

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

Eleventh meeting of the Conference of the Parties
Gigiri (Kenya), 10-20 April 2000

Interpretation and implementation of the Convention

Conservation of and trade in elephants

MONITORING OF ILLEGAL TRADE AND ILLEGAL KILLING

1. This document has been prepared by the Secretariat.

Long term system for Monitoring the Illegal Killing of Elephants (MIKE)

Background

2. Resolution Conf. 10.10 calls for the establishment, under the supervision and direction of the Standing Committee, of a comprehensive international system to monitor the illegal killing of elephants.
3. The objectives of this monitoring system are:
 - i) measuring and recording current levels and trends of illegal hunting ... in African and Asian range States;*
 - ii) assessing whether and to what extent observed trends are a result of changes in the listing of elephant populations in the CITES appendices and/or the resumption of legal international trade in ivory; and*
 - iii) establishing an information base to support the making of decisions on appropriate remedial action in the event of any problems with compliance or potential detriment to the species".*
4. The Resolution specifies that the monitoring system should:
 - a) facilitate the monitoring of parameters relevant to the issue (i.e. the pattern and scale of illegal killing, the effort and resources being applied to detect or prevent the illegal killing etc.);
 - b) determine whether or not *"there is a causal relationship between changes in these parameters and the decisions of the Conference of the Parties"*, and
 - c) build institutional capacity within the range States for the long-term management of their elephant populations.
5. Specifically, the Resolution instructs the CITES Secretariat, together with the participation and advice of the African Elephant Specialist Group and the Asian Elephant Specialist Group of the IUCN Species Survival Commission, and the TRAFFIC Network, to:
 - a) select sites for monitoring as representative samples;*
 - b) develop a standardized methodology for data collection analysis;*
 - c) provide training to designated officials in countries with selected sites and to CITES Management Authorities of elephant range States;*

- d) *collate and process all data and information from all sources identified; and*
- e) *provide a report ... for transmission to the Standing Committee and Parties to CITES."*

The Resolution is unique, in that it provides a long-term mechanism whereby elephant range States, with the assistance of the CITES Secretariat, can develop the skills and technology required to effectively manage their elephant populations.

Progress to date

7. Significant progress has been achieved since the adoption of Resolution Conf. 10.10. The Resolution points to the Secretariat as having overall responsibility for the systems for monitoring illegal killing, under the supervision and direction of the Standing Committee.
8. The Resolution came into effect in October 1997 and the Secretariat moved immediately to establish a sub-contract with IUCN, to assist in the development of the required monitoring protocols.
9. A presentation was given to the Standing Committee on establishing a long term system for Monitoring the Illegal Killing of Elephants (MIKE) at its March 1998 meeting in London (Doc. SC.40.5.2.6). Subsequently, at its February 1999 meeting in Geneva, the Standing Committee endorsed the final project proposal (Doc. SC.41.6.3), and established a Sub-Group to oversee the further development, refinement and implementation of MIKE. At that same meeting, the Standing Committee authorised 'seed funding' (CHF 140,000) for this further development and implementation of MIKE.
10. The commitment of governments of all the c.40 countries hosting selected MIKE sites (60 throughout Africa and Asia) is essential for the success of the project. This commitment is being progressively obtained as Sub-Regional pilots are launched. Contact has now been made with the governmental authorities in four of the six MIKE Sub-regions (i.e. all sub-regions other than East Africa and South Asia) and the reaction has been one of strong support and eagerness to participate. Support involves permitting sites to be included in the system, providing staff members to undergo training and conduct surveys, allowing personnel to be National Co-ordinators and allowing data to be released back into the central system. The benefits will be increased knowledge to monitor biodiversity resources allowing appropriate strategies for conservation to be put in place, as well as increasing the number of highly trained personnel who can train others. If problems arise about a particular site, MIKE has a fallback mechanism to bring in other locations.
11. Governmental, local management and NGO personnel in Central African and South-East Asian range States are currently being engaged in the understanding and practical development of MIKE through pilot implementation projects in their sub-regions. Most range States in the Southern Africa sub-region (Botswana, Namibia, South Africa and Zimbabwe) are fully implementing MIKE and an agreement has been reached to establish a pilot program for MIKE implementation in West Africa. The timetable indicates the intention to launch MIKE in all remaining Sub-regions, through appropriate meetings, by the end of the first quarter of the year 2000.
12. The following chronology of events details the progress made in implementing the Resolution:

October 1997:	Resolution Conf. 10.10 comes into effect
December 1997:	A workshop of Experts (in elephant biology, management, conservation management, trade, law enforcement, population modelling and statistics), from both African and Asian range States convened in Nairobi to assist in developing the international monitoring system
January 1998:	African Elephant Specialist Group meeting in Burkina Faso to review recommendations and propose sites

- March 1998: IUCN/SSC and TRAFIC present recommendations to 40th meeting of CITES Standing Committee in London (Doc. SC.40.5.2.6)
- Standing Committee agrees that CHF 76,000 can be made available, from the CITES Trust Fund, to assist in the technical refinement and further development of MIKE
- June/July 1998: Site selection criteria applied and three sampling scenarios statistically derived
- August 1998: A long term system for Monitoring the Illegal Killing of Elephants (MIKE) drafted, with Africa cost elements
- September 1998: Prototype MIKE system presented to 3rd African Elephant Range States dialogue meeting in Arusha
- October 1998: Prototype MIKE system presented to the Asian Elephant Specialist Group
- November 1998: Final MIKE proposal and budget submitted to the CITES Secretariat (refer to Doc. SC.41.6.3)
- February 1999: Standing Committee endorses MIKE at its 41st meeting, in Geneva (Doc. SC.41.6.3), and establishes a Sub-Group to oversee, on its behalf, and in collaboration with the Secretariat and IUCN, *"the further development, refinement and implementation of MIKE"*
- Standing Committee agrees that CHF 140,000 can be made available, from the CITES Trust Fund, to provide 'seed money' to assist in the technical refinement and further development of MIKE
- Questions raised, during the Standing Committee, regarding the general statistical design and function of the proposed monitoring system for illegal killing of elephants (MIKE) were answered in detail and circulated to the participants (refer to Annex 1 of this document)
- April 1999: MIKE Pilot phase launched in Central Africa at a workshop in Libreville, hosted by ECOFAC, and attended by range States, NGOs and donor agencies
- The MIKE Pilot (three sites in five countries) aims to provide the technical refinement to MIKE required to effectively monitor elephants in dense-forest habitats
- Numerous NGOs commit to assist the Secretariat in implementing MIKE in the Central African sub-region. WCS selected by those attending the workshop to co-ordinate the Pilot MIKE Program in Central Africa
- Appointment of a consultant to develop a funding strategy for MIKE and to galvanize donor support for its implementation
- May 1999: CITES Secretariat visits the Central African range States to secure participation in MIKE from the relevant Management Authorities. Specific commitment secured from all seven States
- First meeting of the MIKE Sub-group (27 May 1999). The minutes of this meeting were presented to the 42nd meeting of the Standing Committee (Doc. SC. 42.10.2.2, Annex 1)
- Development of a Memorandum of Understanding between the CITES Secretariat and IUCN to progress MIKE implementation

- June 1999: Secretariat contracts IUCN to develop MIKE data collection protocols and to progress Pilot Programs (funded by the 'seed money' from the CITES Trust Fund)
- Establishment of a MIKE Pilot Phase in Central Africa
- July 1999: Second meeting of the MIKE Sub-group (29 July 1999). The records of this meeting were presented to the 42nd meeting of the Standing Committee (Doc. SC. 42.10.2.2, Annex 2)
- September 1999: MIKE Field course in Congo-Brazzaville (Nouabale Ndoki NP) for Central African teams (15 people, 8 weeks)
- MIKE Sub-Group reports on MIKE's progress to the 42nd meeting of the Standing Committee, in Lisbon (refer to Doc. SC.42.10.2.2)
- Various range States in Southern Africa (viz. Botswana, Namibia, South Africa and Zimbabwe) confirm to the Standing Committee their willingness to implement MIKE. They seek the assistance of the Secretariat to convene a workshop to explain the necessary data collection protocols to be used in savannah habitats
- October 1999: A Second MIKE Pilot Program, for South East Asia, is launched at a workshop in Bangkok, attended by relevant range States, NGOs and donor agencies
- Detailed MIKE funding proposal submitted to DGVIII, of the European Commission, seeking substantial financial support for MIKE implementation in Africa and Asia
- Commitment received from US Fish and Wildlife Service to fully fund the completion of the Mike Pilot Program in Central Africa
- November 1999: CITES Secretariat visits six SE Asian States to secure participation from the relevant Management Authorities
- Secretariat conducts MIKE workshop in Namibia to initiate MIKE in Southern Africa. Four range States (viz. Botswana, Namibia, South Africa and Zimbabwe) commit to implementing MIKE immediately in their countries (self-funded) and Namibia is elected as the Sub-regional co-ordinator for MIKE implementation in Southern Africa. A MIKE training workshop is planned for senior wildlife managers in Southern Africa, to which Mozambique and Zambia will be invited
- CITES Secretariat visits 14 West African range States to secure commitment to a third MIKE Pilot Program, planned for the West Africa sub-region
- December 1999: A Sub-regional meeting, to plan for MIKE implementation in West Africa, is held in Accra (Ghana). It agrees that they wish to have IUCN West Africa co-ordinate the further implementation of MIKE in West Africa and a sub-set of the sites are agreed upon for the pilot phase
- February 2000: MIKE is posted on the CITES Web site (www.cites.org).

Benefits of MIKE

13. Elephants are a wide-ranging keystone species in the habitats in which they occur. For the first time, at an international level and on a consistent scientific basis, MIKE will assess, in the selected MIKE sites, the levels and trends of elephant populations and illegal killing. MIKE will attempt to identify the reasons for any change in population trends, including whether any changes can be attributed to CITES decisions to allow or suspend trade in elephant products. This will assist not only elephant conservation but the benefits of improved resource management will flow to other species sharing

habitat with them. It will significantly increase the capacity of conservation staff in governments and NGOs to monitor this and other threatened species and this expertise will be directly transmissible to other sites and other countries.

14. MIKE has been developed in recognition of the fact that the resources and capacity to monitor and manage elephant populations and to enforce CITES decisions are generally not available in the range States in Africa and Asia. MIKE's aim is to strengthen the capacity of these range States to manage their elephants in order to increase the benefits for local people and to enhance the related biodiversity advantages that will flow from any improved management of such a keystone species.
15. The main target groups for the output from MIKE are national wildlife management authorities and international decision-makers in CITES. These agencies need to assess the likely effect of decisions to trade or suspend trade in elephant products and they need to be able to adapt their management strategies in the light of MIKE reports about trends in elephant numbers, mortality and enforcement effort. In addition, surveys and information-gathering activities will collect data and intelligence on other species, as well as enhancing the capacity of the field staff from government agencies and NGOs who participate.
16. Although a few range States have relatively good data on changes in their elephant populations and on levels of poaching and other illegal killing (e.g. of problem animals), in most others the coverage and quality of data vary immensely. This disparity prevents any well-founded assessment of changes in population status at the continental level, much less their possible or probable causes. In order to achieve the objectives of MIKE there will be a need for major improvements in the capacity of senior wildlife officers to organise surveys on a rigorous scientific basis and for their field officers to be able to implement surveys efficiently. While survey methods for savannah habitats are well-established, in forest habitats, in both Africa and Asia, indirect counting methods, including standardised sampling coverage, will require considerable testing and refinement. In some cases, basic mapping of selected sites, mostly in protected areas, will be a precursor of statistical surveys, while methods of deducing quantifiable information about poaching and mortality from interviews, in the course of reconnaissance forays, will also need exploration.
17. The potential is that management and field staff have the motivation and the capacity to develop the necessary skills, if the resources are provided. Considering the fact that some national wildlife authorities have the relevant expertise, particularly for savannah habitats, there is a good opportunity for co-operation between range States. For Africa, such co-operation already occurs through the Range State Dialogues (part of the CITES process) which have helped to bridge the gaps in understanding of the opportunities and challenges that exist between the African elephant range States. Mike will build on this strong foundation and facilitate further co-operation. For both Asia and Africa, MIKE will help increase the range State's understanding of each others opportunities and problems, previous ignorance of which has contributed to a lack of unity when international debates on elephants take place.

MIKE will also assist range States individually, by providing a cross check with existing systems for collecting data on elephant numbers and illegal killing levels. Importantly, MIKE will greatly increase national capacity for developing and operating such systems, where they do not already exist.

The funding for MIKE

Cost estimates

19. The current estimate of costs for each of the main components of MIKE, year by year for the first 6 years, is provided in the table below. MIKE will cost c.CHF 23 million (over six years).

MIKE SUMMARY BUDGET TABLE
(CHF)

6 year period

Budget items	Total
A MIKE central co-ordinating unit	2,707,200
B MIKE sub-regional and national co-ordinators	9,096,000
C MIKE sub-regional and site-based capacity building	2,456,000
D MIKE site-based surveys in Asia	3,964,800
E MIKE site-based surveys in Africa	4,950,400
Total (A + B + C + D + E)	23,174,400

20. For the continuing project throughout the six year period it is envisaged that major contributions be obtained from the GEF/World Bank, bilateral donors and NGOs as well as from the EC. The proportion sought for different elements of MIKE would vary. For example, the EC is being asked to shoulder the bulk of the costs of the global and sub-regional elements, whereas support for in-country surveys should come largely from local donor budgets and bilateral contributions.
21. Throughout the MIKE project, it is envisaged that national wildlife management authorities and NGOs will make substantial contributions, especially to the survey costs, mainly through in kind contributions, including the participation of their staff on a no cost basis.

Support already provided

22. Support has already been given or pledged to MIKE by various donors. Since all of these contributions are for particular elements of MIKE development, it must be realised that the current level of Secretariat involvement in MIKE cannot be sustained unless major new resources become available. The amounts concerned (in CHF) are as follows:

CITES Trust Fund for initial consultants	216,000
Wildlife Conservation Society for Central African pilot	148,000
MacArthur Foundation for training in Central Africa	125,000
USFWS for Central African pilot	499,000
USFWS for South East Asian pilot	201,000
Netherlands IUCN for Central African training	15,000
Netherlands IUCN for West African workshop	23,000
Environment Agency of Japan for Central Unit	70,000
Environment Agency of Japan for SE Asian pilot	30,000
Japanese Ivory Association (JIA)	30,000
Total (to date)	1,357,000

Synergy with other Monitoring Programmes

23. The MIKE project, which is entirely new, is directly complimentary to TRAFFIC International's Bad Ivory Database (BIDS) which, with donor support and the endorsement of CITES, has been monitoring seizures of illegal ivory for the period since 1991. Under Resolution Conf.10.10, BIDS has been expanded to include surveillance of all illegal elephant products and to collect intelligence and

economic data under a new programme named ETIS (Elephant Trade Information System – refer to discussion below).

24. Reports from MIKE will be amalgamated with those from ETIS to provide assessments to CITES meetings, the Secretariat and national Management Authorities to enable corrective action to be taken or to guide the consideration of proposals for change.

The Elephant Trade Information System (ETIS)

Background

25. Resolution Conf. 10.10 calls for the establishment, under the supervision and direction of the Standing Committee, of a comprehensive international system to monitor the illegal trade in elephant specimens.
26. The objectives of this monitoring system are:
 - i) measuring and recording current levels and trends of illegal trade ... in African and Asian range States and in trade entrepots;*
 - ii) assessing whether and to what extent observed trends are a result of changes in the listing of elephant populations in the CITES appendices and/or the resumption of legal international trade in ivory; and*
 - iii) establishing an information base to support the making of decisions on appropriate remedial action in the event of any problems with compliance or potential detriment to the species".*
27. Annex 1 of the Resolution specifies how the monitoring of illegal trade in ivory and other elephant specimens is to be conducted. Specifically, the monitoring system is required to include the details of law enforcement records for seizures or confiscations of elephant specimens which have occurred anywhere in the world since 1989. Clearly, the Resolution envisages that the monitoring system will become the international instrument for monitoring the pattern and measuring the scale of illegal trade in elephant specimens.
28. TRAFFIC's Bad Ivory Database System (BIDS) was designated as the appropriate instrument for these purposes, and the CITES Parties were mandated to communicate information on elephant ivory and other elephant product seizures to TRAFFIC via the CITES Secretariat.

Progress to date

29. Significant progress has been achieved since the adoption of the Resolution.
30. With the approval of the Standing Committee, TRAFFIC's BIDS database has evolved into a more sophisticated monitoring tool called the Elephant Trade Information System (ETIS). TRAFFIC subjected BIDS to an external evaluation process, the results of which were refined at a workshop of technical experts convened in Nairobi, Kenya in December 1997
31. The 40th meeting of the CITES Standing Committee (March 1998) approved the basic design elements of ETIS. At that meeting, the Standing Committee agreed to make available CHF 30,000, from the CITES Trust Fund, to assist in the technical refinement and further development of ETIS
32. To assist in the provision of information, the Secretariat circulated an "*Ivory and Elephant Product Seizure Data Collection Form*" to all Parties in Notification to the Parties No. 1998/10 on 31 March 1998. In reporting ivory seizures and confiscations, this form is to be completed and returned to the CITES Secretariat for transmission to TRAFFIC. Through Notification to the Parties No. 1999/36, of 30 April 1999, the Secretariat also circulated *Explanatory Notes for the "Ivory and Elephant Product Seizure Data Collection Form"*. Through Notification to the Parties No. 1999/92, of 30 November 1999, these documents were re-circulated as a reminder.

33. A functional specification outlining the theory, structure and practical application of ETIS was produced by consultants at the University of Reading's Statistical Services Centre. This facilitated the development of document Inf. SC.41.1 *Development of the CITES Elephant Trade Information System (ETIS)*, presented at the 41st meeting of the CITES Standing Committee (Geneva, February 1999).
34. A new MS/ACCESS-based, ETIS software programme for the seizures database was designed and installed at the TRAFFIC East/Southern Africa regional office in Lilongwe, Malawi by technical consultants of the University of Reading's Statistical Services Centre. The database structure features a core seizures database held by TRAFFIC East/Southern Africa in Lilongwe, Malawi. A complimentary database on law enforcement effort is under development and will be housed at TRAFFIC International in Cambridge, U.K. Other subsidiary databases on related background information will be developed as appropriate.
35. The first step in fully operationalising ETIS involved the conversion of all previous data from the former BIDS system into the new programme.
36. As of 31 October 1999, ETIS contained 4,257 records of ivory seizures which have occurred anywhere in the world since 01 January 1989. TRAFFIC has provided a detailed country-based report on these seizures to each CITES Party. TRAFFIC will provide a summary report on ivory seizures and confiscations to COP11.

The funding for ETIS

Support already provided

37. Substantial support has already been given to TRAFFIC, to implement ETIS, by various donors. The amounts concerned are as follows:

Date	Source	Amount	Purpose
11/1997	WWF-International	70,000 CHF	Redesigning BIDS assessment/operation
12/1998	USFWS	2,300 CHF	BIDS data input
03/1998	USFWS	4,200 CHF	BIDS evaluation
03/1998	CITES Trust Fund	30,000 CHF	ETIS development/data collection form/software
04/1999	UK DETR	103,200 CHF	ETIS installation/operation/computer purchases

Cost estimates

38. The current estimate of costs for each of the main components of ETIS, for the period 2000 to 2002, is provided in the table below. The maintenance and further development of ETIS will cost c.CHF 456,000 (over this three year period).

ETIS OPERATIONAL BUDGET 2000-2002
(CHF)

Budget items	2000	2001	2002
A Personnel costs	67,040	73,632	80,240
B Equipment purchase/operations/repairs	12,480	4,624	5,168
C Communication costs	9,840	10,848	11,776
D Office supplies/consumables	5,568	6,112	6,624
e: professional fees	38,128	29,632	39,008
F Travel/subsistence for project staff	12,384	6,992	13,984
G TRAFFIC's administrative overheads (5%)	7,272	6,592	7,840
Total (A+B+C+D+E+F+G)	152,712	138,432	164,640

Future developments for ETIS

39. TRAFFIC has produced individual country reports that present all seizures in the database that occurred in, or involved a national of the country in question. The ETIS Country Reports are referenced to specific periods of time, and provide a tabular summary of all cases where ivory or other elephant products were seized or confiscated either in, coming from, or going to a particular country, or any other cases where nationals of a particular country were identified as involved as a suspect in an ivory seizure that occurred elsewhere in the world. TRAFFIC has three objectives in providing these reports. Firstly, it is important to begin the feedback loop in the process so that each country is aware of its status in the ivory trade. Secondly, TRAFFIC hopes to provide a means for individual countries to validate, update, or otherwise comment on individual cases in the data base. Thirdly, TRAFFIC hopes to identify deficiencies in the manner in which data are presently being reported from each country so that steps can be taken at the national level to improve the quality of data that are being reported as part of the ETIS process. This effort should engender incentives for greater participation in the future.
40. The other major activity will be the development of the subsidiary databases in ETIS, particularly one on law enforcement effort at the national level, which has not progressed satisfactorily. The primary reason for this has been the fact that it was originally envisaged at the technical workshop (Nairobi, December 1997) that comparative data on law enforcement effort and performance on a country-by-country basis would be available through co-operative (and probably confidential) arrangements with INTERPOL and the World Customs Organization. In fact, this has not been possible and TRAFFIC is now reassessing how to develop alternative indicators to achieve this purpose. TRAFFIC International has held considerable discussions with the CITES Secretariat about possible formal avenues for collection of enforcement effort and effectiveness data. The conclusion reached is that no existing relevant data sources are available to ETIS and that a stand-alone data collection activity will be required. In consultation with the CITES Secretariat and other relevant experts, TRAFFIC will develop a questionnaire for circulation to the Parties by the CITES Secretariat on a periodic basis to collect the required information. A database format for storage of this information is under development and the new ETIS software will integrate enforcement effort and effectiveness indicators into the overall analysis of seizure information.
41. Concerning data collection through the CITES process, it appears that many more seizures are occurring than are being reported to the Secretariat through the ETIS data collection process. Within Africa, the lack of response seems to be related to internal capacity and understanding. There is a need to promote better understanding about the requirements of ETIS and to support the development of national-level data collection protocols to support better implementation of Resolution Conf. 10.10.

A written record of the IUCN/TRAFFIC responses to questions on the design of the system for
Monitoring the Illegal Killing of Elephants (MIKE)
raised during discussion at the 41st CITES Standing Committee meeting
(Geneva, 8–12 February 1999)

During the 41st CITES Standing Committee meeting a number of questions were raised regarding the general statistical design and function of the proposed monitoring system for illegal killing of elephants (MIKE). At the request of the Chair, IUCN and TRAFFIC were called upon to answer questions raised from member and observer governments in the meeting room. Additionally, the Chair entertained a request from IUCN that the opportunity might be taken to address any additional or more detailed questions outside the meeting room during the course of the formal Standing Committee meeting. Accordingly, delegates met with IUCN and TRAFFIC throughout the week.

This text provides written answers given to delegates attending the Standing Committee meeting either inside or outside the meeting room and serves as a formal record of IUCN and TRAFFIC's responses to the questions raised.

1. The methodology used for site selection

- 1.1 A number of concerns voiced suggest that the methods used in the site selection process have not been well understood. The criteria used for selection are explained in Section 3.2 of the MIKE proposal (Doc. SC. 41.6.3, Annex 1). The statistical process used to apply these criteria to the final selection of sites is explained in Annex 4 of the MIKE proposal. Though this presentation of the methodology is very technical, there is no simple, lay explanation of the complex process employed. The main point is that the requirements of CITES Resolution Conference 10.10 (Annex 2) are met, in particular with regard to selecting a representative sample of sites across Africa and Asia.
- 1.2 Some concern was expressed regarding the inclusion or exclusion of particular sites. In answer to this, it was explained that the sites were drawn from a pool of proposed sites prepared and vetted by the IUCN/SSC's African and Asian Elephant Specialist Groups. Further, it was reiterated that the process of final site selection from the pool of proposed sites was objective and anonymous, so as to avoid the introduction of any bias, unconscious or otherwise. The final selection of sites was the product of a process that followed logically from (a) the list of candidate sites in Africa and Asia, (b) the selection criteria and (c) the application of the method adopted.
- 1.3 There were also a number of questions concerning the related issue of the power or sensitivity of the MIKE system to detect a real change. The estimates presented on page 9 of the MIKE proposal document *must be read in the context of the assumptions and simplifications* that were necessary to produce them. These are clearly stated in the document, in particular in the third paragraph on p. 67. It is worrying to IUCN that the caveats and provisos on this power issue, although adequately mentioned in the main text of the proposal, and emphatically stated again in Annex 4, are apparently being ignored. The estimates presented are necessarily very rough *but conservative* and are based on some very broad assumptions and simplifications. Their main purpose was to provide a basis for comparison of three, proposed sampling scenarios. The method adopted has been widely used and recommended elsewhere (See Green (1994) for statistical details and justification).

2. Analysis of MIKE Data

- 2.1 A number of questions on data analysis within the MIKE system have arisen during discussion. This is likely the result of the MIKE proposal, as submitted to the 41st Standing Committee meeting, providing few details of the statistical techniques to be applied to the MIKE data during the analysis phase. This omission, in fact, was not because the details of the possible analyses had not been discussed in the MIKE development process but because they were not required in the contract between the CITES Secretariat and IUCN which followed from a decision made at the 40th Standing Committee meeting in March 1998 "to develop a plan for the long-term, site-based monitoring of illegal killing" (Notification No. 1998/09) for consideration at the 41st Standing Committee meeting in February 1999. This proposal was to include an unbiased representative sample of monitoring

sites in Asia and Africa as well as an indicative budget for the implementation of MIKE (i.e. including the initial set up costs and five years of subsequent running costs).

Although precise details of the analytical methodology will only be settled after the initial phase of implementation, the section below outlines the most likely analysis scenario.

- 2.2 Before any detailed analysis of data, it is always sensible to use methods of exploratory data analysis (EDA), especially with data as complex as those to be produced by the MIKE system. The purpose of the EDA phase is to highlight the main features of the data, eliminate or investigate anomalous data points and to suggest hypotheses and modelling approaches. EDA depends heavily on interactive graphical methods, and powerful packages for such analyses are readily available.
 - 2.3 At the simplest level, MIKE output will require descriptive summaries of data and derived indicators. These summaries consist of tables of counts, means, totals, percentages and rates (accompanied by graphical representations where appropriate). Modern techniques of *data smoothing* will also be used, especially for highlighting *trends* in time series data. Examples of these methods are LOESS and kernel smoothing, which are very powerful tools for revealing underlying trends in highly variable data (Venables & Ripley, 1997).
 - 2.4 Particular hypotheses will be investigated by means of a process of statistical modelling. The modelling framework used will most probably be as follows. Generalised linear models (GLMs), in particular, the Poisson regression (allowing for over-dispersion), almost certainly will form the backbone of the analysis of population data and carcass count data (McCullagh & Nelder, 1989). The models used will have to extend the usual GLM in two ways: firstly, to account for serial correlations, i.e. taking account of the longitudinal nature of monitoring data (Diggle, Liang & Zeger, 1994). Secondly, the hierarchical structure of the sampling process (sampling sites and then locations within sites, etc.) imposes the need for multi-level modelling (Goldstein, 1995). It is possible that spatial correlations will also have to be taken into account; but this may not be necessary, unless some of the sampled sites are close to one another. These methods, especially in combination, are quite complex, and indeed are close to the cutting edge of modern applied statistical research.
 - 2.5 The issue of “causality” is discussed at some length in Section 3, below, but comments in the context of the proposed data analysis are presented here. Modelling the data using multi-level statistical models will enable the effect of a factor that operates at one level of the data hierarchy to be assessed at other levels. By “factoring out” the effects of all possible external variables, further analysis of the residuals should provide a sensitive measure of the effect of changes in the status of the African/Asian elephant in CITES.
3. The issue of establishing “causality” in the short and long-term
 - 3.1 It is important to understand the design of the MIKE system in the context of its intended function. While Decision 10.1, Part A, g) does require “the establishment of a mechanism to halt and immediately transfer the Appendix I populations back to Appendix II in the event of [...] the escalation of illegal hunting of elephants and/or trade in elephant products owing to the resumption of legal trade” it was never intended that this be a function of the long-term, international monitoring system, now known as MIKE.
 - 3.2 It was recognised by IUCN early on that the lack of baseline or benchmark data precluded this possibility and the 40th Standing Committee (London, March 1998) was informed of these limitations. As a result, reporting systems were established through the use of the incident report and national reporting forms by the CITES Secretariat. The CITES Standing Committee has now established a process for using these reporting systems to assist in any decisions regarding the re-transfer of the three populations should this become necessary (Doc. SC. 41.6.4 (Rev. 2)).
 - 3.3 However, none of this invalidates the use or value of the long-term monitoring process. The MIKE system is designed to meet the specifications of a long-term monitoring system incorporating the scope and methodology and directions for data collection and compilation stipulated in Resolution Conference 10.10 (Annex 2) and called for in Decision 10.1, Part A, i).

- 3.4 In common with countless other fields of conservation policy, MIKE represents an attempt to address the problem of decision making in the face of uncertainty. Ultimately, the decisions to be taken by the Parties to CITES will be the result of the careful weighing of evidence and informed judgement. A good monitoring system will strive to supply the best possible information required to make this judgement. The information outputs of the system will consist of robust indicators of the processes being monitored at the site level: elephant population numbers and trends, mortality from illegal killing, levels of law enforcement activity. The system will also assess the extent to which these parameters are correlated with factors likely to influence them and will provide statistical measures of the *reliability* of this information. The monitoring system is thus a tool to help us understand the dynamics of the underlying process and to provide measured information as the basis of decision making.
- 3.5 It is necessary to regard the so-called "causality" issue in this context. The monitoring system will help us to understand the process being monitored and hence to make *judgements* on causal relationships, including the effect of any future decisions to allow legal trade, on the incidence of illegal killing that may be made once the monitoring system is in place. To "prove" that the resumption of legal trade, or any other change in the status of the African elephant within CITES, has led to an increase in mortality from poaching is not something that any monitoring system could ever achieve regardless of its design. The most that can be achieved is to statistically assess the evidence relating or correlating legal trade with elephant mortality. MIKE is designed to make such assessments.
- 3.6 Care is needed in interpreting some of the language of the COP10 Decision 10.1, Part A, g) and in Resolution Conference 10.10 the section, "Regarding monitoring of illegal hunting of and trade in elephant specimens, sections a) and b)". There has been a tendency to incorrectly assume that the agreed international monitoring system needs to provide a deterministic mechanism for: (a) triggering any future decision to transfer the African elephant back to Appendix I, under specified conditions and (b) the establishment of causality between the change in status of the African elephant within CITES and changes in the level and trends of illegal killing of elephants. If the interpretation of the COP decisions and resolutions are taken too literally, it could be construed that what is proposed is not a monitoring system but an *expert system*, i.e. an automated, "data in/answer out" system that makes the decision for us. There is no claim that MIKE is designed to be used as an expert system, nor was it the intention of the Parties that an expert system be designed.
4. Factoring in the role of the price of ivory
- 4.1 IUCN and TRAFFIC were asked why the price of ivory was not included as an explanatory or independent variable in the proposed monitoring systems. It was explained that, in principle, there is no reason why ivory price should not be utilised as a variable although it is much more appropriately tracked in the context of the Elephant Trade Information System (ETIS) than within MIKE. However, it was explained that the relationship between price and poaching is complex and data are often unreliable. These factors would have to be incorporated in the overall analysis linking the two systems. It was further explained that several important points regarding the pricing of ivory need to be considered.
- 4.2 Most ivory price data collected in the past have been derived from the declared value of imports under a legal trade regime; such data are now no longer available.
- 4.3 The fact that much (if not most) of the available price data fails to pinpoint a specific place in the chain of trade (for example, the price paid to the poacher, the price paid for raw ivory to middlemen, the price of raw ivory paid by carvers, the price of worked ivory at the retail level, etc.) constrains the explanatory power of any analysis. The stage at which price is recorded can be critical to any meaningful analysis. For example, an analysis of the rhinoceros horn trade showed that while the price paid to rhino poachers remained at a fairly constant low-level throughout the period examined, at other levels of the trade, profit margins increased dramatically. This is likely to also be the case for elephant ivory as well.

4.4 Factors determining the price of ivory are complex and depend on a variety of forces. These include:

- the quality and, hence, the commercial value of ivory (for example, larger tusks are usually more valuable than smaller pieces of ivory, while ivory which is discoloured, cracked, dry, old, bleached or otherwise in poor condition generally commands far lower prices);
- the circumstance of the sellers and buyers (for example, how quickly someone wants to get rid of their ivory stock; whether or not there are ready buyers on the black-market within Africa or developed connections with end-use buyers; and a variety of other such factors); and
- the problem of price distortion. In some instances, ivory price data have been distorted due to entrapment or "sting"-type operations on the part of the relevant law enforcement authorities.

4.5 TRAFFIC has received funding to undertake a detailed and comprehensive assessment of ivory price data from 1989 to the present.

4.6 It was pointed out that Question 12 of the ETIS Seizures Data Collection Form, which was circulated by the CITES Secretariat in Notification to the Parties 1998/10 on 31 March 1998, requests information on the value of the ivory seized.

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