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

CITES

Seventeenth meeting of the Conference of the Parties
Johannesburg (South Africa), 24 September – 5 October 2016

Species specific matters

Elephants (Elephantidae spp.)

REPORT ON MONITORING THE ILLEGAL KILLING OF ELEPHANTS (MIKE)

1.   This document has been prepared by the Secretariat.

2.   Resolution Conf. 10.10 (Rev. CoP16) on *Trade in elephant specimens* establishes the CITES programme for Monitoring the Illegal Killing of Elephants (MIKE) with the following objectives:

      i)   *measuring and recording levels and trends, and changes in levels and trends, of illegal elephant killing and trade in ivory and other elephant specimens in elephant range States, ivory consumer States and ivory transit States;*

      ii)   *assessing whether and to what extent observed trends are related to: measures concerning elephants and trade in elephant specimens taken under the auspices of CITES; changes in the listing of elephant populations in the CITES Appendices; or the conduct of legal international trade in ivory;*

      iii) *establishing an information base to support the making of decisions on appropriate management, protection and enforcement needs; and*

      iv)   *building capacity in elephant range States and, as applicable, countries involved in trade in elephant specimens, to implement and make use of MIKE and ETIS in managing elephants and enhancing enforcement.*

3.   Resolution Conf. 10.10 (Rev. CoP16) further directs the Secretariat to provide a comprehensive report of the MIKE Programme at each meeting of the Conference of the Parties. Information on the MIKE Programme has been provided to the Conference of Parties at its 11th, 12th, 13th, 14th, 15th and 16th meetings (CoP11, Gigiri, 2000, in document Doc. 11.31.2; CoP12, Santiago, 2012, in document CoP12 Doc. 31.2; CoP13, Bangkok, 2004, in document CoP13 Doc. 29.3; CoP14, The Hague, 2007, in document CoP14 Doc. 53.3; CoP15, Doha, 2010, in document CoP15 Doc. 44.2 (Rev. 1); and CoP16, Bangkok, 2013, in document CoP16 Doc. 53.1).

4.   This report addresses objectives i) to iv) of the MIKE mandate above. The work of the MIKE Programme, including the preparation of this report, has been possible thanks to the generous financial support of the European Union and vital in-kind support from elephant range States.

MIKE objective i): Levels of and trends in illegal killing of elephants

Data and methods

5.   Trend analyses of MIKE data using standardized methodology have been presented: at CoP15 and CoP16; at the 61st, 62nd, 65th and 66th meetings of the CITES Standing Committee (SC61 to SC66, Geneva, 2011, 2012, 2014, 2016); and at other meetings, such as the African Elephant Summit (Gaborone, December 2013) and its follow-up meeting (Kasane, March 2015). In addition, analyses of

MIKE data have been published in the peer-reviewed scientific literature (Burn, Underwood and Blanc, 2011; Wittemyer *et al.,* 2014).

6. MIKE operates in a large sample of designated sites spread across the range of African elephants, *Loxodonta africana*, and Asian elephants, *Elephas maximus,* in 30 countries in Africa (58 sites) and 13 countries in Asia (27 sites). Together, MIKE sites in Africa hold an estimated 30 to 40% of the African elephant population. MIKE data are collected by ranger patrols in the field and other means (e.g. reports from local community members and researchers) in designated MIKE sites. When an elephant carcass is found, site personnel try to establish the cause of death and other details, such as sex and age of the animal, status of ivory and stage of decomposition of the carcass. This information is recorded in standardized carcass forms, details of which are then submitted to the MIKE Programme. A database of more than 15,000 carcass records has been assembled to date, providing the world's most substantial information base available for making a statistical analysis of the levels of illegal killing of elephants.

7. MIKE monitors relative poaching levels using the Proportion of Illegally Killed Elephants (PIKE), which is calculated as the number of illegally killed elephants found divided by the total number of elephant carcasses encountered by patrols or other means (e.g. community reports, researchers, etc), aggregated by year for each site. Coupled with estimates of population size and natural mortality rates, PIKE can be used to estimate numbers of elephants illegally killed, as well as poaching rates (i.e. the proportion of the total elephant population illegally killed).

8. While PIKE provides a robust measure of broad-scale poaching trends, it may be affected by a number of potential biases related to data quality, variation in carcass detection probabilities, variation in natural mortality rates and other factors. Hence results need to be interpreted with some caution. However, the fact that the trend information presented below is in good agreement with quantitative information available from other sources, such as the Elephant Trade Information System (ETIS) and the African Elephant Database of the IUCN/SSC African Elephant Specialist Group, gives confidence as to the robustness of the results.

9. Since the report submitted at SC66, in January 2016, which included records received up to the end of 2014, additional records for 1,334 elephant carcasses encountered in the course of 2015 were received from 40 sites in Africa. While the number of reporting sites declined in 2015 compared to 2014, when 46 sites reported, the number of carcass records received is comparable. Data for 2016 will only be available in early 2017, and an update on trends will be released on the CITES website on 3 March 2017, on the occasion of World Wildlife Day.

10. The data set used for trend analysis consists of 14,606 records of elephant carcasses found between 2003 and the end of 2015, at 54 MIKE sites, in 29 range States in Africa, representing a total of 505 site-years. Data for Asian sites were still being compiled at the time of writing this document. The analysis presented in the present document is therefore restricted to African MIKE sites. An addendum, reporting on Asian data, will be prepared and submitted for consideration at CoP17. Summary carcass data used in the analysis can be downloaded from https://cites.org/eng/prog/mike/data_and_reports.

Continental trend in Africa

11. Figure 1 shows estimated marginal mean annual PIKE values, with 90% confidence intervals, from 2003 to 2015, for MIKE sites in Africa from which reports were received. Estimated marginal means (Searle, Speed and Milliken, 1980), also known as 'least squares means' and 'population means' (Harvey, 1966), are weighted averages that adjust for imbalances in sample sizes across groups (sites, countries and subregions in this case). The chart shows a steady increase in levels of illegal killing of elephants starting in 2006, punctuated by a decline in 2009 and peaking in 2011, then somewhat declining between 2011 and 2013 and remaining virtually unchanged thereafter. The odds in favour of a real decline in PIKE between 2011 and 2013 are estimated at 108 to 1, meaning that the likelihood of a true decline is high. However, it should be noted that this only reflects a decline on average across reporting sites; PIKE increased in a number of sites, and declined in others, during that period.

12. Despite variation at the site level, poaching levels in 2015 overall remained stable but high across African MIKE sites. It is difficult to estimate poaching impact at the site level, especially in sites that do not report sufficiently large numbers of carcasses, or where there may be indications of bias in reported PIKE levels. Among sites that reported 20 or more carcasses for 2015, i.e. where the site-level PIKE can be taken to be relatively reliable, those that remain of particular concern (with a PIKE of 0.7 or higher) in 2015 include: Pendjari (Benin), where PIKE nevertheless declined by 10% compared to 2014; Garamba (Democratic

Republic of the Congo); Niassa (Mozambique); and Katavi-Rukwa, Ruaha-Rungwa and Selous-Mikumi (United Republic of Tanzania).
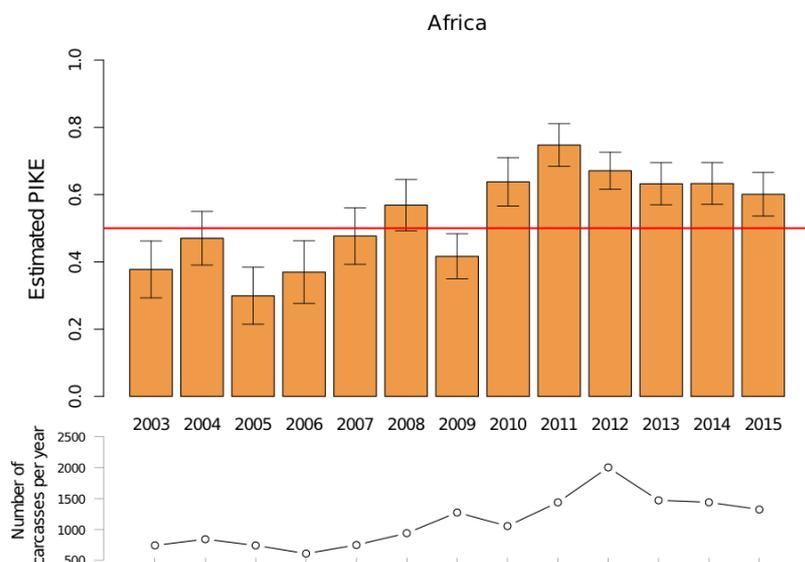

Figure 1. The upper chart shows the PIKE trend in Africa with 90% confidence intervals, based on 14,604 elephant carcasses (illegally killed or otherwise) reported to MIKE for the period 2003-2015. PIKE levels above the horizontal line at 0.5 (i.e. where half of dead elephants found are deemed to have been illegally killed) are cause for concern. The lower graph shows the total number of carcasses reported by year, irrespective of cause of death.

13. A substantial increase in PIKE was recorded in Kruger National Park (South Africa), which went from 0.17 in 2014 to 0.41 in 2015 (a nearly 2.5-fold increase). While the PIKE level in Kruger in 2015 remained below the 0.5 level, this increase in what had been one of the most secure sites for elephants in Africa is a cause for concern. Along with Chobe (Botswana) and Etosha (Namibia), Kruger was until recently one of only three sites in Africa where PIKE had been consistently low since the start of MIKE monitoring in the early 2000s. PIKE also increased substantially in Ruaha-Rungwa (United Republic of Tanzania; by 28%, from 0.58 to 0.74) and Chewore (Zimbabwe; by 69%, from 0.17 to 0.29). On the other hand, a substantial decline in PIKE was recorded in Tsavo (Kenya), where PIKE dropped from 0.49 in 2014 to 0.33 in 2015 — a 33% decrease.

Subregional trends

14. The overall stability in PIKE levels over the period 2013-2015 is reflected at the subregional level, with the PIKE values in all four African subregions in 2015 being statistically indistinguishable from those reported in 2014 (Figure 2). Estimated PIKE levels in 2015 remained below 0.5 in Eastern and Southern Africa, but were above that level in Central and West Africa. It is worth noting that 2015 was the fourth consecutive year in which the PIKE value declined in Eastern Africa since the peak in 2011. The PIKE value for Eastern Africa in 2015 is comparable to the levels recorded in that subregion in 2008. Southern Africa remains the only African subregion where the estimated PIKE has not exceeded the 0.5 level in the period 2003-2015.

15. With only eight sites reporting data for 2015, West Africa continues to be a cause for concern in terms of the regularity of reporting and data quality, making reliable inference on trends impossible for the subregion. While small populations, such as those prevalent in West Africa, cannot be expected to yield large numbers of carcasses, there have been apparent examples of under-reporting. Such is the case of Gourma (Mali), for which 18 carcasses were reported to MIKE in 2015, whereas the United Nations Peacekeeping mission in Mali (MINUSMA) reported at least 57 dead elephants in the site between January and June 2015 (Farge, 2015).
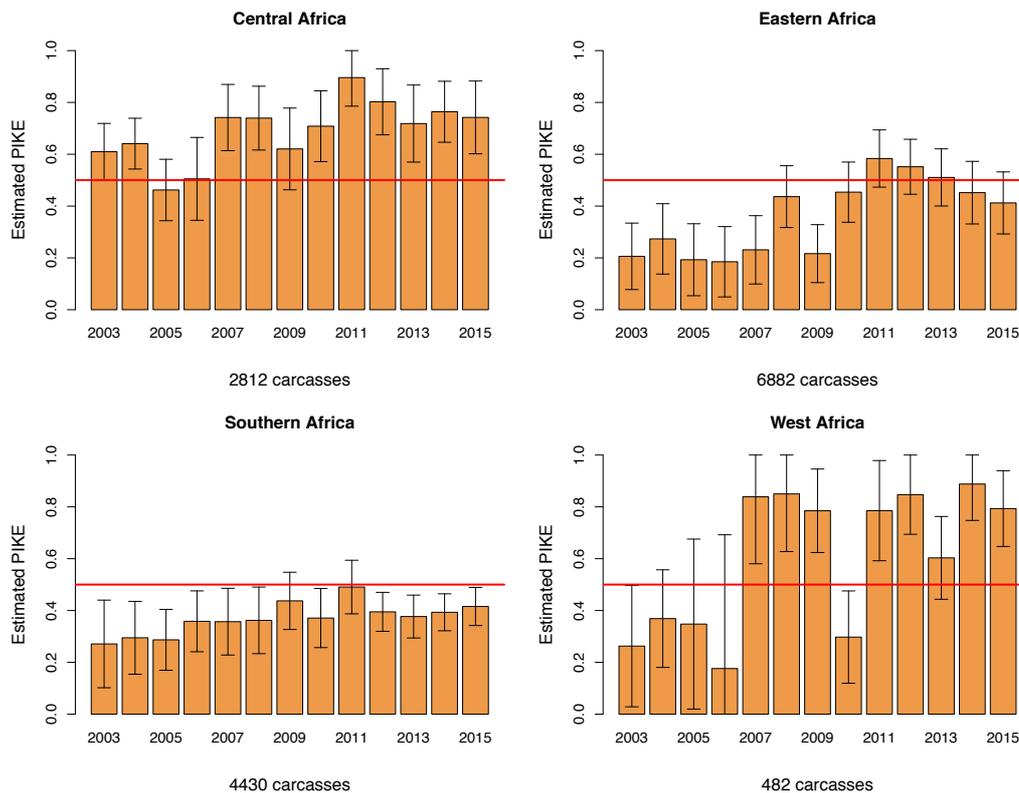
Figure 2. Subregional PIKE trends with 90% confidence intervals. The numbers of carcasses on which the trends are based are shown at the bottom of each chart.

Estimates of poaching rates and scale of illegal killing

16. As noted in paragraph 7, using methods derived by Dr Kenneth Burnham, the statistical expert in the MIKE and ETIS Technical Advisory Group (TAG), PIKE data can be combined with estimates of natural mortality rates to yield estimates of the poaching rate (i.e. of the proportion of total elephant population that was illegally killed in any given year). The relationship between PIKE and the poaching rate k is given by

$$k = \frac{mp}{1-p}$$

where p is the PIKE estimate and m is an estimate of the natural mortality rate.

17. It is worth drawing attention to two important properties of the above equation:

    a) The poaching rate k is directly proportional to the PIKE odds, $\frac{p}{1-p}$. As p tends to one, $1-p$ tends to zero, and thus the odds increase non-linearly with respect to p. As shown in Figure 3, the relationship is initially approximately linear, but as p reaches high values, the PIKE odds Q begin to increase much more rapidly, resulting in the curve taking a sharp turn upwards. In consequence, changes in PIKE equate to different poaching rates depending on the initial value of PIKE.

    b) The second property to note is that the estimate of natural mortality, m, is also directly proportional to the poaching rate estimate. Thus, for instance, for any given level of PIKE, a doubling of the natural mortality rate results in a doubling of the estimated poaching rate.

18. The main implication of the above properties is that, while the poaching rate is in principle a better measure of the impact of poaching than PIKE is, its calculation requires good estimates of natural mortality rates. Unfortunately, however, such estimates are only available for a handful of sites in which detailed demographic studies have been conducted, such as Amboseli (Moss, 2001), Etosha (Lindeque, 1988), Kruger (Whyte, 2001), Samburu (Wittemyer, Daballen and Douglas-Hamilton, 2013), and Tarangire (Foley and Faust, 2010).
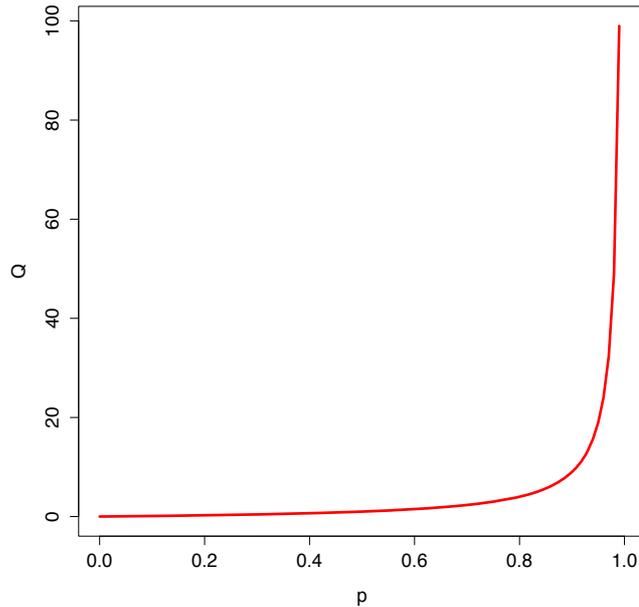
Figure 3. Relationship between PIKE (p) and the PIKE odds (Q). For explanation see text.

19. The MIKE report to CoP16 (document CoP16 Doc. 53.1) provided estimates of poaching rates across African subregions. As advised by the MIKE and ETIS TAG at the time, natural mortality values ranging from 1.5% to 4.5% were used to estimate the poaching rates reported in that document. On the other hand, Wittemyer *et al.* (2014) used a natural mortality estimate of 3.2%, with a variance of 0.015%. This estimate was derived from seven demographic studies conducted in savannah environments, and applied to all elephant age groups, from juvenile to adult.

20. However, as the MIKE and ETIS TAG noted at its 13th meeting (Nairobi, March 2016), an appropriate natural mortality rate to use in such calculations would be partitioned to exclude juvenile mortality, as juveniles are usually not directly targeted by poachers (even though there may be 'collateral' juvenile deaths resulting from the poaching of adult females). In addition, carcasses of juvenile elephants tend to disappear quickly through the action of scavengers and, in consequence, they hardly feature in the data reported to MIKE. Yet, as juvenile elephants tend to be more vulnerable than adults to predation, drought, accidents and other natural causes of death, a natural mortality rate that excludes juvenile mortality is likely to be considerably lower than a combined rate for all age groups.

21. Figure 4 shows an estimated trend in poaching rates for all African sites combined under a 3% natural mortality scenario. This natural mortality rate is only slightly lower than the rate used in Wittemyer *et al.* (2014) which, as explained above, might be an overestimate. Under this scenario, estimated median rates of illegal killing of elephants were above the 5% threshold (i.e. exceeding the normal growth rate of elephant populations) between 2010 and 2014, dropping in 2012 to converge towards the estimated sustainability threshold of 5% by 2013. While the 2015 estimate fell below the 5% threshold for the first time in six years, its 90% confidence interval still spans that threshold, making it difficult to ascertain with any degree of confidence whether the poaching rate was biologically sustainable that year.

22. Estimates of numbers of elephants illegally killed can be obtained by combining estimates of the poaching rate (see equation in paragraph 16) with estimates of elephant population size. The estimated number of elephants illegally killed K is given by

$$K = kN$$

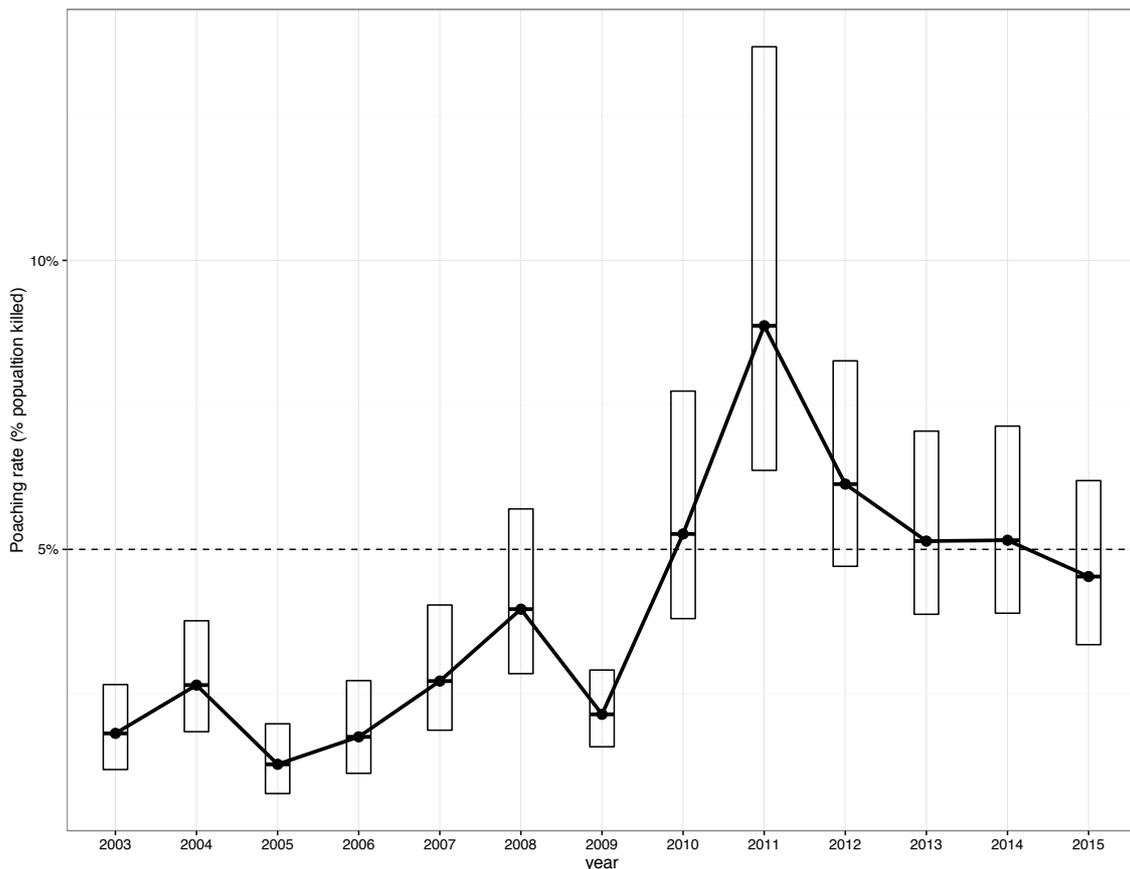where N is the elephant population estimate.

Figure 4. Trend in estimated poaching rates in African MIKE sites (median, black line) under a 3% natural mortality scenario. The boxes represent the 90% confidence interval derived from a Monte Carlo simulation framework. The dashed line at 5% represents the normal growth rate of elephant populations. Poaching rates above this level are likely to result in net population declines.

23. African elephant population data for the MIKE Programme are maintained in the African Elephant Database (AED) of the IUCN African Elephant Specialist Group (AfESG). Regular elephant population surveys, and annual updates of the AED, are critical for the MIKE Programme to be able to provide estimates of numbers of elephants illegally killed on a yearly basis. However, in the period currently covered by the PIKE trend (2003 to 2015), the AfESG has only been able to produce two updates. The first of these (Blanc *et al.,* 2007) provided population estimates obtained up to the end of 2006, while the second provided population estimates obtained up to the end of 2013 (African Elephant Specialist Group, 2014). Given that interpolating continental elephant population estimates is fraught with difficulty, for this report, estimates of numbers of elephants killed have only been calculated for those two years (2006 and 2013). The AfESG plans to release a new African Elephant Status Report prior to CoP17, with estimates up to the end of 2015. This update will include the results of aerial surveys conducted in 2014 and 2015 as part of the Great Elephant Census funded by the Paul Allen Family Foundation. Once those estimates become available, estimates of numbers killed in 2015 will be provided in an addendum to the present document.

24. If the results of recent surveys lead to lower subregional and continental estimates of elephant numbers, as is expected given the high levels of poaching prevalent in recent years, the estimates of numbers of elephants killed in 2015 would consequently be lower as well. This would be the case even if the poaching rate had remained unchanged since 2013, as it would merely reflect the smaller elephant population estimate.

25. In view of the lack of reliable estimates of adult natural mortality, as described above, the MIKE and ETIS TAG advised, at its 13th meeting, that two natural mortality scenarios be used in this document to derive estimated numbers of elephants killed illegally, namely a rate of 3%, as above, as well as a substantially lower rate of 2%. Figure 5 shows estimated numbers of illegally killed elephants in 2006 and 2013 by subregion under these two natural mortality scenarios. Continental estimates are shown in Table 1. These estimates extrapolate beyond MIKE sites under the assumption that poaching rates derived at the subregional level are representative of their respective subregions.
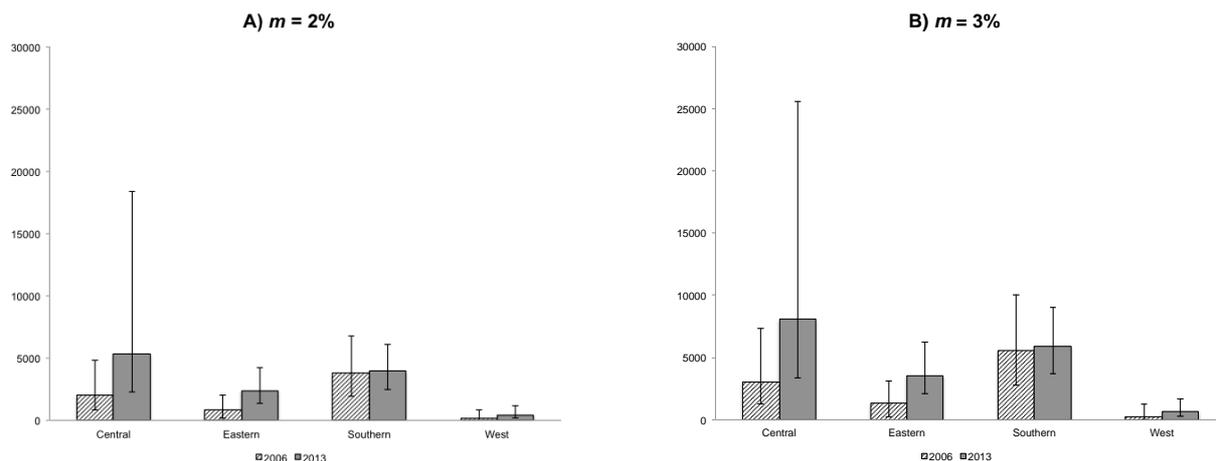
Figure 5. Subregional estimates (medians) of numbers of elephants illegally killed in 2006 and 2013, with 90% confidence intervals, under two natural mortality scenarios: A) 2% average natural mortality, and B) 3% average natural mortality. These estimates are extrapolated to the entire African elephant population estimates for each subregion, and not just to the population at MIKE sites.

Table 1. Continental estimates (medians) of African elephants killed in 2006 and 2013, with 90% confidence intervals, under two natural mortality scenarios (2% and 3%). These estimates are extrapolated to the entire African elephant population estimate, and not just to the population at MIKE sites.

	2% natural mortality		3% natural mortality	
Year	Estimate	90% confidence interval	Estimate	90% confidence interval
2006	7,544	[4,560 - 11,531]	11,291	[6,785 – 17,390]
2013	14,533	[8,634 - 25,742]	21,291	[12,913 – 36,734]

26. As can be seen from Figure 5, the estimates for Central Africa are rather imprecise (i.e. their 90% confidence intervals are very wide). While undoubtedly this is partly a result of high levels of poaching in the subregion, it is also likely to be due in part to biases in the probability of detection of elephant carcasses in forested areas, where visibility is limited, and where illegally killed elephants are more likely to be detected than naturally dead elephants, because they can be revealed through poacher trails and other human signs.

27. Inevitably, the wide 90% confidence intervals for Central Africa also cause the continental estimates in Table 1 to display wide 90% confidence intervals. For this reason, and given the uncertainty around natural mortality rates, these estimates, and others like them, should be treated with caution. Rather than focusing on the actual numbers given, appropriate statements about these estimates would focus on the order of magnitude (i.e. tens of thousands of elephants), and on whether that order of magnitude is acceptable.

28. The MIKE Programme will continue to refine its methodologies, specifically aiming to address the problems of natural mortality rates and detection probability bias. It is important to note that improvements in methodology are bound to result in different estimates of poaching rates and of numbers of elephants killed. Other sources of data, such as elephant population trends arising from systematic surveys conducted according to the MIKE survey standards (Craig, 2012; Hedges and Lawson, 2006), and ivory trade data from ETIS, are critical to corroborate MIKE estimates. Similarly, data from the genetic and isotopic analyses of seized ivory, in compliance with Resolution Conf. 10.10 (Rev. CoP16) and Decision 16.83, may help in calibrating site-level estimates of poaching levels, both at MIKE sites and beyond.

MIKE objective ii): Assessment of effects of CITES decisions on levels of illegal killing of elephants

29. At its 14th meeting (The Hague, 2007), the Conference of the Parties approved, by consensus, the international sale of government-owned raw ivory from the four populations of *Loxodonta africana* included in Appendix II (Botswana, Namibia, South Africa and Zimbabwe) to approved trading partners (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 proposals to allow commercial trade in elephant ivory from those four populations. The sales took place in November 2008, and the ivory reached its destinations in January 2009.

30. Document CoP16 Doc. 53.1 presented an analysis of factors associated with levels of illegal killing of elephants. The analysis found that levels of poverty in and around MIKE sites, law enforcement capacity, levels of governance and corruption in range States, and demand in major ivory consuming nations, were important predictors of spatial and temporal poaching trends, accounting for nearly two-thirds of the variation in PIKE levels.

31. On the other hand, no evidence was found to suggest that illegal killing of elephants increased or decreased as a direct result of the one-off ivory sales or the nine-year moratorium. If the decisions approving these had any effect on poaching levels, a discontinuity in the continental trend would have been expected, but that effect was not discernible from the available data. The decisions associated with the sales were spread over time and the increase in poaching levels had become apparent before the decisions were made. Under the mandate provided in Decision 14.78 (Rev. CoP16), the analysis was repeated for SC65, with minor improvements as described below, with data available up to the end of 2013, and the above conclusions continued to hold.

32. The analysis for SC65 (see document SC65 Doc. 42.1) again showed that MIKE sites where high levels of poverty prevail (as measured by subnational infant mortality rates), and countries with poor governance scores (as measured by Transparency International's Corruption Perceptions Index), tend to experience higher poaching levels. These two factors explain most of the spatial variation in PIKE levels. The temporal variation in PIKE is strongly correlated with the trend in the import price of legal mammoth ivory in China (including Hong Kong and Macao SAR). This variable proved to be a better correlate of PIKE trends than the trend in consumer spending in China that had been used in previous analyses.

33. Virtually all raw mammoth ivory in international trade originates from the Siberian tundra and is therefore exported by the Russian Federation. Importing countries over the last 20 years have included Canada, Germany, the Republic of Korea, Singapore, Thailand and the United States of America. Since the mid-1990s, however, China (including Hong Kong SAR and Macao SAR) has been by far the largest importer, accounting for over 95% of all imports of Russian raw ivory by weight since 2006 (Figure 6 A). As shown in Figure 6 (B-D), both the supply of, and demand for, Russian mammoth ivory rose sharply between the late 1990s and the mid-2010s. The total reported volume of Russian raw ivory exports rose from 17.3 tonnes in 1995 to 105 tonnes in 2014, a more than six-fold increase, or an average rate of increase of 10% per annum. The price per kg, calculated on the basis of declared value and weight at import, increased at the same rate, from USD 37.6 to 150.6 in real terms (2010 USD), or from USD 28 in 1995 to USD 171 in 2014 in nominal terms. The total declared value of the trade increased more than 24-fold in real terms, from just under USD 645,000 in 1995 to nearly USD 16 million in 2014. This represents an average rate of increase of 21% per year, after adjusting for inflation, thus greatly outstripping interest rates in China, which hovered around 6% during the period in question. It is worth emphasizing that these are merely declared values averaged over all grades of ivory; actual values are likely to be considerably higher, especially for high-grade mammoth ivory (Vigne and Martin, 2014).

34. These sharp increases in both price and volume of trade in mammoth ivory are likely to be a reflection of a shift in standard demand, and not necessarily a result of 'conspicuous consumption', or of mammoth ivory being a 'Veblen good' (Leibenstein, 1950). The fact that both the price and the volume of trade increased, and not just the price, suggests that mammoth ivory is a normal good, rather than a luxury good or a status symbol. However, how much of that demand is from consumers, and how much from speculators storing mammoth ivory as an investment, remains an open question. There is increasing evidence that speculation currently plays an important role in the illegal trade in elephant ivory (Gao and Clark, 2014; Moyle, 2014), and the same might apply to the legal trade in mammoth ivory.

35. While elephant poaching trends appear to be on a slow decline, the price and value of the mammoth ivory trade have continued to increase sharply. In other words, the relationship between PIKE and mammoth ivory prices may be breaking down. While this might suggest that a substitution effect may be taking place, with preferences shifting away from elephant ivory and towards mammoth ivory, the economics of ivory

consumption, and the interaction between the mammoth and elephant ivory markets, are poorly understood.

36. It is also worth emphasizing that no causal connection can be established at present between PIKE and any of its correlates identified thus far. The MIKE Programme, in collaboration with ETIS and other partners, intends to continue to evaluate evidence on factors associated with levels of illegal killing of elephants, whether these are CITES decisions or other factors that lie beyond the control of the Convention.
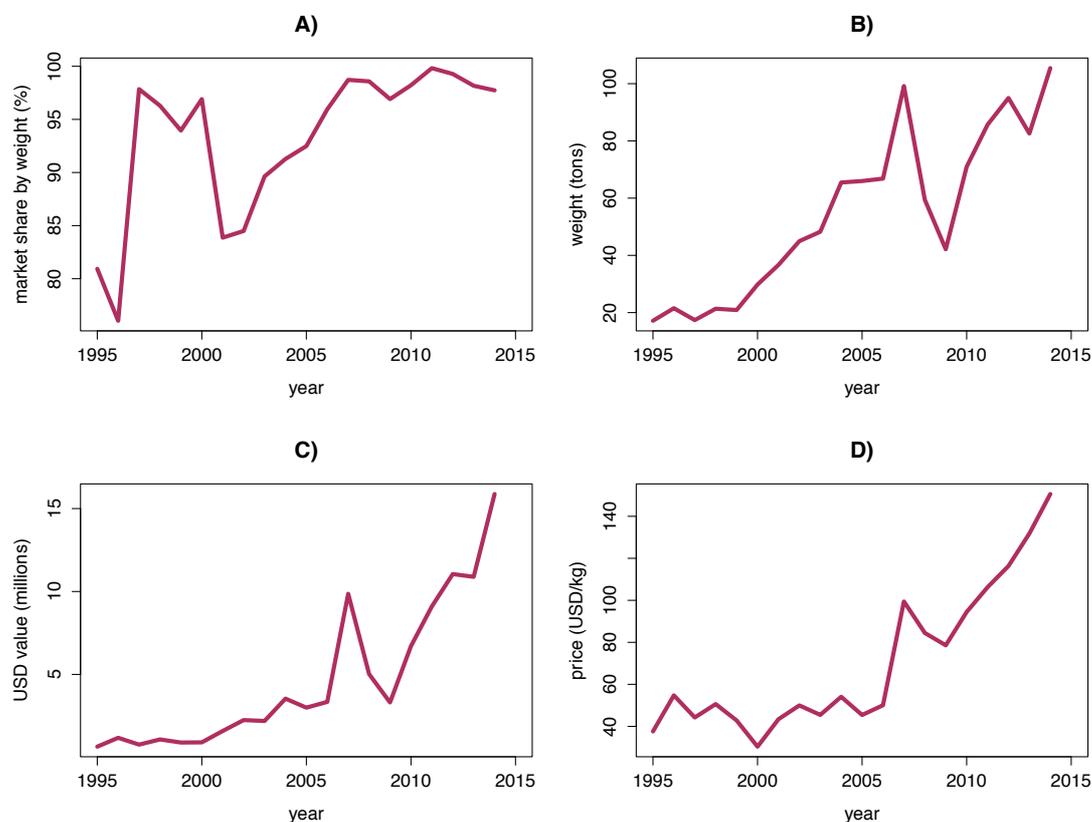

Figure 6. Trend in China's (including Hong Kong and Macao SAR) share of raw ivory imports from the Russian Federation in the period 1995-2014 (A), and trends raw ivory exports from the Russian Federation (as reported by all importers), in the same period, by declared weight (B), declared import value (C) and average declared price (derived) (D). These values are for all raw ivory from the Russian Federation, which may include non-mammoth ivories such as walrus and narwhal, but those are likely to only represent a small proportion of the totals. All dollar values are in real terms (2010 USD). Source: http://comtrade.un.org. Data for 2015 were not yet available from all importers when this document was being finalized (April 2016).

MIKE objective iii): Establishing an information base to support decisions on management, enforcement and protection needs

37. In order to complement the information base provided by MIKE on levels of and trends in illegal killing of elephants, the MIKE Programme has developed a site-level Law Enforcement Capacity Assessment (LECA) designed to assess the effort and resources employed by participating range States in the detection and prevention of illegal killing of elephants. This assessment, which was developed as part of the project entitled "Minimizing the Illegal Killing of Elephants and other Endangered Species" (MIKES) with funding from the European Union, is also intended to help participating range States, and the wider CITES community, to better understand the status of wildlife law enforcement efforts at the conservation area level, to pinpoint key areas where investments and projects could potentially be targeted, and to monitor progress in strengthening wildlife law enforcement capacity.

38. The LECA is designed to be undertaken as a self-assessment by wardens or senior wildlife law enforcement officers based at participating MIKE sites. The assessment is administered in a Portable Document Format (PDF) form, which can be sent by email and can be either completed electronically or

printed and filled in manually. The assessment is organized into a series of law enforcement pillars, each with a set of questions designed to assess a different aspect of law enforcement capacity at site level. The form and guidance can be downloaded from https://cites.org/eng/prog/mike/tools_training_materials/leca.

39. The assessment consists of 41 questions organized into the following six law enforcement pillars:

      A. Law Enforcement finances and human resources (six questions)
      B. Law Enforcement patrols (twelve questions)
      C. Patrol operations (seven questions)
      D. Investigations and intelligence (five questions)
      E. Law Enforcement monitoring (six questions)
      F. Community participation in Law Enforcement (five questions)

40. For each question, respondents are asked to select an option from a four-point descriptive ranked scale that best matches the current circumstances at the site. Respondents can further elaborate their answers in a comments field. The assessment is intended to be completed by a lead person, assisted where possible by specialists in the different law-enforcement pillars.

41. In 2015, the assessment form and guidance on its completion were circulated to all MIKE sites in Africa via MIKE national focal points. At the time of writing (April 2016), 43 responses had been received. There were roughly equal numbers of responses from the four subregions (11 from Central Africa; 12 from Eastern Africa; 10 from Southern Africa; and 10 from West Africa). Figure 7 summarizes the responses received, with average scores by pillar, displayed as a star plot for each site.

42. While the results of the self-assessments showed clear differences between sites, no clear spatial pattern is discernible from the data. A pattern that does emerge from the self-assessment, however, is that sites tend to consider themselves weakest in the pillar of investigations and intelligence (pillar D). Indeed, the two questions with the two lowest average scores (1.9 & 2.2 out of a maximum of 4) were both from this pillar. Approximately four out of five sites (80%) indicated that human resource capacity for wildlife investigation and intelligence gathering was insufficient and that, while intelligence information may be stored electronically, it was not often used to inform the law enforcement response (Figure 8). This finding is particularly relevant in view of evidence that investigations and intelligence are more effective in combating poaching than are regular patrols (Jachmann, 1998).

43. Despite the inherent limitations of self-assessments, feedback obtained from range States suggests that the MIKE Law Enforcement Capacity Assessments help site managers to evaluate their capacity and needs to effectively prevent and respond to wildlife crime in a structured manner. Indeed, several African elephant range States have requested that the MIKE Programme conduct these assessments on an annual schedule, rather than the biennial schedule that was originally envisaged. In addition, the MIKE Programme is conducting on-site verification exercises, which will increase the reliability of these assessments. Verified assessments may not only help to pinpoint areas where investments in strengthening wildlife law enforcement capacity should be focused, but might also provide a good source of data for evaluating the relationship between law-enforcement capacity and poaching levels.

MIKE objective iv): Capacity building in elephant range States

44. In accordance with its mandate under Resolution Conf. 10.10 (Rev. CoP16), the CITES MIKE Programme has traditionally focused its capacity building efforts at the site level with the aim of improving the ability of site management ability to implement and make use of MIKE and to enhance wildlife law enforcement.

Ability of site management to implement and make use of MIKE

45. Reliance on ranger-based monitoring as the primary source of information has been one of the key strengths of the MIKE Programme. This bottom-up approach to data collection and analysis places a high value on practical information derived straight from site-level monitoring. In this way, MIKE is well placed to enable monitoring systems to be tailored to meet site-specific management needs, as well as to inform adaptive management. However, many sites also require significant additional resources and capacity building support if this potential to support area management is to be fully realised and utilized.

Figure 7. Summary results from the MIKE site-level Law Enforcement Capacity Assessment conducted in 2015. The length of the spokes in the star plots represent the mean score for each pillar. The plots are colour-coded on mean scores across all pillars as low (red, average score less than 2), intermediate (orange, average score between 2 and 3) and high mean (green, average score greater than 3). The size of the spokes in the legend is not to scale with the spokes in the star plots.
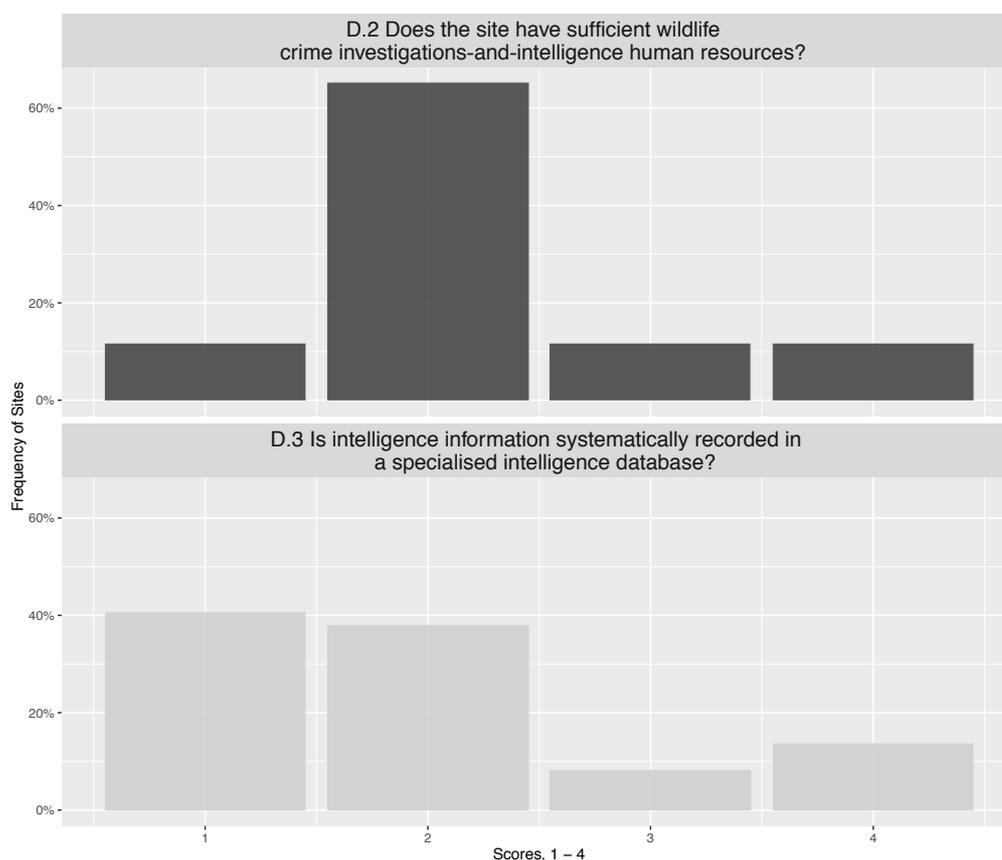
Figure 8. Frequency of responses for the two lowest-scoring questions in the site-level enforcement capacity assessment conducted in 2015, both of which are in pillar D (Investigations and intelligence). For question D2, the possible responses are as follows: 1: the site has no investigations-and-intelligence staff; 2: investigations and intelligence are functions of LE staff at the site, but the capacity is insufficient; 3: investigations and intelligence are functions of LE staff at the site, and the capacity is sufficient; 4: the site has dedicated, trained and active investigations-and-intelligence staff and their number is sufficient for the scale of the wildlife crime problem. For question D3, the possible responses are as follows: 1: intelligence information is only responded to as necessary and there is no database used to record information collected; 2: basic intelligence information is recorded in a generic database (such as a spreadsheet), but it does not help investigators to develop suspect profiles using partial information or to establish linkages between information provided; 3: intelligence information is recorded in a specialized intelligence database that can build suspect profiles and establish linkages, but feedback to management action is insufficient; 4: intelligence information is recorded in a specialized intelligence database, and this is frequently informing management responses.

46. The MIKE Subregional Support Units have led capacity building efforts in this area and have focused on selecting and supporting suitable monitoring tools with regard to site capacity and management needs, and strengthening the ability of sites to implement and make use of these tools as part of the MIKE system. This capacity building has been achieved through a variety of site visits, on-site training, and technical support, including establishing and maintaining hardware and software, and support for data collection and management. Table 2 provides a summary of the 43 site-based training events that took place during 2013 and 2014. This level of effort will continue during the ongoing EU-funded MIKES project, which was launched in 2014 and will run to 2018. However, activities in 2015 were hampered by problems brought about by the United Nations transition to Umoja, the new Enterprise Resource Planning system implemented that year. The transition made it impossible to process payments to implementing partners for an extended period, hence negatively affecting the activities of the MIKE Subregional Support Units. The Secretariat is sincerely grateful to IUCN, which hosts the MIKE Subregional Support Units, for its continued support to the MIKE programme in the face of these challenges. Fortunately, however, these issues have now been largely resolved, and capacity-building activities resumed in March 2016.

Table 2. Summary of training activities conducted by the MIKE Subregional Support Units in Africa in 2013 and 2014.

Subregion	Country	Site	Data collection: No. field staff trained	Data Management: No. officers trained
Central Africa	Cameroon	Bouba-Ndjida	32	4
	Cameroon	Boumba Bek	23	8
	Cameroon	Deng Deng	15	4
	Cameroon	Lobéké		2
	Cameroon	Waza	24	3
	Central African Republic	Dzanga Sangha		3
	Chad	Sena Oura	10	6
	Chad	Zakouma		1
Eastern Africa	Ethiopia	Babile	15	
	Rwanda	Akagera	15	
	United Republic of Tanzania	Katavi Rukwa	20	
	United Republic of Tanzania	Ruaha Rungwa	49	
	Uganda	Murchison Falls	50	
	Uganda	Queen Elizabeth	50	
Southern Africa	Botswana	Chobe	33	
	Malawi	Kasungu	31	3
	Mozambique	Magoe	10	
	Mozambique	Niassa	10	
	Namibia	Caprivi	5	
	Zambia	National (Chipata)		28
	Zambia	South Luangwa	47	
	Zimbabwe	Chewore	33	
	Zimbabwe	Mana Pools	30	
	Zimbabwe	National (Harare)		22
	Zimbabwe	Nyaminyami	14	
West Africa	Burkina Faso	Nazinga		3
	Côte d'Ivoire	Marahoué	15	
	Ghana	Kakum		7
	Ghana	Mole		11
	Guinea	Ziama	15	
	Mali	Gourma	12	
	Niger/Benin	Parc W	24	18
	Liberia	Sapo		2
	Togo	Fazao-Malfakassa	9	2
TOTAL	**23 countries**	**34 sites**	**581**	**127**

47. Training in data management has involved a number of tools, primarily MIST (Management Information SysTem; see http://ecostats.com/web/MIST) and, more recently, SMART (Spatial Monitoring and Reporting Tool; see http://smartconservationtools.org). However, both of these systems require a relatively high level of technical capacity and IT infrastructure at the site, which has undermined their utility in many sites. The MIKE Programme's approach has remained to support implementation of the most appropriate tools in relation to existing management needs and capacity, rather than to focus on the promotion of a particular monitoring tool.

48. As many sites appeared to be struggling to utilize effectively the full potential of some of the more sophisticated tools, a simpler, spreadsheet-based 'MIKE Workbook' is being developed and piloted in a number of sites. Many sites have already utilized an early version of this tool to report elephant mortalities to the MIKE Programme, and the focus is now on developing simple summaries of law enforcement effort and other basic metrics that can immediately inform area management, while still meeting MIKE reporting needs.

49. In combination with training activities, key equipment was also provided to improve the ability of MIKE sites, and national and site focal points to implement and make use of MIKE systems. This included hardware for data collection (i.e. Global Positioning System units and other handheld data collection devices) as well as a number of computers for the management of data on elephant mortality and other information (such as law enforcement effort and coverage information). This is in addition to the nominal support provided to MIKE sites to aid data collection and management.

50. Strong, ongoing interactions between the Subregional Support Officers and the focal points for countries and sites are critical in achieving and maintaining an adequate standard in data quality, in ensuring that MIKE data are of value to the sites, and in facilitating the uptake of the new aspects of the MIKE Programme. The MIKE Subregional Support Units further enhance the capacity of focal points by facilitating travel and communications between national offices and MIKE sites, by providing limited computer equipment and software, and by providing training in data management.

51. Overall, demand for, and uptake of, MIKE monitoring protocols remain strong among elephant range States. Indeed, there is demand from range States not originally included in the site sample, such as Angola and South Sudan, to formally join MIKE. Similarly, there is demand from range States already participating in MIKE to add new MIKE sites without expectation of support from the MIKE Programme. From the point of view of the MIKE and ETIS TAG, adding new sites would serve to strengthen the monitoring system and the inferences that can be drawn from MIKE data, provided that data quality can be assured and that MIKE human resources and support to sites are not further diluted. Responding to this demand and advice from the TAG, the MIKE Programme recently established a process for new sites to be added to the MIKE system on a voluntary basis. For details on the process and the nomination form, see https://cites.org/sites/default/files/common/prog/mike/tools/MIKE_Site_nomination_form_150814.pdf.

52. In April 2016, the Secretariat received an application from Mozambique to include Limpopo National Park in the list of MIKE sites. Upon review of the application, the MIKE and ETIS TAG recommended that Limpopo National Park be added to the list, and the site has now been added to the list.

Enhancing wildlife law enforcement

53. The final evaluation of the MIKE Phase II project, which ran from 2006 to 2012 with funding from the European Union, recognized that, with the resources available to MIKE, it was not possible to build capacity substantially across all MIKE sites in Africa. The evaluation recommended that, in addition to ongoing activities, MIKE provide specific and more substantial support focused on enhancing enforcement in a smaller number of important conservation areas.

54. As a result of this recommendation, under the MIKES project, funds have been allocated for focused efforts to build law-enforcement capacity in eight 'focal sites'. The focal sites were selected on the basis of their importance for elephant conservation and other key CITES-listed species, levels of poaching, and existing levels of law-enforcement capacity. An objective process based on well-defined criteria was employed in the selection of the focal sites. This process was endorsed by the MIKE and ETIS Subgroup of the Standing Committee and undertaken in close consultation with the African elephant range States.

55. The eight selected focal sites, along with the specific areas of capacity building support being provided, are shown in Table 3. At the time of writing this document (April 2016) five support packages had been developed and agreements with implementing partners were being finalized. The specific areas of support were defined through participative meetings held in the focal sites with site-based managers and senior or experienced field staff, and were then reviewed at the national level by senior wildlife management agency staff. The implementation of these support packages will be overseen by two Senior Technical Advisors — one in Central and West Africa and one in Eastern and Southern Africa — who will be collocated with the MIKE Subregional Support Units and hosted by IUCN. At the time of writing, the recruitment of these Senior Technical Advisors was still ongoing.

Table 3. Focal sites selected under the MIKES project and main focus of capacity-building activities developed, as at the end of April 2016.

Subregion	Country	Site	Main focus of activities
Central Africa	Cameroon	Boumba Bek National Park	Patrol staff effectiveness Law enforcement operations management Law enforcement monitoring
	Central African Republic	Dzanga Sangha Complex	Patrol staff effectiveness Law enforcement operations management Specialized law enforcement operations
	Democratic Republic of the Congo	Okapi Faunal Reserve	To be confirmed

Subregion	Country	Site	Main focus of activities
Eastern Africa	Uganda	Queen Elizabeth National Park	Patrol staff effectiveness Law enforcement operations management Intelligence, investigations and prosecutions Law enforcement monitoring
	United Republic of Tanzania	Katavi National Park and Rukwa Game Reserve	To be confirmed
Southern Africa	Mozambique	Niassa National Reserve	Patrol staff effectiveness Management facilities and patrol mobility Intelligence and community collaboration Law enforcement monitoring
	Zimbabwe	Mana Pools, Sapi and Chewore World Heritage Site	Patrol staff effectiveness Law enforcement operations management Law enforcement monitoring Intelligence and community collaboration
West Africa	Benin, Burkina Faso and Niger	Parc W, Arli and Pendjari (WAP) Complex	To be confirmed

Capacity building activities in Asia

56. For the last 10 years, progress in the implementation of MIKE in Asia has been hampered by insufficient funding, despite the widespread support amongst Asian elephant range States for the revival and continued implementation of MIKE in Asia. In 2014, the US Fish and Wildlife Service awarded a grant to the CITES Secretariat for MIKE in South Asia. Funds from that grant have enabled the MIKE Programme to establish a Subregional Support Unit hosted by the IUCN Country Office in Delhi, India. The same funds also permitted the development, in partnership with the United Nations Office on Drugs and Crime (UNODC), of a funding proposal to the European Union to support law enforcement and monitoring activities in both South and Southeast Asia between 2016 and 2018. The proposal was approved by the European Commission and the project was launched in March 2016. The CITES-implemented component of the project will support the fulfillment of the MIKE and ETIS mandate in Asia. The UNODC-implemented component will: strengthen national-level legal frameworks for combating wildlife trafficking and crime; strengthen capacity for investigating and prosecuting illegal wildlife trade incidents, including in domestic markets; and build collaboration in wildlife crime and trafficking prevention nationally and regionally.

Summary and conclusions

57. Based on the best available evidence, the MIKE Programme documented a considerable increase in levels of illegal killing of elephants in Africa between 2006 and 2011. There are strong reasons to believe that this increase has had negative consequences on elephant populations across much of Africa in recent years. Although average poaching levels have declined and stabilized since 2011, they remain higher than they were in the 2000s, and may still be having a negative impact on elephant populations in many parts of the continent. It is estimated that the number of elephants illegally killed annually in Africa between 2010 and 2015 ran into the tens of thousands. Although moving in the right direction, elephant poaching trends in 2015 remained a cause for concern.

58. The MIKE Programme has found no evidence that levels of elephant poaching increased or decreased as a direct result of CITES decisions concerning the trade in elephant ivory. Instead, MIKE has documented strong correlations between: poaching levels and the quality of human livelihoods at the site level; the quality of governance at the country level; and demand for ivory at the global level.

59. The MIKE Programme has continued to build and expand the information base to support the protection of elephants, striving to ensure that such information is relevant and used to inform management at the site, national, subregional and global levels. In this regard, the Secretariat hopes that the Law Enforcement Capacity Assessments recently developed by the MIKE Programme will result in a better understanding of law-enforcement capacity challenges faced by those charged with the protection of elephants across their range, and that this will assist in better focusing capacity-building efforts. Within its means, the Secretariat

will continue to work with elephant range States to strengthen the capacity of elephant range States to manage their elephant populations sustainably.

60. Subject to the availability of the substantial external funds required to implement MIKE, the Secretariat will continue to improve and refine and enhance the MIKE Programme, its tools and its outputs, and will also continue report to the Conference of the Parties, and to the Standing Committee, as may be required by the proposed revision to Resolution Conf. 10.10 on *Trade in elephant specimens* under agenda item 57. Funds for MIKE implementation in Africa and Asia have been secured up to the end of 2018 (see the Annex).

Acknowledgements

61. The Secretariat is deeply grateful to the European Union for its continued support of the MIKE Programme in Africa (currently through the MIKES project), and now in Asia as well. The CITES Secretariat is also grateful to France, Japan, the United Kingdom of Great Britain and Northern Ireland, and the United States of America for funding provided to the MIKE Programme in Asia in previous years.

62. The Secretariat is also grateful to the members of the MIKE and ETIS Subgroup of the Standing Committee for their oversight of MIKE, and to the members of the MIKE and ETIS TAG for their dedication to ensure that MIKE delivers sound and robust outputs to the Convention and to the elephant range States. The Secretariat would also like to express its appreciation to IUCN for its long-standing partnership in the implementation of the MIKE programme.

63. Finally, the Secretariat would like to express its sincere appreciation to the African and Asian elephant range States for their commitment, ownership and vital in-kind support to the implementation of MIKE.

Recommendation

64. The Conference of the Parties is requested to note this report.

References

African Elephant Specialist Group. 2014. "*Provisional African Elephant Population Estimates: Update to 31 Dec 2013*." http://www.elephantdatabase.org/preview_report/2013_africa_final/2013/Africa.

Blanc, J. Julian, Richard F. W Barnes, G. Colin Craig, Holly T Dublin, Chris R Thouless, Iain Douglas-Hamilton, and John A Hart. 2007. *African Elephant Status Report 2007: An Update from the African Elephant Database*. Vol. 33. Occasional Papers of the IUCN Species Survival Commission. Gland, Switzerland: IUCN. https://portals.iucn.org/library/efiles/documents/SSC-OP-033.pdf.

Burn, Robert W., Fiona M. Underwood, and Julian Blanc. 2011. "Global Trends and Factors Associated with the Illegal Killing of Elephants: A Hierarchical Bayesian Analysis of Carcass Encounter Data." *PLoS ONE* 6 (9): e24165. doi:10.1371/journal.pone.0024165.

Craig, G. Colin. 2012. "*Aerial Survey Standards for the MIKE Programme — Version 2.0*." Nairobi: CITES MIKE. https://cites.org/sites/default/files/common/prog/mike/survey/MIKE_aerial_standards.v2.pdf.

Farge, Emma. 2015. "Poaching Threatens Mali's Rare Desert Elephants: UN Mission." *Reuters Africa*, October 9. http://af.reuters.com/article/topNews/idAFKCN0S30MR20151009.

Foley, Charles A. H., and Lisa J. Faust. 2010. "Rapid Population Growth in an Elephant Loxodonta Africana Population Recovering from Poaching in Tarangire National Park, Tanzania." *Oryx* 44 (02): 205–12. doi:10.1017/S0030605309990706.

Gao, Yufang, and Susan G. Clark. 2014. "Elephant Ivory Trade in China: Trends and Drivers." *Biological Conservation* 180 (December): 23–30. doi:10.1016/j.biocon.2014.09.020.

Harvey, Walter R. 1966. "Least-Squares Analysis of Data with Unequal Subclass Numbers." ARS 20-8. Betsville, MD: US Department of Agriculture. http://agris.fao.org/agris-search/search.do?recordID=US201300590036.

Hedges, Simon, and David Lawson. 2006. "Dung Survey Standards for the MIKE Programme." Nairobi: CITES Monitoring the Illegal Killing of Elephants. http://www.cites.org/common/prog/mike/survey/dung_standards.pdf.

Jachmann, Hugo. 1998. *Monitoring Illegal Use and Law Enforcement in African Savanna Rangelands*. Edited by Richard C. V Jeffery. Lusaka: Wildlife Resource Monitoring Unit.

Leibenstein, H. 1950. "Bandwagon, Snob, and Veblen Effects in the Theory of Consumers' Demand." *The Quarterly Journal of Economics* 64 (2): 183–207. doi:10.2307/1882692.

Lindeque, Malan. 1988. "*Population Dynamics of Elephants in Etosha National Park, S.W.A./Namibia*." D.Phil, Stellenbosch University. http://hdl.handle.net/10019.1/66481.

Moss, Cynthia J. 2001. "The Demography of an African Elephant (Loxodonta Africana) Population in Amboseli, Kenya." *Journal of Zoology* 255 (2): 145–56. doi:10.1017/S0952836901001212.

Moyle, Brendan. 2014. "The Raw and the Carved: Shipping Costs and Ivory Smuggling." *Ecological Economics* 107 (November): 259–65. doi:10.1016/j.ecolecon.2014.09.001.

Searle, S. R., F. M. Speed, and G. A. Milliken. 1980. "Population Marginal Means in the Linear Model: An Alternative to Least Squares Means." *The American Statistician* 34 (4): 216–21. doi:10.1080/00031305.1980.10483031.

Vigne, Lucy, and Esmond Martin. 2014. *China Faces a Conservation Challenge: The Expanding Elephant and Mammoth Ivory Trade in Beijing and Shanghai*. Nairobi and Lympne: Save the Elephants / The Aspinall Foundation. http://saveheelephants.org/wp-content/uploads/2014/12/2014_ChinaConservationChallenge.pdf.

Whyte, Ian J. 2001. "*Conservation Management of the Kruger National Park Elephant Population*." PhD, University of Pretoria. http://upetd.up.ac.za/thesis/available/etd-02272006-101716/.

Wittemyer, George, David Daballen, and Iain Douglas-Hamilton. 2013. "Comparative Demography of an at-Risk African Elephant Population." *PLoS ONE* 8 (1): e53726. doi:10.1371/journal.pone.0053726.

Wittemyer, George, Joseph M. Northrup, Julian Blanc, Iain Douglas-Hamilton, Patrick Omondi, and Kenneth P. Burnham. 2014. "Illegal Killing for Ivory Drives Global Decline in African Elephants." *Proceedings of the National Academy of Sciences* 111 (36): 13117–21. doi:10.1073/pnas.1403984111.

TENTATIVE BUDGET AND SOURCE OF FUNDING FOR THE
IMPLEMENTATION OF DRAFT RESOLUTIONS OR DECISIONS

According to Resolution Conf. 4.6 (Rev. CoP16) on Submission of draft resolutions, draft decisions and other documents for meetings of the Conference of the Parties, the Conference of the Parties decided that any draft resolutions or decisions submitted for consideration at a meeting of the Conference of the Parties that have budgetary and workload implications for the Secretariat or permanent committees must contain or be accompanied by a budget for the work involved and an indication of the source of funding.

As a number of revisions are being proposed to Resolution Conf. 10.10 (Rev. CoP16), estimated budgets for MIKE operations in Africa (2015-2018) and Asia (2016-2019) are presented below. These funds have been secured from the European Union, and are denominated in Euros.

MIKE implementation in Africa

Activity	EUR Budget
Capacity building at MIKE sites, subregional coordination and data compilation (58 sites)	€2,734,070
Law enforcement support to eight focal MIKE sites (see Table 3 for list of areas and countries)	€3,723,202
National-level law enforcement support (Congo, Gabon, Kenya, Mozambique)	€408,750
Analysis of illegal killing and methodological development; support to ETIS and African Elephant Database; MIKE & ETIS TAG meetings; and emergency support to sites	€1,244,642
Global coordination and operating costs	€2,271,000
Communications and visibility actions	€371,000
Audit	€45,000
Administrative Costs for CITES Secretariat and UNEP (7%)	€755,836
Total	**€11,553,500**

MIKE Implementation in Asia

Activity	EUR Budget
Capacity building at MIKE sites, subregional coordination and data compilation	€1,207,758
Capacity building to make use of MIKE and ETIS at national level	€563,529
Administrative costs for CITES Secretariat and UNEP (7%)	€123,990
Total	**€1,895,277**