from 1940 to 1965, they were unable to discern a clear pattern of change at the continental level. The SPC notes that examples of increasing subpopulations can be found, even when the overall population trend is declining. This is indeed the case during 1965–2015 when more reliable data are available for multiple subpopulations. The assessors conclude that the available information does not support an assumption of overall one-generation growth from 1940 to 1965.

SPC Ruling and Recommendations

It is clear that there is large uncertainty in population trends across the entire species' range from 1940 to 1965. Given the uncertainty and the different interpretations of available evidence, it is not surprising that different attitudes towards uncertainty could result in different assessment outcomes. Under these conditions, it is not unreasonable to assume no change. Thus, the SPC does not change the category.

The SPC agrees with the petitioners that "direct observation" is not applicable as the basis of reduction; the basis should only be "b" (index of abundance) and "d" (exploitation).

IUCN Red List Guidelines encourage incorporating uncertainties and explicitly stating their effects on the results, in the form of a range of categories (section 3.2.5). With 60% decline from 1965 to 2015 (and ignoring, for the time being, the uncertainty of this number), if the average annual growth rate from 1940 to 1965 ranged from -1% to +1%, then the 3-generation reduction would range from 49% to 69%, corresponding to a range of VU to EN. Considering that the current assessment already results in 25% probability of the 2-generation reduction being consistent with VU (Supplementary material Table 1a), the uncertainty could easily justify the range VU-EN. Given this, the assessment should acknowledge that VU is also a plausible category.

All Red List Criteria for which there are sufficient data must be applied. Accordingly, the SPC encourages assessors to continue their efforts to assess the species under criterion A4, as stated in the 2021 assessment justification. If, for instance, what is known about the current threats, conservation measures, and population trends indicate a suspected population stabilization, or no net change, over the period 2015–2040 (perhaps with an initial reduction continuing the recent downward trend followed by an increase as conservation measures take effect), the overall 3-generation reduction would be assessed as EN A4bd, strengthening the current assessment.

The SPC also encourages assessors to consider undertaking a Green Status assessment (<https://portals.iucn.org/library/sites/library/files/documents/2021-022-En.pdf>) for this species. This would build on the Red List assessment and enable the known variation in trends among subpopulations to be incorporated into an evaluation of past and potential conservation impact across the species' range.