The tricky business of balancing the rhino books

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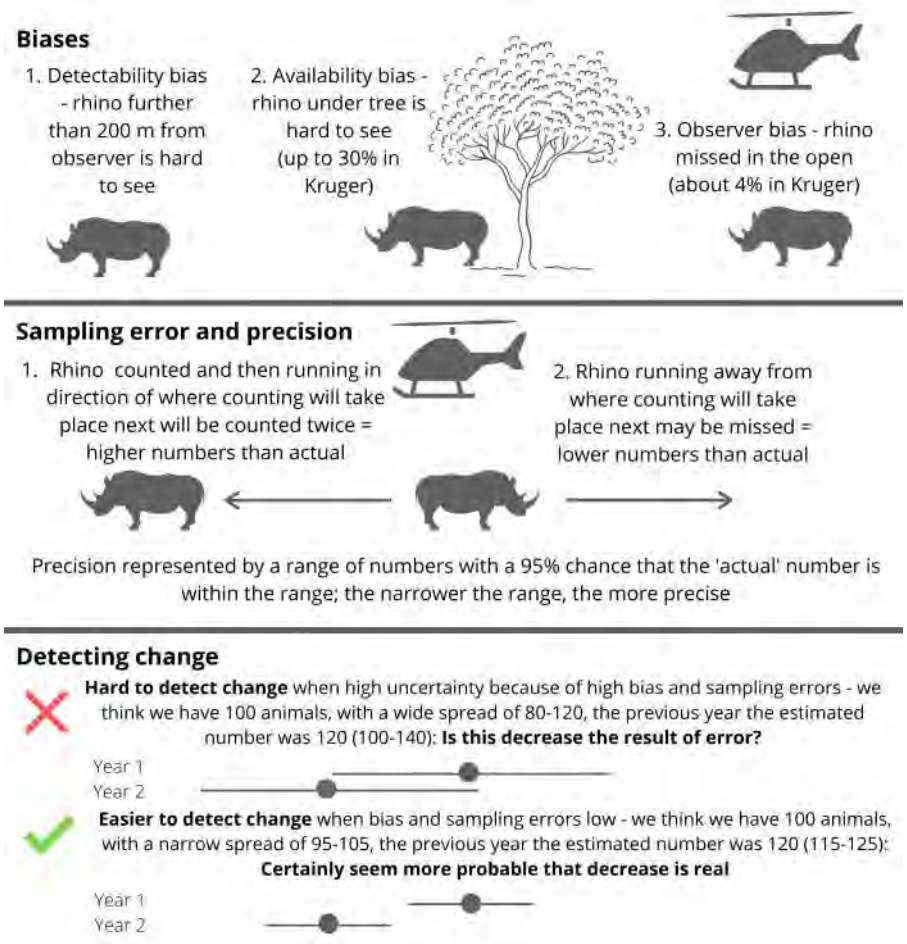
Photo by Sam Ferreira and graphs by Corli Coetsee

Where have all the rhinos gone? This question is asked every year when SANParks' rhino numbers are released. The public subtracts the reported number of poached rhinos in the previous year from the estimated population total, and they conclude that the differences do not add up.

The reality is that SANParks' rhino numbers are estimates from counts that are made from aerial counts done once a year, and in many cases these counts cover only part of larger parks such as Kruger. Estimates, as the word implies, are never exact as the "partial counts" need to be extrapolated to the larger area and not every rhino is counted in an annual survey because it is impossible to see every last rhino on the day. To account for this, scientists report "measures of error", or in other words, the upper and lower values that are statistically likely for the counts. The better your rhino accounting, the better the lines predicted by the models should fit onto the actual counts (i.e. the round dots in Fig. 1). Models can also predict numbers over time. For example, the trends in rhino numbers up to 2007 before poaching started, suggest rhinos should have increased substantially (Fig. 1, blue line).

During the 1960s and 1970s, 351 white and 88 black rhinos were



WORKING OUT RHINO NUMBERS IS NOT A SIMPLE EXERCISE OF TAKING THE CURRENT COUNT AND SUBTRACTING RHINOS REPORTED AS POACHED.

introduced to Kruger. Rhino numbers grew so well that soon (starting in the 1990s) there were enough rhinos that some could be caught and sent to establish other populations. Although these removals reduced population numbers slightly over time (Fig. 1, black line), they were minor enough to have had little impact on rhino population growth rate. Further, occasional adverse conditions may also affect growth rates (Fig. 1, green line). For instance, white rhino deaths (i.e. the number of rhinos that died from natural causes in a year as a percentage of how many rhinos were alive at the start of that year) increased during the 2015/2016 drought and births (i.e. the number of calves less than one year old as a percentage of how many rhinos were alive at the start of that year) decreased one to two years later due to poor conception rates of the cows. However, in comparison to these natural processes and planned removals, the poaching of rhinos has had dire consequences for rhino populations (Fig. 1, brown). The observed poaching pressure in Kruger (i.e. the number of rhino carcasses found with missing horns) drastically decreased population growth. In reality, poaching fatalities are in the region of 15% higher than observed due to detection challenges in the vast terrain. Accounting for these "missing" rhino improves the fit of the line (Fig. 1, red line).

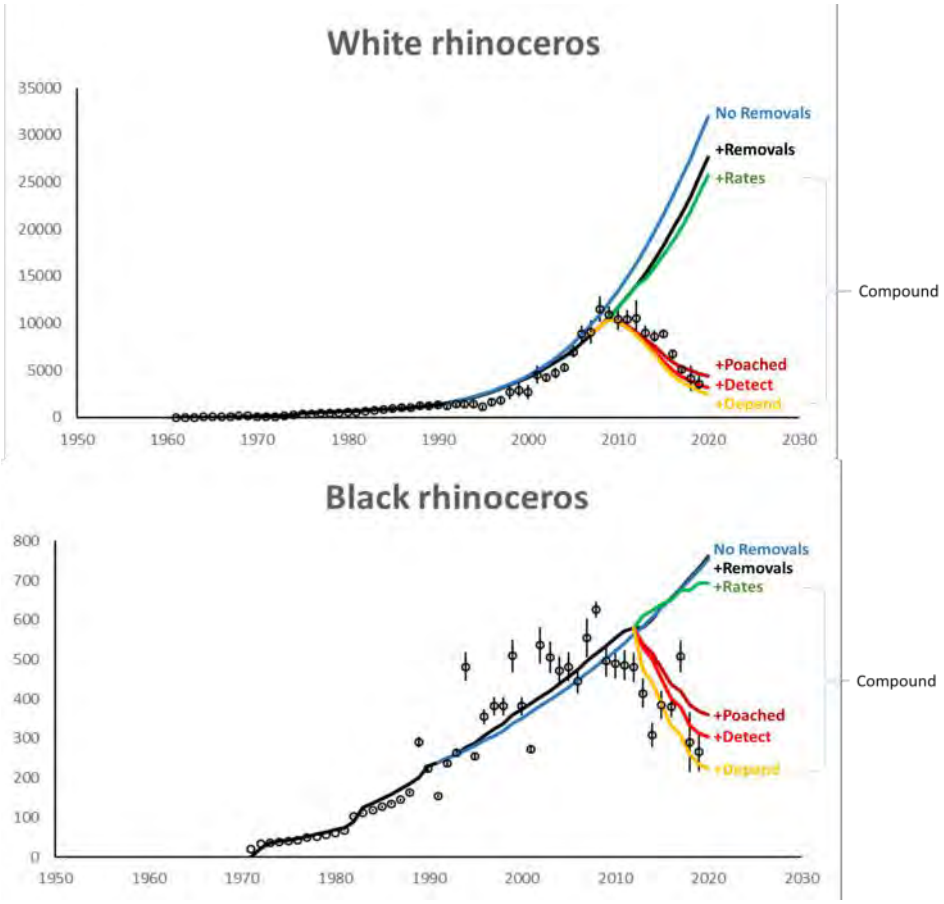


Figure 1. Time series of point estimates for rhinos extracted from the literature since introductions. The trend lines reflect different models. Blue reflects outcomes following introductions with no subsequent interventions. Black reflects outcomes following introductions and subsequent removals. Green reflects outcomes that include removal effects and the influence of environmental variability on recruitment and fatalities other than those caused by poaching. Brown reflects model outcomes when correcting for the undetected poaching deaths. Red reflects model outcomes when adding the effect of imperfect carcass detection. Orange reflects model outcomes when also adding the dependent calf effect (i.e. calf of poached cow also dying).

Apart from the loss of adults, poaching has additional indirect negative effects on rhino populations. Calves up to three years old depend on cows for nutrition (i.e. suckling), as well as for defence against predators and other rhinos. Up to 52% of calves will die when orphaned, reducing the number of female calves that will go on to have their own calves, further throttling rhino population growth rates (Fig. 1, orange line). These negative poaching-related outcomes collectively drive steep population declines.

In Kruger, the cumulative influences of these impacts explained most of the trends observed in rhino numbers (93% for white rhino and 82% for black rhino). As a result, poaching has far bigger effects on rhino numbers than just those individuals lost through poaching. Should poaching cease soon there would still be time for the current population to recover relatively quickly through exponential growth.