

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



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CONSERVATION AND MANAGEMENT ISSUES FACING AFRICAN ELEPHANTS

1. The report attached, presenting an update on conservation and management issues facing African elephants, was prepared by the IUCN/SSC African Elephant Specialist Group.
2. The working document pertains to agenda item 16 of the provisional agenda of the third African elephant meeting.

Update on conservation and management issues facing African elephants

A report to the 3rd African Elephant Meeting, convened by the CITES
MIKE Programme



Source: Walpole & Linkie, 2007

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Contents

	Page
Introduction	6
Continental Overview	7
Central Africa	8
<i>Population Surveys</i>	8
Cameroon	8
Central African Republic	8
Chad	7
Congo	7
Democratic Republic of Congo	7
<i>Illegal Killing</i>	9
Central African Republic	9
Chad	9
Democratic Republic of Congo	9
<i>Habitat loss and degradation</i>	10
<i>Human-elephant conflict</i>	10
<i>Ivory trade</i>	10
Eastern Africa	12
<i>Population surveys</i>	12
Kenya	12
Rwanda	12
Sudan	12
Tanzania	13
Uganda	13
<i>Transboundary surveys</i>	14
<i>Human-elephant conflict</i>	14
<i>Ivory trade</i>	14
Southern Africa	15
<i>Population surveys</i>	15

Botswana	15
Namibia	15
Mozambique	15
South Africa	15
Zambia	15
Zimbabwe	16
<i>Local overabundance of elephants</i>	16
<i>Human-elephant conflict</i>	16
<i>Illegal killing</i>	18
<i>Ivory trade</i>	18
West Africa	19
<i>Population surveys</i>	19
Benin	19
Burkina Faso	19
Ghana	19
Liberia	19
Mali	19
Nigeria	19
<i>Human-elephant conflict</i>	20
<i>Illegal killing</i>	20
Emerging issues	21
<i>New developments in HEC mitigation</i>	21
<i>Logging and oil concessions</i>	22
<i>Population survey techniques</i>	22
References	23
Additional bibliography	32
Appendix I – Summary of population surveys	34

Introduction

This paper provides an overview of conservation and management issues facing the African elephant (*Loxodonta africana*) based on a review of survey reports and other material collected since 2006 by the CITES Monitoring of the Illegal Killing of Elephants (MIKE) programme and the IUCN/SSC African Elephant Specialist Group (AfESG).

The population estimates from the survey reports submitted to CITES MIKE and the AfESG are summarized in Appendix I to this report. Only the most significant findings are discussed in the relevant regional sections below. Planned future surveys are also included in Appendix I.

While relevant survey results are discussed in this report, no attempt has been made to carry out a quantitative or qualitative analysis of the population and range data. Furthermore, because of information gaps, and time lags between events and their documentation, the issues covered here may not fully reflect the current reality on the ground. Therefore, range States are encouraged to contribute additional information, including new survey data and updates on specific issues and developments with regard to elephant conservation and management.

Continental overview

There have been numerous elephant surveys since 2006 which provide valuable information on the range and status of the species. The survey results indicate that some populations, especially in Central Africa, have experienced drastic declines while others are stable or increasing. Some new information has also become available on poorly known populations, including the first elephant counts in southern Sudan since the 1980s. Many data gaps still remain, however, most notably on the present status of Angola's elephants.

Based on the review of reports since 2006, it appears that illegal killing, habitat loss and fragmentation, and human-elephant conflict remain the main conservation challenges for African elephants. The negative impacts of locally overabundant elephant populations on their habitats continue to cause concern, especially in southern Africa.

Poaching for meat and ivory is widespread, particularly in Central Africa (e.g. Poicelot, et al., 2010; Luhunu, 2009; Chardonnet & Boulet, 2007). The most recent analysis of CITES MIKE data singles out Government Effectiveness and the Human Development Index as the most important predictors of illegal killing across elephant range States (De Meulenaer, 2010). At the global level - which includes Asian elephants - the MIKE data suggest declining or stable levels of illegal killing of elephants between 2002 and 2006, a marked increase through 2007 and 2008, followed by a decline in 2009 (De Meulenaer, 2010).

The role that Asian crime syndicates and Chinese nationals play in the ivory trade in Africa has emerged as a major issue of concern in recent years (Milliken, 2010; Milliken & Sangalakula, 2009). This prompted China to make a commitment to CITES in 2008 to ensure its citizens living in Africa were fully aware of the illegality of dealing in ivory. However, there is little evidence to support that this commitment is being honoured (Milliken, 2010). Illicit ivory trade remains strongly correlated with the presence of unregulated domestic ivory markets, such as those in Cameroon, Côte d'Ivoire, Democratic Republic of the Congo, Gabon, Ghana and Nigeria (Milliken & Sangalakula, 2010).

Human-elephant conflict (HEC) remains pervasive throughout the range of the African elephant (e.g. Lamarque, 2009; Sitati & Tchamba, 2008; Walpole & Linkie, 2007). Where the costs of co-existing with elephants to affected communities outweigh the benefits, elephants are often killed or displaced into ever more isolated refuges (Sitati et al, 2007; Dublin & Hoare, 2004). Current thinking on HEC management emphasizes inexpensive community-based elephant deterrent methods and land use planning supported by a favourable legislative and policy framework that helps to balance the costs and benefits of living with elephants (e.g. Lamarque, et al., 2009; Walpole & Linkie, 2007; Hoare, 2007).

Human settlement and livestock grazing in protected areas and elephant corridors is widespread (e.g. Plumptre, et al., 2010; Hibert, et al., 2010; Jones, et al., 2009). Logging, mining, oil exploration and large scale agricultural development continue to claim large tracts of former elephant habitat and open up areas for illegal hunting. However, in Central African forests well managed and protected oil and logging concessions have been shown to support high densities of elephants (Stokes et al, 2010; Kolowski, 2010).

Central Africa

Population surveys

Cameroon

A 2007 total aerial count in the Waza ecosystem in northern Cameroon counted 246 elephants inside the park and a further 250 outside the park migrating towards the Kalamaloue National Park (KNP), giving a total minimum estimate of 496 animals. However, there is a need to carry out simultaneous counts in both parks and the environs to estimate the total population in this ecosystem (Omondi, et al., 2007).

Female elephants were found to range over 5,900 km² migrating through unprotected range north of Waza National Park to the Kalamaloue National Park. Southwards from Waza, the elephants ranged 3,679-5,339 km² into unprotected areas. This highlights the need to secure the important elephant corridors in this area (Foguekem, et al., 2009).

Central African Republic

Very few signs of elephants were seen in Bangassou during a recent survey (Luhunu & Bechem, 2009). Blake (2005) had estimated the population to be 500 individuals.

Chad

Total aerial counts of elephants in the Zakouma National Park in Chad in March 2009 produced only 542 elephants (Potgieter, et al., 2010), compared to 617 counted in the the year before (Potgieter, et al, 2009), and down from 3,020 counted in 2006 (Fay, et al., 2006). These surveys were carried out at the same time of year and used the same survey methodology. The 2006 count covered an area of approximately 3,000 km² corresponding to the park boundaries. In order to minimize the risk of undercounting, the survey block limits were slightly modified for the 2009 and 2010 counts, covering a total area of 3,370 km², (Potgieter, et al., 2010).

Congo

A 2006 survey of the Ndoki-Likouala Conservation Landscape, which included the Nouabalé-Ndoki National Park, the Lac Télé Community Reserve and several surrounding commercial logging concessions, estimated an elephant population of 11,480 (95%CL 8,323-15,211) (Stokes et al.,2010).

Democratic Republic of Congo

A 2008 survey found no signs of elephants in the Watalinga Forest in the Virunga National Park (Nixon & Lusenge, 2008). The area had a heavy military presence throughout the civil war and elephants may have become extirpated there as long ago as 2000. However, elephants may still occur in the nearby Mt. Hoyo region and immigration to Watalinga from there is a possibility (Nixon & Lusenge, 2008). The rebel groups have now been largely driven out of the area and the military has moved their bases to the edge of the park (Plumptre, et al., 2010). A subsequent survey of the Greater Virunga Landscape, encompassing both the Virunga and Queen Elizabeth National Parks, produced an estimate of 347 elephants in the northern (north of Lake Edward) and central (south of Lake Edward) sections of the survey zone (Plumptre, et al., 2010).

A survey of the Salonga-Lukenie-Sankuru landscape in western DRC found that forest elephants were absent over much of the area. Most elephant signs were encountered to the north of the Lokoro River. The western *Raffia* palms swamps in the proposed Lotoi-Lokoro CBNRM zone seem to be the most important habitat for elephants in this area (Steel, 2007).

In Kahuzi-Biega National Park, where no signs of elephants were seen in 2004-2007, tracks belonging to approximately 30 elephants were observed in 2008. The presence of elephants was later confirmed by camera traps (Luhunu, 2009).

Illegal killing

Illegal killing of elephants has risen to alarming levels in many parts of Central Africa. A 2009 analysis of MIKE sites showed that Central Africa remained the region with the highest poaching pressure on the continent (De Meulenaer, 2010). While the dynamics influencing poaching differ in each country, the situation has been exacerbated by armed conflict and weak law enforcement.

Central African Republic

In Northern Central African Republic elephant populations are under serious pressure from Sudanese and Chadian poachers (Bouché, 2009; Chardonnet & Boulet, 2007). The illegal killing in northern CAR appears to follow a seasonal pattern starting in mid-January with the onset of the dry season, which marks the arrival of the poachers, and continues till May when the rains begin. There appears to be some collusion between the poachers who hunt elephants for their ivory and local communities who benefit from the meat left behind by the ivory poachers (Bouché, 2009; Chardonnet & Boulet, 2007).

Chad

In Zakouma National Park massive poaching of elephants has caused the elephant population to plummet from approximately 3,900 animals in 2005 to 542 in 2009 (Poicelot, et al., 2010). Animals of all ages have been targeted for their ivory (Poicelot, 2010; Potgieter, et al. 2009). The heavily armed poachers have been acting with impunity even near the park headquarters (Potgieter, et al., 2009). In the rainy season, elephants migrate 70-100 kilometers north of the park where they are particularly vulnerable (Potgieter, et al., 2009; Fay, et al., 2006).

Since the introduction of aerial patrols by the Wildlife Conservation Society (WCS) in 2008, and stronger law enforcement under the aegis of the CURESS¹ project, the rate of poaching in Zakouma seems to have slowed down (Poicelot, et al., 2010; Potgieter, et al, 2009). President Déby has also shown personal interest in this problem and has contributed both personnel and firepower to the park (Potgieter, et al., 2009). Despite these efforts, the problem is still not under control (Potgieter, et al., 2010). The African Parks Network (APN) is expected to formally take over the management of the Zakouma Park in 2010 (APN, 2009).

A recent report suggests that some of the anti-poaching efforts in Chad have caused poachers to divert their activities to northern Cameroon where elephants of all ages are being killed for their ivory, allegedly to supply an 'Asian-run criminal network operating out of Nigeria and Sudan' (Bour, 2010).

Democratic Republic of Congo

In the 2003-2005 period the Proportion of Illegally Killed Elephants (PIKE) in four MIKE sites in the Democratic Republic of Congo (DRC) was estimated at 81% for Garamba National Park, 78% for the Okapi Wildlife Reserve, 84% for Kahuzi-Biega National Park and 71% for Salonga (Luhunu, 2009). Over the 2008-2009 period, the poaching has expanded to even actively patrolled populations (Hart, 2009).

In Garamba National Park there was a marked decline in the level of poaching in 2005 (Luhunu, 2009; APN, 2008; Emslie, et al., 2006). However, the presence of the Lord's Resistance Army (LRA) rebel movement in the park led to a resurgence of poaching in 2008 which prompted the combined forces of the DRC, South Sudan and Uganda to chase the LRA out of the park. However, elephant poaching for meat and ivory has continued, allegedly with the subsequent involvement of the DRC armed forces (APN, 2010a).

¹Conservation et Utilisation Rationnelle des Écosystèmes Soudano-sahéliens

Habitat loss and degradation

A number of protected areas and key elephant habitats in Central Africa suffer from human encroachment, including illegal logging, settlement and livestock grazing (e.g. Plumptre, et al., 2010; Omondi et al. 2007; Steel et al, 2007).

Roads in unprotected areas can act as effective barriers to elephant movement. Studies have documented an increasing abundance of forest elephants with distance from roads, presumably correlating with reduced poaching pressure (Stokes, et al, 2010; Blake, et al., 2008; Blake, 2007). Road building in unprotected landscapes may therefore serve to isolate populations and limit habitat availability (Blake, et al., 2008).

There is some suggestion that oil concessions, which have a high degree of protection and minimal habitat degradation, may provide refuge to forest elephant in an otherwise insecure landscape. A recent study (Kolowski, 2010) found that elephants congregated in a well-protected oil concession area in Gabon, never venturing into nearby national parks, despite the presence of an 800-strong labour force, a well developed road network and other oil extraction infrastructure. It appears that the strictly enforced ban on hunting, the relatively intact habitat, and restricted access to the area combined to create a safe haven for the elephants. The elephants in this area were also found to exploit forage opportunities provided by the roadside secondary vegetation, in stark contrast to the road avoidance typical of other less secure sites.

Similarly, well managed and protected commercial logging operations may provide important habitats for forest elephants and could help extend the protected area coverage in Central African forests (Clark, et al., 2009; Weinbaum, et al. 2007). In northwestern DRC, one well managed logging area had comparable elephant densities to the nearby Noubalé-Ndoki National Park (Stokes, et al., 2010).

Human-elephant conflict

Very few recent studies seem to have been carried out on HEC in Central Africa. The most comprehensive new report on the issue (Sitati & Tchamba, 2008) found HEC to be widespread in both savannah and forest regions. Crop raiding is the most common form of HEC but some competition over water resources and damage to water installation also occurs in the drier savannah areas. The conflict is exacerbated by habitat loss and fragmentation and the lack of

opportunities for affected communities to benefit from wildlife tourism or legal consumptive use of wildlife.

The negative attitudes to elephants sometimes contribute to illegal killing, either by the local communities themselves, or by poachers from outside the area (Sitati & Tchamba, 2008; Wilungula Balongelwa, 2008). In some countries, relatively large numbers of elephants also killed on wildlife authority problem animal control operations (Edjang Miko, 2009).

The presence of rebel groups and intense poaching in some forest sites is causing elephants to disperse into surrounding agricultural areas resulting in increased crop raiding (Sitati & Tchamba, 2008). The insecurity in many sites has made it difficult for the government to try and address the problem. There is also an absence of clear policies and strategies, and inadequate resources for dealing effectively with HEC at all levels (Sitati & Tchamba, 2008).

Eastern Africa

Population surveys

Kenya

A 2008 wet season aerial survey in the Laikipia-Samburu ecosystem counted 7,415 elephants (Litoroh, et al., 2010). A 2002 dry season aerial count in the same ecosystem had produced 5,447 elephants (Omondi, et al., 2002). The 2008 survey area included two new survey blocks which were not covered in the 2002 survey.

A total of 319 elephants were counted in the Marsabit area in 2008 (Litoroh, et al., 2010).

Rwanda

A 2006 dung count estimated the elephant population in the Akagera National Park to be 28 (Parker, 2006).



Photo: Nurla Ortega (APN, 2009). Elephants in Akagera National Park.

Sudan

The aerial sample counts carried out by the Wildlife Conservation Society (Grossman, et al., 2008; Fay, et al., 2007) constitute the first systematic surveys of elephants in Southern Sudan since the 1980s (Boitani, et al., 1981). Both surveys took place in the dry season.

The first of these surveys, which covered the Boma National Park area, the Southern National Park, Jonglei and the Lotilla block, produced a total estimate of 6,850 elephants (Fay, et al., 2007). In the Jonglei area, the estimate of 5,462 elephants is higher than the 1980s estimate for the same area using the same survey methodology. However, a comparison of the results with those of Boitani et al (1981) in Southern National Park (SNP) area suggests a dramatic decline in elephant populations in the SNP, apparently due to organized poaching by nomadic pastoralists and ‘horsemen from the north & west’, as well as the Murahleen militia men from western Sudan (Fay, et al, 2007).



The only elephant group sighted in SNP during the survey (Fay, et al., 2007.)

The second survey (Grossman, et al., 2008) covered the proposed Bandingalo National Park, the Nimule National Park, the Kidepo Reserve and the Loelle area. In Nimule National Park 69 elephants were observed. The survey also confirmed the seasonal use by elephants of the Loelle area (a proposed protected area), which may form part of a transboundary population between Southern Sudan, Ethiopia, and Kenya. Some elephant tracks were observed in the Bandigalo area and in the Kidepo Reserve, which is contiguous with the Kidepo National Park on the Ugandan side. Wet season counts should be carried out to better understand the seasonal distribution of elephants across these landscapes (Grossman, et al., 2008).

All these populations are threatened by uncontrolled development of extractive industries (oil, timber and minerals), major infrastructure developments (e.g. roads), return of people displaced by the war, poaching and increased encroachment in important habitats (Fay, et al., 2007).

Tanzania

In Tanzania a national aerial count of six ecosystems (Tarangire-Manyara, Serengeti, Selous-Mikumi, Ruaha-Rungwa, Katavi-Rukwa and Moyowosi-Kigosi) gave a total elephant population estimate of 105,439 ($\pm 6,080$ SE). Notable was the apparent decline of the population in the Selous ecosystem by approximately 30,000 elephants since the last count in 2006. Possible reasons given for this decline include migration of elephants outside the survey area - into the Niassa Game Reserve in Mozambique -and data processing errors in the 2006 survey (TAWIRI, 2009). According to the 2006 census results, there were more elephants outside protected areas than inside (TAWIRI, 2007), but the reverse was observed in 2009.

For a detailed account on the status of all the main elephant corridors in Tanzania the readers are advised to refer to Jones, et al., 2009.

Uganda

Currently estimated at 904 ± 666 animals, the elephant population in the Murchison Falls National Park seems to be well on its way to recovery (Rwetsiba & Numawanya, 2010).

Transboundary surveys

In 2008 an aerial survey in the Tsavo/Mkomazi ecosystem counted 11,733 elephants. Most of the elephants were observed inside the protected areas (Omondi, et al., 2010). Tsavo East National Park had a markedly larger concentration of elephants than Tsavo West NP.

Another total count, jointly organized in 2010 by the Kenya Wildlife Service and the Tanzania Wildlife Research Institute, found 1,420 elephants in the Amboseli-West Kilimanjaro and Magadi- Natron cross-border landscapes (KWS & TAWIRI, 2010).

Human-elephant conflict

Settlement and human activities, including livestock grazing, in wildlife corridors and other important habitats is leading to increased isolation of elephant populations in many protected areas and contributes to high levels of HEC throughout Eastern Africa (e.g. KWS & TAWIRI, 2010; Omondi, et al., 2010; Ngene & Omondi, 2009). This conflict is sometimes exacerbated by the influx of immigrant settlers with a hostile attitude to elephants (Jones, et al., 2007). The direct economic costs of the conflict can be substantial (Ngene & Omondi, 2009). In response to these problems, large numbers of elephants are killed each year on problem animal control (Niskanen, 2009; WWF, 2008; Hoare, 2007).

Ivory trade

In Ethiopia the domestic ivory market has been revived since the 2005 crackdown by authorities. In 2008 ivory was found readily for sale and selling at substantially higher prices than before. New tusks from Kenya and Sudan continue to be smuggled into Ethiopia. Chinese nationals working in Ethiopia are the main consumers of the ivory (Vigne & Martin, 2008).

The recent development of forensic techniques to analyse stable isotopes (Cerling, et al., 2007) and DNA in samples (Wasser, et al., 2010; Wasser, et al., 2009; Wasser, et al., 2007) of confiscated ivory have made it possible to determine more accurately the likely geographic origin of the ivory. Two ivory seizures in Taiwan and Hong Kong in June 2006 were traced to the Niassa-Selous elephant population using the DNA method (Wasser, et al., 2009).

Southern Africa

Population surveys

Botswana

Aerial surveys were carried out in the Okavango area in 2008 and 2009. The 2008 sample count covered the Jao concession and estimated 538 elephants (Viljoen, 2008). The 2009 survey estimated 1,351 elephants in the NG/26 Wildlife Management Area (Viljoen, 2009).

A survey covering all of northern Botswana is planned for 2010 (MIKE, 2010).

Namibia

A September-October 2007 aerial survey of the Caprivi Strip (Chase, 2008) estimated a population of 14,064 suggesting that elephant numbers increased by nearly 20% since August 2004 (MET, 2004). Movement of elephants into the Caprivi from Botswana may account for this increase (Chase, 2007).

Mozambique

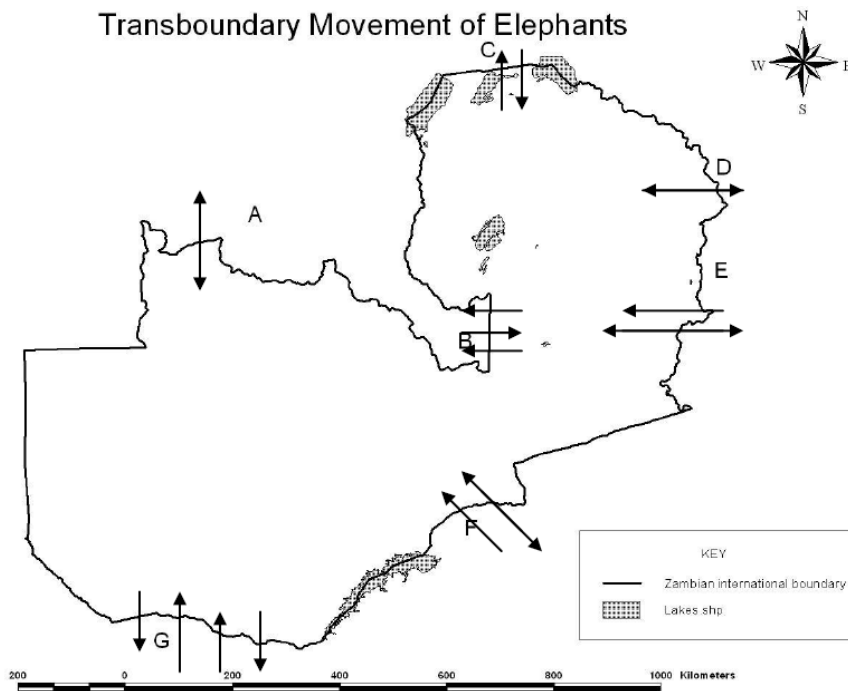
A 2008 national census of wildlife in Mozambique covering estimated an elephant population of 22,144 elephants ($\pm 26\%$) (Agrego, 2008). No elephants were seen in the Gilé Special Reserve during the national census, but another survey (Mésochina, et al., 2008) estimated a population of at least 78 elephants in the Gilé area. A survey of the Niassa Reserve and surroundings was carried out in 2009, but the report is not yet available (MIKE, 2010).

South Africa

The Kruger National Park's (KNP) elephant population in 2007 was estimated at 13,050, compared to 12,427 the year before (Whyte, 2007). Subsequent surveys were carried out in 2008 and 2009. These covered the KNP and the surrounding areas, and produced estimates of 15,811 and 16,315, respectively (SANParks, 2009).

Zambia

Aerial counts were conducted in 2008 resulting in an estimate of $26,282 \pm 4,405$ elephants (Simukonda, 2009). The survey area covered 69% of the protected area system, including 17 National Parks, 25 Game Management Areas (GMA) and three Open Areas - Lundazi, Sikongo and Kazungula. The West Lunga area was not included in the survey and is no longer considered to be elephant range (Simukonda, 2009). All elephants seen during the survey were in National Parks and GMAs; no elephants were sighted in the open areas. Most of the elephants were estimated to be in the Luangwa (72%) and Kafue (13%) systems. The elephants in the Bangweulu area are suspected to form part of a Zambia-DRC transboundary population. Other transboundary corridors include: Tanganyika-Congo DR, Nyika Zambia-Nyika Malawi, Lukusuzi Zambia-Vwaza Malawi, Lower Zambezi-Mana Pools and Sioma-Namibia/Botswana (see map below). Satellite tracking of elephants in 2006 confirmed movement of elephants from the Sioma Ngwezi NP into the Luiana PR in Angola (Chase, 2006).



Transboundary elephant corridors in Zambia (from Simukonda, 2009).

There are also unconfirmed reports of the presence of elephant bulls in Liuwa Plains (APN, 2009).

Zimbabwe

In Gonarezhou National Park (GNP) in Zimbabwe an aerial sample count produced an estimate of $6,516 \pm 27.5\%$, the largest number of elephants estimated in GNP by any survey in the last 25 years (Dunham, et al., 2007a). A more recent survey (Dunham, et al., 2010) of Gonarezhou and surrounding lands, estimated 9,281 elephants, the majority (9,123) of which were within the park. As the international border is no longer fenced, it is possible that these increases are partially due to immigration. Counts in GNP should be coordinated with simultaneous surveys on the Mozambican side of the border, and in the Kruger National Park in South Africa. No elephants were seen in Zinave during recent surveys (Stalmans, 2007; Dunham, et al., 2010).

There have been reports of elephants dispersing into Angola and Zambia from Caprivi and Botswana, especially along the Kwando River and East Caprivi (Chase, 2008).

Local overabundance of elephants

Concerns over the impact of local overabundance of elephants have continued to elicit a great deal of debate and research, particularly in Southern Africa. In South Africa, the vigorous and sometimes acrimonious debate over the management of elephant populations prompted the government, in 2006, to convene a panel of experts to examine the issue, which resulted in a comprehensive scientific assessment of the consequences of various elephant management strategies (Mennell & Scholes, 2007). In 2007, a special task force of the IUCN/SSC AfESG also published a comprehensive review of options for managing the impact of locally overabundant elephants (Balfour, et al., 2007).

While it is not possible to provide a detailed summary of the issue here, the wealth of recent research has broadly shown that it is the distribution of elephants in the landscape, rather than their absolute numbers, that results in undesirable impacts. Therefore, management actions, at

least in large areas, should focus more on altering the distribution of elephants than their total numbers. It is also clear that there is no single population management strategy that works in all circumstances; all options have their pros and cons. The selection of which management options to choose is determined by the land use objectives of the specific area in question.

For recent research on impacts and management of local overabundance, see additional selected references provided in the bibliography at the end of this document.

Human-elephant conflict

While crop raiding is the most widespread type of conflict in southern Africa, damage to water installations can be the most severe form of HEC in some dry areas (Lamarque, et al., 2009).

In Zambia HEC is considered particularly severe in the South Luangwa area. There are also fears that elephants in the Luangwa valley are becoming locally over-abundant with consequent negative impacts on the environment (Simukonda, 2009).

In Zimbabwe, between 2002 and 2006, more than 5,000 incidents of HEC were recorded and 774 elephants killed during problem animal control operations (Campfire, 2007).

In Malawi elephants were reintroduced into the Majete Forest in 2008 when 64 elephants were translocated there from Liwonde and Lengwe National Parks (APN, 2008). In 2009, another 85 elephants were translocated to Majete from Phirilongwe Forest Reserve in Mangochi District where they had been causing severe HEC (APN, 2009; Labuschagne, 2007). The translocation exercises seem to have been carried out successfully; however, judging by subsequent reports of crop-raiding, human deaths and injuries, destruction of problem elephants, and demands for compensation (APN, 2010b, 2010c, 2010d; 2009), it seems that the HEC problem may have been transferred to Majete together with the elephants.

Mozambique, one of the few African countries to try and tackle human-wildlife conflict on a national scale, recommends landscape level approaches, such as land use planning combined with ways of distributing benefits from consumptive and non-consumptive utilization of elephants (Agreco, 2008).

Despite general consensus on the failure of most centralized compensation schemes (IUCN, 2003), advance payments, or 'performance payments', funded by revenues from elephant hunts to compensate affected farmers, are being considered by Botswana Department of Wildlife and National Parks (Jackson et al, 2008).

Self-insurance schemes, such as the one piloted in Namibia, may have a place under certain circumstances (Lamarque, et al., 2009).

Planned and ongoing transboundary conservation initiatives need to consider implications of expanding range of elephants and to balance costs and benefits to affected communities in all the concerned countries (Metcalf & Kepe, 2008).

Illegal killing

High carcass ratios and high proportions of fresh carcasses were noted in several areas during the 2008 Zambia national elephant census (Simukonda, 2009). For example, a carcass ratio of 13.1% was recorded in the Musalangu GMA; all the carcasses seen there were in the 'fresh' category. The carcass ratio for the Lower Zambezi system was 14.37%. Of the carcasses seen,

most were in the Lower Zambezi National Park and the Chiawa GMA. Of these, 32% were in the fresh category (Simukonda, 2009).

In Zimbabwe, increased poaching has been reported in the Sebungwe region (Dunham, 2008).

Poaching has also been reported to be a problem in the Chobe area in Botswana (Botswana MIKE report, 2009) and in the Gilé Special Reserve in Mozambique (Mésochina, et al., 2008).

Ivory trade

Some concerns have been expressed over the apparent lack of control over Namibia's market for traditional '*ekipa*' ivory carvings. Specifically, it is feared that ivory originating from poached elephants outside the borders of Namibia is being laundered through this market (Reeve, et al., 2007).

West Africa

Population surveys

Few new reports are available on the status of West African elephants.

Benin

The Pendjari Biosphere survey in 2008 estimated 669 elephants, a lower figure than previous counts. This decline may be due to migration of elephants into the 'W' National Park and Arly, but unsustainable off-take through trophy hunting is also suggested as a possible reason (Sinsin, et al., 2008).

Burkina Faso

Surveys since 1999 suggest the elephant population in Konkombouri Hunting Zone in south eastern Burkina Faso is stable. During the December- March periods of 2005 and 2006 elephant densities reached the 'highest mean dry-season density recorded in West Africa in recent decades' (Bouché, 2007b).

Ghana

According to Jachmann (2008) the Kyabobo Range National Park shares a transboundary population of 20-30 elephants with neighbouring Fazao-Malfakassa National Park in Togo.

Liberia

A joint CITES-MIKE and Wild Chimpanzee Foundation survey of the Sapo Forest was conducted in November 2009. A preliminary report has been completed but the results are not yet available (MIKE, 2010).

Mali

A 2007 total aerial count of the Gourma elephant population in Mali estimated a minimum of 344 elephants. In 2002 the estimate was 322-375 using similar methods, which suggests that the population is stable (Bouché, 2007a).

Nigeria

Surveys in Nigeria in 2007 and 2008 reported the presence of elephants in Okomu National Park, Omo, Ifon Forest and possibly the Shasha Forest Reserve. All these populations are severely threatened by habitat loss and fragmentation, especially cocoa plantations (Ikemeh, 2009 & 2008).

Human-elephant conflict



Many elephant habitats in West Africa are experiencing severe fragmentation, and human encroachment (e.g. Hibert et al, 2010; Ouattara, et al., 2010; Nakandé et al, 2007). Crop raiding is the most common problem and seems to be getting worse in several areas (e.g. Kumordzi et al., 2008; Oppong, et al., 2008; Nakandé, et al., 2007).

Elephants in the Bia Conservation Area, Ghana, seem to be shifting from crop raiding at night to day time raids, presumably in order to avoid night time anti-crop raiding patrols (Oppong, et al, 2008).

In dry areas, competition for water and pasture can be severe and is exacerbated during drought years (Bouché, 2007a; 2007b; Douglas-Hamilton & Wall, 2009). In the transboundary 'W' National Park, livestock grazing inside the park in the dry season was found to effectively displace elephants to other areas (Hibert, et al., 2010).

Illegal killing

A study in Ghana (Jachmann, 2008) found that poachers tended to concentrate their efforts on areas with high elephant densities, mostly Mole and Digya National Parks, and the Bia and Kakum Conservation Areas. The study noted that a much larger patrol effort is required to bring down poaching to acceptable levels in forest than savannah sites.

Two elephants were reported to have been killed in Sapo National Park in 2009 (Massalatchi & Bofo, 2009).

There was an unsubstantiated report of poaching of elephants in the Outamba-Kilimi National Park in Sierra Leone where elephants tend to concentrate close to the park headquarters, possibly for security reasons (Barnes, et al., 2006).

Emerging Issues

New developments in HEC mitigation

Community-based conflict mitigation strategies have continued to evolve and several practical manuals have been developed to help disseminate this knowledge (e.g. Osei-Owusu & Bakker, 2008; Parker, et al., 2007).

Despite the proliferation of projects using chilli-based deterrents and many successful trials involving chilli, a new study suggests that the use of fences smeared with chilli grease may not significantly increase deterrent effect against elephants when compared to other strategies where several methods are used in unison. Furthermore, these studies imply that the chilli method may be too costly and labour intensive to be adopted by communities in the long run (Hedges & Gunaryadi, 2010; Graham & Ochieng, 2008).

The hypothesis that elephants are deterred by the sound of bees and that beehive fences can successfully reduce crop depredation by elephants has been studied more extensively (King, et al., 2009). The results showed avoidance by elephants of farms with bee hive fences. Bee hives may therefore be a useful addition to the suite of HEC mitigation measures, at least in communities with a bee keeping tradition. The method has the added advantage that the cost of fence construction and maintenance can be partially offset by the sale of honey.

Other innovative methods piloted in recent years include using tracking software and SMS technology to give problem animal control teams advance warning of approaching crop raiders (STE, 2007).

Integrated solutions to HEC

In recent years a great deal of research and effort has gone into understanding the dynamics, effects and root causes of HEC (e.g. Walpole & Linkie, 2007; Hoare & Dublin, 2004; Hoare, 2000). Many different methods have been tried to alleviate human-elephant conflict but no one method has been shown to be completely effective in eradicating the problem (e.g. Lamarque et al, 2009; Hoare, 2001). The most successful mitigation strategies are likely to be those that integrate a combination of different measures and that address both the symptoms of the problem (e.g. crop raiding) as well as its ultimate causes (e.g. poverty) (e.g. Jackson et al, 2008; Barnes, 2002; Hoare, 1999). There also is an increasing understanding that “governance” of elephants needs to be addressed within the context of wider governance of natural resources and society (IUCN, 2009; Hoare, 2007). An integrated strategy that incorporates the right measures at each of the levels in a coordinated manner is therefore much more likely to have a sustainable positive impact than applying the measures in a piecemeal and ad hoc manner. Such an integrated HEC management model is currently being designed for possible pilot implementation in Mozambique and Tanzania (IUCN, 2009).

Logging and oil concessions

The documented presence of elephants in relatively high densities in logging and oil concessions in Central Africa (Stokes, et al., 2010; Kolowski et al., 2010 Clark, et al., 2009) merits more attention and may offer some promise for closer collaboration with the extractive industries in this region and beyond.

Population survey techniques

Studies in different sites suggest that mark-resight (Morley & Van Aarde, 2007) and acoustic survey (Thomson, et al., 2010) methods can produce just as accurate, or more accurate, estimates than aerial and dung counts. Provided their use proves to be cost-effective, these methods may therefore have wider applicability in the future.

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Appendix I

Summary of Population Surveys*

Year	Survey Area/Country	Population Estimate	Survey Method ¹	Reference
2002	Gambella/Ethiopia	150	OG	Demeke, 2010
2006	Alatash NP/Ethiopia	50	OG	Demeke, 2010
2006	Dabus Controlled Hunting Area/thiopia	100	OG	Demeke, 2010
2006	Babille Elephant Sanctuary/Ethiopia	324	OG	Demeke, 2010
2006	Borana Controlled Hunting Area/ Ethiopia	50	OG	Demeke, 2010
2006	Grumeti Reserves / Tanzania	892	AT	Goodman, 2006
2006	Niassa Reserve/Mozambique	11,833	AS	Craig, 2006
2006	Maputo Special Reserve/Mozambique	329	AT & AS	Matthews & Nemane, 2006
2006	Akagera NP/Rwanda	28	DC	Parker, 2006
2006	Zakouma/Chad	3,020	AT	Fay, et al., 2006
2006	Southern Garamba/DRC	3,800	AT	Emslie, et al., 2006
2006	Ndoki- Likouala Landscape/Congo	11,480	DC	Stokes, et al., 2010
2007	Gonarezhou/Zimbabwe	6,516	AS	Dunham, et al., 2007a
2007	Matabeleland/Zimbabwe	39,765	AS	Dunham, et al., 2007b
2007	Caprivi&Khaoudom/Namibia	14,064	AS	Chase, 2007
2007	Southern NP/S.Sudan	1,425	AS	Fay, et al., 2007
2007	Jonglei/S.Sudan	5,462	AS	Fay, et al., 2007
2007	Boma NP/S.Sudan	606	AS	Fay, et al., 2007
2007	Gourma/Mali	344	AT	Bouché, 2007a)
2007	Konkonbouri/Burkina Faso	605	GS	Bouché, 2007b)
2007	Waza/Cameroon	496	AT	Omondi, et al., 2007
2007	Kalamaloué NP/Cameroon	250	IG	Omondi, et al., 2007
2007	Kruger NP/South Africa	13,050	AT	Whyte, 2007
2007	Garamba/DRC	?	AT?	Reid, 2007/No report yet
2007	Meru NP/Kenya	?	AT?	KWS/No report yet
2007	Zinave NP/Mozambique	0	AS	Stalmans, 2007
2007	Transmara District/Kenya (Dry)	640	DC	Sitati, 2007/No report yet
2007	Transmara District Kenya (Wet)	513	DC	Sitati, 2007/No report yet
2007	Omo NP/Ethiopia	26	?	No report yet
2008	Omo NP/Ethiopia	120	IG	APN, 2008
2007-2008	Tai, Comoe, nationwide/ Côte d'Ivoire	?	GS, AS, RC	No report yet
2008	Bangwelu/Zambia	Range		APN, 2008
2008	Boumba Bek/Cameroon	?	DC	No report yet
2008	Nimule/S.Sudan	69	AT	Grossman, et al., 2008

Year	Survey Area/Country	Population Estimate	Survey Method ¹	Reference
2008	Loelle/S.Sudan	Wet season tracks only	AS	Grossman, et al., 2008
2008	Kidepo/S.Sudan	Wet season tracks only	AS	Grossman, et al., 2008
2008	Bandingalo NP/S.Sudan	Wet season tracks only	AS	Grossman, et al., 2008
2008	Maputo SR/Mozambique	330	AT	Mathews, 2008
2008	Mozambique national census	22,114	AS	Agreco, 2008
2008	Virunga NP, Watalinga Forest/DRC	0	RC	Nixon & Lusenge, 2008
2008	Zakouma/Chad	937	AS	Poicelot, 2008
2008	South West Nigeria	Presence recorded	RC	Ikemeh, 2008
2008	KNP & surrounds/South Africa	15,811	AT	SANParks/No report yet
2008	Kafue/Zambia	703	AS	Frederick, H. (2009)
2008	Gilé SR/Mozambique	78	GS	Mésochina et al (2008)
2008	NG25 Block Okavango Delta /Botswana	538	AS	Viljoen, 2008
2008	Tsavo Ecosystem/ Kenya	11,692	AT	Omondi, et al., 2010
2008	Mkomazi/Tanzania	41	AT	Omondi, et al., 2010
2008	Samburu Laikipia/Kenya	7,415	AT	Litoroh, et al., 2010
2008	Marsabit & Environs/ Kenya	319	AT	Litoroh, et al., 2010
2008	Zambia national census	26,382	AS	Simukonda, 2009
2008	Reserve de Biosphere de la Pendjari /Benin	669	AS	Sinsin, et al., 2008
2009	Bili Gangu/DRC	2,500	?	Hart, 2009/No report yet
2009	Tshuapa, Lomami and Lualaba Rivers/DRC	500	?	Hart, 2009/No report yet
2009	Zakouma/Chad	617	AT	Potgieter, et al. 2009
2009	Manovo Zamza, Bohou Kpata, Idongo da Bangoran, Bamingui Bangoran ZCV, Koukourou Bamingui/CAR	1	GS	Bouché, 2009
2009	Idanre FR/Nigeria	Presence recorded	RC	Ikemeh 2009a
2009	KNP & surrounds/South Africa	16,315	AT	SANParks/No report yet
2009	Tarangire-Manyara/Tanzania	2561	AT	TAWIRI, 2009
2009	Serengeti/Tanzania	3,068	AS	TAWIRI, 2009
2009	Ruaha-Rungwa/Tanzania	34,664	AS	TAWIRI, 2009
2009	Katavi-Rukwa/Tanzania	6396	AS	TAWIRI, 2009
2009	Moyowosi-Kigosi/Tanzania	15,198	AS	TAWIRI, 2009
2009	Selous-Niassa Corridor/Tanzania	4,577	AS	TAWIRI, 2009
2009	Selous Ecosystem/Tanzania	38,975	AS	TAWIRI, 2009
2009	NG26 Block Okavango Delta / Botswana	1,251	AT	Viljoen, 2009
2009	Niassa/ Mozambique	?	AS	Craig, C.G./No report yet
2009	Sapo NP/Liberia	?	DC	MIKE/Massalatchi & Boafo
2009?	Dzanga Sangha/CAR	?	IR?	Turkalo, A./No report yet
2009	Caprivi/Namibia		AS	MET/Elly Hamunyela
2009	Tai/Côte d'Ivoire		DC	Nandjui, A./WWF

Year	Survey Area/Country	Population Estimate	Survey Method ¹	Reference
2010	Amboseli Ecosystem/Kenya	1,291	AT	KWS & TAWIRI, 2010
2010	Magadi/Kenya	48	AT	KWS & TAWIRI, 2010
2010	West Kilimanjaro/Tanzania	61	AT	KWS & TAWIRI, 2010
2010	Natron/Tanzania	19	AT	KWS & TAWIRI, 2010
2010	Zakouma	542	AT	Potgieter, et al., 2010
2010	Gilé SR/Mozambique	?	RC	IGF, Chardonnet, P./No report yet
2010	Okavango Panhandle/Botswana	?	AS	Chase, M./No report yet
2010	Northern CAR (Various Sites)	68	AS	Bouché, 2010
2010	Southern Kenya 2006-2010	Range data only	RC	Nyamu, et al. 2010
2010	Zinave/Mozambique	0	AS	Dunham, et al., 2010
2010	Gonarezhou & Communal lands/ Zimbabwe	9,146	AS	Dunham, et al., 2010
2010	Queen Elizabeth NP/Uganda	2,502	AS	Plumptre, et al., 2010
2010	Queen Elizabeth NP/Uganda	1,570	AT	Plumptre, et al., 2010
2010	Virunga/DRC	571	AS	Plumptre, et al., 2010
2010	Murchison Falls/Uganda	904	AS	Rwetsiba & Nuwamanya 2010 (summary)/No report yet
2010	Zambezi Valley/ Mozambique and Zimbabwe	?	AS	MIKE/Chimuti, S./No report yet
PLANNED SURVEYS				
2010	Bangassou/CAR		GD	MIKE/Luhunu/Bechem
2010	Eastern CAR		?	WWF/ Pélissier
2010	BF, NE, TG PDJ, WBJ, WBF, WNE, KER WAPOK Ecosystem		AT	MIKE/Massalatchi
2010	Maiko NP/DRC		RC	FFI
2010	Southern Angola		AS	Chase, M.
2010	Northern Botswana		AS	DWNP/Taolo, C.
2010	Etosha/ Namibia		AS	MET/Hamunyela, E.
2011	Tsavo Ecosystem/Kenya		AT	KWS/Omondi, P.

¹AS=Aerial Sample Count; AT = Aerial Total Count; DC = Dung count; IG = Informed Guess; OG = Other Guess; GS =Ground survey

*(Source: MIKE, 2010)