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

Sixteenth meeting of the Conference of the Parties
Bangkok (Thailand), 3-14 March 2013

Interpretation and implementation of the Convention

Species trade and conservation

Elephants

MONITORING THE ILLEGAL KILLING OF ELEPHANTS

1. This document has been prepared by the Secretariat.

Background

2. The programme known as the CITES Monitoring the Illegal Killing of Elephants (MIKE) was established under the supervision of the Standing Committee in accordance with the provisions of Resolution Conf. 10.10 adopted at the 10th meeting of the Conference of the Parties (CoP10, Harare, 1997) on *Trade in elephant specimens* [now Resolution Conf. 10.10 (Rev. CoP15)]. The Resolution stipulates that "the CITES Secretariat will provide an updated report on information collected, as part of this monitoring programme, at each meeting of the Conference of the Parties".

3. The Secretariat has provided progress reports at the 11th, 12th, 13th and 14th and 15th meetings of the Conference of the Parties (Gigiri, 2000; Santiago, 2002; Bangkok, 2004; The Hague, 2007; and Doha, 2010, respectively). An adapted version of the report produced by the MIKE programme for CoP15 [document CoP15 Doc. 44.2 (Rev. 1)] was submitted in 2011 for publication in a scientific peer-reviewed journal, and was published by the Public Library of Science in September of that year.[1] In addition to being reviewed by the CITES community, the MIKE analytical methods have therefore now undergone the formal scientific peer-review process.

4. In compliance with Decision 14.78 (Rev. CoP15), the Secretariat reported findings from the MIKE programme at the 61st and 62nd meetings of the Standing Committee (SC61, Geneva, August 2011; and SC62, Geneva, July 2012). The Secretariat also presented information on the operation and results of MIKE to the Standing Committee's MIKE-ETIS Subgroup, with the Subgroup also reporting to the Standing Committee. Other documents relating to the MIKE programme are available on the CITES website.

5. The present report presents an analysis of trends in levels of illegal killing of elephants based on data collected up to the end of 2011 and submitted to the MIKE programme. In addition, the report contains an analysis of factors associated with levels in the illegal killing of elephants. This analysis was presented at SC62, after a review of the analytical report by the Technical Advisory Group (TAG).

6. In compliance with a request from the Standing Committee at its 58th meeting (Geneva, July 2009) to provide the Conference of the Parties with information as up-to-date and complete as possible, elephant carcass data continued to be collected during the course of 2012 and an updated trend analysis, including data to the end of June 2012, will be presented in a revision to this document before the present meeting.

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[1] *The paper can be found at http://dx.doi.org/10.1371/journal.pone.0024165.*

7. This document also includes a brief analysis of the current poaching situation in World Heritage sites of the UNESCO World Heritage Convention that participate in the MIKE programme.

8. Finally, this report provides a summary of information on the implementation of MIKE based on the results of a questionnaire survey conducted at the site and country levels.

MIKE data analysis of 2011: trends and factors influencing levels of illegal killing of elephants

9. In compliance with Decision 14.78 (Rev. CoP15), an analysis of data compiled by the CITES MIKE programme was conducted in February 2012 and duly reviewed by the MIKE Technical Advisory Group (TAG), for consideration at SC62. The analysis builds on previous MIKE analyses submitted at CoP15 and SC61. New features and refinements in this analysis include new site-level covariates on Protected Area Management Effectiveness indicators and rainfall anomaly data; a more thorough analysis of trends; and estimates of the scale of poaching at MIKE sites.

10. Data for 1,408 new carcasses collected in 2011 were received from 37 sites in Africa. Only five Asian sites, all in Southeast Asia, reported any carcasses in 2011, with four sites reporting one carcass each and one site reporting three carcasses. In view of this, and in view of the fact that no data for Asian sites could be obtained for 2010, the current analysis is restricted to African sites only. Notable gaps in the African data for 2011 include all but two of the 11 participating west African range States. As noted in the MIKE reports for SC61 and SC62, there continues to be ample room for improvement in reporting in West Africa and Asia.

11. The data set used for analysis consists of 8,575 records of carcasses of elephants that died between 2002 and 2011 in 49 MIKE sites in 27 range States in Africa, representing a total of 348 site years[2]. The data can be found in the Annex to this document.

12. The MIKE programme evaluates relative poaching levels based on 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 through other means, aggregated by year for each site. As a ratio, PIKE is a dimensionless quantity that can range in value from zero (no illegally killed elephants encountered) to one (all dead elephants encountered were illegally killed). PIKE may be affected by a number of potential biases related to data quality, carcass detection probabilities and other factors, hence results need to be interpreted with caution. However, the fact that the quantitative results presented below are in good agreement with quantitative information available from the Elephant Trade Information System (ETIS), as well as with qualitative information from the IUCN/SSC African Elephant Specialist Group, gives confidence as to the robustness of the results.

Trends and levels of illegal killing of elephants

13. Figure 1 shows time trends in PIKE at the continental level for African MIKE sites, with error bars (95 % confidence intervals[3]). The data suggest an ongoing increase in levels of illegal killing of elephants since 2006, with 2011 displaying the highest levels of poaching since MIKE records began in 2002. This increase between 2010 and 2011 is statistically significant. Prior to 2011, 2010 had the highest levels on record.

14. As Figure 2 shows, poaching levels in 2011 were clearly increasing in all four African subregions. While central Africa continued to display the highest levels of elephant poaching in any subregion, PIKE levels were above 0.5 in all four subregions in 2011, meaning that more than half of elephants found dead were deemed to have been illegally killed. This level translates to an illegal annual offtake likely to be higher than the number of elephants born annually in a naturally increasing population. In other words, a PIKE level of 0.5 or higher means that the elephant population is very likely to be in net decline (see also the section on *Scale of elephant poaching* below).

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[2] *A year in which a site submits carcass data is counted as one site year.*

[3] *The range of values in which the true value is likely to fall with a probability of 95 %.*

Figure 1. PIKE trends in Africa with 95 % confidence intervals.
The number of carcasses on which the chart is based is shown at the bottom of the figure.

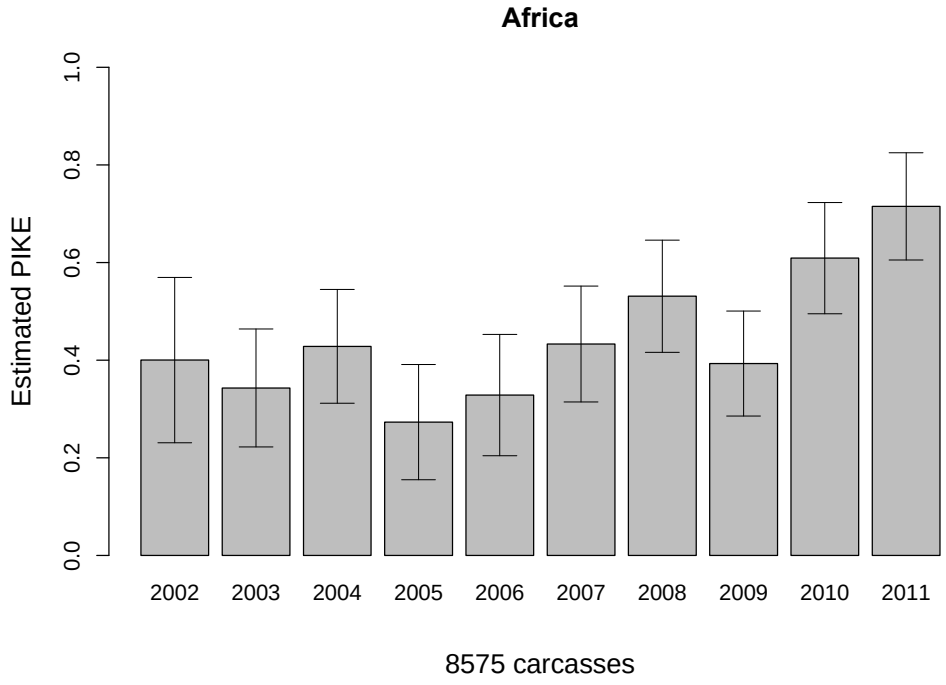
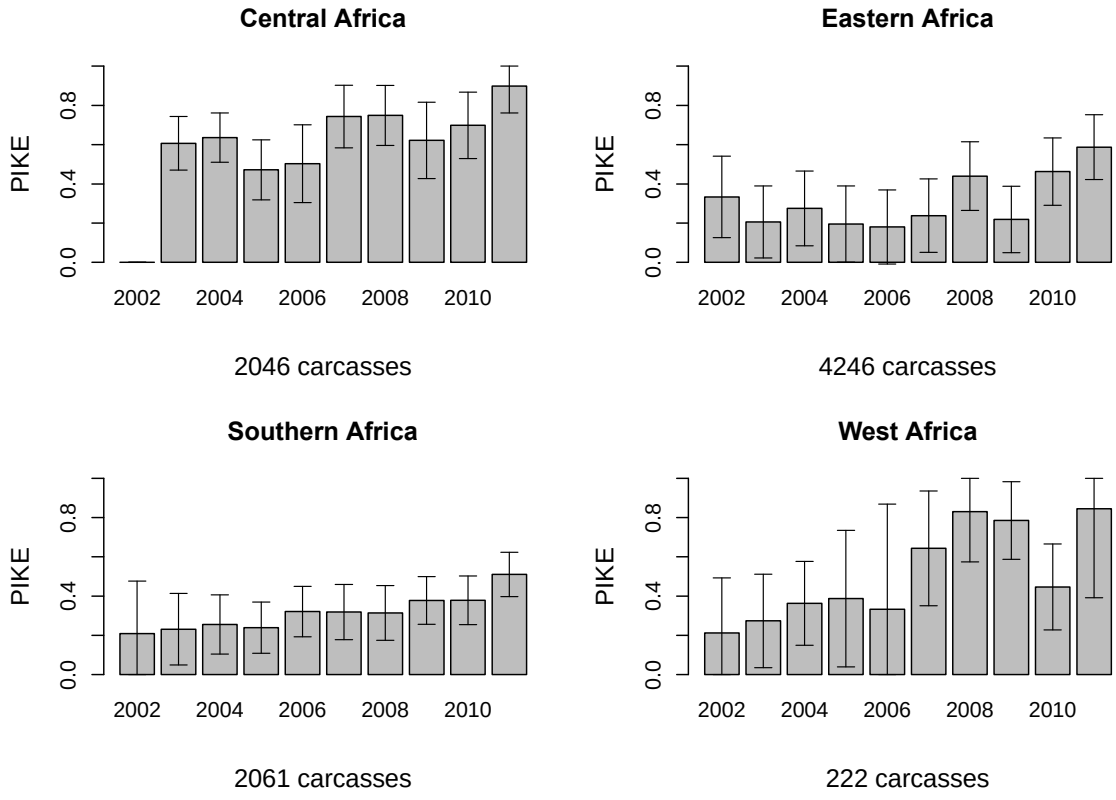


Figure 2. Subregional PIKE trends with 95 % confidence intervals.
The number of carcasses on which the graphs are based is shown at the bottom of each graph.



Factors associated with levels of illegal killing of elephants

15. The MIKE analysis evaluated the relationships between poaching levels and a wide range of factors at the site, country and global levels, including those identified as important in previous MIKE analyses. A number of new, time-dependent, site-level covariates were also incorporated into the analysis. These included

variables on Protected Area Management Effectiveness (PAME) and rainfall anomalies. A full list of covariates used and descriptions on how the new covariates were assembled can be found in document SC62 Inf. 1, together with a detailed description of the analytical procedures followed.

16. The statistical model developed as part of the analysis, which includes the factors described below, explains nearly 65 % of the total variation in PIKE (see document SC62 Inf. 1 for details). Figure 3 below shows the relationships between PIKE and the various site-, country- and global-level covariates that emerged as important correlates of PIKE in the analysis.

Site-level factors

17. Human infant mortality in and around MIKE sites, which is used as a proxy for poverty at the site level, is the single strongest site-level correlate of PIKE, with sites suffering from higher levels of poverty experiencing higher levels of elephant poaching.

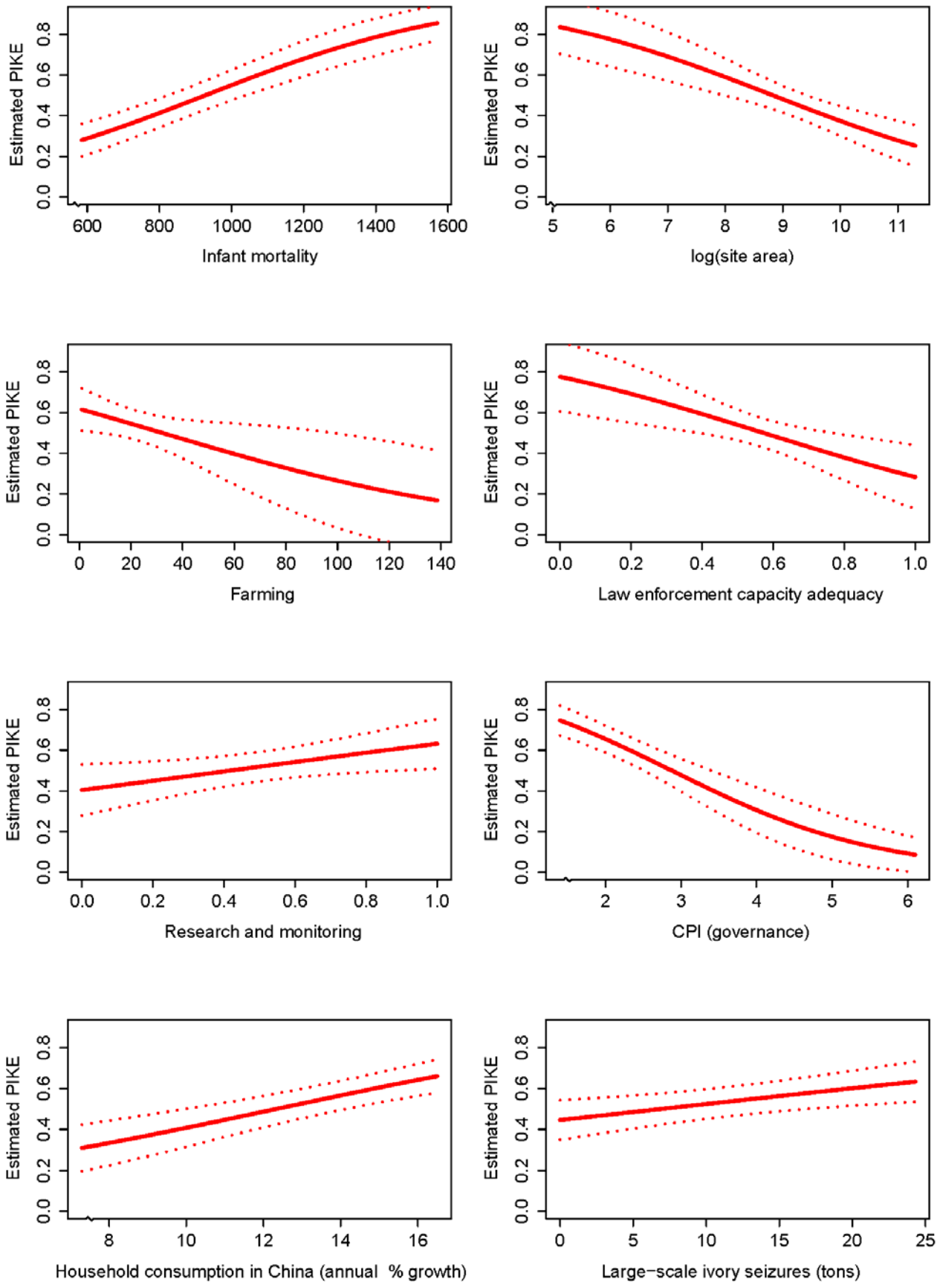
18. Both livestock density and crop occurrence are negatively correlated with PIKE, meaning that poaching levels decrease as livestock or crop density increase. These variables were merged into a single variable named 'farming' and used as a proxy for food security. The relationship between farming and PIKE may be confounded by the fact that both crop occurrence and livestock density are strongly correlated with human population density. Nevertheless, there is only weak evidence of a (negative) relationship between human population density and PIKE, and there was no significant relationship between PIKE and land degradation. The relationships between poverty, food security and PIKE highlight a close linkage between the well-being of local communities and the health of elephant populations, and suggest that there may be a greater incentive to facilitate or participate in the illegal killing of elephants in areas where human livelihoods are insecure.

19. Results also show that sites with a better law enforcement capacity, as estimated by PAME methodologies, tend to experience lower levels of elephant poaching. In contrast, sites with better research and monitoring efforts tend to report higher PIKE levels, suggesting that better monitoring results in higher detection rates of elephants killed illegally, rather than higher rates of illegal killing.

20. In the two previous MIKE analyses, a strong relationship was detected between vegetation density and PIKE. This variable was interpreted as an indicator of the ease with which poaching can be conducted, with higher levels of poaching in forested areas. However, in the present analysis, the effect of this variable on PIKE declined in importance to the point of becoming statistically not significant. This may be a reflection of the ongoing increase in poaching levels across the continent, which is taking place in forest and savannah alike. On the other hand, the surface area of each site, which was also considered to be an indicator of ease of poaching, continues to emerge as a significant correlate of PIKE in the present analysis, with generally lower levels of poaching in larger sites.

21. Although rainfall anomaly on its own did display a positive relationship with PIKE (suggesting that lower-than-average rainfall is associated with lower PIKE levels due to increases in natural mortality caused by drought), the significance of the relationship dissipated when the variables discussed above were included in the model. Therefore, while PIKE may be diluted by droughts at individual sites, this effect disappears when multiple sites and other explanatory factors are taken into consideration.

Figure 3. Relationships between covariates and PIKE while holding other covariates constant at their means. Dotted lines represent 95 % confidence bands.



Country-level factors

22. As in all previous MIKE analyses, governance continues to emerge as the single most important national-level correlate of elephant poaching. The consequences of poor governance are likely to manifest themselves throughout the ivory supply chain, facilitating the movement of illegal ivory from the killing site all the way to the point of export, be it through weak law enforcement or active aiding and abetting by corrupt officials. National-level indicators of governance and human development are strongly correlated, and there is good evidence of a two-way causal relationship between the two, whereby limitations in one preclude improvements in the other. While this makes it difficult to tease apart the effects of each in isolation, the empirical relationships between PIKE and site-level poverty on the one hand, and national-level governance on the other, are consistent with the hypothesis that both poverty and weak governance are independently correlated with levels of illegal killing of elephants.

Global-level factors

23. In order to test for relationships between consumer demand and PIKE, the MIKE analysis prepared for SC61 tested the relationship between PIKE and trends in consumer spending (as measured by the annual percentage change in household consumption expenditure) in several countries identified by ETIS as potentially important destinations or transit points for illegal ivory (namely China, Japan, Malaysia, the Philippines, Thailand and Viet Nam). China was the only one of these countries where trends in household consumption expenditure were strongly related to PIKE levels. This relationship emerged again in the present analysis. Although household consumption expenditure measures general consumer demand for goods and services, and not demand for ivory specifically, the increased level of consumer demand in China is mirrored by a steady increase in the wholesale price paid by carvers and ivory processors for illegal raw ivory in that country, which more than doubled between 2002 and 2004 (from around USD 150 to USD 350 per kg) and again between 2004 and 2010 to around USD 825 per kg. Legal wholesale ivory prices between 1990 and 2009 are unknown but, in 2010, legal wholesale ivory was being sold at an average of USD 455 per kg (Martin and Vigne 2011[4]).

24. The only other country to show a relationship between PIKE and trends in household consumption expenditure in the previous analysis was Japan, although the relationship was marginal and negative. Data for Japan's household consumption in 2011 were not yet available at the time of the analysis, so this relationship could not be tested again for this analysis.

25. The inclusion in the model of the growth in household consumption in China absorbs a considerable proportion of the temporal variation in PIKE. However, after adjusting for the effects of the above variables by holding them constant at their means, there remains a residual temporal trend, with declining or stable PIKE levels between 2002 and 2006, and increasing thereafter to a higher level in 2011 than at any previous point in the trend. The shape of this residual trend is strikingly similar to the trend in large-scale ivory seizures by weight reported by ETIS at SC62 [see Figure 5 in document SC62 Doc. 46.1 (Rev. 1)]. Indeed, when the estimated weight of raw ivory seized annually in large-scale ivory seizures and reported by ETIS [see Table 2 in document SC62 Doc. 46.1 (Rev. 1)] is included in the model, there remains no residual temporal trend. Thus, all other things being equal, higher levels of PIKE in a given year are associated with larger weights of ivory seized in large-scale seizures in that same year. This is a clear indication that both MIKE and ETIS are detecting essentially the same signals at different points in the illegal ivory supply chain, and gives further confidence as to the robustness of the results reported by the two monitoring systems.

Effects of CITES decisions on levels of illegal killing of elephants

26. The MIKE system is mandated in Resolution Conf. 10.10 (Rev. CoP15) to asses "whether and to what extent observed trends [in the illegal killing of elephants] are related to changes in the listing of elephant populations in the CITES Appendices and/or the resumption of legal international trade in ivory".

27. At CoP14, the Conference of the Parties approved, by consensus, the international sale of government-owned raw ivory from the four populations included in Appendix II (Botswana, Namibia, South Africa and Zimbabwe) to approved trading partners. 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 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.

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[4] *The ivory dynasty: A report on the soaring demand for elephant and mammoth ivory in southern China. London, 2011.*

28. As part of the MIKE analysis, the change in the PIKE trend associated with each of the years from 2002 to 2011 (i.e. the statistical effect of each year) was investigated through an analysis of deviance. The only two statistically significant year effects in the trend were 2005 and 2011, which were the lowest and highest points in the trend respectively. PIKE levels began to increase after 2005, and continued to do so up to 2011. Thus the increase commenced nearly three years before the sale took place, and more than one year before the Parties approved the sale and moratorium. If these decisions by the Conference had had any significant impact on the trend, it could have been expected that the year they were taken, or the years they were implemented, would have been associated with, or followed by, a change in the direction or rate of change in the trend. Instead, and except for a transitory decline in 2009, there was no discernible change in the rate of change in the trend in the 2005-2011 period.

29. The MIKE analysis has therefore not found any evidence to suggest that illegal killing of elephants increased or decreased as a direct result of the CoP decisions. If the decisions had any effect on poaching levels, that effect was not discernible from the available data. The above notwithstanding, it is important to note that these decisions represent a single data point in the time since MIKE was established, whereas all of the factors formally tested in the MIKE analysis consist of many data points. It is not possible to make statistically valid inferences based on a single data point. In order to test for relations between CITES decisions relating to the ivory trade and poaching trends, there would need to be several decisions in the time series, such as different ivory sales at different points in time. Only then would it be possible to test for any temporal associations between CITES decisions and observed trends.

30. It is also important to note that allowing an ivory sale and simultaneously establishing a moratorium on further proposals to allow sales may be expected *a priori* to have opposite effects on poaching levels. Even if there had been a detectable relationship between the timing of these decisions and PIKE trends, it would not have been possible to discern which, if any, of the two decisions may have been associated with the PIKE trend. For example, some have argued that allowing legal sales would stimulate demand and pave the way for increased illegal killing of elephants to provide ivory to launder into the legal market. On the other hand, others argued that the moratorium would cause the price of illegal ivory to increase, thus providing an incentive for traders to acquire illegal ivory stocks in order to meet demand, at higher profits, over the period of the moratorium. Given that the sale and moratorium were approved at the same time, and that they were implemented simultaneously, it is not possible to assess the relative merits of these two hypotheses from the available data.

31. In order to assess the effects of policy interventions, such as ivory trade decisions, such interventions would need to be unequivocal and made at distinct times. This was not the case with the above sales, which had been the subject of CITES discussion since 2002. Any hypothesis of a causal link between legal ivory sales and subsequent poaching levels would have to specify the expected direction, duration and spatial distribution of any effect, the expected length of any time lags, and the hypothesized causal mechanisms linking such sales to poacher behaviour. Well-articulated hypotheses accompanied by well-designed and implemented policy interventions would effectively constitute quasi-experiments, from which the MIKE and ETIS systems would eventually be able to discern any true impact of CITES decisions on poaching and possibly learn about causal links.

Scale of elephant poaching

32. A method has been developed by Mr Kenneth Burnham, the statistical consultant to the MIKE programme, to estimate the proportion of the elephant population illegally killed in any given year at MIKE sites. This method, details of which can be found in document SC62 Inf. 1, relies on estimates of natural mortality and PIKE. As no reliable estimates of natural mortality are available across MIKE sites, lower and upper bounds for natural mortality for forest sites were set at 1 % and 4 % respectively, while for savannah sites the values used were 1.5 % and 4.5 % respectively (MIKE TAG, pers. comm.). These figures, together with estimated PIKE values from the model, were used to estimate the percentage of the elephant population killed annually at reporting MIKE sites, aggregated at the subregional and continental levels, from 2005 to 2011.

33. Given the uncertainty surrounding natural mortality rates, the figures shown in Table 1 below are only rough estimates and should be interpreted with caution. Nevertheless, they provide the best indication that is currently possible of the likely scale of poaching at MIKE sites. Given recent and reliable elephant population estimates, the method could also be used to estimate total numbers of elephants killed annually. While such population estimates are not available for most sites, making it impossible to give absolute figures, the number of elephants being killed annually at African MIKE sites in recent years is likely to run into the tens of thousands. If PIKE values and reliable population estimates could be obtained for most sites with elephants, along with better estimates of natural mortality at each site, it would be

possible to derive estimates of numbers of elephants illegally killed annually at the continental and global levels.

Table 1. Lower and upper bounds of estimated proportions of elephant populations illegally killed annually in reporting MIKE sites between 2005 and 2011, expressed as percentages. Low bounds correspond to natural mortality rates of 1 % in forest sites and 1.5 % in savannah sites, while upper bounds correspond to natural mortality rates of 4 % in forest sites and 4.5 % in savannah sites.

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Central	1 - 4.1	2.2 - 8.5	4.0 - 15.9	3.2 - 12.5	1.6 - 6.5	4.1 - 16.1	5.8 - 22.9
Eastern	0.7 - 2.0	0.7 - 2.2	1.2 - 3.7	1.4 - 4.2	0.7 - 2.2	2.9 - 8.6	3.6 - 10.8
Southern	0.3 - 0.8	0.5 - 1.5	0.7 - 2.1	1 - 3.1	0.4 - 1.1	1.4 - 4.3	2.0 - 5.9
West	1.3 - 3.8	2.1 - 6.2	11.1 - 42.5	5.9 - 22.3	3.1 - 11.5	4.6 - 13.9	4.4 - 12.8
All	0.6 - 2.1	0.9 - 3.0	1.5 - 5.3	1.7 - 5.9	0.9 - 3.0	2.5 - 8.4	3.5 -11.7

34. Elephant populations do not usually increase at rates much greater than 5 % per annum. The upper ranges of the estimated losses exceed this figure, and it is therefore likely that elephant populations across all four African regions are in net decline.

Elephant poaching situation in World Heritage sites

35. In August 2012, the UNESCO World Heritage Convention Secretariat and the CITES Secretariat held discussions, *inter alia,* on the elephant poaching situation at World Heritage sites. As a result of those discussions, the MIKE CCU has conducted a preliminary analysis of PIKE data at MIKE sites that are also World Heritage sites. A comparison of PIKE values at African World Heritage properties between the period 2002-2010 and 2011 shows that most World Heritage sites in elephant range are being seriously affected by poaching.

36. A total of 16 MIKE sites are World Heritage sites or are part of larger World Heritage properties. Fourteen of these are in Africa and two in Asia. Half of the African sites are currently in the World Heritage Convention's list of World Heritage in danger (see Table 2 below). Four of these World Heritage sites (Comoé, Kahuzi-Biega, Niokolo-Koba and Taï) have never reported any data to the MIKE programme, or have only reported once. With the exception of Taï, which may still harbour over 180 elephants, elephant populations in these properties are believed to have been reduced by poaching to the point of becoming unviable or even locally extinct.

Table 2. Comparison of PIKE values between 2002-2010 and 2011 in African World Heritage sites.

Elephant range State	**MIKE / WHC site**	**PIKE**			**WHC 'In danger list'**
		2002 - 2010	**2011**	**% change**	
Central African Republic	Dzanga-Sangha (Sangha Trinational)	0.55	0.10	-81.67	N
Congo	Nouabale-Ndoki (Sangha Trinational)	0.36	0.40	10.59	N
Côte d'Ivoire	Comoé	-	-	-	Y
	Taï	1.00	-	-	N
Democratic Republic of the Congo	Garamba	0.90	0.93	3.42	Y
	Kahuzi-Biega				Y
	Okapi	0.95	1.00	5.05	Y
	Salonga	0.75	1.00	34.18	Y
	Virunga	0.81	1.00	23.85	Y
Gabon	Lopé (Lopé-Okanda)	0.35	0.25	-28.57	N
Niger	W du Niger	0.42	0.83	100.00	N
Senegal	Niokolo-Koba	0.00	-	-	Y

Elephant range State	MIKE / WHC site	PIKE			WHC 'In danger list'
		2002 - 2010	2011	% change	
United Republic of Tanzania	Selous	0.50	0.64	26.68	N
Zimbabwe	Chewore (Mana Pools and Chewore Safari Area)	0.24	0.67	180.39	N

37. In eight of the remaining 10 African World Heritage properties, PIKE levels increased, more than doubling in two cases, in 2011 with respect to the 2002-2010 average. Only in two sites, namely Lopé and Dzanga-Sangha, the latter part of the newly inscribed Sangha Trinational World Heritage site, did reported PIKE levels decline in 2011 with respect to the long-term average.

38. While these results are by no means encouraging, they demonstrate that the value of systematic and standardized site-level monitoring, such as that established and reported by the MIKE programme, can extend beyond CITES and be of benefit other Conventions. The considerable overlap between World Heritage properties and MIKE sites also presents a good opportunity for collaboration between the two Conventions, which could lead to similar standardized reporting across a wider range of sites and species.

Discussion

39. The illegal killing of elephants for the illegal international trade in ivory is currently a very serious threat to elephant populations in many range States and may be leading to significant declines in some populations, particularly in Central Africa. Data from the MIKE programme indicate a continuing increase in levels of illegal killing of African elephants since 2006, with 2011 displaying the highest levels since MIKE records began in 2002.

40. The factors associated with spatial and temporal patterns of elephant poaching are broadly similar to those identified in previous MIKE analyses conducted in 2010 and 2011, namely poverty, poor law enforcement, weak governance and the demand for illegal ivory. The first three of these probably reflect 'background levels' of poaching, while increasing demand accounts for much of the temporal trend. Whilst the empirical relationships revealed by the MIKE analyses are not necessarily directly causal, they provide a good basis from which to investigate causality. At the very least, the factors identified in the MIKE analysis are likely to facilitate or to provide incentives for the illegal killing of elephants and the illegal trade in ivory.

41. The MIKE analysis found no evidence to suggest that the 2008 legal sales of ivory and the establishment of a nine-year moratorium on further sales had any discernible impact, whether a rise or a reduction, on the trend in levels of illegal killing of elephants, which had started to increase in 2006.

42. The close correspondence between the trend in large-scale ivory seizures and the trend in PIKE (after adjusting for the effects of covariates) shows that MIKE and ETIS are independently detecting very similar patterns at different points in the illegal ivory supply chain. This should give further confidence as to the reliability of results being produced by the two monitoring systems. However, the information and analyses provided by these monitoring systems can only be as good as the quality of the data that go into them. Elephant range States must be encouraged to demonstrate their commitment to elephant conservation by providing timely, accurate data to the four monitoring systems recognized by CITES (MIKE, ETIS, UNEP-WCMC and the IUCN systems for monitoring the status of elephant populations).

Implementation of MIKE in compliance with Resolution Conf. 10.10 (Rev. CoP15)

43. In line with previous reporting by the Secretariat on MIKE to the Conference of the Parties, the present document summarizes information on the status of implementation of the MIKE programme, recognizing that this is not specifically required under the terms of the Resolution.

44. The MIKE programme in Africa has continued to operate thanks to generous funding from the European Union. The grant that supported the MIKE programme in Africa since 2007 was due to come to an end in December 2011, but the European Commission granted a no-cost extension to allow MIKE to continue operations until the end of 2012, for which the Secretariat is very grateful. In early November 2012, the European Commission approved a new grant to cover MIKE operations in Africa for the period 2013-2014,

for which the Secretariat is also most grateful. However, this grant is at a reduced level and results in the loss of half of the MIKE staff. Discussions are underway for a larger, seven-year project starting in 2015 to extend MIKE monitoring to other species of large mammals threatened by trade, to expand the coverage of sites and to build capacity for effective protection at the site level.

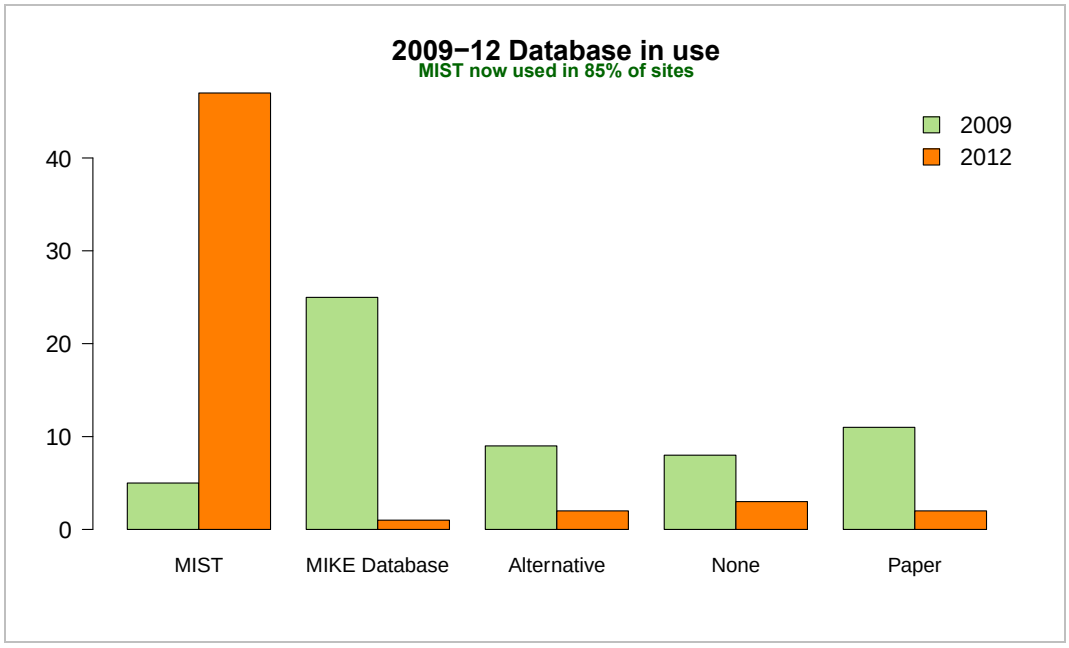
45. Meanwhile, MIKE operations in Asia, which had considerably stagnated owing to a lack of funds since 2007, began to move forward again in 2012, thanks to donations from the Governments of China, France, Japan and the United Kingdom of Great Britain and Northern Ireland. A project cooperation agreement was signed in early 2012 between the CITES Secretariat and the Wildlife Conservation Society for the implementation of MIKE activities in Southeast Asia for a period of two years. Also in 2012, the Asian Nature Conservation Foundation was engaged to conduct a needs assessment and feasibility study for the re-establishment of MIKE operations in South Asia. The results of the assessment are expected to be available in early 2013, and funds are being sought for the re-establishment of MIKE in that subregion.

46. MIKE governance structures in Africa have continued to operate smoothly, with regular meetings of the Subregional Steering Committees, the Technical Advisory Group and the MIKE-ETIS Subgroup. In addition, African elephant range States have been brought together at two African Elephant Meetings organized by the MIKE programme since CoP15. Numerous capacity-building activities have been undertaken in over 80 training events, resulting in the training of some 1,500 rangers and data-management officers.

47. The effectiveness of these efforts are illustrated by a comparison of the results of a survey of MIKE implementation in Africa, conducted by the MIKE CCU in 2009 and reported on at CoP15 in document CoP15 Doc. 44.2 (Rev. 1), with those of a similar survey conducted in 2012, as part of an evaluation of analytical capacity-building needs commissioned by the MIKE CCU. Comparison of the two assessments offers important insights on the effectiveness of MIKE implementation over the last few years.

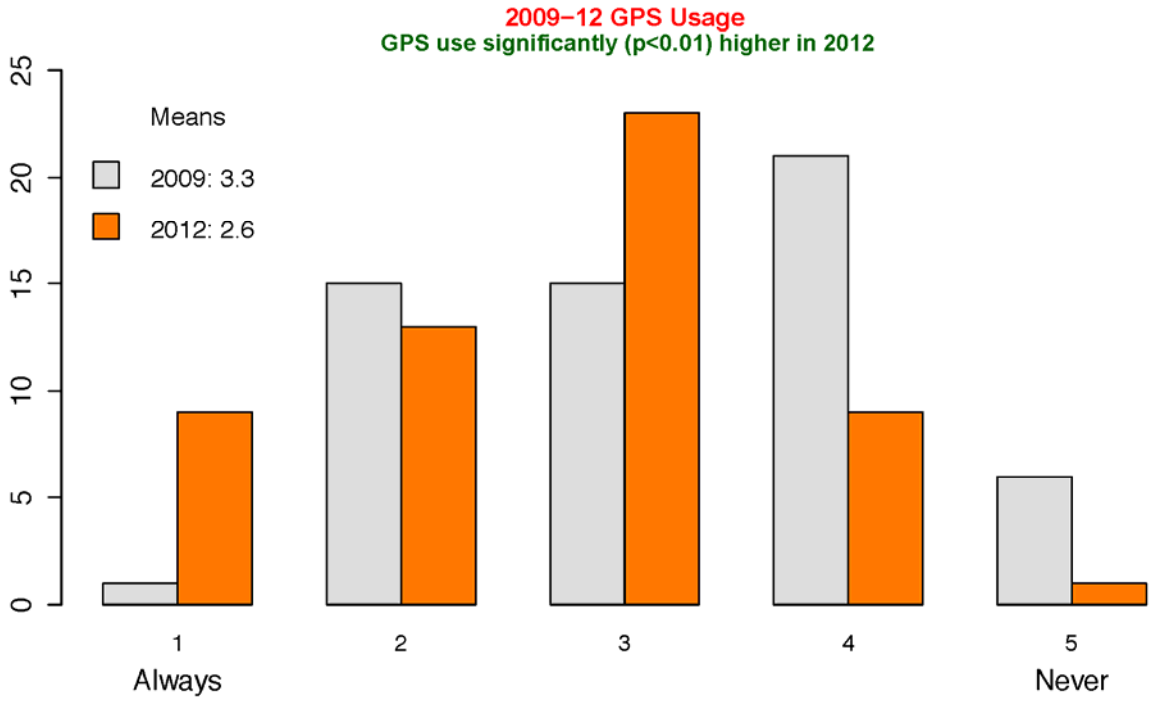
48. Between 2002 and 2007, the MIKE programme developed and deployed a custom-made database application to capture MIKE data. In 2008, it initiated the deployment of an alternative, more comprehensive data management system, known as MIST. MIST was developed in the late 1990s for Uganda Wildlife Authority as a generalized and customizable law-enforcement monitoring system. It was designed to meet the needs of conservation area managers well beyond elephant monitoring alone. As shown in Figure 4 below, MIST had become by 2012 the dominant data-management and analysis tool used at MIKE sites, with 26 out of 29 range States participating in MIKE adopting the system. Moreover, 16 out of those 29 range States have taken steps to adopt MIST as their standard ranger-based data collection and data management tool across their entire protected area networks.

Figure 4. Change in database systems 2009-2012.
Bar heights represent numbers of sites using each system



49. The 2012 assessment noted that wildlife authorities are increasingly requiring formalized law enforcement and patrol data for reporting within their hierarchy and for adaptive monitoring and management of changing situations in the field. Data are collected, usually with MIST or similar system, and can be summarized and mapped easily. The assessment also noted that more advanced analyses are increasingly valued by protected area wardens and their superiors, including the generation of month-by-month comparisons. In addition, geographic data are increasingly being seen as important for strategic planning of patrol operations as well as for general reporting on human activities and ecological factors. Maps and other graphical data appear in internal reports much more often than used to be the case. With this, the use of GPS equipment in the field is seen as more important, and is increasingly being adopted for regular use by patrols (see Figure 5 below). Nevertheless, it was still common in 2012 for data from GPS units to be transcribed by hand, rather than automatically downloaded to computers, with the potential for human error that this introduces.

Figure 5. Use of GPS units by patrols, 2009-2012. The mean frequency of GPS usage, on a scale of 1 to 5 (always to never), improved from 3.3 in 2009 to 2.16 in 2012.

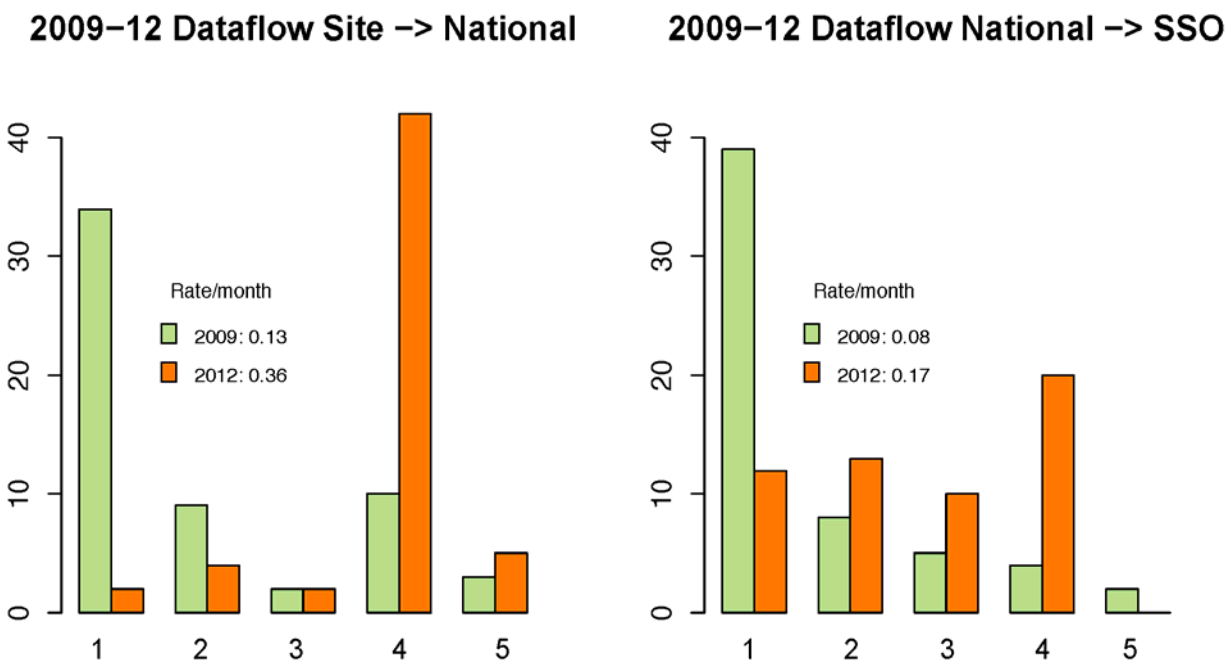


50. The 2009 assessment showed that, while MIKE data were usually collected and transcribed onto paper forms in the field, data typically only reached the national officers when the MIKE Subregional Support Officers (SSO) visited the site (57 % of the cases). This situation had improved considerably by 2012, with the majority of sites reporting to their national officers on a quarterly basis, and data being sent to the MIKE SSOs at regular intervals (see Figure 6 below).

51. While the 2012 assessment also noted some improvement in other areas, such as the frequency of data entry and validation by site officers, it also found continuing shortcomings in aspects such as site and national staff turnover and data validation by national officers. In the interest of sustainability, the MIKE programme plans to address these continuing challenges by providing training trainers from appropriate national and subregional institutions in all aspects of ranger-based monitoring.

52. It is anticipated that these efforts will not only improve site management, but will also increase the quantity and quality of elephant mortality data supplied to the MIKE programme, particularly by elephant range States in West Africa and the two Asian subregions. There are doubts about the accuracy of some of the data supplied by range States in these subregions, and their reporting rates are generally very poor. Although elephant populations in these subregions are comparatively small, their contribution in terms of data is crucial to informed decision-making by the CITES Parties.

Figure 6. Changes in the flow of data from site and national office to MIKE between 2009 and 2012.
Reporting frequency in the horizontal axes is coded as follows:
1: Only when SSO visits the site or National Office; 2: Annually; 3: Biannually; 4: Quarterly; 5: Monthly.



Support for the MIKE programme

53. The CITES Secretariat is grateful to the European Union for its financial support to the MIKE Programme in Africa. The Secretariat is also grateful to China, France, Japan and the United Kingdom for their support of the MIKE Programme in Asia. Finally, the Secretariat would also like to express its gratitude to the African and Asian range States for their cooperation in the implementation of MIKE, and in particular to all the rangers, MIKE site officers and national officers from participating sites and range States, whose dedication make the MIKE programme possible.

Recommendations

54. The Conference of the Parties is requested to take note of this report, recognizing that the MIKE programme provided information on trends in the illegal killing of elephants and on factors associated with the observed trends, and that its further implementation will require substantial resources, as well as a strong commitment from elephant range States and all other stakeholders.

55. Further recommendations relating to MIKE can be found in a proposal for the revision of Resolution Conf. 10.10 (Rev. CoP15), which is contained in document CoP16 Doc. 26.

Summary data received by MIKE to 31 December 2011. PIKE values are given for each site and year.
Numbers in brackets reflect the number of elephant carcasses form which the PIKE value was calculated.

	Range State	Site	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Central Africa	Cameroon	Boumba-Bek		0.68 (19)	0.71 (7)	1 (3)	0 (12)	0 (1)	0 (1)	0.36 (14)	0.6 (5)	0.8 (5)
		Waza		0.33 (3)	0.5 (2)	0.5 (2)	0.33 (3)	0 (1)	0 (2)	1 (1)	0 (1)	1 (1)
	Central African Republic	Bangassou		1 (3)	1 (8)						1 (6)	0.88 (8)
		Dzanga-Sangha				0.89 (9)	0.5 (2)	0.5 (2)	0.63 (27)	0.3 (10)	0 (5)	0.1 (10)
		Sangba		0.1 (10)	0 (1)				1 (8)	1 (4)	1 (2)	1 (6)
	Chad	Zakouma		0.65 (34)	0.86 (35)	0.27 (11)	0.67 (60)	0.97 (160)	0.94 (86)	0.6 (20)	0.92 (39)	0.71 (7)
	Congo	Nouabale-Ndoki		0.63 (8)	0.29 (14)	0.75 (4)	0 (5)	0 (1)	0.25 (4)	0.4 (5)	0.33 (6)	0.4 (10)
		Odzala		0.05 (38)	0.53 (36)	0 (73)	0 (1)	0.97 (36)	0.53 (17)	1 (3)		0.96 (123)
	Democratic Republic of the Congo	Garamba		0.96 (114)	0.89 (197)	0.9 (86)	0.94 (34)	0.5 (14)	1 (4)	1 (6)	0.67 (15)	0.93 (14)
		Kahuzi-Biega		- (0)	- (0)	- (0)	- (0)	- (0)	- (0)	- (0)		
		Okapi		1 (20)	0.9 (10)	0.95 (22)	1 (5)	1 (11)	0.67 (3)	1 (18)	0.87 (15)	1 (37)
		Salonga		0 (2)	0.64 (56)	0.25 (4)	- (0)	- (0)	- (0)	0.93 (15)	0.97 (29)	1 (9)
		Virunga				0.44 (9)	0.33 (3)	0 (15)	1 (63)	0.8 (20)	1 (25)	1 (16)
	Gabon	Lopé		0.57 (7)	0.25 (4)	- (0)	0 (1)	- (0)	0 (1)	0.67 (3)	0 (4)	0.25 (8)
		Minkébé		0.73 (11)	0.92 (13)	0.5 (6)	- (0)	- (0)	1 (4)	0.75 (4)	0.94 (18)	0.87 (31)
Eastern Africa	Eritrea	Gash-Setit	0 (3)	0.33 (3)	0 (1)		0.14 (7)	0.5 (4)	0.4 (5)	0.17 (6)	0 (2)	
	Kenya	Meru					0.5 (14)	0.27 (11)	0.38 (13)	0.48 (40)	0.7 (40)	0.78 (81)
		Mount Elgon		0.86 (7)	0.71 (7)	0 (1)	0.4 (5)	0.5 (2)	0.5 (2)	0.71 (7)		0.58 (12)
		Samburu Laikipia	0.38 (159)	0.18 (195)	0.31 (128)	0.17 (160)	0.14 (96)	0.24 (97)	0.51 (278)	0.26 (326)	0.47 (164)	0.61 (264)
		Tsavo		0.22 (82)	0.29 (65)	0.28 (60)	0.17 (88)	0.2 (56)	0.33 (79)	0.16 (329)	0.68 (81)	0.61 (107)
	Rwanda	Akagera			- (0)	- (0)	0 (1)				0 (1)	0.25 (4)
	Uganda	Murchison Falls	- (0)	1 (10)	0.5 (2)		1 (2)	0.5 (2)	0.5 (2)	0.4 (5)	0.29 (7)	0.92 (26)
		Queen Elizabeth	0 (3)	1 (1)	0.38 (8)	0 (1)	0.18 (11)	1 (4)	0.44 (9)	0.38 (8)	0.36 (11)	0.8 (20)
	United Republic of Tanzania	Katavi Rukwa		0.75 (12)	0.75 (20)	0.5 (6)	1 (2)	1 (2)	1 (9)	0.8 (5)	0.92 (13)	0.86 (29)
		Mkomazi										1 (2)
		Ruaha Rungwa		0.1 (10)	0.17 (6)	0.67 (15)	0.89 (9)	0 (2)	0.67 (3)	0.33 (3)	0.57 (28)	0.94 (34)
		Selous Mikumi		0.22 (9)	0.18 (11)			0.42 (103)	0.59 (90)	0.48 (100)	0.55 (195)	0.64 (224)
		Tarangire		0.14 (7)	0 (11)		0.25 (4)	0.2 (5)	0.4 (5)	0 (2)	0.5 (42)	0.2 (5)

	Range State	Site	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Southern Africa	Botswana	Chobe	- (0)	0 (59)	0.07 (73)	0.05 (153)	0.1 (111)	0.14 (101)	0.04 (113)	0.13 (120)	0.24 (37)	0.33 (42)
	Mozambique	Cabora Bassa	0 (1)	0.33 (3)	1 (2)						0.58 (12)	0.83 (18)
		Niassa			0 (14)		0.33 (3)		0.88 (16)		0.84 (77)	0.89 (85)
	Namibia	Caprivi	0 (1)	0.25 (8)	0 (6)	0.25 (4)	0.4 (5)	0 (5)	- (0)	0 (7)	0.33 (6)	0.59 (29)
		Etosha	0 (24)	0 (18)	0 (4)	0 (25)	0 (15)	0 (25)	0 (14)	0 (21)	0 (11)	0 (27)
	South Africa	Kruger	0 (1)	0 (2)	0 (18)	0 (35)	0 (51)	0.03 (34)	0 (18)	0.03 (35)	0 (14)	0.05 (20)
	Zambia	South Luangwa	0.25 (4)	0.63 (8)	0.65 (23)	0.25 (4)	0.77 (35)	0 (11)	0.88 (8)	0.43 (14)	0.53 (49)	0.64 (22)
	Zimbabwe	Chewore	0.37 (19)	0.3 (10)	0.21 (14)	0 (20)	0.12 (17)	0.79 (14)	0.08 (13)	0.38 (26)	0.14 (29)	0.67 (51)
		Nyami Nyami	0.67 (3)	0.29 (7)	0.82 (11)	0.83 (6)	0.67 (3)	0.5 (10)	0.9 (20)	0.87 (52)	1 (19)	0.81 (16)
West Africa	Benin	Pendjari	0 (1)	0.5 (2)	0.33 (3)				0 (1)	0.88 (8)	0 (6)	
		W du Bénin	0 (1)	0 (1)	0 (3)					0 (1)		
	Burkina Faso	Nazinga	0 (1)		0 (2)	0 (3)	0 (1)		1 (4)	1 (1)	1 (1)	
		W du Burkina	0 (1)		0 (1)				1 (6)	0.89 (9)		
	Côte d'Ivoire	Marahoué						1 (8)	1 (1)	1 (2)		
		Taï			1 (2)							
	Ghana	Kakum	0.5 (2)	0 (6)	0 (5)			0 (1)	1 (1)	1 (1)	0 (1)	
		Mole	0 (1)	0.5 (2)	0.25 (8)	1 (3)		0.8 (5)	1 (2)		1 (1)	
	Guinea	Ziama		1 (1)	1 (2)			1 (1)	1 (4)	1 (11)		
	Liberia	Sapo						1 (1)	1 (1)	1 (3)		
	Mali	Gourma	0 (3)	0 (1)	0 (1)	0 (2)	0 (3)	0 (2)	0 (2)	0.25 (4)	0 (27)	
	Niger	W du Niger	1 (1)	0.25 (4)	1 (2)					0.33 (3)	0.33 (3)	0.83 (6)
	Nigeria	Sambisa		0.33 (3)	0.5 (2)							
		Yankari	0 (6)	0.25 (4)	0.6 (5)	0 (2)					0.67 (6)	1 (1)
	Senegal	Niokolo-Koba		0 (1)								

	Range State	Site	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
South Asia	Bangladesh	Chunati				- (0)	0 (1)	0 (1)	0 (1)	0 (1)		
	Bhutan	Samtse				- (0)	- (0)	- (0)	- (0)			
	India	Chirang-Ripu		0 (1)	0 (2)			0 (1)	0 (8)	0 (5)		
		Deomali				- (0)	0 (2)					
		Dihing Patkai			0.5 (2)	0 (1)	0 (1)	0 (3)	0.2 (5)	0 (3)		
		Eastern Dooars		0 (4)	0 (12)	0.13 (8)	- (0)	0 (15)	0.07 (15)	0 (2)		
		Garo Hills		0 (6)	0.1 (10)	0 (2)	0 (4)	0.09 (11)	0.17 (6)	0.38 (8)		
		Mayurbhanj			0 (12)	0.12 (17)	0 (1)					
		Mysore				0.13 (30)	0.33 (3)					
		Shivalik				0 (2)						
		Wayanad			0 (2)	0.13 (8)	- (0)					
	Nepal	Royal Suklaphanta			- (0)	- (0)	- (0)	- (0)	- (0)	- (0)		
Southeast Asia	Cambodia	Mondulkiri					0 (1)				0.67 (3)	
	China	Xishuangbanna				- (0)	0 (1)					
	Indonesia	Bukit Barisan Selatan					- (0)					
		Way Kambas					0 (1)					
	Lao People's Democratic Republic	Nakai Nam Theun		1 (1)				0 (1)				1 (1)
	Malaysia	Gua Musang				- (0)	- (0)	- (0)	- (0)	- (0)	1 (1)	
		Kluang						0 (1)		0.5 (2)	1 (1)	
	Myanmar	Alaungdaw Kathapa					1 (2)			1 (1)		
		Shwe U Daung					0 (1)			0 (1)		1 (1)
	Thailand	Kuibiri				- (0)	- (0)				1 (1)	0 (3)
		Salakphra				0 (1)	- (0)			0 (1)	0 (1)	
	Viet Nam	Cat Tien					- (0)			1 (6)		