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CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

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A STATEMENT FROM THE MIKE AND ETIS TECHNICAL ADVISORY GROUP ON RECENT CLAIMS THAT THE CITES-APPROVED IVORY SALES IN 2008 CAUSED A SPIKE IN POACHING LEVELS

This document has been submitted by the Secretariat at the request of the MIKE and ETIS Technical Advisory Group (TAG) in relation to agenda item 57.5 on *Report on Monitoring the Illegal Killing of Elephants (MIKE)*.

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1. In late June 2016 there was extensive media interest [1, 2, 3] in a working paper written by Solomon Hsiang from the University of California at Berkeley and Nitin Sekar from Princeton University, and released on the National Bureau of Economic Research (NBER) website [4]. Using data from the two CITES monitoring systems for elephants (MIKE and ETIS), the study claims that the international one-off sale of ivory that was conducted in 2008, with approval by consensus of the CITES Conference of the Parties at its 14th meeting in 2007, led to a sustained and substantial step-change in poaching of elephants for their ivory.

2. This matter is of particular interest to the MIKE and ETIS Technical Advisory Group (TAG), because one of the mandates of the MIKE and ETIS monitoring systems is to assess whether, and to what extent, observed trends in the illegal killing of elephants and the illegal trade in ivory are related to measures concerning elephants taken under the auspices of CITES, including the conduct of legal international trade in ivory.

3. The MIKE and ETIS Technical Advisory Group welcomes informed, competent new analyses of MIKE and ETIS data and different approaches to understanding the complex problems around the illegal ivory trade. Analyses by independent researchers that are not involved in the MIKE and ETIS process are particularly welcome, and especially those that benefit from the credibility and validation associated with the scientific peer review process [5].

4. Given its relevance to the discussions to be held at the 17th meeting of the Conference of the Parties (Johannesburg, September-October 2016), members of the TAG have carefully reviewed the working paper by Hsiang and Sekar. The review presented here focuses solely on the scientific quality of the working paper in order to advise on whether it should be used by the Parties to inform CITES policy on elephants. The review has identified major flaws in the logic and statistical treatment of both the MIKE and ETIS data in the working paper.

Background

5. In 2007, at its 14th meeting, the CITES Conference of the Parties approved, by consensus, the international sale of government-owned raw ivory from the four African elephant populations included in Appendix II (i.e. those of Botswana, Namibia, South Africa and Zimbabwe) to approved trading partners (namely China and Japan). At the same time, the Conference of the Parties established a moratorium of nine years, from the date of the sale, on the submission of further proposals to the Conference of the Parties to allow trade in elephant ivory from those four populations. The sales took place in November 2008, and the ivory reached its destinations in January 2009.

6. Based on statistical analyses of the Proportion of Illegally Killed Elephants (PIKE) statistic, the MIKE programme has reported an increase in levels of illegal killing of elephants, starting in 2006, climbing steadily to a peak in 2011 (only punctuated by a transitory decline in 2009) and plateauing in subsequent years. Thus, the increase in poaching levels was already ongoing when the Parties approved the sale and moratorium. Except for the transitory decline in PIKE levels recorded in 2009, there was no discernible difference in the rate of change in the trend in the 2006-2011 period [6, 7, 8]. The ETIS programme has similarly reported an increase in the illegal ivory trade, starting around 2007 and leveling off from about 2012 onwards [9]. Both the MIKE and ETIS reports are based on statistical analyses that have been reviewed and approved by the MIKE and ETIS TAG and accepted by both the CITES Conference of the Parties [6, 7, 8, 9, 10] and the Standing Committee [11, 12, 13, 14]. Methods used in MIKE and ETIS analyses have also been published in the peer-reviewed scientific literature [15, 16].

Logic

7. The main argument of Hsiang and Sekar is that, in their modelling of the PIKE data, they found that estimates of elephant poaching prior to the legal sale of ivory (from 2003 to 2007) are significantly lower than estimates after the sale (from 2008 onwards). They state that this apparent step change in poaching can only be attributed to the legal sale of ivory because they do not find evidence of a similar step change in the small number of variables that they have selected to measure Chinese influence and presence in elephant range States.

8. The TAG is of the view that this is an overly simplistic and logically flawed argument, even if the apparent step change was supported by the data. As is well known, correlation does not imply causation; just because two things happen in the same year, it cannot be implied that one causes the other. Regardless of whether the increase in poaching observed over the last 10 years was gradual or sudden, there are many other factors that could have caused, or contributed to causing, an increase in poaching levels. For example, the impact of the Global Financial Crisis was also felt worldwide at the time of the ivory sale, and this could have affected trends in the illegal ivory trade. In 2008 there was a drop in international shipping costs, which may have made illegal trade in ivory more profitable, and thereby more attractive to criminal syndicates [17]. There is also evidence of similar trends in the price and volume of trade in other commodities over the same period, including goods that take a similar role to elephant ivory, such as gold, luxury watches and semiprecious stones [18, 19, 20]. As mentioned above, 2008 also marked the start of the still-ongoing 9-year moratorium on further ivory sales. By the authors' logic, events such as these could have also been causes for the step change they claim. It is also worth noting that there has also been a rapid increase in poaching of other high-value species, such as African rhinos, over the same period but no one-off sales of these species' products have taken place in that time [21, 22]. Other potential causes of the increase in poaching over the last 10 years cannot be ruled out without considering factors such as these.

9. Even if the sale had had an effect, it is unlikely that it would have been the sole reason for an increase in poaching levels. The sale would instead be more likely to have been one of several factors contributing to an increase in demand for illegal ivory. The illegal ivory trade is a complex dynamic system involving many different countries and players with different drivers acting at different places and on different temporal and spatial scales along the trade chain. To understand whether a particular event has impacted on the trade, its role would need to be assessed in relation to all other potential drivers of the trade. Any analysis should therefore look at the relative contribution of different drivers, rather than attempting to attribute any changes to a single cause. Without this, incorrect conclusions are liable to be drawn. It is extremely challenging, however, to disentangle these effects in the context of broader trends that lie beyond the control of CITES, especially given the observational nature of the available data.

Analysis

10. With regard to the statistical analysis, the TAG's view is that the authors have not properly modelled the properties or structure of the data; in particular, the linear model they used is inappropriate [23, 24, 25]. The authors illustrate their argument using a plot which appears to show a step change in the average estimate of elephant poaching levels from 2008. This pattern is different to the results reported by the MIKE programme, which, as described above, essentially show a gradual increase in PIKE from 2006 to 2011. The key factor leading to the difference between these results is that the MIKE analyses take account of the variation in the total number of carcasses reported by each site each year, whereas this is not the case in Hsiang and Sekar's analysis.

11. Accounting for the variation in total carcass counts is not a matter of choice. The data show that the total number of carcasses encountered at MIKE sites varies greatly between sites and over time, making it a confounding factor that needs to be adjusted for in the analysis. Hsiang and Sekar could have accounted for this variability using a weighted linear regression, with the total carcass counts as the weights. Such weighting is vital to avoid violating a basic assumption in linear regression, namely that of variance homogeneity. Hsiang and Sekar have ignored these facts, and this renders their analysis, and thereby their conclusions, invalid [24]. Had Hsiang and Sekar weighted the data appropriately, or used more suitable methods for modelling proportions, which automatically account for the variability in total carcass counts [26], they would have obtained essentially the same results as those presented in the MIKE analyses, which show no discontinuity in 2008.

Conclusion

12. The conclusion by Hsiang and Sekar that an apparent step change in elephant poaching was triggered by the one-off ivory sale in 2008 is fundamentally flawed from two key perspectives: i) The statistical modelling is inappropriate for the MIKE data, leading to incorrect model outputs and conclusions; and ii) robust causal inference is not possible from simple by-eye comparisons between a trend and trends in other selected variables. This is particularly so in complex systems with dynamic interacting processes such as the illegal ivory trade. The claim of a discontinuity in poaching levels in 2008 is invalid but, even if were not, the conclusion that the discontinuity was *caused* by the 2008 sale is logically flawed.

13. The claims in the working paper by Hsiang and Sekar are fundamentally flawed, both in logic and methodology. The MIKE and ETIS TAG is therefore of the view that the study should not be used to inform CITES policy on elephants.

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