

# African Elephant Status Report 2007

An update from the African Elephant Database

J.J. Blanc, R.F.W. Barnes, G.C. Craig, H.T. Dublin, C.R. Thouless, I. Douglas-Hamilton and J.A. Hart



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Cover photo: © Gene Eckhart.  
Cover caption: The quality and availability of information on the status of elephants in Africa vary considerably across the continent. As with the elephant pictured on the cover, some areas are rich in detailed information, while in many others we are still in the dark. This edition of the *African Elephant Status Report* incorporates a new Information Quality Index to better highlight the extent of this variation in the quality and availability of elephant population data.
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# INTRODUCTION

This is the fourth African Elephant Status Report (AESR) produced under the aegis of the African Elephant Specialist Group (AfESG) of the IUCN Species Survival Commission (SSC). Like its predecessors, the AESR 2007 is based on data from the African Elephant Database (AED), the most comprehensive database on the conservation status of any single species of mammal in the wild. The AESR 2007 aims to provide the most authoritative, comprehensive and up-to-date source of knowledge on the distribution and abundance of the African elephant at the national, regional and continental levels.

One continuing challenge for the AESR is to interpret apparent trends in elephant numbers, particularly at the continental level. This is a tall order, as large gaps remain in our knowledge of elephant distribution and abundance across their range. Furthermore, guesswork still accounts for a large proportion of the elephant numbers reported in the AED, and an unknown number of elephants remain unaccounted for in the database.

Clearly, comparing guesses to derive population trends is a meaningless exercise. Yet such comparisons of elephant numbers continue to be done by many on a regular basis, despite the AED's existing data categorization systems and repeated warnings in each edition of the AESR. To help ensure that only valid comparisons will be made in the future, several new features have been developed and implemented in this report.

The first of these features is a system for tracking changes in elephant numbers between this and the previous report, at the national, regional and continental levels. Each section now includes a table showing changes in elephant numbers grouped by the attributed causes of any reported change. In effect, the system separates those apparent changes where valid comparisons can be made (**REPEAT SURVEYS**) from the rest (e.g. new guesses, different survey techniques, etc.). Where methodologically comparable data account for a large proportion of elephant numbers at the regional level, a statistical analysis of changes since the previous report, as described by Blanc et al. (2005), is also presented.

In order to ensure the correct interpretation of elephant status, it is important to give readers an intuitive feel for the limited quality of elephant data available. To this end, a new Information Quality Index (IQI), calculated from data contained in the AED, has been developed. The IQI assigns a score from zero to one for every country, region and the entire continent, and it should enable readers to understand and compare how data quality varies from one place to another.

Based on the IQI, a system to identify those areas for which population surveys are most needed has also been devised. The Priority for Future Surveys gives a score of one (highest priority) to five (lowest) to every site, country and region, reflecting the quality of data and the need to conduct systematic population surveys. This system is intended to assist managers and donors in prioritizing their elephant population monitoring efforts, an important exercise in view of limited resources for survey work.

Readers will notice that the convention previously used for titling the AESR has been changed for this report. In the past, the title *African Elephant Status Report* (or *African Elephant Database* in editions prior to the AESR 2002) was followed by the year to which the most recent information in the report referred. For instance, the *African Elephant Status Report 2002* (Blanc et al., 2003) contained data up to the end of 2002, even though the report itself was published in 2003. This led to considerable confusion and incorrect

citations in the published literature. The AESR 2007 and future editions will be titled using the year in which the report is published. Thus, the *African Elephant Status Report 2007* (this report) contains data gathered up to the end of 2006. We hope that this new convention will provide greater clarity to readers.

The new convention may give the impression that five years have passed between the publication of the AESR 2002 and the AESR 2007, whereas, in fact, it has only been three. Nevertheless, financial constraints continue to make it increasingly difficult to produce the AESR at three or four year intervals. Resources permitting, we anticipate that in future the AESR will be published every five years.

The AED and its status reports have come a long way in the 15 years that they have been under the responsibility of the AfESG. The production of the AESR has faced many conceptual and technical challenges in that period, and the AfESG is keen to share the lessons it has learned. We would like to see similar monitoring systems adopted for other charismatic/iconic species. The AfESG believes that expanding the AED to include other such species, thereby creating a multi-species database, would result in an even more valuable resource, with better prospects of long-term financial sustainability. We would welcome interest from those wishing to take this concept further.

# THE AFRICAN ELEPHANT DATABASE

The African Elephant Database is a spatial database used to store, manage, analyze and disseminate information on the distribution and abundance of elephant populations on the African continent. In order to provide a current and accurate picture of the status of African elephants, the database is regularly updated, and African Elephant Status Reports are produced and published periodically.

## *Why Count Elephants?*

Information on elephant range and numbers is vital for the effective conservation and management of Africa's elephants. The elephant is a "keystone" species that plays a pivotal role in structuring both plant and animal communities (Dublin, 1995; Owen-Smith, 1988; Shoshani, 1993) and often dominates mammal biomass in the habitats it occupies (White, 1994). While the effect of the African elephant on its habitat is often beneficial (Cochrane, 2003; Magliocca et al., 2003; Nchanji & Plumptre, 2003; Or & Ward, 2003; Ruggiero & Fay, 1994), it can have a detrimental impact on vegetation where high densities build up in confined areas (Craig, 1995; Jachmann & Croes, 1989; Swanepoel, 1993; Tchamba & Mahamat, 1992; Western & Maitumo, 2004).

The potential impact of elephants on their habitats raises important management issues for protected areas. It is pertinent to ask, for instance, how large a protected area needs to be to support a viable elephant population without negatively affecting biological diversity (Armbruster & Lande, 1993). Conversely, and in order to prioritize efforts in elephant conservation, it is necessary to define minimum viable populations within isolated protected areas (Sukumar, 1993).

Elephant distribution, however, is not confined to protected areas. Indeed, the majority of elephant range may still be found in unprotected land. This poses additional challenges for wildlife authorities and wildlife managers (Kangwana, 1995). Levels of human-elephant conflict, for instance, are high in many parts of the continent, and especially where human and agricultural expansion moves into new areas (Hoare, 2000).

In order to meet these challenges, it is essential that management objectives be clearly defined for both protected and unprotected areas of elephant range (Lindeque, 1995; Lindsay, 1993). Information on elephant distribution and abundance must be available in order to set such goals, as well as to monitor the effectiveness of management actions.

In summary, wildlife management authorities need to know the status of their elephant populations, whether they are increasing or decreasing and whether their numbers should be regulated to reduce conflict and to relax the pressure on habitats.

## *The Need for a Continental Approach*

The status of the African elephant varies considerably across its range, and the long-term survival of national populations is more threatened in some countries than in others. While the desire to conserve elephants is widespread, opinion differs as to how this goal can best be achieved. It is difficult, however, to make objective decisions about elephant management and conservation within and beyond protected areas without the sort of overview that a synthesis of continent-wide information can provide.

Continent-wide information is required because elephants move long distances across protected area boundaries and international borders, and a policy or management decision made in one country can affect elephant populations elsewhere. Changing land-use patterns or different approaches to tourism, such as trophy hunting in border areas, may have impacts beyond sovereign boundaries. Likewise, policies concerned with ivory management and trade, in particular, can transcend political boundaries. Many argue,

for instance, that trading by one country could affect poaching or smuggling in another, and that any management action which, directly or indirectly, leads to fluctuations in the price of ivory, could ultimately affect the future of the continent's elephant population (e.g. Bulte et al., 2003; Douglas-Hamilton, 2000). Regardless of whether this view is correct (Kantai, 2000; Stiles, 2004), monitoring at the continental level is necessary.

Civil instability and wars often lead to the mass migration of refugees into previously uninhabited areas of elephant range. Several important Range States are emerging from armed conflict, and have little or no capacity to monitor their elephant populations. These factors all make it difficult to partition elephant management into clear political units.

While regional initiatives, such as the Southern African Elephant Survey and Monitoring Programme (ELESMAP), which involved most Southern African Range States in the 1990s (Craig, 1996a), are necessary to census and manage shared, cross-border populations, a continental perspective is also of utmost importance for identifying conservation priorities at the regional and continental levels.

### *History of the AED*

The AED was initiated by Iain Douglas-Hamilton in 1986. The objective of the project was to develop a comprehensive picture of elephant numbers and distribution throughout Africa. Using data ranging from systematic survey results to guesses collected in questionnaires and interviews, a database of elephant population estimates and distribution was assembled (Burrill & Douglas-Hamilton, 1987) using a Geographical Information System (GIS).

Initially housed at the United Nations Environment Programme (UNEP) headquarters in Nairobi, Kenya, the AED was from its inception until April 1998 a collaborative effort of the Global Environment Monitoring System (GEMS), the Global Resource Information Database (GRID) of UNEP and the IUCN/SSC AfESG. Towards the end of 1992, the AED became the direct responsibility of the AfESG, which had by then become a separate group from the African Rhino Specialist Group (AfRSG). In April 1998 the AED was moved from UNEP to its present location in the AfESG offices in Nairobi.

Since 1992, the structure and management of the AED is overseen by a group of technical experts known as the Data Review Working Group (DRWG). The DRWG meets periodically to review and discuss technical aspects of the AED. The DRWG oversees the selection and categorization of data to be included in the AED, agrees on new features and analyses to be implemented in the AED and reviews the technical content of the AESR. Decisions made by the DRWG are implemented by a full-time database manager.

Prior to the present report, three reports of the AED were published under this framework, namely, the *African Elephant Database 1995* (Said et al., 1995), the *African Elephant Database 1998* (Barnes et al., 1999) and the *African Elephant Status Report 2002* (Blanc et al., 2003). These reports are freely available for download, in PDF format, from the AfESG website (<http://iucn.org/afesg>). It is a testimony to the success of these reports that, in the three years since it was first posted on the website, the AESR 2002 has been downloaded no fewer than 150,000 times.

At a meeting held in Nairobi in September 2002 under the auspices of the programme for Monitoring the Illegal Killing of Elephants (MIKE) of the Convention on the International Trade in Endangered Species of Fauna and Flora (CITES), African elephant Range States unanimously adopted the AED as the official repository of African elephant population data generated by the MIKE Programme (MIKE, 2002a,b).

## *Database Management*

The AED contains both spatial and non-spatial (attribute) data, managed using GIS software and a relational database management system (RDBMS). Spatial data layers are currently maintained in ArcGIS 9.1 Geodatabase format within a Microsoft Jet (Access) database, and are stored as polygons or points depending on the geographic feature type. These data sets are combined with base map data derived from the Digital Chart of the World (ESRI, 1992), a widely available global geographical data set.

Survey reports are obtained from wildlife management agencies and other organizations, and questionnaires and maps are distributed to AfESG members and other individuals with possible access to reliable information on elephant distribution and abundance. Data are received in a variety of formats, including paper maps, reports, personal communications and geo-referenced digital data. Information from paper maps is digitized and geo-referenced, while attribute data from reports, communications and questionnaire replies are entered through the keyboard.

New data are conflated with existing data and boundaries are adjusted to rivers, lakes, and political boundaries of the base map. Spatial polygon data are maintained in geographic (unprojected) coordinates in degrees of latitude and longitude. When it is necessary to calculate areas, the data set is projected “on the fly” into the Lambert Azimuthal Equal-Area projection which, when applied to the African continent, results in minimal distortion to shape, distance and direction while retaining true area information. The surface areas of input zones, protected areas and elephant range as calculated by the GIS are aggregated at national, regional and continental levels to determine their total surface area. In addition, the overlay capabilities of GIS are used to determine percentages of both protected and surveyed elephant range.

## DATA TYPES AND CATEGORIZATION

### *Elephant Taxonomy*

A number of genetic studies published in recent years have suggested that the previously recognized subspecies of African elephant, namely the savanna elephant *Loxodonta africana africana* and the forest elephant *Loxodonta africana cyclotis*, may, in fact, constitute two separate species, namely *Loxodonta africana* (Blumenbach 1797) and *Loxodonta cyclotis* (Matschie 1900) respectively (Comstock et al., 2002; Roca & O'Brien, 2005; Roca et al., 2001, 2005). Although many have been quick to adopt the specific distinction between forest and savanna elephants, the above studies have been criticized on the grounds that their sampling was insufficiently extensive. There is still no consensus in the scientific community as to the number of species of elephant currently extant in Africa (Debruyne, 2005; Debruyne et al., 2003). In addition, the existence of a third species, a West African elephant inhabiting both forests and savannas in that region, has also been postulated (Eggert et al., 2002).

In 2003, after carefully reviewing the evidence available, the AfESG agreed that, in view of the lack of consensus among experts in elephant genomics, the premature allocation of African elephants into separate specific taxa would leave hybrids in an uncertain taxonomic and conservation status, and that more research is needed before such an allocation can be made (AfESG2003b). In conformity with this view, the AED and its outputs continue to treat African elephants as a single species.

The AED stores data on two basic variables reflecting the conservation status of African elephants, namely, distribution and abundance. The collection of data on these variables presents a number of challenges related to the availability and quality of information. These challenges, and the ways in which the AED has been designed to handle them to assist in proper interpretation of data, are described in detail in the subsections that follow.

### *Elephant Distribution (Range)*

African elephants occur in a wide variety of habitats, from tropical swamp forests to deserts. Elephants often move extensively in search of food, water and minerals or in response to disturbance, and the extent to which they move may depend on a large number of factors. In certain areas, seasonal movements are predictable, while in others, movement patterns are far more difficult to decipher. These factors, together with the scarcity of animals at the edges of range, make elephant range a complex concept to define and pin down. For these reasons, elephant range is broadly defined by the AfESG as the entire area where the species occurs in the wild at any time.

Collecting precise distribution information on such a wide-ranging species as the African elephant presents a number of practical problems, often related to the remoteness and challenges posed by some of the habitats in which elephants are found. As a result, the quality of information varies considerably from one area to another. The range map for a particular country is often updated by a single individual answering a questionnaire, and thus subjective elements inevitably affect the collection of range information. Trying to draw a precise range boundary on maps of varying quality and scale is often an arbitrary exercise. Neat, rounded lines may be indicative of scanty knowledge in comparison to the fragmented, more detailed pictures which emerge from countries where more precise information is available. Elephant range often fits precisely the boundaries of protected areas, because that is where most population surveys are carried out, and elephant movements in and out of protected areas are often ignored.

Frequently, the depiction of range is also delimited by a natural boundary such as a river or a mountain range for convenience rather than accuracy. When range information in one country extends to a national border, it does not always match the range in the neighbouring country. While this is sometimes due to

steep gradients in human population density across the border, more often lack of reliable information is the cause of the hard boundaries.

In order to address some of these difficulties, the AED classifies elephant range information into four categories of certainty, as described in Table 1. In addition, range information in the AED is fully documented and referenced to original sources of data. This allows some evaluation of the reliability of range information, based on how and when each record was obtained.

Table 1. Categorization of elephant range data in the AED

Range Category	Definition
KNOWN	Areas in suitable habitat which, if searched with reasonable intensity, are likely to yield signs of elephant presence. If no information is obtained confirming the presence of elephants for a 10 year period, KNOWN range is downgraded to POSSIBLE range (below).
POSSIBLE	Areas within historical range and in suitable habitat where there are no negative data to rule out the presence of elephants, including former areas of KNOWN range where the source information is more than 10 years old. Areas of POSSIBLE range are considered to be a priority for studies to establish the presence or absence of elephants.
DOUBTFUL	Areas where there are reasons to believe that elephants are no longer present, but which have not been formally surveyed. If further corroborative evidence is obtained, areas of DOUBTFUL range are reclassified as NON-RANGE. As with POSSIBLE range, areas of DOUBTFUL range are a priority for absence/presence studies.
NON-RANGE	Areas which are known to hold no elephants – be it due to habitat modification, local extinction or any other reason.
POINT RECORDS	Sightings of elephants or evidence of their presence outside of KNOWN elephant range, shown as crosses on the maps.

Many areas of POSSIBLE range shown in previous editions of the AESR had not been updated in many years, and were therefore unreliable. It continues to be difficult to obtain updated information for many parts of elephant range, and yet many factors may have changed in such areas since the data were first collected. Human population density and habitat loss, for instance, are known to be major factors affecting elephant distribution. Hoare and du Toit (1999) found that people and elephants can coexist up to a threshold of human population density of 15.2 persons per km<sup>2</sup>, beyond which elephants are absent. As human populations have continued to increase throughout much of the continent, an attempt has been made to update and improve the reliability of range data in this report. To this end, human population data was obtained from the Landsat 2002 human population density data set (ORNL/GIST, 2002). This data set models the spatial distribution of human population density by incorporating data from census counts and spatially distributing them based on a number of other factors, such as distance from roads and night lights as seen from space. For this report, Landsat 2002 data were overlaid with elephant range data from the AED, and areas of POSSIBLE elephant range where human population density is estimated to exceed 15 persons per km<sup>2</sup> were categorized as DOUBTFUL range. As mentioned in Table 1, it is important to conduct studies in these areas to establish the absence or presence of elephants.

### *Elephant Abundance*

Although a wide variety of methods are available to arrive at estimates of elephant numbers in an area, no single method is perfect. Possible sources of bias include the choice of survey technique, surveyor skill,

quality and availability of adequate equipment, financial constraints, climatic conditions and vegetative cover. Ideally, data on elephants in any country should be collected by a wildlife management authority using qualified staff and standardized methods for collecting, recording and analysing data (e.g. Craig, 2004; Hedges & Lawson, 2006). In reality, elephant data are often collected by a multiplicity of agencies and individuals, often without any direct linkage to one another and using a variety of different techniques based on current opinion and available resources. The result is a collection of data of variable quality in most countries, and no data at all on many populations. Very few countries have the means, either financial or in the form of expertise, to conduct systematic surveys on a regular basis. Furthermore, political strife plagues many Range States and precludes monitoring work.

Elephants are often found in unprotected landscapes, where few surveys are undertaken. In some countries, elephants inhabit different types of habitat and it is necessary to combine data from different types of surveys to calculate a national estimate. Seasonal and cross-border movements of elephants are additional factors that can lead to inaccurate national estimates. To date, there have been few cross-border surveys to estimate the size of such populations. Instead, they are treated as separate populations on either side of the border, which may occasionally result in either under- or over-counting.

There is no ideal method for counting elephants. Each method has its advantages and disadvantages and is applicable in a different situation. The brief description of some of the most important methods below is not intended to be detailed or comprehensive. For more details, the reader is referred to the specialized texts available on the subject (e.g. Barnes, 1993; Craig, 1993; Craig, 2004; Douglas-Hamilton, 1996; Hedges & Lawson, 2006; Kangwana, 1996; Norton-Griffiths, 1978).

#### Methods of Estimating Elephant Numbers

Methods for estimating elephant numbers fall into three broad categories: **total counts, sample counts and guesses.**

**Total counts** aim to see and record all the elephants in a defined area, either from the air or from the ground.

Aerial total counts are conducted from fixed-wing aircraft or helicopters, and are only suitable for open habitats, where elephants are unlikely to be hidden by forest or thick bush. The speed at which the aircraft is flown also influences the accuracy of the count, with high speeds usually leading to undercounts (Norton-Griffiths, 1978). Aerial total counts are commonly used in savanna habitats, especially in Eastern and Southern Africa.

Total counts of a limited area can also be conducted at ground level by teams in vehicles or on foot. These are uncommon in Africa, but are sometimes carried out in India, where observers ride on domesticated elephants.

In a handful of places, total ground counts have been accomplished by identifying every individual in the population. This is only possible for intensively studied, closed populations where animals can be observed readily. For such individual recognition studies to provide high quality data for the AED, *every* individual in the population must be registered. Many ongoing studies have so far only covered a fraction of the populations being studied, and cannot therefore provide reliable estimates of entire populations.

**Sample counts**, in which only part of the area is counted (usually between 3% and 20%), are generally conducted along transects which may be randomly distributed or systematically placed across the study



area. The resulting data are used to calculate a population estimate with confidence limits. In contrast with total counts, which tend to produce underestimates of the true population, sample counts have in principle an equal chance of underestimating or overestimating the true population, provided that sampling error is the main source of error. In practice, however, factors such as high aircraft speed or dense vegetation cover will lead to undercounts. Sample counts can be further subdivided into *direct sample counts* and *indirect sample counts*.

*Direct sample counts* are most commonly made from the air, but may also be conducted on the ground, either on foot or from vehicles. Aerial sample counts require considerable technical expertise and coordination, as well as the use of expensive equipment such as radar altimeters. Aerial sample counts are the most commonly employed survey technique in Eastern and Southern Africa.

*Indirect sample counts* are usually the only way in which to obtain objective estimates of elephant populations in forests, where it is difficult to see any animals. Elephant dung is counted along transects using line transect sampling techniques, and results are combined with estimates of elephant defecation rate and dung decay rate, to provide a population estimate with confidence limits. Dung decay rates vary considerably across sites, and an estimate of decay rate obtained from the study area is crucially important to arrive at an accurate estimate of elephant numbers (Laing et al., 2003). If properly conducted, dung-counting techniques can provide estimates that are at least as accurate as those from direct methods, and more precise than those of aerial sample counts (Barnes, 2001, 2002).

A new indirect sample counting technique was recently applied to the estimation of elephant population size in forests (Eggert et al., 2003). The technique relies on the extraction of genetic material (DNA) from as many dung-piles as possible within a given area, and the use of a DNA fingerprinting protocols to identify the number of unique genotypes (individuals) in the samples collected. The rates of repeat samples obtained can then be used to estimate the population size for the area using the equivalent of a mark-recapture census technique (Eggert et al., 2003). This technique is likely to find wide application in sites where other methods are unlikely to give reliable results, for example, areas of mixed habitat and areas with low densities of elephants where other methods would give wide confidence limits.

**Guesses** are often the only kind of estimate obtainable for many areas. Organizing an elephant survey, whether a total or sample count, from the air or on the ground, requires a considerable investment in manpower, equipment, time and money, and this is often not feasible. It is then that guesses made by people who know the area in question have to be relied upon. If informants provide sufficient data to permit an evaluation of the accuracy of their estimate, such as a survey estimate with little or no details of methodology, then the estimate is considered an **INFORMED GUESS**. If no such information accompanies the estimate, or if an estimate is more than 10 years old, then it is considered an **'OTHER GUESS'**.

Every survey method has its own sources of error and bias, and the choice of method is often not a matter of selecting the best, but of avoiding the worst (Norton-Griffiths, 1978). In addition, pooling individual estimates to arrive at national, regional and continental estimates, presents problems of its own. It is inappropriate, for instance, to obtain a combined estimate for two areas by adding up the results of a sample count in one area to those of a guess for another. Even if similar methodologies were employed in the two areas, adding up the results would be of questionable value if the surveys were conducted at two very distant points in time. For these reasons, it is essential to categorize the information available and to present it in a manner that truly reflects the different degrees of inherent reliability.

Elephant population data in the AED are categorized according to **data quality** and **survey reliability**, as described below.

#### Survey data quality

Data quality is based on survey parameters that may affect the accuracy and precision of the estimate. It gives an indication of the thoroughness with which a survey is conducted, and thus gives a basis with which to compare the quality of surveys of a given area that employ the *same* methodology. A score of 1 to 3 (best to worst) is given to each survey estimate, as described below.

#### Ground survey data

GROUND TOTAL COUNTS (GT), including INDIVIDUAL REGISTRATION (IR) studies, are given a data quality score of 1. It is worth noting, however, that the categorization of IR studies is currently under review, as many such studies do not always cover entire populations, and hence do not necessarily merit a high quality rating.

GROUND SAMPLE COUNTS (GS) are rated according to *sampling intensity*, or sample fraction, which is defined as the proportion of the input zone covered in the survey. The following quality scores are based on percentage sampling intensity of a given area:

1. Greater than 20%
2. 5% to 20%
3. Less than 5% or not reported

#### Aerial survey data

AERIAL TOTAL COUNTS (AT) are categorized in terms of *search rate*, or the area covered per hour, as follows:

1. Less than 100 km<sup>2</sup>/hr
2. 100 - 200 km<sup>2</sup>/hr
3. More than 200 km<sup>2</sup>/hr or not reported

AERIAL SAMPLE COUNTS (AS) are categorized using *sampling intensity*. In stratified aerial sample counts, *effective sample intensity*, defined as the proportion of animals actually seen to the population estimate, is used instead. In both cases, the following quality categories are based on percentage sampling intensity:

1. Greater than 20%
2. 5% to 20%
3. Less than 5% or not reported

#### Dung counts (DC)

1. Percentage Relative Precision (PRP)<sup>1</sup> for mean elephant density less than 30% and one of the following:
  - a. Dung decay rate measured on site for 50 dung-piles or more
  - b. Defecation rate measured on site
  - c. PRP for dung density estimate  $\leq 20\%$
  - d. Sampling done in both dry and wet seasonsOR any three of the above four conditions in (a)-(d).
2. PRP for elephant density of 50% or less  
OR any two of the following three conditions:
  - a. Decay rate measured on site for 30 dung-piles or more
  - b. Defecation rate measured on site

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1. PRP is the 95% confidence limit expressed as a percentage of the estimate. Thus an estimate of 30 with confidence limits of  $\pm 15$  has a PRP of 50%

- c. PRP for dung density  $\leq 30\%$
- 3. When the conditions for (1) and (2) are not met.

#### Genetic dung counts (GD)

*Effective sampling intensity*, defined as the number of unique genotypes identified expressed as a percentage of the estimate, is used as the measure of quality for genetic dung counts, as follows:

- 1. Greater than 40%
- 2. 20% to 40%
- 3. Less than 20% or not reported.

#### Guesses

Both INFORMED GUESSES (IG) and OTHER GUESSES (OG) are given a data quality rating of 3.

#### Survey reliability

Population estimate data entered into the AED vary in quality from the identification of individual animals to plain guesswork. The addition of population estimates of varying quality into national, regional and continental totals is, from a statistical viewpoint, strictly invalid and produces misleading results. On the other hand, discarding low-quality estimates would produce equally misleading estimates, as high-quality survey estimates are not available for most areas in which elephants are found.

In order to solve this problem, the AED incorporates a system to accommodate all types of estimates by categorizing them according to their type and allocating them into non-overlapping categories. Thus, while it is still impossible to produce a single continental estimate, it is at least possible to obtain totals for a number of categories of differing degrees of reliability.

Four categories are used, each associated with a different level of uncertainty. The categories are DEFINITE, PROBABLE, POSSIBLE and SPECULATIVE. In order to place estimates into the appropriate categories, population estimates are classified according to survey type along a scale of survey reliability ranging from A (highest) to E (lowest). Each data reliability category contributes to the four categories as detailed in Table 2.

In addition to determining the breakdown of population estimates into DEFINITE, PROBABLE, POSSIBLE and SPECULATIVE numbers of elephants, survey reliability gives an indication of the level of certainty that can be placed on a given estimate, as determined by the type of method employed. Survey reliability gives a basis with which to compare surveys of a given input zone that employ *different* methodologies.

#### *Derivation of National, Regional and Continental Totals*

The categorization system described above is implemented in the AED through a series of algorithms. When executed, these algorithms categorize each population estimate in terms of data quality and survey reliability. The categorized records are then used to produce national, regional and continental totals.

In order to produce national, regional and continental totals, the variances of sample counts are added together in order to produce a 95% confidence interval for the sum of the estimates (Norton-Griffiths, 1978) before allocation of the pooled estimates to the four groups, DEFINITE, PROBABLE, POSSIBLE and SPECULATIVE. This is the reason why the regional totals in the DEFINITE, PROBABLE and POSSIBLE groups are not always the sum of the corresponding national group subtotals. Likewise, the continental total numbers of elephants in these three groups do not match the simple sum of the regional subtotals.

Table 2. Categorization of elephant population estimates according to survey type and contribution of each to the four categories of elephant numbers.

Survey Reliability	Survey type(s)	Categorization of estimates
A	<ul style="list-style-type: none"> <li>INDIVIDUAL REGISTRATIONS (IR)</li> <li>AERIAL TOTAL COUNTS (AT)</li> <li>GROUND TOTAL COUNTS (GT)</li> </ul>	DEFINITE = the population estimate. PROBABLE = none. POSSIBLE = none. SPECULATIVE = none.
B	<ul style="list-style-type: none"> <li>AERIAL SAMPLE COUNTS (AS) or GROUND SAMPLE COUNTS (GS) with 95% confidence limits</li> <li>DUNG COUNTS (DC) with 95% confidence limits <i>and</i> an estimate of dung decay rate obtained on site</li> </ul>	DEFINITE = the lower 95% confidence limit of the population estimate (there are <i>at least</i> this number of elephants) or the number actually seen, whichever is greater. PROBABLE = the difference <sup>a</sup> between the estimate and the lower confidence limit, or between the estimate and the actual number seen or between the estimate and zero, if the lower confidence limit is negative <sup>b</sup> . POSSIBLE = the difference between the upper confidence limit and the estimate. SPECULATIVE = none.
C	<ul style="list-style-type: none"> <li>DUNG COUNTS (DC) with 95% confidence limits but no on-site measurement of dung decay rate</li> <li>GENETIC DUNG COUNTS (GD)</li> </ul>	DEFINITE = none, or the number actually seen, if given <sup>c</sup> . PROBABLE = the population estimate. POSSIBLE = the difference between the upper confidence limit and the estimate. SPECULATIVE = none.
D	<ul style="list-style-type: none"> <li>AERIAL SAMPLE COUNTS (AS), GROUND SAMPLE COUNTS (GS) and DUNG COUNTS (DC) without 95% confidence limits</li> <li>INFORMED GUESSES (IG)</li> </ul>	DEFINITE = the number actually seen, if given. PROBABLE = none. POSSIBLE = the population estimate or the lower estimate if a range is given, minus the actual number seen, if given. SPECULATIVE = the difference between upper and lower estimates, if given.
E	<ul style="list-style-type: none"> <li>OTHER GUESSES (OG)</li> <li>Any of the above survey types in which the estimate is over 10 years old</li> </ul>	DEFINITE = the number actually seen, if given. PROBABLE = none. POSSIBLE = none. SPECULATIVE = the estimate, or the mean of the upper and lower limit, minus the actual number seen, if given.

a. Rounded to the nearest whole number if necessary.

b. If the lower confidence limit of the estimate is a negative figure, the estimate will be zero or, if reported, the actual number of elephants seen in the survey.

c. For dung counts it is assumed that there are no elephants unless any are observed directly (which is seldom the case). This is because, unlike with aerial surveys, where the estimate is almost invariably lower than the true population size, dung counts may underestimate or overestimate the population size, depending on the choice of parameters used (such as forest area, decay rate, or the mathematical model used). For genetic dung counts (GD) the number of distinct genotypes identified is regarded as the number of elephants actually “seen”.

At all levels of addition (national, regional and continental), estimates in the DEFINITE (Df), PROBABLE (Pr), POSSIBLE (Ps) and SPECULATIVE (Sp) totals are non-overlapping. In other words, a POSSIBLE estimate does not include DEFINITE or PROBABLE estimates. Thus, for a country, a region or the entire continent there are, simply speaking, “definitely” Df elephants, “probably” Df + Pr elephants, “possibly” Df + Pr + Ps elephants and “speculatively” Df + Pr + Ps + Sp elephants.

It is important to note that the totals presented for each country and region are minimum estimates, based on the estimates for the areas that have been surveyed or for which guesses are available in that country or region. In many countries, and in all regions, there are large areas of elephant range where elephant numbers have not been estimated. No extrapolations have been performed for these areas in the AED, and they are therefore not included in the totals. If all of the elephant range is listed, then the totals are national estimates. If, on the other hand, estimates are only given for a fraction of the elephant range in the country, the total cannot be considered a total national estimate. For this reason, the estimates given for the regions and for the continent cannot be interpreted as complete regional and continental estimates respectively.

### *Changes in Elephant Numbers*

One of the questions that most interests decision makers involved in African elephant conservation and management is whether elephant populations increase or decrease over time at the continental level. Many authors have in the past incorrectly compared estimates from different AESRs to derive continental population trends (e.g. Government of Kenya & Government of India, 2002). This is invalid and misleading for a number of reasons, as described in Blanc et al. (2005), from which the text below is adapted.

Many of the continent’s elephant populations have never been systematically surveyed. Most elephant surveys tend to concentrate in and around protected areas, although nearly 70% of elephant range may lie outside these (see this report). Any changes reported in the AESRs are only derived from a subset of all elephant populations, and may therefore not reflect overall changes in numbers. The extent of unsurveyed range across the continent amounts to nearly half of the total elephant range in Africa (this report), but even this estimate is subject to considerable uncertainty. As noted above, elephant distribution data for the AED are obtained from questionnaire replies and other potentially unreliable sources, which can quickly become outdated, and knowledge on the actual extent of elephant range remains unreliable.

Many important populations are not surveyed frequently and several have only been surveyed once. In consequence, any one AESR repeats a number of estimates from the previous report because these are still the most up-to-date available. This makes using total numbers invalid as a measure of change, as constancy of numbers at some sites reflects only the same information carried forward from one status report to the next. The totals in the DEFINITE and PROBABLE categories may decline where an out-of-date estimate has been degraded to the SPECULATIVE category and no more recent information is available. Conversely, where a population is surveyed for the first time, the resultant increase in the total is due not to population increase, but to the inclusion of new information. False increases (or decreases) may also happen when the boundary of the study area changes between surveys, although the site name remains the same. When only parts of the ranges of elephant populations are included in the surveyed area, changes in estimates may be caused by elephant movements rather than real changes in population size.

Even where two successive surveys of the same area are available, misleading changes may be observed when different methods, liable to different levels of accuracy or bias, are used in the two consecutive surveys. Variation in survey conditions – like the time of the year or even the use of different survey crews

– may result in changes in numbers of elephants seen, thus contributing to differences recorded over time. In addition, many estimates come from sample surveys, and are therefore subject to statistical sampling error. As a result, differences between successive estimates could be due purely to chance, but can still make a large contribution to the differences between totals.

In order to disentangle these confounding factors from real changes in elephant numbers at the national, regional and continental levels, a new system to track changes in estimates and their ostensible reasons has been devised and implemented in the AED. The system relies on linking estimates contained in the current version of the AED to the corresponding estimates contained in the version of the AED used to produce the previous report, and assigning a “cause of change” to each pair of estimates, as described in Table 3. Changes in estimates are then grouped by cause of change, and overall differences in the DEFINITE, PROBABLE, POSSIBLE and SPECULATIVE categories are calculated at the national, regional and continental levels.

While the REPEAT SURVEY group (see Table 3) contains all those sites where surveys have been repeated using comparable methods, not all pairs of estimates in that group are necessarily statistically comparable. Other factors described above but not captured by the tracking system, such as a different season or different survey crew, could still render comparisons meaningless. Where it is suspected that such factors may be responsible for the difference in the estimates, the survey pair is deemed not to be comparable and is marked RS’.

Where the more recent surveys in methodologically comparable survey pairs account for a large proportion of the DEFINITE plus PROBABLE estimate for a given region, a statistical comparison of elephant numbers over time, albeit restricted to a segment of the population, can be performed (see Blanc et al., 2005 for details). A list of methodologically comparable surveys featured in this and the previous report is provided in Appendix II.

### *Overall Quality of Information and Survey Priorities*

The status of African elephants varies considerably across their range, with elephants occurring in large, dense populations in some parts of the continent but only surviving in small, fragmented populations in others. In a very similar way, the quality and extent of knowledge on elephant status varies widely across the continent. Some populations have never been surveyed, or are only surveyed rarely, while others are counted annually. The objectives of the AED include promoting the use of standardized, reliable survey techniques throughout elephant range, as well as facilitating the task of donors, wildlife authorities and decision-makers in prioritizing their efforts to monitor elephant populations.

In order to assist in meeting these objectives, a simple index has been developed to measure the quality of elephant population data available at the national, regional and continental levels. Based on this index, a system to identify and prioritize the areas, countries and regions where systematic surveys are most needed has also been developed and implemented in the AED. These new measures, both of which are calculated from data contained in the AED, are described in turn below.

#### Information Quality Index (IQI)

If all elephant populations on the continent were systematically surveyed, and unbiased estimates with measured precision produced, the sum of the DEFINITE and PROBABLE categories in the AED would be an accurate statement of true elephant numbers. Even with incomplete data, the sum of these two categories provides the “best estimate” of elephant numbers from systematic surveys (i.e. surveys in data reliability categories A–C).

Table 3. Codes and descriptions of causes of change as implemented in the AED.

Code	Cause of Change	Description
RS	REPEAT SURVEY	Both surveys were conducted using comparable methodologies.
DA	DIFFERENT AREA	Both surveys were conducted using the same methodology, but the extent of the areas covered differ by 10% or more.
DT	DIFFERENT TECHNIQUE	The most recent survey uses a different survey methodology, or replaces a guess.
NP	NEW POPULATION	A new entry into the AED, i.e. no previous survey or guess to compare with.
PL	POPULATION LOST	The population is known to have disappeared from the site, be it through translocation or local extinction.
NG	NEW GUESS	A guess replaces an older guess or a survey estimate that has been downgraded to the category of OTHER GUESSES for being more than 10 years old.
NA	NEW ANALYSIS	Data from previous report has been re-analyzed or re-interpreted in the light of new information other than a new estimate.
DD	DATA DEGRADED	The estimate in the previous report has been downgraded to the category of OTHER GUESSES for being more than 10 years old.
—	NO CHANGE	The estimate has been retained unchanged from previous report.

A good indication of the overall quality of available survey data is given by the ratio of good-quality population data to total population data (i.e. the sum of the DEFINITE, PROBABLE, POSSIBLE and SPECULATIVE categories). This ratio, or ‘probable fraction’ (PF), is therefore defined as

$$PF = \frac{\text{DEFINITE} + \text{PROBABLE}}{\text{DEFINITE} + \text{PROBABLE} + \text{POSSIBLE} + \text{SPECULATIVE}}$$

In order to make it a more meaningful indicator of the quality of information, however, the PF needs to be combined with a measure of the completeness of estimate coverage. Such a measure can be obtained simply from the proportion of total range for which population estimates (of any quality) are available. Thus, the Assessed Range Fraction (ARF), is calculated as

$$ARF = \frac{\text{ASSESSED RANGE}}{\text{KNOWN RANGE} + \text{POSSIBLE RANGE}}$$

The product of the above two factors gives an unbiased, normalized and scaleable index of the overall quality of information on elephant population estimates. Thus, the IQI is defined as

$$IQI = PF \times ARF$$

Priorities  
for Future  
Surveys

The IQI ranges from zero (no reliable information) to one (perfect information). Thus a country or region where few reliable surveys have been conducted, and which cover only a small portion of its total range, will have a score closer to zero. A country or region where high-quality data are available for most of its elephant range, on the other hand, will have a score close to one. Note that at the infra-national (i.e. site) level, the ARF is constant, and hence the IQI is simply equal to the PF.

The IQI can further be used to derive an unbiased system for setting priorities as to the areas that are in most need of systematic surveys. For a truly accurate continental picture of elephant abundance to emerge, reliable estimates would have to be available for *all* elephant range. Thus, countries that account for a large proportion of total continental range should be prioritized more highly. It is therefore important to include in the prioritization system the Continental Range Fraction (CRF) accounted for by each country:

$$\text{CRF} = \frac{\text{COUNTRY RANGE AREA}}{\text{CONTINENTAL RANGE AREA}}$$

To yield a score of Priority for Future Surveys (PFS), the IQI and CRF are combined as follows:

$$\text{PFS} = \log_{10}\left(\frac{1 + \text{IQI}}{\text{CRF}}\right)$$

When calculated for each country or region, the result of the above equation, rounded to the nearest integer, gives a convenient measure, ranging from 1 to 5, of the countries/regions where population surveys are most needed. At the infra-national (site) level, the CRF is replaced by the proportion of national range accounted for by the site in question.

Note that the logarithmic nature of the priority scores means that the difference between two successive priority scores is of an order of magnitude. *All areas of elephant range that have never been surveyed, i.e. those for which estimates are currently unavailable, are automatically assigned a priority of 1.* Systematic surveys should be conducted in areas of unsurveyed KNOWN range. In areas of DOUBTFUL range and unsurveyed POSSIBLE range, elephant presence/absence should be established prior to conducting systematic population surveys.

It is important to stress that neither the IQI nor the PFS are measures of the health of elephant populations, or of overall elephant conservation priorities, but rather of the quality of elephant population data and of the need to conduct systematic surveys in future. For instance, range loss in a country will often result in a decline in the proportion of unassessed range, thus causing the IQI to increase and the priority ranking to decline. A list of all African elephant Range States with their IQI and PFS scores is shown in Appendix I.

While it is hoped that the PFS system will prove useful for prioritizing elephant population monitoring efforts, the system is not intended to be prescriptive. Individual Range States may have good reasons to use different criteria and different systems for prioritizing elephant population surveys.



## HOW THIS REPORT IS ORGANIZED

Information in this report is presented at the continental, regional and national levels. The continental section is followed by regional sections, each of which contains the relevant individual country sections, in alphabetical order. Each section follows the format described below.

### Overview

Each section begins with a brief overview intended to supplement the information provided by the maps and tables that follow. The overviews are not intended to provide the reader with exhaustive information on each country, but simply to describe the current situation and to highlight any factors that may have contributed to it. This report no longer contains Historical Background sections featured in the previous report; readers interested in the history of elephant populations can consult the AESR 2002 (Blanc et al., 2003).

The overview contains the following sub-sections:

**General Statistics.** This section provides summary statistics of country area, protected area coverage, area of elephant range, amount of elephant range in protected areas, and the amount of range which has been surveyed or has elephant population estimates, IQI, CITES Appendix and year of CITES listing. Only protected areas that fall within the IUCN protected area management categories I through IV have been included for these calculations. While many important management areas for elephants belong in categories V (Protected Landscapes) and VI (Managed Resource Areas), their conservation importance and effective protection is far from uniform across the continent.

**Current Issues.** Any issues that may, directly or indirectly, affect elephant populations and their conservation and management. These may include poaching, political conflict, refugee crises, land use and wildlife management policies.

**Range Data.** Summary information on how elephant range was determined and categorized, as well as any changes made to the map since the last report.

**Population Data.** Description of the areas that have been surveyed and the methods employed, and how the data have been interpreted and categorized. Any changes between individual and pooled estimates are described and explained here.

**Cross-border Movements.** Information on movements of elephants across international borders. This section is omitted from the Continental Overview.

The text overviews are followed by three tables that summarize elephant population estimates, changes in estimates since the previous report, and the areas of range covered by each type of estimate. These tables are described in turn below.

### Summary Tables

#### Summary Totals Table

The summary totals tables present pooled estimates at the national, regional and continental levels, separated into four groups, DEFINITE, PROBABLE, POSSIBLE and SPECULATIVE numbers of elephants, based on the survey reliability categories (A-E) described in the Data Types and Categorization section. It is worth repeating that the totals presented for each country are not necessarily complete national estimates, and depend on the amount of range that is covered by estimates (see below). Totals from the previous report are also shown on the table.

## Interpretation of Changes in Elephant Estimates since the Previous Report

This table shows the breakdown and net changes in the four categories of elephant estimates, grouped by the ostensible reason for change, as described in Table 3. Due to the method of pooling variances to calculate totals in the four categories, the calculated changes would not necessarily add up to the net changes between the estimates presented in this report and the AESR 2002. Thus, and in order to make the rows of the table add up to the net, each component figure is adjusted by dividing it by the net difference between the two reports and multiplying that by the total change calculated through pooling variances. In a few cases, however, the discrepancy between the net and calculated changes is such that the sign of the components is reversed. In such cases, the change is proportional to the magnitude of change, but not to its direction.

## Area of Range Covered by Each Data Category

These tables depict the contribution of each survey type to the total area (in km<sup>2</sup>) for which estimates are available. In addition, areas of unassessed **KNOWN** and **POSSIBLE** range are also shown on the tables. Pooled estimates of elephant numbers for countries or regions where large areas of range remain unassessed are likely to be underestimates. Large areas of unassessed **POSSIBLE** range, however, could simply reflect inadequate information on current elephant distribution.

A map is shown for each country, region and the entire continent, showing elephant distribution, input zones, protected areas, national and/or regional boundaries, major towns, rivers and lakes. Neighbouring countries and regions are shown to highlight important cross-border populations, as well as the spatial relationships between elephant populations in different countries. A thumbnail locator map is shown at the bottom of each map to easily identify the location of the country in the continental context.

**Input zones** are shown with a grey hatched pattern. The reliability of the associated population estimate is reflected by the spacing of the hatching, with reliable surveys being depicted with a more closely spaced hatching than guesses.

**Elephant range** is displayed according to the elephant range categories described in the Data Types and Categorization section above. **KNOWN** range is shown in dark green, **POSSIBLE** range in light green, and **DOUBTFUL** range is displayed in a dotted pattern, while **NON-RANGE** is transparent (white). **POINT SIGHTINGS** are shown as crosses on the map.

**Protected area** boundaries are shown in khaki, and are individually labelled on national maps. The official designations of protected areas are abbreviated on the labels; a list of these abbreviations can be found in Appendix IV. An alphabetical list of protected areas within elephant range, including details on surface area, year of establishment, IUCN Category, and the country in which they are found is shown in Appendix III. Note that the IUCN Category of any given protected area is not necessarily an indication of the effectiveness of protection.

Each country map is preceded by a national table of estimates showing an alphabetical listing of input zones. By providing the location of the centroid of each input zone in decimal geographic coordinates, the table also serves as a key to the input zones shown on the map. In addition, national tables of estimates present details on estimates, their quality and other metadata, as described in Table 4. The columns shown in the regional and continental tables are different from those shown in the country tables, and they are described in Table 5.

## Table of Estimates and Map

Table 4. Details and survey parameters provided in national tables of estimates in this report

Column	Description
INPUT ZONE	Name of the input zone followed by its legal designation (if any), e.g. Kruger National Park.
CAUSE OF CHANGE	Attributed reason for the change in the estimate with respect to the previous report. As described in the Data Types and Categorization section, causes of change are coded DA (DIFFERENT AREA), DD (DATA DEGRADED), DT (DIFFERENT TECHNIQUE), NA (NEW ANALYSIS), NG (NEW GUESS), NP (NEW POPULATION), PL (POPULATION LOST) and RS (REPEAT SURVEY). Where an estimate has been retained from the previous report, a dash (—) is shown to indicate that the estimate has not changed. Where a new systematic survey has been conducted (i.e. RS, DA, DT and NP), the cause of change code is shown in bold type.
SURVEY TYPE	Type of survey conducted and its assigned quality score (1, 2 or 3), as described under the Data Types and Categorization section.
SURVEY RELIABILITY (RELIAB.)	Category (A, B, C, D or E) into which the elephant population estimate falls. Survey reliability is dependent on survey type and additional criteria, as described in the Data Types and Categorization section.
SURVEY YEAR	Year in which the survey was conducted, or in case of guesswork, the year to which the guess applies.
NUMBER OF ELEPHANTS	Elephant population estimate from the survey or guess reported.
95% C.L.	The 95% confidence limit for the estimate or, in the case of INFORMED GUESSES, the upper range of the guess marked with an asterisk. This cell is blank for surveys in which there are no confidence limits (e.g. total counts and unreliable dung counts), as well as for OTHER GUESSES.
SOURCE	Author(s) and year of the report, questionnaire reply, personal communication or published source from which the estimate was obtained. All sources appear in the list of references at the back of this report.
PRIORITY FOR FUTURE SURVEYS (PFS)	Based on the precision of estimates and the proportion of national range accounted for by the input zone, the PFS is a measure of the importance and urgency of the need for future systematic surveys. Priorities range from 1 (highest) to 5 (lowest). All areas of unassessed range (i.e. un-hatched areas on the map) are considered to be of the highest priority (1). For full details on the how the PFS is calculated, please refer to the Data Types and Categorization section.
AREA	Size of the input zone in square kilometres (km <sup>2</sup> ). Where available, the area given is as reported by the reference source. If unreported, the area is either derived from the size of the protected area(s) to which the estimate refers, or is calculated using the GIS in the Lambert Azimuthal Equal area projection.
MAP LOCATION	Longitude (LON) and latitude (LAT) of the centroid of the input zone, given in decimal degrees with one decimal.

Table 5. Details of the columns shown in the regional and continental tables of estimates of this report.

Column	Description
COUNTRY / REGION	Name of the country or region.
ELEPHANT NUMBERS	Elephant numbers in the four categories (DEFINITE, PROBABLE, POSSIBLE and SPECULATIVE).
RANGE AREA (KM <sup>2</sup> )	Estimated total elephant range area (KNOWN + POSSIBLE range) in the country or region.
% OF REGIONAL RANGE	Percentage of the regional/continental range accounted for by the country/region in question. Rounded to the nearest integer.
% OF RANGE ASSESSED	Percentage of elephant range in the country or region for which elephant estimates are available.
INFORMATION QUALITY INDEX (IQI)	In the regional tables, the IQI is shown for each country, and for the entire region in the totals row. In the continental table, the IQI is shown for each region and for the continent in the totals row. Please refer to the Data Types and Categorization section for details on how the IQI is calculated. A complete list of all Range States with their IQI scores can be found in Appendix I.
PRIORITY FOR FUTURE SURVEYS (PFS)	In the regional tables, the PFS is shown for each country, and for the entire region in the totals row. In the continental table, the PFS is shown for each region. No priority is shown for the continent as a whole. Please refer to the Data Types and Categorization section for details on how the PFS score is calculated. A complete list of all Range States with their PFS scores can be found in Appendix I.

# AFRICA

## CONTINENTAL OVERVIEW

### *General Statistics*

Total area: 22,617,267 km<sup>2</sup>  
Range area (% of continent): 3,335,827 km<sup>2</sup> (22%)  
Protected area coverage (% of continent): 9%  
Protected range (% of known and possible range in protected areas): 31%  
Information Quality Index (IQI): 0.41

### *Current Issues*

In broad terms, the main issues affecting elephant conservation across the continent today are habitat loss and fragmentation; human-elephant conflict; poaching for meat and ivory; and negative localized impacts of elephants on their habitats. The relative importance of these issues varies considerably across countries and regions, and these are discussed in more detail at the regional and national levels.

In response to the issues and threats identified, two regions, namely West and Central Africa, have developed their own regional strategies for the conservation of elephants (AfESG, 2003a, 2005), and Southern Africa has now embarked on a similar process.

The one issue that continues to engage the continent as a whole is the debate over the legalization of the international trade in ivory, which still divides countries holding diametrically opposing views.

### *Range Data*

Elephants occur in 37 Range States in sub-Saharan Africa. Savanna elephants (*Loxodonta africana africana*) are found predominantly in Eastern and Southern Africa, while forest elephants (*Loxodonta africana cyclotis*) occur primarily in the Congo Basin of Central Africa. In West Africa, elephants live in both forest and savanna habitats, but their taxonomic status remains uncertain.

The distribution of elephants varies considerably across the four regions – from small, fragmented populations in West Africa to vast, virtually undisturbed tracts of elephant range in Central and Southern Africa. Southern Africa has the largest extent of elephant range of any region, and accounts for 39% of the species' total range area. Central and Eastern Africa follow with 29% and 26% of the continental total respectively, while West Africa accounts for only 5%. Detailed knowledge of the status of elephant distribution is scanty in many parts of the continent, however, particularly in Central Africa, and in countries emerging from armed conflict, such as Angola, Sudan, Liberia and Sierra Leone.

The total area of elephant range at the continental level is currently estimated at over 3.3 million km<sup>2</sup>. This is nearly 1.6 million km<sup>2</sup>, or 32%, less than the range estimated for the previous report. This change in the estimated range is primarily due to the updating and improvement of previously unreliable information on elephant distribution, particularly in Central Africa, and should not be construed as a rapid reduction in actual elephant range in recent years. Improved knowledge of elephant distribution is reflected in the proportion of range categorized as KNOWN, which has increased from 38% to 63%. Much of the remaining information on POSSIBLE range is now over 10 years old.

### *Population Data*

This report features new or updated estimates for a total of 197 sites, over three-quarters of which are derived from systematic surveys. The proportion of elephant range for which elephant estimates are available, currently standing at 51%, has not changed notably since the previous report. However, the overall reliability of estimates has increased considerably, with estimates from systematic surveys now

accounting for 29% of total range, versus 17% in the previous report. Indeed, the overall quality of information, as measured by the IQI, has improved by 20% since the previous report as a result of new surveys in previously unassessed areas and the replacement of guesses with estimates from systematic surveys.

Holding nearly 58% of the continent's DEFINITE plus PROBABLE elephants, Southern Africa has by far the largest known number of elephants in any region. Eastern Africa comes a distant second, with 30%. While Central Africa is an even more distant third (10.7%), its regional estimates in the POSSIBLE and SPECULATIVE categories are large compared to other regions. A substantial investment to improve the quality of data for Central Africa may therefore considerably increase its ranking in this respect. With only 1.5% of the continental DEFINITE plus PROBABLE estimate, West Africa continues to hold the smallest regional population by any measure.

The number of elephants in the DEFINITE category has increased by about 70,200 since the AESR 2002, largely as a result of updated estimates for sites where comparable survey techniques were employed. The estimate under the PROBABLE category has increased by over 23,600, primarily due to new dung count estimates in Gabon, where estimates had previously been degraded to the category of OTHER GUESSES because they were long out of date. Figures under the POSSIBLE and SPECULATIVE categories, on the other hand, have declined by around 15,500 and 49,000 respectively. This is largely due to new guesses, the degradation of old data from the POSSIBLE to the SPECULATIVE category, the reanalysis of old data for Gabon and the removal of guesses for areas of the Democratic Republic of Congo where elephants may not have even been present at the time of the previous report. In other words, the changes in these two categories are reflective of changes in the quality of information, and not of actual changes in elephant numbers.

Estimates from methodologically comparable surveys (i.e. those labelled REPEAT SURVEY or RS in the national tables of estimates) account for over two-thirds of the continental DEFINITE plus PROBABLE estimate. However, most comparable surveys were conducted in Southern and Eastern Africa (see Appendix II for a list of sites), and it would not be valid to analyze continental changes based largely on data from these two regions. It is nevertheless possible to conduct an analysis restricted to the data from these two regions combined (see Blanc et al. (2005) for details on methods), which together account for 88% of the continental DEFINITE plus PROBABLE estimate. The results of this analysis indicate an increase of 66,302 elephants (95% CI 21,777 to 110,827) in the combined estimates for the comparable populations. This highly significant increase ( $t = 2.92, p < 0.01$ ) translates into an estimated annual rate of increase of 4.00% (95% CI of rate 1.14% to 6.58%) in the comparable populations during the period between the AESR 2002 and this report.

It should be emphasized that these results refer only to the relevant total numbers, as there are insufficient data in most cases to make valid comparisons at the site level. Similarly, the results do not imply a uniform increase across all sites, but merely an increase on average. Although the estimated rates of increase are within biologically possible limits, it is impossible to determine whether changes are due solely to natural population growth. While the possibility that elephant movements may have contributed to the observed increases cannot be ruled out, it is unlikely that much of the unsurveyed range contains high densities of elephants. It must be reiterated that this analysis says nothing about the situation in Central or West Africa, where there are insufficient data to draw any conclusions. The results of similar analyses conducted at the regional level can be found in the Overview sections for Eastern and Southern Africa.

## CONTINENTAL SUMMARY TOTALS

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	52,320	0	0	0
Direct Sample Counts and Reliable Dung Counts	416,703	36,566	36,566	0
Other Dung Counts	601	46,138	8,788	0
Informed Guesses	2,645	0	38,980	6,148
Other Guesses	0	0	0	44,216
<b>TOTALS 2006</b>	<b>472,269</b>	<b>82,704</b>	<b>84,334</b>	<b>50,364</b>
<i>TOTALS 2002</i>	<i>402,067</i>	<i>59,024</i>	<i>99,813</i>	<i>99,307</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+53,703	+5,897	+7,715	-617
New Population	+3,772	+857	+3,580	+1,480
Different Technique	+10,720	+24,031	+2,582	-7,048
Different Area	+24,540	-2,631	-2,286	0
New Guess	-6,536	-1,283	-9,747	-4,999
New Analysis	-6,816	-700	-11,058	-44,885
Population Lost	0	0	-63	-171
Data Degraded	-9,180	-2,490	-6,203	+7,297
<b>NET CHANGE</b>	<b>+70,202</b>	<b>+23,680</b>	<b>-15,479</b>	<b>-48,943</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	170,682	12,334	<b>183,016</b>
Direct Sample Counts and Reliable Dung Counts	678,335	36,939	<b>715,274</b>
Other Dung Counts	83,328	24	<b>83,352</b>
Informed Guesses	172,379	30,022	<b>202,400</b>
Other Guesses	411,597	113,026	<b>524,623</b>
Unassessed Range	597,909	1,029,252	<b>1,627,161</b>
<b>TOTAL</b>	<b>2,114,230</b>	<b>1,221,597</b>	<b>3,335,827</b>

## AFRICA: CONTINENTAL AND REGIONAL TOTALS & DATA QUALITY

REGION	ELEPHANT NUMBERS				RANGE AREA (km <sup>2</sup> )	% OF CONTINENTAL RANGE	% OF RANGE ASSESSED	IQI <sup>1</sup>	PFS <sup>2</sup>
	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE					
Central Africa	10,383	48,936	43,098	34,129	975,079	29	52	0.22	<b>1</b>
Eastern Africa	137,485	29,043	35,124	3,543	880,063	26	45	0.36	<b>2</b>
Southern Africa	297,718	23,186	24,734	9,753	1,305,140	39	53	0.48	<b>1</b>
West Africa	7,487	735	1,129	2,939	175,545	5	66	0.44	<b>3</b>
<b>TOTAL*</b>	<b>472,269</b>	<b>82,704</b>	<b>84,334</b>	<b>50,364</b>	<b>3,335,827</b>	<b>100</b>	<b>51</b>	<b>0.41</b>	

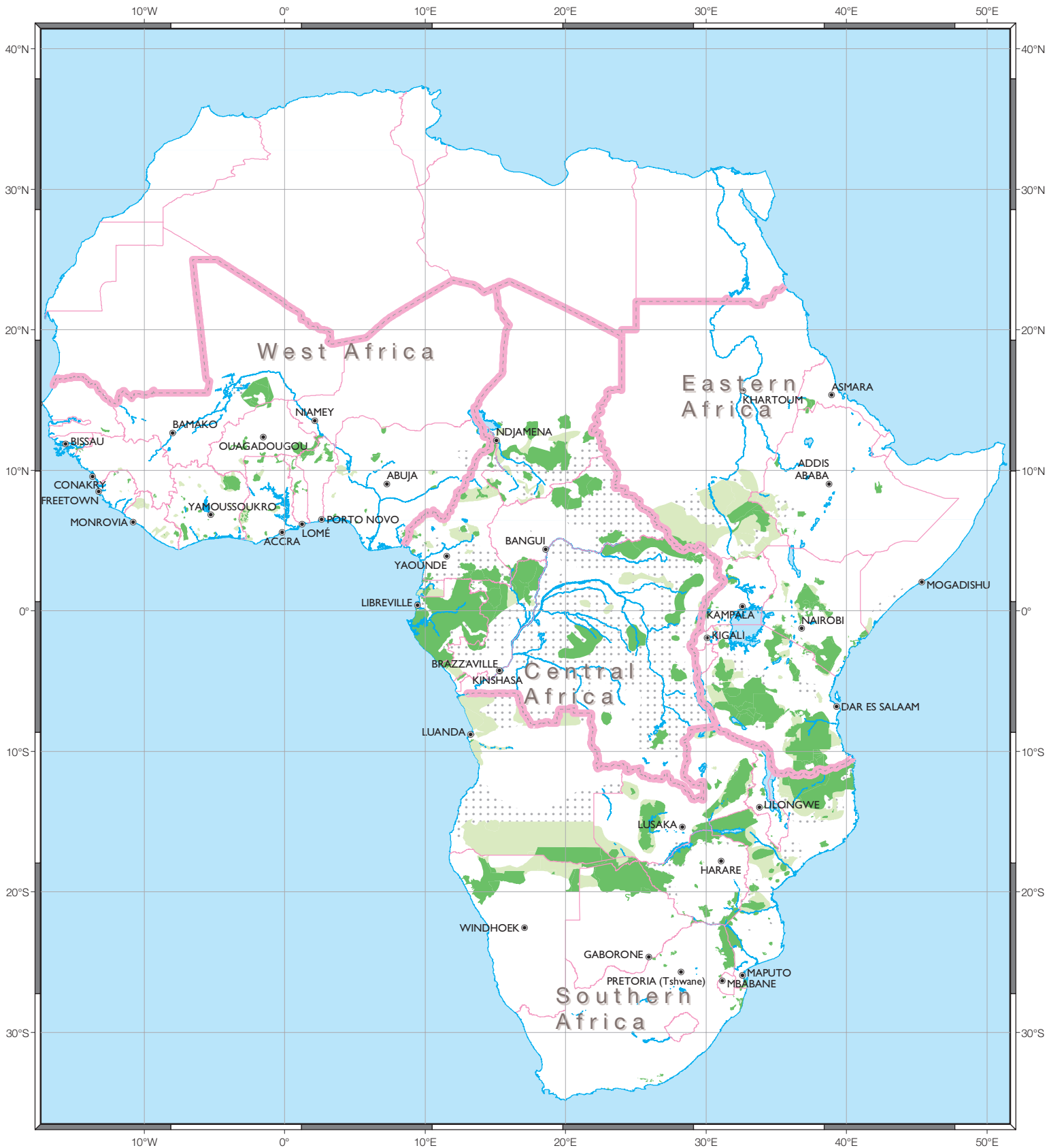
\* Note that totals for the Definite, Probable and Possible categories are derived by pooling the variances of individual estimates, as described under the Data Types and Categorization section. As a result, totals do not necessarily match the simple sum of the entries within a given category.

<sup>1</sup> **IQI: Information Quality Index.** This index quantifies overall data quality at the regional level based on the precision of estimates and the proportion of assessed elephant range (i.e. range for which estimates are available). The IQI ranges from zero (no reliable information) to one (perfect information). See the Introduction section for details on how the IQI is calculated.

<sup>2</sup> **PFS: Priority for Future Surveys,** ranked from 1 (highest) to 5 (lowest). Based on the IQI and the proportion of continental range accounted for by the region in question, PFS is a measure of the importance and urgency for future population surveys, particularly in areas of unassessed range and areas not surveyed in the last 10 years or more. See the Introduction section for details on how the PFS is derived.



# Elephant Range in Africa



	Regional Boundary	<b>Elephant Range</b>
	International Boundary	
	Capital Cities	
		Known
		Possible
		Doubtful



African Elephant Specialist Group



Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.

# CENTRAL AFRICA

## REGIONAL OVERVIEW

### General Statistics

Total Area: 5,365,550 km<sup>2</sup>

Range area (% of region): 975,079 km<sup>2</sup> (38%)

Protected area coverage (% of region): 9%

Protected range (% of known and possible range in protected areas): 33%

Information Quality Index (IQI): 0.22

### Current Issues

There have been widespread reports in recent years of intense poaching for both ivory and meat throughout much of Central Africa, and the region is believed to be the main source of ivory currently supplying the world's illegal trade (Hunter et al., 2004). Poaching is exacerbated by new roads for logging operations and mineral and oil extraction, which provide both access to deep forest and routes for the transport of ivory and meat.

A widespread lack of institutional capacity and resources, coupled with difficulties associated with monitoring in forests, result in a general lack of reliable information on the status of elephant populations in the region. While it is therefore difficult to ascertain the impact that the above threats may be having on elephant populations, it is feared that elephant numbers may be declining in Central Africa as a whole.

The Congo Basin Forest Partnership (CBFP), established in 2002 under the aegis of the Council of Ministers in charge of the Forests of Central Africa (COMIFAC), received substantial funding from the United States government over the 2003-2005 period. Funds were largely focused on 11 priority landscapes, all of which are in elephant range, and were aimed at improving capacity, regional cooperation and law enforcement efforts.

In 2005, Central African Governments collaborated in the development of a regional elephant conservation strategy (AfESG, 2005). The strategy aims to reduce the illegal killing of elephants, prevent the fragmentation of elephant populations, improve knowledge on the status of populations and their habitats, and to change the negative perceptions of the wider public in the region with respect to elephants.

### Range Data

Most of the continent's tropical forests are found in Central Africa, with forest originally occupying much of the current **KNOWN** and **POSSIBLE** range estimate of nearly 1 million km<sup>2</sup>. The majority of this range is inhabited by forest elephants (*Loxodonta africana cyclotis*), with savanna elephants (*Loxodonta africana africana*) occurring in northern Cameroon, northern Central African Republic and Chad. Areas of potential hybridization between forest and savanna elephants exist in northern and eastern Democratic Republic of Congo and possibly in southern Central African Republic.

Central Africa ranks second amongst the regions in terms of range extent, accounting for 29% of the continental total, but the estimated range area is less than half that reported in the AESR 2002. This results from the re-classification as **DOUBTFUL** range of large tracts of formerly **POSSIBLE** range in Cameroon, Central African Republic, Chad, Congo and the Democratic Republic of Congo (see individual country sections for details). The difference is a consequence of better and more updated information, and is not necessarily an indication of a recent reduction in the extent of actual elephant range. Nevertheless, although most (93%) of the range data for Central Africa is less than 10 years old, and the proportion of

## SUMMARY TOTALS FOR CENTRAL AFRICA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	3,885	0	0	0
Direct Sample Counts and Reliable Dung Counts	6,166	4,260	4,260	0
Other Dung Counts	0	44,676	8,775	0
Informed Guesses	332	0	30,063	4,105
Other Guesses	0	0	0	30,024
<b>TOTAL 2006</b>	<b>10,383</b>	<b>48,936</b>	<b>43,098</b>	<b>34,129</b>
<i>TOTALS 2002</i>	<i>16,450</i>	<i>32,263</i>	<i>64,477</i>	<i>82,563</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+548	+1,431	+1,768	0
New Population	0	0	+2,210	+1,376
Different Technique	-3,130	+29,895	+3,641	-5,239
Different Area	-1,130	-10,826	-4,363	0
New Guess	-171	-1,645	-11,848	-4,749
New Analysis	-21	+20	-9,536	-44,862
Data Degraded	-2,163	-2,202	-3,250	+5,040
<b>TOTAL CHANGE</b>	<b>-6,067</b>	<b>+16,673</b>	<b>-21,379</b>	<b>-48,434</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	3,151	0	<b>3,151</b>
Direct Sample Counts and Reliable Dung Counts	62,012	1,800	<b>63,812</b>
Other Dung Counts	71,491	0	<b>71,491</b>
Informed Guesses	77,576	1,816	<b>79,392</b>
Other Guesses	258,652	27,890	<b>286,542</b>
Unassessed Range	323,430	147,263	<b>470,693</b>
<b>TOTAL</b>	<b>796,310</b>	<b>178,769</b>	<b>975,079</b>

## CENTRAL AFRICA: COUNTRY AND REGIONAL TOTALS & DATA QUALITY

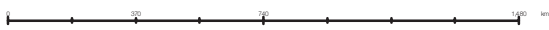
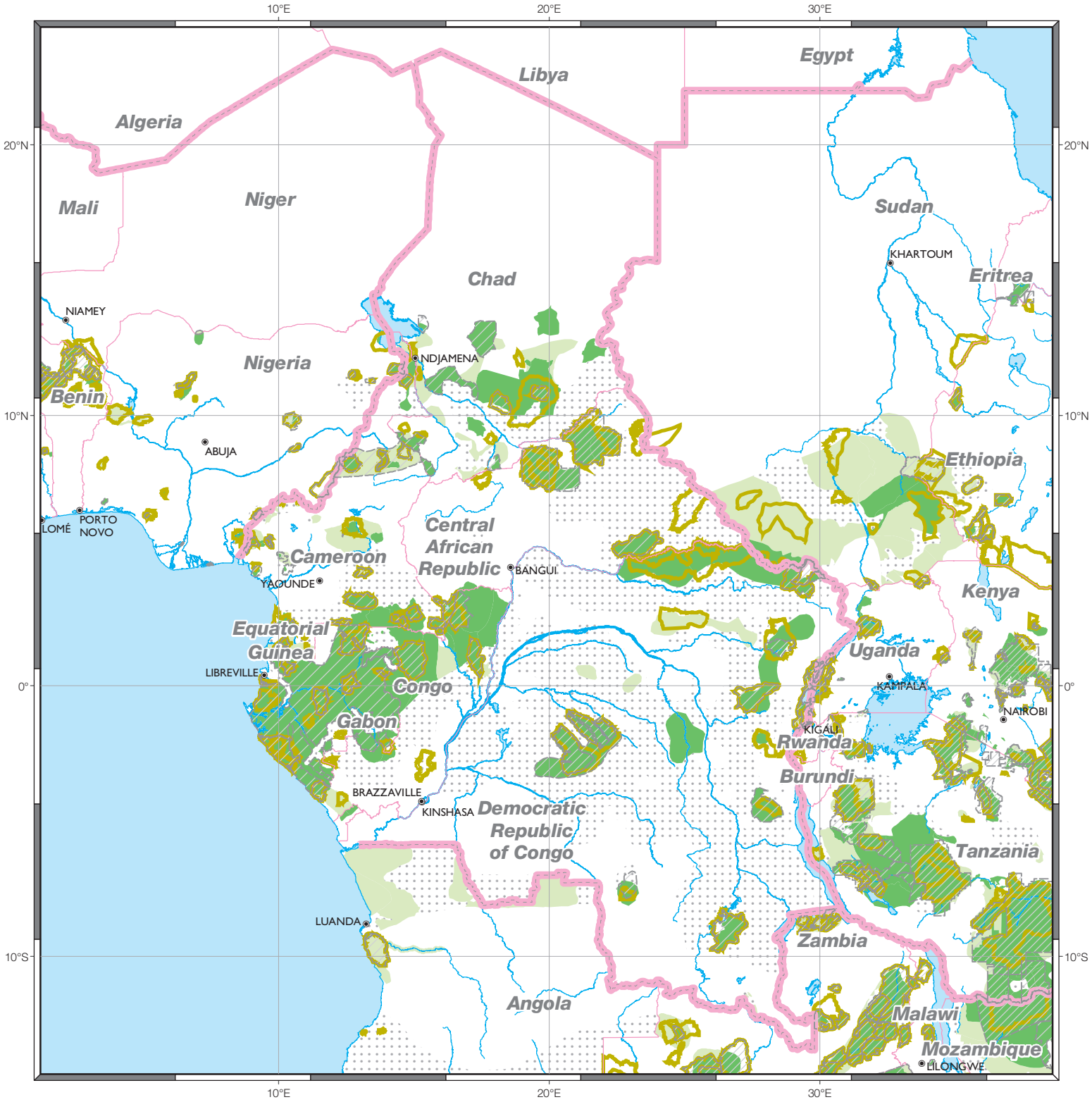
COUNTRY	ELEPHANT NUMBERS				RANGE AREA (km <sup>2</sup> )	% OF REGIONAL RANGE	% OF RANGE ASSESSED	IQI <sup>1</sup>	PFS <sup>2</sup>
	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE					
Cameroon	179	726	4,965	9,517	118,571	12	45	0.03	1
Central African Republic	109	1,689	1,036	500	73,453	8	95	0.51	2
Chad	3,885	0	2,000	550	149,443	15	26	0.15	1
Congo	402	16,947	4,024	729	135,918	14	23	0.18	1
Democratic Republic of Congo	2,447	7,955	8,855	4,457	263,700	27	40	0.18	1
Equatorial Guinea	0	0	700	630	15,008	2	13	0.00	2
Gabon	1,523	23,457	27,911	17,746	218,985	22	94	0.33	1
<b>TOTAL*</b>	<b>10,383</b>	<b>48,936</b>	<b>43,098</b>	<b>34,129</b>	<b>975,079</b>	<b>29</b>	<b>52</b>	<b>0.22</b>	<b>1</b>

\* Note that totals for the Definite, Probable and Possible categories are derived by pooling the variances of individual estimates, as described under the Data Types and Categorization section. As a result, totals do not necessarily match the simple sum of the entries within a given category.

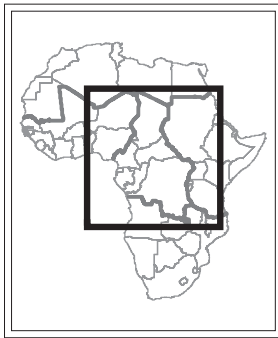
<sup>1</sup> **IQI: Information Quality Index.** This index quantifies overall data quality at the national and regional levels based on the precision of estimates and the proportion of assessed elephant range (i.e. range for which estimates are available). The IQI ranges from zero (no reliable information) to one (perfect information). See the Introduction section for a detailed explanation of how the IQI is calculated.

<sup>2</sup> **PFS: Priority for Future Surveys,** ranked from 1 to 5 (highest to lowest). Based on the IQI and the proportion of continental range accounted for by the country in question, the PFS is a measure of the importance and urgency for future population surveys, particularly in areas of unassessed range and areas not surveyed in the last 10 years or more. See Introduction for a more detailed explanation of how the priority ranking is derived.

# Central Africa



	Regional Boundary		<b>Input Zones</b>
	International Boundary		<b>Elephant Range</b>
	CAPITAL CITIES		Known
	Rivers & Lakes		Possible
	Protected Areas		Doubtful



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.

range classified as **KNOWN** has increased from 36% to 82%, knowledge of elephant distribution remains unreliable in many parts of the region.

Two countries, namely the Democratic Republic of Congo and Gabon, account for nearly half of the regional range estimate. Most of the remaining half is distributed approximately equally between Cameroon, Congo and Chad, with the Central African Republic and Equatorial Guinea accounting for 8% and 2% respectively. Although a third of the estimated range area lies within designated protected areas, many parks and reserves in the region lack any form of management or effective protection.

### *Population Data*

Survey activity has increased in Central Africa in recent years, largely as a result of initiatives such as the CITES MIKE Programme and the CBFP, but few surveys have provided reliable estimates of absolute elephant abundance. Out of 27 new estimates featured in this report, 16 derive from systematic surveys, but only six are sufficiently reliable to yield estimates in the **DEFINITE** category, and four of them are aerial surveys in savanna elephant areas. Only two reliable dung counts were conducted in the forest zone since the last report, namely in Conkouati (Congo) (Vanleeuwe, 2006) and in Lopé (Gabon) (Maisels et al., 2006). Surveys conducted for the CITES MIKE Programme in Central Africa during 2003 and 2004 (Blake, 2005) have only yielded estimates in the categories of **OTHER DUNG COUNTS**, **INFORMED GUESSES** and **OTHER GUESSES**.

Estimates of elephant abundance are only available for just over half a million km<sup>2</sup>, or 52% of the total regional elephant range. This represents a decline in coverage with respect to the previous report, both in relative and absolute terms. The decline is largely attributable to the removal of large tracts of former **POSSIBLE** range and their associated estimates in the Democratic Republic of Congo. Reliable estimates are only available for 13% of assessed range, while guesses still account for 73%. Consequently, elephants in the **POSSIBLE** and **SPECULATIVE** categories still outnumber those in the **DEFINITE** and **PROBABLE** groups.

Although the estimate under the **DEFINITE** category has increased in areas where surveys have been repeated using comparable techniques, the overall number of **DEFINITE** elephants has declined by over 6,000, largely caused by the downgrading of old survey estimates to the **SPECULATIVE** category, as well as by new estimates obtained using different techniques and covering different areas. Numbers in the **PROBABLE** category have increased by over 16,500 as a result of new estimates using different census techniques. The considerable declines in the **POSSIBLE** and **SPECULATIVE** categories largely result from new guesses and data degradation, but more significantly from the removal of estimates for areas that are no longer believed to hold elephants in the Democratic Republic of Congo.

Although overall data quality, as measured by the IQI, has improved compared to the previous report, Central Africa continues to be the region with the lowest ranking on this score, and it is impossible to make valid comparisons of elephant numbers over time for the region. At the country level, the quality of available information is currently lowest in Equatorial Guinea, followed by Cameroon, which still holds elephant populations of potential continental significance. Chad, Congo and the Democratic Republic of Congo all have comparably low levels of data quality, while Gabon and Central African Republic have the highest overall levels in the region.

### *Cross-border Movements*

Elephant movements may occur between Central and Eastern Africa, across the borders of the Democratic Republic of Congo with Sudan and Uganda. In addition, movements occur between Central and West Africa, across the borders of Cameroon and Nigeria.

# C A M E R O O N

## General Statistics

Country area: 475,440 km<sup>2</sup>  
Range area (% of country): 118,571 km<sup>2</sup> (37%)  
Protected area coverage (% of country): 8%  
Protected range (% of known and possible range in protected areas): 26%  
Information Quality Index (IQI): 0.03  
CITES Appendix: I  
Listing Year: 1989

## Current Issues

In 2002 Cameroon was identified as having the largest unregulated domestic ivory market in Central Africa, and also as an important entrepôt in the illicit international ivory trade (Milliken, 2002; TRAFFIC, 2004). Consequently, and as required by the draft Action Plan for the Control of the Trade in African Elephant Ivory adopted at the 13<sup>th</sup> Meeting of the Conference of the Parties to CITES (CITES Secretariat, 2004), Cameroon embarked on a programme to stem the illegal trade in ivory and other wildlife products. A considerable number of arrests and ivory seizures have been made in recent years. Despite these measures, it is widely believed that illegal logging and poaching for ivory and bushmeat continue to pose a threat to elephant populations (Usongo, 2003).

These problems are compounded by inadequate law enforcement, particularly in the southeast, as well as by the lack of reliable and up-to-date information on the status of elephant populations in spite of the ubiquitous presence of international conservation organizations in the country's major protected areas.

Cameroon continues to have a annual CITES export quota for elephant trophies of 160 tusks (80 animals) (UNEP-WCMC, 2006), but this quota is not based on elephant population monitoring data (Blake, 2005).

The Boumba Bek and Nki Forest Reserves in southern Cameroon, both of which are believed to hold important elephant populations, were declared national parks in October 2005 as part of a transboundary conservation initiative, jointly developed with the Governments of Congo and Gabon.

## Range Data

Elephants in Cameroon occur in three distinct biogeographical regions. Savanna elephants (*Loxodonta africana africana*) are found in the northern Sahelian and Sudanian regions, while forest elephants (*Loxodonta africana cyclotis*) occur in the southern forested area (Tchamba et al., 1997).

The Cameroon range map has been substantially altered for this report. The extent of **KNOWN** range in the southeast has been considerably reduced, with some areas categorized as **DOUBTFUL** range, based on detailed information provided by Sánchez Ariño (2004). Parts of the remaining **KNOWN** range in the southeast have been updated with information from de Wachter (2000).

A recent exploration of the Mbam-Djerem National Park only found signs of elephant presence around the central and southern sectors (F.G. Maisels, pers. comm., 2006c). This area has been categorized as **KNOWN** range, while the rest of the park appears as **DOUBTFUL** range. An area to the southeast of Mbam Djerem has also been categorized as **KNOWN** range using information from an analysis of potential routes for an oil pipeline connecting southern Chad to the Atlantic Ocean (Johnson, 1999). The same study found evidence of elephant movements in the northeast, close to the Chadian border, and this is depicted in the form of two crosses on the map.

## *Cross-border Movements*

Satellite tracking work suggests that elephants disperse from their northern savanna range as far as Lake Chad and into Nigeria (Loomis, 2002) in the dry season. There is evidence that elephants leave Bouba Ndjidah National Park in the wet season and move into the Gagal-Yapala region of Chad, where they cause crop damage (Tchamba et al., 1997). Further south, elephants also appear to move between southwestern Chad and Cameroon (Johnson, 1999).

A satellite tracking programme documented the sporadic movement of elephants across the Sangha River between Cameroon and the Central African Republic (Usongo, 2003). A similar program, started more recently in Nki National Park, has yet to find any evidence of movement across the border to Congo. Elephants also move across to Gabon (de Wachter, 2000) and Equatorial Guinea (Bekhuis & Prins, 2003) to the south.



## SUMMARY TOTALS FOR CAMEROON

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Other Dung Counts	0	726	295	0
Informed Guesses	179	0	4,670	1,320
Other Guesses	0	0	0	8,197
<b>TOTALS 2006</b>	<b>179</b>	<b>726</b>	<b>4,965</b>	<b>9,517</b>
<i>TOTALS 2002</i>	<i>2,006</i>	<i>3,058</i>	<i>9,017</i>	<i>3,160</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	0	-368	+219	0
New Population	0	0	+1,405	+345
Different Technique	0	+178	+147	-157
New Guess	+175	0	-2,212	+1,025
Data Degraded	-2,002	-2,142	-3,610	+5,144
<b>TOTAL CHANGE</b>	<b>-1,827</b>	<b>-2,332</b>	<b>-4,052</b>	<b>+6,357</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Other Dung Counts	1,503	0	<b>1,503</b>
Informed Guesses	7,767	734	<b>8,501</b>
Other Guesses	17,269	26,597	<b>43,865</b>
Unassessed Range	31,842	32,860	<b>64,702</b>
<b>TOTAL</b>	<b>58,381</b>	<b>60,190</b>	<b>118,571</b>

## CAMEROON: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Abong-Mbang Forest Reserve	—	OG3	E	1994	100		A. Ekobo, pers. comm., 1994	2	1,540	13.1 E	4.2 N
Bayang-Mbo Wildlife Sanctuary	<b>RS'</b>	DC2	D	2001	457		Bechem & Nchanji, 2001	3	662	9.6 E	5.3 N
Benoué National Park	—	IG3	E	1991	540		DFPN, 1991	2	1,800	13.8 E	8.3 N
Bouba Ndjidah National Park	—	IG3	E	1991	660		DFPN, 1991	2	2,200	14.7 E	8.6 N
Boumba-Bek National Park	NG	IG3	D	2004	318		Blake, 2005	2	2,383	15.0 E	2.7 N
Campo (South) National Park	—	DC2	C	2001	548	255	Bekhuis & Prins, 2003	3	648	10.1 E	2.3 N
Dja Faunal Reserve	DD	IG3	E	1995	1,500	500*	M.N. Tchamba, pers. comm., 1995	2	5,260	13.0 E	3.1 N
Faro National Park	—	IG3	E	1991	60		Tchamba, 1993	2	3,300	12.7 E	8.2 N
Korup National Park	DD	DC3	E	1993	425	271	Powell, quest. reply, 1993	2	1,259	9.0 E	5.2 N
Lobéké National Park	DD	DC2	E	1993	3,719	2,125	Ekobo, 1995	2	1,985	15.9 E	2.3 N
Ma'an Region	—	IG3	D	2000	4	10*	Matthews & Matthews, 2000	3	654	10.4 E	2.3 N
Mengame Wildlife Sanctuary	<b>NP</b>	IG3	D	2003	1,354	285*	Halford et al., 2003	2	1,425	12.3 E	2.3 N
Mongokele Forest Reserve	—	DC2	E	1991	773	53	A. Ekobo, pers. comm., 1994	3	850	16.0 E	2.0 N
Mt. Cameroon	<b>DT</b>	DC3	C	2003	178	148	Ekobo, 2003	3	676	9.2 E	4.2 N
Nki Forest Reserve	—	DC3	D	1998	2,178		A. Ekobo, pers. comm., 1998	2	1,815	14.5 E	2.4 N
Sudanian Area	—	IG3	E	1991	360		DFPN, 1991	1	24,985	13.7 E	8.3 N
Waza National Park	NG	IG3	D	2002	475	1025*	Saleh et al., 2002	2	1,700	14.7 E	11.3 N
Yabassi Area	<b>NP</b>	IG3	D	2002	63		WWF Cameroon, 2003	2	2,425	10.3 E	4.5 N
Yoko Area	<b>NP</b>	OG3	E	1999	60		T. Sánchez Ariño, pers. comm., 2004	4	25	12.4 E	5.6 N

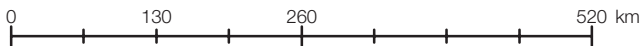
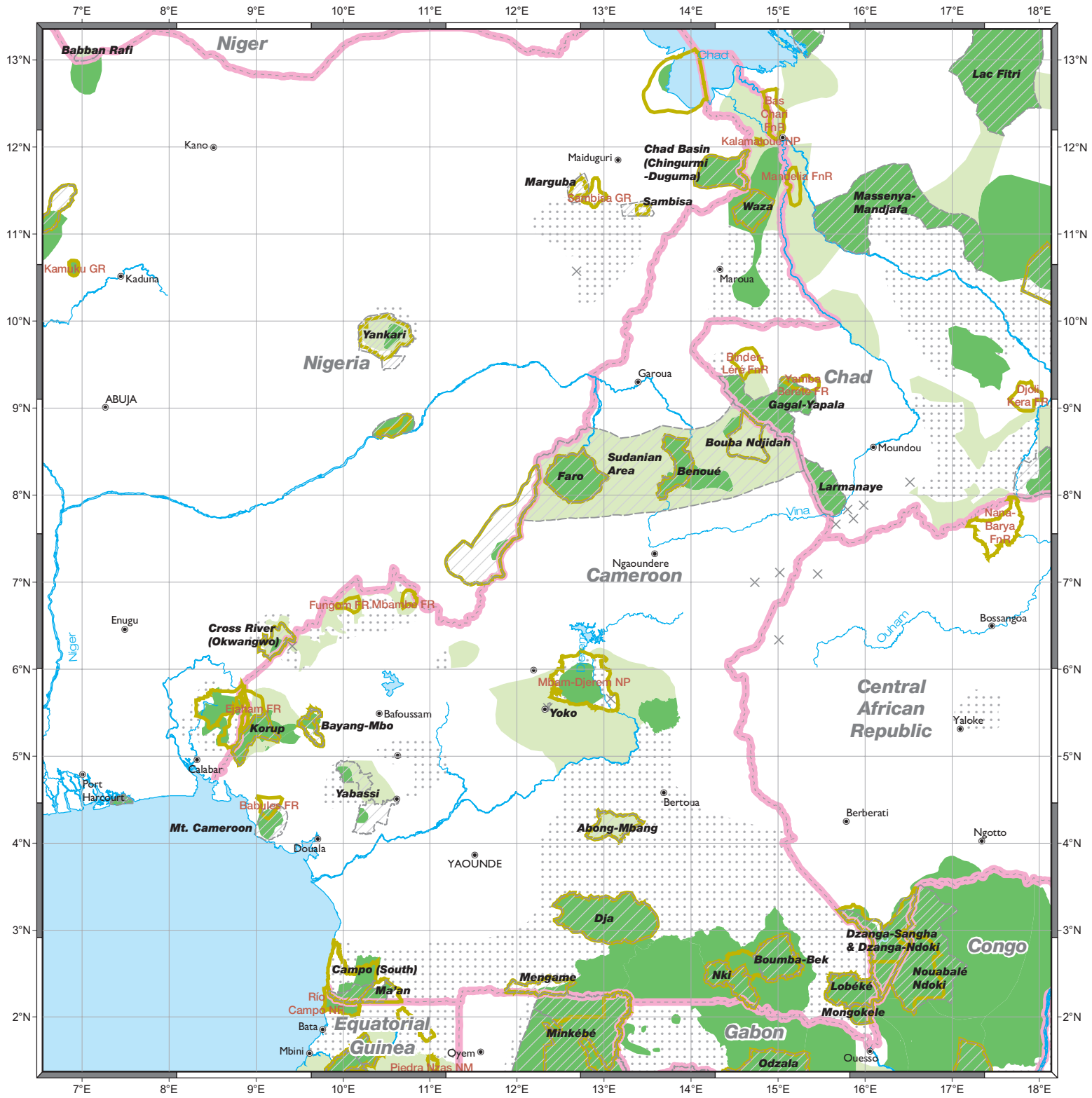
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

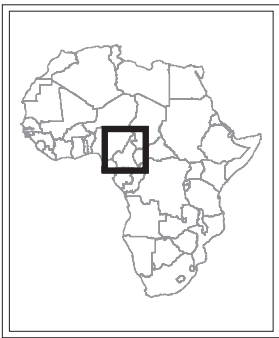
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Cameroon



	International Boundary	<b>Elephant Range</b>		Known
	Rivers & Lakes		Possible	
	Towns		Doubtful	
	Protected Areas		Sighting/sign	
	<b>Input Zones (variable hatching)</b>			



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# CENTRAL AFRICAN REPUBLIC

## General Statistics

Country area: 622,980 km<sup>2</sup>  
Range area (% of country): 73,453 km<sup>2</sup> (35%)  
Protected area coverage (% of country): 13%  
Protected range (% of known and possible range in protected areas): 85%  
Information Quality Index (IQI): 0.51  
CITES Appendix: I  
Listing Year: 1989

## Current Issues

Elephant populations in the Central African Republic (CAR) are now largely restricted to protected areas, but the lack of law enforcement, political unrest and porous international borders continue to make poaching, both in forest and savanna areas, the most prominent threat to the conservation of elephants in the country.

The eastern part of the Central African Republic has been affected by the influx of refugees from both the Democratic Republic of Congo (DRC) and the Sudan, putting wildlife populations under considerable pressure. Ivory and meat trafficking are known to occur between the Central African Republic and the Democratic Republic of Congo (Turkalo, quest. reply, 2005).

Elephant meat is found openly for sale in a number of markets around Bangui, Bangassou and Ngotto. In this last area, which is in the process of being gazetted as a protected area, cases of crop raiding by elephants and other instances of human-elephant conflict are frequently reported (Hakizumwami & Luhunu, 2005).

The Dzanga-Sangha Special Reserve and Sangha-Ndoki National Park form part of the Sangha Tri-National Park transboundary protected area. The Government of the Central African Republic is planning to sign agreements with its counterparts in Chad and the Democratic Republic of Congo for the creation of additional transboundary protected areas, but the success of these will depend on the availability of sufficient financial support and the capacity to improve law enforcement and monitoring.

## Range Data

Three known elephant populations remain in the country: a savanna elephant (*Loxodonta africana africana*) population in the north in the Manovo-Gounda - St. Floris and Bamingui-Bangoran reserve complexes; and two forest elephant (*Loxodonta africana cyclotis*) populations, one in the southeast, north of the town of Bangassou; and another in the southwest, in the area stretching from the Dzanga-Ndoki Special Reserve north into the Ngotto Forest.

Much of the north and east of the Central African Republic was believed to be elephant range until relatively recently, but it is now thought that poaching has virtually wiped out elephant populations in the area (T. Sánchez Ariño, pers. comm., 2004). As a result, most of the areas outside the reserve complexes of Manovo-Gounda - St Floris and Bamingui-Bangoran have been categorized as DOUBTFUL range. A small patch of range near the town of Yaloke has also been categorized as DOUBTFUL range (T. Sánchez Ariño, pers. comm., 2004; Turkalo, quest. reply, 2005). There are reports that a population remains around the town of Bria in the east of the country (Boulet, cited in Hakizumwami & Luhunu, 2005), but this could not be confirmed.

## SUMMARY TOTALS FOR CENTRAL AFRICAN REPUBLIC

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Direct Sample Counts and Reliable Dung Counts	109	820	820	0
Other Dung Counts	0	869	216	0
Other Guesses	0	0	0	500
<b>TOTALS 2006</b>	<b>109</b>	<b>1,689</b>	<b>1,036</b>	<b>500</b>
<i>TOTALS 2002</i>	<i>2,977</i>	<i>1,600</i>	<i>2,420</i>	<i>390</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Different Technique	-2,868	+1,686	-264	-390
New Guess	0	-1,597	-1,120	+500
<b>TOTAL CHANGE</b>	<b>-2,868</b>	<b>+89</b>	<b>-1,384</b>	<b>+110</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Total Range
Direct Sample Counts and Reliable Dung Counts	53,378	<b>53,378</b>
Other Dung Counts	4,234	<b>4,234</b>
Other Guesses	11,976	<b>11,976</b>
Unassessed Range	3,865	<b>3,865</b>
<b>TOTAL</b>	<b>73,453</b>	<b>73,453</b>

## CENTRAL AFRICAN REPUBLIC: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Bamingui-Bangoran National Park & Environs	<b>DT</b>	AS2	B	2005	830	807	Renaud et al., 2005	1	37,200	20.0 E	8.0 N
Bangassou Forest Reserve	NG	OG3	E	2004	500	500*	Blake, 2005	1	12,011	23.3 E	5.2 N
Dzanga-Sangha & Dzanga-Ndoki National Parks	<b>DT</b>	DC1	C	2005	869	216	Blake, 2005	2	2,554	16.2 E	2.9 N
Manovo Gounda - St Floris National Park	<b>DT</b>	AS2	B	2005	99	146	Renaud et al., 2005	1	37,200	21.6 E	9.1 N

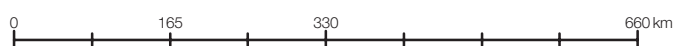
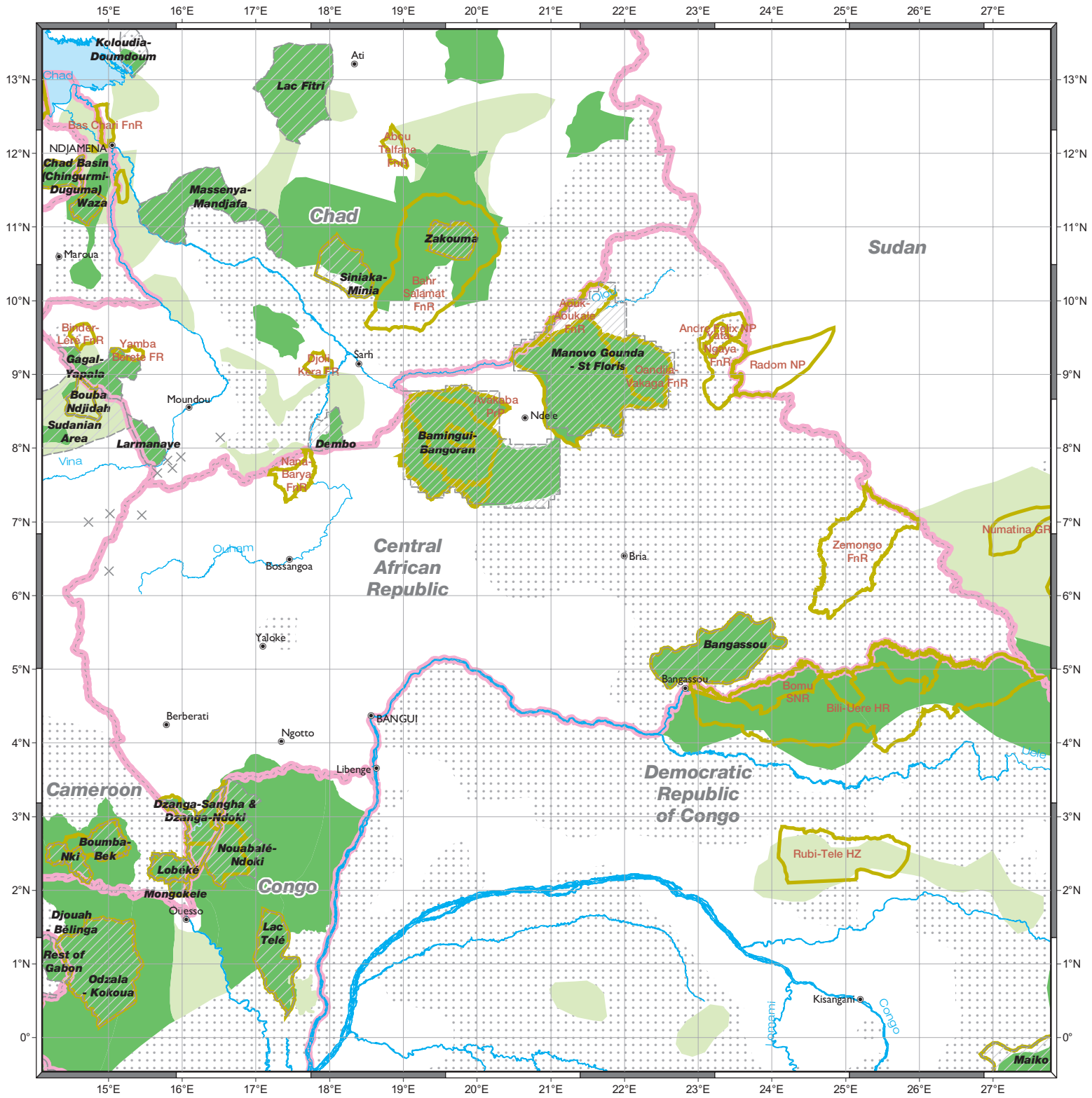
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

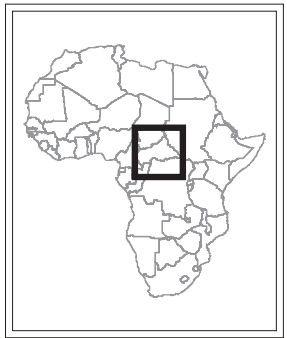
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Central African Republic



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

It is reported that around 100 elephants are occasionally seen in the northwest, close to the borders with Cameroon and Chad (Oyele, cited in Hakizumwami & Luhunu, 2005), and two crosses are shown on the map to reflect this.

### *Population Data*

All known elephant populations in the Central African Republic have been surveyed since 2004 as part of the CITES MIKE programme. Estimates from an aerial sample count conducted in the Manovo-Gounda - St. Floris ( $830 \pm 807$ ) and Bamingui-Bangoran ( $99 \pm 146$ ) reserve complexes (Renaud et al., 2005) have been used to replace INFORMED GUESSES of 300 and 1,000 respectively (R.G. Ruggiero, pers. comm., 2003).

A dung count conducted in the Dzanga-Sangha Special Reserve and Dzanga-Ndoki National Park returned an estimate of  $869 \pm 216$  (Blake, 2005). Although this is considerably lower than the previous estimate of nearly 3,000, which was an INFORMED GUESS based on an individual registration study (A.K. Turkalo, pers. comm., 2003), the new estimate has to be interpreted in the context of the larger population of which Dzanga-Sangha's elephants are part. This population stretches across the border to Congo, where another dung count in Nouabalé-Ndoki National Park returned an estimate of  $3,032 \pm 755$  (Blake, 2005). The combined estimate for both survey zones is actually higher than the combined estimate in the previous report.

A dung survey was planned for the Bangassou Forest Reserve, but the low number of dung-piles (7) detected in the pilot phase drove the surveyors to conclude that the line transect method would not yield a reliable estimate for this site, and thus to cancel the planned survey (Blake, 2005). The survey team leader nevertheless guessed the Bangassou population to be between 500 and 1,000 elephants, and this replaces an estimate of  $1,600 \pm 1,200$  from a 1996 dung count (Kpanou et al., 1998). Any comparison between the two estimates would, however, be meaningless, as the later estimate is only a guess.

Only 5% of remaining range in the Central African Republic remains unsurveyed, largely as a result of the categorization of a large portion of formerly POSSIBLE range as DOUBTFUL range. Estimates from systematic surveys are now available for over 72% of remaining elephant range. As a result of better information and a more systematic knowledge of the transboundary population in the southwest of the country, estimates in the DEFINITE and POSSIBLE categories have decreased substantially with respect to the last report, whereas those in the PROBABLE and SPECULATIVE categories have increased marginally.

### *Cross-border Movements*

Elephants in Dzanga-Sangha are part of a single population that extends across the border with Congo into the Nouabalé-Ndoki National Park (F.G. Maisels, pers. comm., 2003). Elephants may also move sporadically across the Sangha River into Lobéké National Park in Cameroon. The northeastern part of the Ngotto Forest is believed to be a corridor for elephants moving between Congo and the Central African Republic, as they are only seen there seasonally (Brugière et al., 2005).

Elephants used to move to Sudan across the eastern border (J. Garang, pers. comm., 2002), but this cannot be confirmed at present, as there is uncertainty as to the current presence of elephants on either side of the border. Similarly, it is not known whether elephants continue to move across the northern border to Chad as they used to (Dejace, 1996; Dejace, 1999), or from Bangassou south into the Democratic Republic of Congo.



## CHAD

### General Statistics

Country area: 1,284,000 km<sup>2</sup>  
Range area (% of country): 149,443 km<sup>2</sup> (21%)  
Protected area coverage (% of country): 9%  
Protected range (% of known and possible range in protected areas): 16%  
Information Quality Index (IQI): 0.15  
CITES Appendix: I  
Listing Year: 1989

### Current Issues

Desertification and drought are believed to be among the chief threats facing elephant populations in Chad, as the southward advance of the desert increasingly puts elephants in direct competition with people. The net result of this is increased incidence of human-elephant conflict, poaching, the disruption of elephant migration corridors and consequent fragmentation of elephant habitat (Hakizumwami & Luhunu, 2005; Malachie & Lassou, 2002).

The African Parks Foundation may be taking over, as from 2007, the management of Zakouma National Park, which holds Chad's largest elephant population (African Parks Foundation, 2006a). In mid-2006 the illegal killing of 100 elephants outside Zakouma National Park was reported and widely publicized in the media, but it is not known whether this was an isolated incident or part of a wider problem.

Within the framework of the Yaoundé Declaration, Chad plans to establish a transboundary conservation area linking Zakouma National Park with the Bamingi-Bangoran and Manovo-Gounda - St. Floris reserve complexes in the northern Central African Republic, all of which hold important elephant populations in their respective countries (but see under Cross-Border Movements below).

### Range Data

Only savanna elephants (*Loxodonta africana africana*) occur in Chad, distributed in pockets of Sudanian woodland in the extreme south, as well as in the drier Sahelian Acacia wooded grasslands further north. Herds may move seasonally between these two zones in search of surface water (Depierre, 1967), but the largest population is concentrated in and around Zakouma National Park. No elephants are found in the Saharan northern half of the country.

The range map for Chad has been considerably revised thanks to information provided by Sánchez Ariño (2004), as well as to data from the Landsat 2002 human population density data set (ORNL/GIST, 2002), resulting in the categorization of much of the south as DOUBTFUL range (see Introduction section for rationale).

A number of crosses have been added to the map in the southwest, where evidence of elephant presence was reported by consultants working for an oil pipeline project (Johnson, 1999).

### Population Data

A total aerial count of Zakouma National Park conducted in 2005 returned an estimate of 3,885 (Malachie et al., 2005). Another aerial survey was conducted in August 2006, but the survey report could not be obtained in time for this report. Hence the result of the 2005 survey has been used to replace an estimate of 1,989 from an aerial total count conducted in 2000 (Planton, 2000). The difference between the two estimates can be explained by the fact that the 2000 survey was conducted at the end of the dry season, when elephants begin to disperse beyond the park boundaries. The 2005 survey, on the other hand, was conducted at the height of the dry season, when elephant density is highest in the park, and when leaf cover is at its lowest. Thus the 2005 figure is believed to be a more accurate estimate of the elephant population

in Zakouma. The resulting increase in the number of elephants under the DEFINITE category is therefore likely to reflect better information, rather than an increase in the elephant population.

The rest of the estimates featured on the table have been retained unchanged from the previous report. Despite the categorization of large areas of formerly POSSIBLE range as DOUBTFUL range, nearly three-quarters of estimated range area in Chad remain unsurveyed. Although these unsurveyed areas are unlikely to contain large numbers of elephants, the estimates reported here cannot be considered a national estimate.

### *Cross-border Movements*

Between 300 and 400 elephants migrate between Lake Chad and northern Cameroon, but spend most of their time in the latter (Tchamba et al., 1997). It is thought that these elephants come into conflict with human communities on their migration between the two countries. Dejace (1996) also believed that elephants move between Chad and the Central African Republic, but this has not been verified.

## SUMMARY TOTALS FOR CHAD

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	3,885	0	0	0
Informed Guesses	0	0	2,000	550
<b>TOTALS 2006</b>	<b>3,885</b>	<b>0</b>	<b>2,000</b>	<b>550</b>
<i>TOTALS 2002</i>	<i>1,989</i>	<i>0</i>	<i>2,000</i>	<i>550</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+1,896	0	0	0
<b>TOTAL CHANGE</b>	<b>+1,896</b>	<b>0</b>	<b>0</b>	<b>0</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	3,151	0	<b>3,151</b>
Informed Guesses	35,048	12	<b>35,061</b>
Unassessed Range	63,045	48,187	<b>111,232</b>
<b>TOTAL</b>	<b>101,244</b>	<b>48,200</b>	<b>149,443</b>

## CHAD: ELEPHANT ESTIMATES

INPUT_ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Dembo Area	—	IG3	D	2002	600	100*	Malachie & Lassou, 2002	2	2,409	18.0 E	8.2 N
Gagal-Yapala Area	—	IG3	D	2002	400	100*	Malachie & Lassou, 2002	2	4,640	14.9 E	9.1 N
Koloudia-Doumdoum Area	—	IG3	D	2002	50	50*	Malachie & Lassou, 2002	2	2,180	15.3 E	13.4 N
Lac Fitri Area	—	IG3	D	2002	200	100*	Malachie & Lassou, 2002	2	11,670	17.6 E	12.9 N
Larmanaye Area	—	IG3	D	2002	100	50*	Malachie & Lassou, 2002	2	2,180	15.5 E	8.1 N
Massenya-Mandjafa Area	—	IG3	D	2002	150	50*	Malachie & Lassou, 2002	2	10,864	16.3 E	11.3 N
Siniaka-Minia Faunal Reserve	—	IG3	D	2002	500	100*	Malachie & Lassou, 2002	2	4,740	18.2 E	10.4 N
Zakouma National Park	<b>RS'</b>	AT2	A	2005	3,885		Malachie et al., 2005	3	2,987	19.7 E	10.8 N

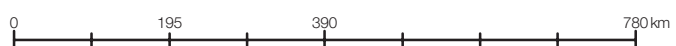
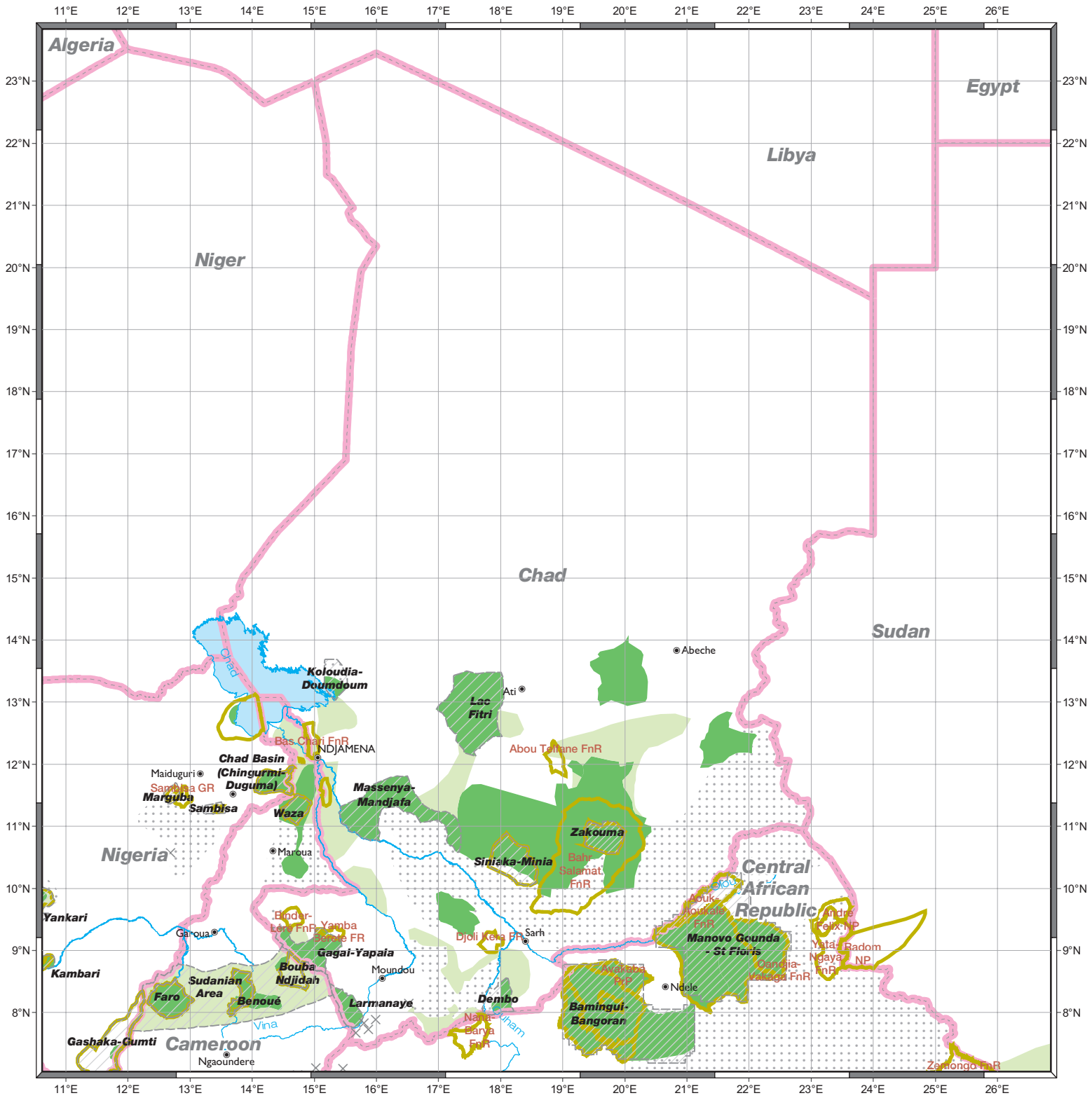
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

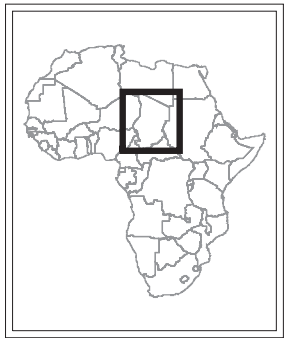
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Chad



	International Boundary	<b>Elephant Range</b>	
	Rivers & Lakes		Known
	Towns		Possible
	Protected Areas		Doubtful
	<b>Input Zones (variable hatching)</b>		Sighting/sign



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# CONGO

## General Statistics

Country area: 342,000 km<sup>2</sup>  
Range area (% of country): 135,918 km<sup>2</sup> (73%)  
Protected area coverage (% of country): 10%  
Protected range (% of known and possible range in protected areas): 20%  
Information Quality Index (IQI): 0.18  
CITES Appendix: I  
Listing Year: 1989

## Current Issues

Poaching of elephants for ivory and meat, fuelled by the proliferation of firearms, along with the commercial exploitation of timber and petroleum are believed to be the most important threats facing elephants in Congo. These problems are aggravated by lack of resources and weak institutional capacity to enforce regulations. Human-elephant conflict, particularly in the form of crop raids, is reported to be a problem, particularly in the areas around Odzala, Conkouati and Nouabalé-Ndoki National Parks (Hakizumwami & Luhunu, 2005).

Congo is a signatory of a number of regional agreements that aim to promote the conservation of the rainforest, to harmonize logging regulations and to curb illegal logging. These include the Yaoundé Declaration and the Brazzaville Process. In addition, Congo participates in two transboundary conservation initiatives with neighbouring countries. The Sangha Tri-National Park, which includes Nouabalé-Ndoki National Park (Congo), Lobéké National Park (Cameroon) and the Dzanga-Ndoki National Park and Dzanga-Sangha Special Reserve (Central African Republic), was the first of these to be established, and has resulted in a number of joint anti-poaching operations. In addition, Congo has begun collaboration with Cameroon and Gabon for the creation of a transboundary protected area that includes Odzala National Park in Congo, Minkébé National Park in Gabon and Dja Faunal Reserve and Nki and Boumba-Bek National Parks in Cameroon.

## Range Data

Most of Congo's elephant range lies in the northern forested area, where only forest elephants (*Loxodonta africana cyclotis*) are believed to occur. For this report, much of centre and south of the country has been categorized as **DOUBTFUL** range, based on information provided by Sánchez Ariño (2004). The area of **KNOWN** range in and around Conkouati-Douli National Park has been extended based on data provided by Vanleeuwe (2006).

## Population Data

A dung count of Odzala-Kokoua National Park conducted in 2005 gave an estimate of 13,545 elephants with an asymmetric confidence interval of 10,836 to 17,608 (Wildlife Conservation Society, 2006). This replaces an estimate of 18,222 from a dung count conducted in 2000 (Hart & Beyers, 2002). In spite of the area covered in the 2006 survey being 73% larger, the estimate is lower by 4,677 elephants. This difference, however, is not statistically significant.

An estimate of  $3,032 \pm 755$  from a dung count of Nouabalé Ndoki National Park and an adjacent logging concession, conducted in 2003 (Blake, 2005), replaces a previous **INFORMED GUESS** of 431 (Maisels, 2002b). The 2003 estimate must be interpreted in conjunction with that for the Dzanga-Sangha and Dzanga-Ndoki National Parks in the Central African Republic which, together with Nouabalé-Ndoki, constitute a single transboundary population estimated at around 3,400 elephants (Blake, 2005).

## SUMMARY TOTALS FOR CONGO

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Direct Sample Counts and Reliable Dung Counts	402	370	370	0
Other Dung Counts	0	16,577	3,338	0
Informed Guesses	0	0	316	729
<b>TOTALS 2006</b>	<b>402</b>	<b>16,947</b>	<b>4,024</b>	<b>729</b>
<i>TOTALS 2002</i>	<i>431</i>	<i>18,222</i>	<i>6,572</i>	<i>2,300</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Population	0	0	+429	+729
Different Technique	-29	+3,404	+170	-2,300
Different Area	0	-4,679	-3,146	0
<b>TOTAL CHANGE</b>	<b>-29</b>	<b>-1,275</b>	<b>-2,548</b>	<b>-1,571</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Direct Sample Counts and Reliable Dung Counts	2,592	345	<b>2,937</b>
Other Dung Counts	21,952	0	<b>21,952</b>
Informed Guesses	5,733	121	<b>5,854</b>
Unassessed Range	87,640	17,535	<b>105,176</b>
<b>TOTAL</b>	<b>117,918</b>	<b>18,001</b>	<b>135,918</b>

## CONGO: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Conkouati National Park	<b>DT</b>	DC2	B	2005	772	370	Vanleeuwe, 2006	2	3,850	11.5 E	3.9 S
Lac Télé Community Reserve	<b>NP</b>	DC3	D	2004	316	729*	Iyenguet et al., 2007	2	4,400	17.3 E	1.1 N
Nouabalé-Ndoki National Park	<b>DT</b>	DC2	C	2003	3,032	755	Blake, 2005	2	6,660	16.7 E	2.7 N
Odzala - Kokoua National Park	<b>DA</b>	DC2	C	2005	13,545	3,252	Wildlife Conservation Society, 2006	2	13,545	14.9 E	1.0 N

\* Range of informed guess

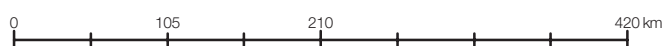
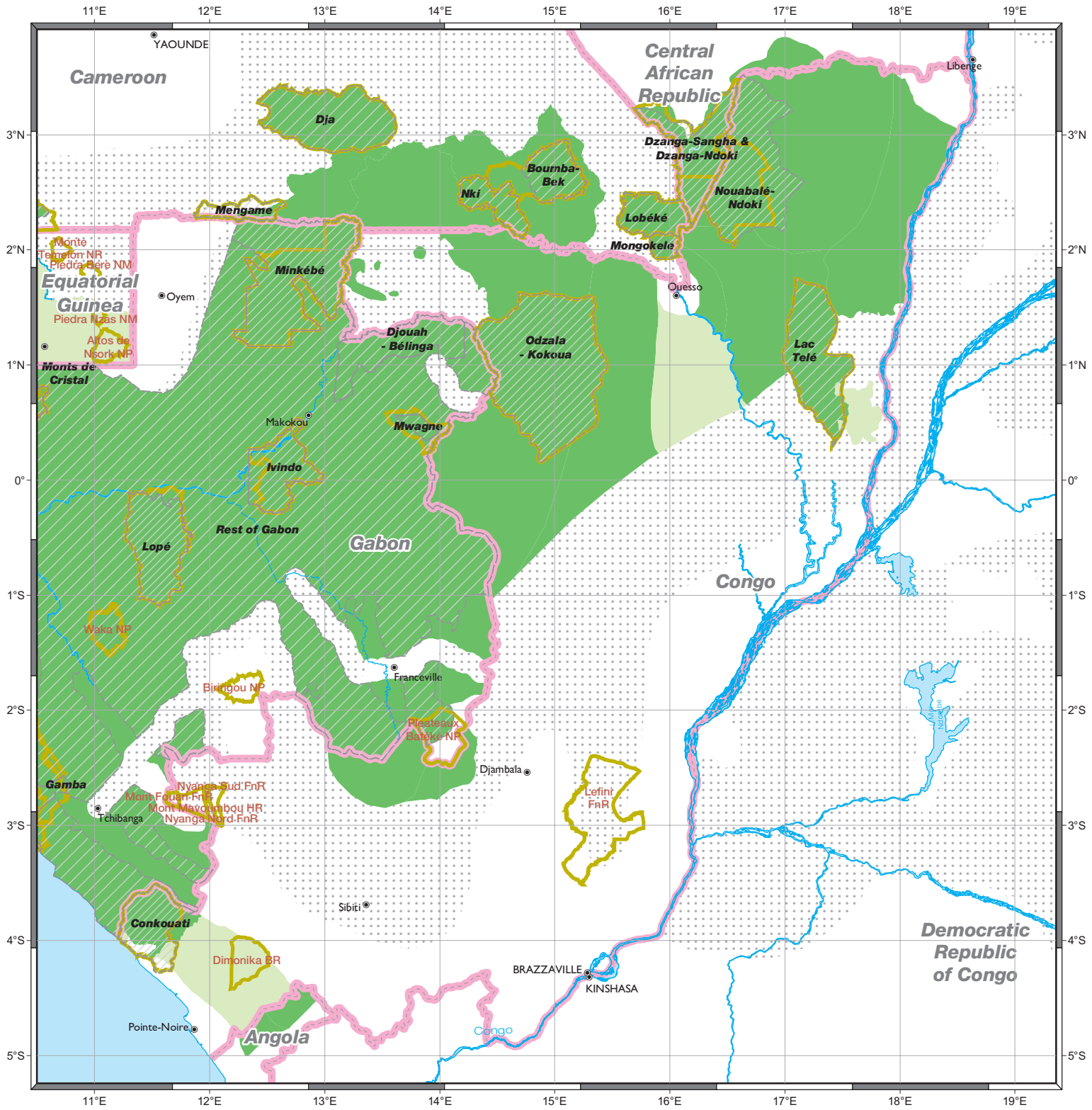
<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

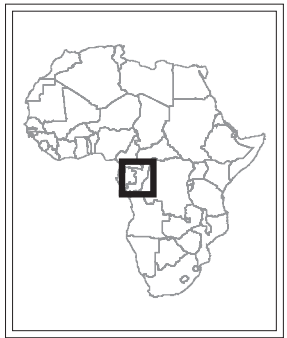
<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.



# Congo



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

A number of dung counts have been conducted in Conkouati-Douli National Park in recent years. The result of  $772 \pm 370$  from the most recent of these surveys (Vanleeuwe, 2006) replaces an INFORMED GUESS of 1,000 by Maisels (2003).

The Lac Télé Community Reserve was surveyed in 2003 and 2004 (Iyenguet et al., 2007; Rainey, 2004). The 2003 survey was conducted when most of the park was flooded and it was difficult to detect elephant dung. The 2004 survey, conducted in the dry season, estimated 316 elephants, with an asymmetric 95% confidence interval of 98 to 1,045 (Iyenguet et al., 2007). This estimate has been categorized as an INFORMED GUESS, as the low number of dung-piles encountered makes it unreliable.

Elephant estimates have declined across all four categories in Congo as a result of changes in the quality and coverage of data. These declines are therefore not indicative of changes in actual elephant numbers, but rather the result of better information. However, nearly 80% of estimated elephant range in Congo remains unsurveyed, and it is therefore impossible to ascertain changes in elephant numbers at the national level, as significant numbers of elephants may be found in the unsurveyed areas.

### *Cross-border Movements*

Elephants are known to move between Nouabalé-Ndoki in northern Congo and Dzanga-Sangha in the Central African Republic, and these elephants form a single transboundary population (A.K. Turkalo, pers. comm., 2003; Maisels, 2001). Cross-border movements are also likely to occur between Congo and Gabon to the west and Cameroon to the north. However, a radio-collaring project in Nki National Park in Cameroon has yet to find evidence of transboundary movement into Congo.

# DEMOCRATIC REPUBLIC OF CONGO

## General Statistics

Country area: 2,345,410 km<sup>2</sup>  
Range area (% of country): 263,700 km<sup>2</sup> (39%)  
Protected area coverage (% of country): 6%  
Protected range (% of known and possible range in protected areas): 53%  
Information Quality Index (IQI): 0.18  
CITES Appendix: I  
Listing Year: 1989

## Current Issues

Poaching for ivory and meat remains the most important threat to elephant populations in the Democratic Republic of Congo (DRC). The situation is particularly serious in the east, where outbursts of fighting have continued even after the signing of a peace deal in 2003.

Large amounts of ivory originating from the Democratic Republic of Congo have been confiscated in recent years (Hakizumwami & Luhunu, 2005), with a total of 17 tonnes of ivory estimated to have been moved from the Okapi Faunal Reserve alone in the last six months of 2004 (Amboya Apobo, 2004). Most of the ivory is destined for consumption overseas and is moved through neighbouring countries, particularly Uganda, the Sudan and Angola (Milliken et al., 2006).

The once significant internal ivory market (Martin & Stiles, 2000) seems to have declined in relative importance in recent years. A survey of a Kinshasa market in 2005, which is supplied mainly from elephant populations in central Democratic Republic of Congo, revealed relatively low levels of activity in comparison to the exports from the east of the country (Mubalama & Hart, in press).

Following widespread reports of incursions of Sudanese poachers into Garamba, the management of the park and its surrounding hunting reserves was taken over by the African Parks Foundation in 2005. Although surveys and anti-poaching operations in Garamba and its environs commenced soon after the new management took over, compliance with the CITES MIKE programme is being implemented more slowly.

Human-elephant conflict is reported to be a problem particularly around Upemba and Virunga National Parks, as well as in the Ituri forest, where it intensified as elephants retreated from remote areas where they were being hunted to areas closer to settlements.

## Range Data

The Democratic Republic of Congo is transversed by an equatorial forest belt surrounded by savanna woodlands in the northeast and south of the country. Forest elephants (*Loxodonta africana cyclotis*) occur in the north and central parts, with savanna elephants (*Loxodonta africana africana*) and forest-savanna hybrids in the north and the east.

The range map has been drastically altered for this report, with the re-categorization of most of the country's POSSIBLE range into DOUBTFUL range based on information from Hart (2006) and the Landsan 2002 human population density data set (ORNL/GIST, 2002; see Introduction section for details). Although nearly 650,000 km<sup>2</sup> of former POSSIBLE range have been converted into DOUBTFUL range, this is not necessarily the result of a recent reduction in actual extent of elephant range, but rather a better reflection of the uncertainty associated with elephant distribution in the Democratic Republic of Congo. A reconnaissance conducted in the northern and southern parts of the lowland sector of Kahuzi Biega

National Park in 2005 found no evidence of elephant presence, and these areas have also been categorized as DOUBTFUL range (Liengola, 2006).

Range in the northern and central sectors of Garamba National Park has been removed, as elephants have not been seen there for many years (Hillman Smith et al., 2003a). The southern sector of the park and its surrounding hunting reserves remain as KNOWN range.

An area in the upper Tshuapa basin to the east of Salonga National Park, and a patch in the Luamba area have been categorized as KNOWN range (Hart, 2006; Mubalama, quest. reply, 2006; T. Sánchez Ariño, pers. comm., 2004).

### *Population Data*

The regular survey programme at Garamba National Park conducted two surveys since the last report, one in May 2003, which returned an estimate of  $6,948 \pm 3,910$  (Hillman Smith et al., 2003a), and another in April 2004 (Hillman Smith et al., 2006). The estimate of  $6,354 \pm 3,975$  from this latter survey is featured in this report, and replaces a previous estimate of  $5,983 \pm 2,320$  from a methodologically comparable survey conducted in 2002. Following widespread reports of heavy poaching in Garamba since 2003 (Hillman Smith et al., 2003b), a reconnaissance survey in August 2005 counted 1,202 elephants in the southern sector of the park (de Merode et al., 2005). Although the reconnaissance was intensive, the possibility that elephants could have moved to surrounding hunting reserves or to the central and northern sectors cannot be ruled out. No evidence of active poaching was detected at the time of the survey. An aerial total count of Garamba's southern sector and part of the adjacent Domaine de Chasse de Gangala na Bodio was conducted in April 2006, and while the final survey report was not available in time for inclusion in this report, the estimate was 3,800 elephants (Emslie & Lobao Tello, 2006), which is within the confidence interval of the 2004 estimate.

The Salonga National Park was systematically surveyed in 2004 as part of the CITES MIKE programme. This survey, which only covered two-thirds of the park, returned an estimate of 1,186 with an asymmetric 95% confidence interval of 666 to 2,114 (Blake, 2005). Hart (2006) estimates that 4,000 elephants occur in the Salonga ecosystem. The approximate difference of 2,800 between this and the MIKE survey estimate has been entered in the category of OTHER GUESSES for the unsurveyed areas inside and outside the park. These two estimates replace a previous INFORMED GUESS of 12,500 for the entire ecosystem (Hart, 2003). Another survey of Salonga in 2005 explored areas not covered in the MIKE survey, but no attempt was made to estimate elephant numbers (Hart, 2006).

A dung count of the central sector of Okapi Faunal Reserve conducted in 2006 produced an estimate of 2,688 with an asymmetric 95% confidence interval of 1,624 to 4,424 (Grossmann et al., 2006). This replaces an estimate of 3,808 with an asymmetric confidence interval of 2,649 to 5,464 (Thomas et al., 2001). While the two results are not significantly different, it must be noted that the 2000 survey covered a larger area.

The central sector of Virunga National Park was the subject of an aerial sample survey in June 2006. An estimate of  $348 \pm 177$  was reported (Kujirakwinja et al., 2006), but the calculation of the estimate excluded a herd of 120 elephants seen in one of the transects, which were subsequently added to the calculated estimate. According to the survey report, this was done to avoid inflating the estimate and variance beyond what the surveyors considered likely for the park. For the present report, the estimate of 348 with an upper range of 177 has been categorized as an INFORMED GUESS, and replaces an older INFORMED GUESS of 486 (Mubalama, 2000).

## SUMMARY TOTALS FOR DEMOCRATIC REPUBLIC OF CONGO

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Direct Sample Counts and Reliable Dung Counts	2,294	4,081	4,081	0
Other Dung Counts	0	3,874	1,516	0
Informed Guesses	153	0	3,258	207
Other Guesses	0	0	0	4,250
<b>TOTALS 2006</b>	<b>2,447</b>	<b>7,955</b>	<b>8,855</b>	<b>4,457</b>
<i>TOTALS 2002</i>	<i>7,667</i>	<i>2,631</i>	<i>34,996</i>	<i>17,554</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	-1,682	+2,123	+1,508	0
New Population	0	0	+37	0
Different Technique	0	+1,430	-10,118	-2,323
Different Area	-3,111	+1,748	+94	0
New Guess	-403	0	-8,505	-5,920
New Analysis	-23	+23	-9,157	-4,854
<b>TOTAL CHANGE</b>	<b>-5,220</b>	<b>+5,324</b>	<b>-26,141</b>	<b>-13,097</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Direct Sample Counts and Reliable Dung Counts	1,402	1,455	<b>2,857</b>
Other Dung Counts	29,959	0	<b>29,959</b>
Informed Guesses	10,665	949	<b>11,614</b>
Other Guesses	59,610	1,290	<b>60,900</b>
Unassessed Range	121,100	37,269	<b>158,369</b>
<b>TOTAL</b>	<b>222,736</b>	<b>40,964</b>	<b>263,700</b>

## DEMOCRATIC REPUBLIC OF CONGO: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Bushimae	—	IG3	E	1987	120		Won wa Musiti, quest. reply, 1991	2	5,232	23.0 E	7.4 S
Gangala-na-Bodio	NA	OG3	E	2002	1,000	450*	Hart, 2003	2	9,671	29.3 E	3.9 N
Garamba National Park	RS	AS3	B	2004	6,354	4,081	Hillman Smith et al., 2006	2	5,525	29.5 E	4.2 N
Kahuzi-Biega (Upland) National Park	NG	IG3	D	2005	20	30*	Hart, 2006	4	154	28.7 E	2.2 S
Luama Hunting Zone	NG	OG3	E	2002	110	15*	Mubalama, quest. reply, 2006	2	9,469	28.0 E	4.5 S
Maiko National Park	NG	IG3	D	2005	3,000		Hart, 2006	2	10,830	27.6 E	0.4 S
Okapi (Central) Faunal Reserve	DA	DC3	C	2006	2,688	1,348	Grossmann et al., 2006	2	5,600	28.5 E	1.5 N
Salonga National Park	DT	DC3	C	2004	1,186	692	Blake, 2005	2	22,100	21.2 E	2.1 S
Salonga (Outside)	NG	OG3	E	2006	2,800		Hart, 2006	2	25,140	21.1 E	2.5 S
Upemba National Park	NG	OG3	E	2005	145		Mubalama, quest. reply, 2006	2	11,730	26.6 E	9.0 S
Virunga (Central) National Park Sector	NG	AS2	D	2006	348	177*	Kujirakwinja et al., 2006	3	2,597	29.4 E	0.4 S
Virunga (Mikeno) National Park	NP	IG3	D	2003	43		Gray, quest. reply, 2005	4	256	29.5 E	1.4 S
Virunga (North) National Park Sector	NA	AS2	B	2003	21	39	Hillman Smith et al., 2003c	3	1,550	29.8 E	0.6 N
Virunga (South) National Park Sector	—	OG3	E	2002	75		L.K. Mubalama, pers. comm., 2003	3	1,290	29.2 E	1.4 S

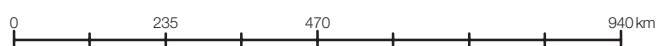
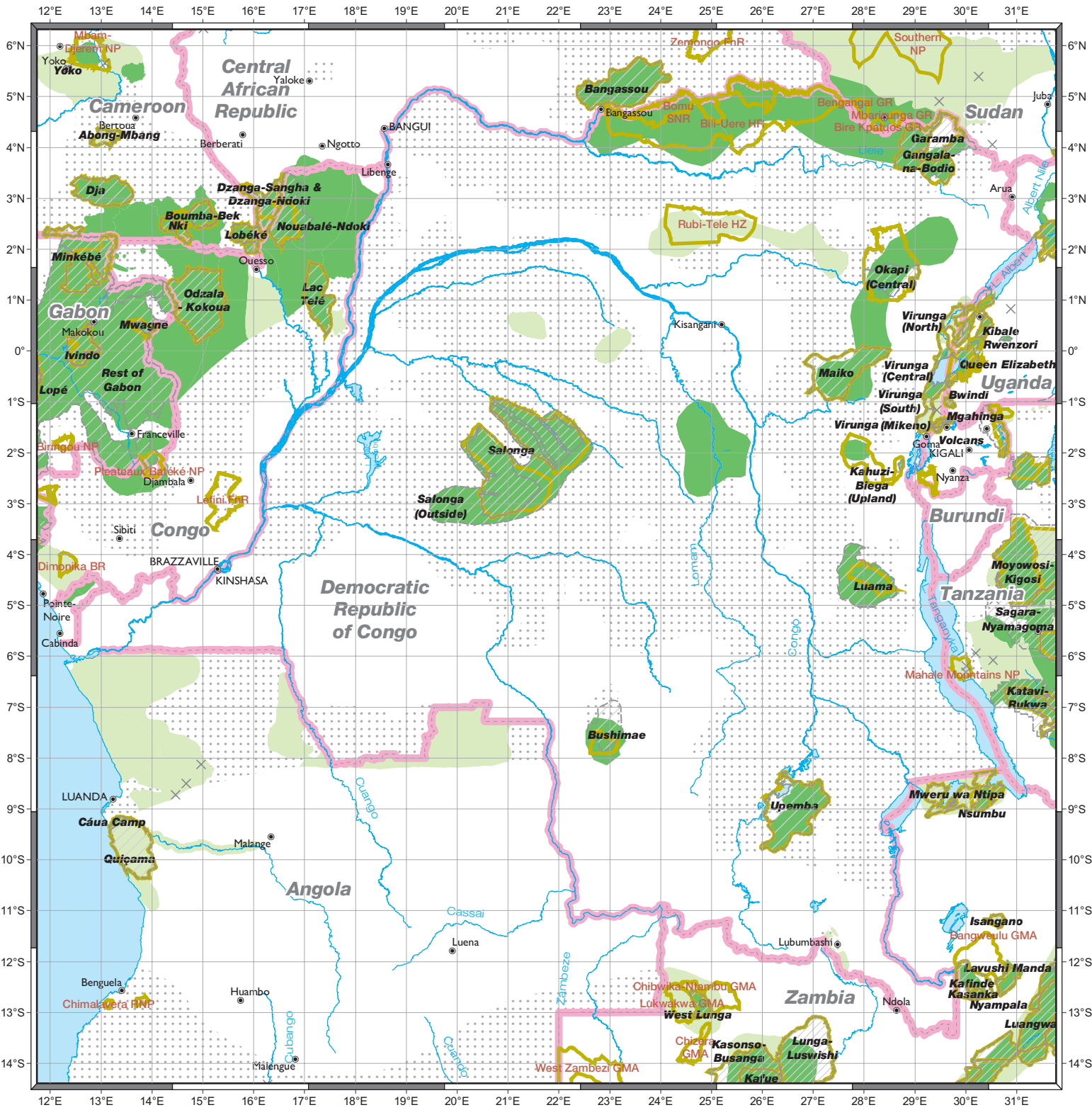
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

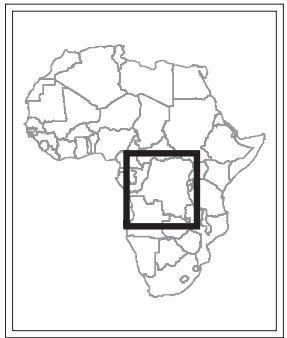
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Democratic Republic of Congo



International Boundary	<b>Elephant Range</b>
Rivers & Lakes	Known
Towns	Possible
Protected Areas	Doubtful
Input Zones (variable hatching)	Sighting/sign



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

The estimate of 21 shown for Virunga North (Hillman Smith et al., 2003c) has been retained from the previous report, where it appeared as an INFORMED GUESS. As the survey report has since become available, the estimate is now correctly categorized as a category 2 aerial sample count. The estimate for Virunga South has been retained unchanged from the previous report.

A reconnaissance of the northeastern sector of Maiko National Park (Amsini et al., 2005) found elephant densities to be comparable to those recorded in a dung count more than a decade earlier (Hart & Sikubwabo Kiyengo, 1993). A later survey of the southern sector, however, found comparatively few signs of elephant presence (Amsini et al., 2006). While neither of these surveys attempted to produce estimates of abundance, Hart (2006) believes the number of elephants to stand at around 3,000 in Maiko. This estimate has been entered as an INFORMED GUESS and replaces an estimate of 6,500 from a dung count conducted in 1992 (Hart & Sikubwabo Kiyengo, 1993).

New guesses for the Luama area and the and Upemba National Park have been provided by Mubalama (2006), replacing guesses by Hart (2003). Guesses featured in the previous report for Lomami-Lualaba and Wamba-Lopori, as well as for portions of the Kivu, Equateur and Orientale Provinces (Hart, 2003), have been removed in this report, as these areas are no longer thought to be elephant range (Hart, 2006). OTHER GUESSES for Upper Tshuapa and Bili-Uere, also provided by Hart (2003) have been removed, as they were deemed to be unreliable.

The considerable decline in the POSSIBLE and SPECULATIVE categories caused by the removal of these estimates should not be interpreted as a recent decline in actual elephant numbers, but rather as the result of better information. The increase in the PROBABLE category resulting from the Salonga and Okapi surveys is matched by a decrease of similar magnitude in the DEFINITE category. These changes are largely due to the lower precision of the 2004 Garamba survey, and to survey estimates obtained using different techniques (Salonga) and different areas (Okapi).

Despite the re-categorization of a large proportion of the DRC's POSSIBLE elephant range into DOUBTFUL range, nearly 30% of remaining range is still only covered by guesses of unknown reliability, and 60% of range remains unassessed.

### *Cross-border Movements*

Elephants move seasonally between the Virunga National Park and the southern sector of Queen Elizabeth National Park in Uganda (Keigwin, 2001; Mubalama, 2000). Movements may also take place between Virunga's northern sector and the Toro/Semliki range in western Uganda (F. Micheltore, pers. comm., 1998). Movement between the Bili Uere area and Bangassou Forest in the Central African Republic is also possible, but has not been confirmed.



# EQUATORIAL GUINEA

## General Statistics

Country area: 28,050 km<sup>2</sup>  
Range area (% of country): 15,008 km<sup>2</sup> (54%)  
Protected area coverage (% of country): 17%  
Protected range (% of known and possible range in protected areas): 27%  
Information Quality Index (IQI): 0.00  
CITES Appendix: I  
Listing Year: 1989

## Current Issues

Logging and subsistence agriculture are the predominant forms of land use in continental Equatorial Guinea. Elephant hunting and snaring is reported to be widespread, particularly in the dry season, but most elephant meat is consumed locally and does not appear to feature prominently in the bushmeat trade. Crop raiding by elephants is reported to be a problem in some areas, often resulting in retaliatory shooting of elephants, often without the requisite permit from the authorities (Malabo) (Rist, quest. reply, 2005).

Despite the recent development of a model for forest concession management, none of the logging concerns in the country is under best practice management or makes any substantial efforts to control illegal hunting. Preliminary management plans have been drafted for Equatorial Guinea's newly created protected areas, but these remain largely on paper, as the agency mandated with their implementation, the National Institute for Forestry Development (INDEFOR), lacks financial and political support from its parent ministry (CARPE, 2005).

An agreement is expected to be signed between Equatorial Guinea and Cameroon, leading to the creation of a transfrontier conservation area encompassing the Río Campo Nature Reserve and the Campo-Ma'an protected areas in Cameroon.

## Range Data

Much of continental Equatorial Guinea is still covered in tropical forest, and is therefore possible elephant habitat. Nevertheless, elephants are thought to be largely absent from the northern half of the territory, where human population densities are higher than in the south. An exception to this is the Río Campo Nature Reserve in the northwest, where an elephant population of unknown size remains. Only forest elephants (*Loxodonta africana cyclotis*) are believed to occur in the country.

The area of KNOWN range in Equatorial Guinea has been considerably expanded to cover the Montes Mitra sector of Monte Alén National Park, as well as an area to the east of it, based on information provided by Rist (2005).

## Population Data

A survey of the remainder of Monte Alén National Park was to be conducted under the auspices of the CITES MIKE programme by 2004, but was postponed for lack of funds (Blake, 2005). As a result, the guess for Monte Alén featured in the previous report has been retained.

A dung count of the Montes Mitra extension of Monte Alén National Park, conducted between October 2003 and February 2004, estimated elephant density at 0.55 per km<sup>2</sup>, with an asymmetric 95% confidence interval ranging between 0.37 and 0.81 (Puit & Ghiurghi, 2007). The authors combined this estimated density with data from reconnaissance walks and provided an approximate estimate of 700 elephants in the study area, with a maximum estimate of 1,100. In view of this, as well as of the fact that no confidence limits of elephant numbers were provided, the estimate has been treated as an INFORMED GUESS. The inclusion of the estimate for this previously unsurveyed area has resulted in increases of 700 and 330 in the

POSSIBLE and SPECULATIVE categories respectively. However, the vast majority (88%) of estimated range in Equatorial Guinea remains unsurveyed.

*Cross-border  
Movements*

Elephants may move between Gabon and southern Equatorial Guinea (L. Arranz, pers. comm., 1995) and possibly between Cameroon's southern forest range and the Río Campo Forest Reserve in northwest Equatorial Guinea (Bekhuis & Prins, 2003), although more survey work is required to establish whether this is the case.

## SUMMARY TOTALS FOR EQUATORIAL GUINEA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Informed Guesses	0	0	700	330
Other Guesses	0	0	0	300
<b>TOTALS 2006</b>	<b>0</b>	<b>0</b>	<b>700</b>	<b>630</b>
<i>TOTALS 2002</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>300</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Population	0	0	+700	+330
<b>TOTAL CHANGE</b>	<b>0</b>	<b>0</b>	<b>+700</b>	<b>+330</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Informed Guesses	1,084	0	<b>1,085</b>
Other Guesses	793	4	<b>797</b>
Unassessed Range	1,715	11,411	<b>13,126</b>
<b>TOTAL</b>	<b>3,593</b>	<b>11,415</b>	<b>15,008</b>

## EQUATORIAL GUINEA: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Monte Alén National Park	—	OG3	E	2002	300		S. Engonga, pers. comm., 2002	2	800	10.2 E	1.6 N
Montes Mitra Sector, Monte Alén National Park	<b>NP</b>	DC3	D	2004	700	330*	Puit & Ghiurghi, 2007	2	1,200	10.0 E	1.4 N

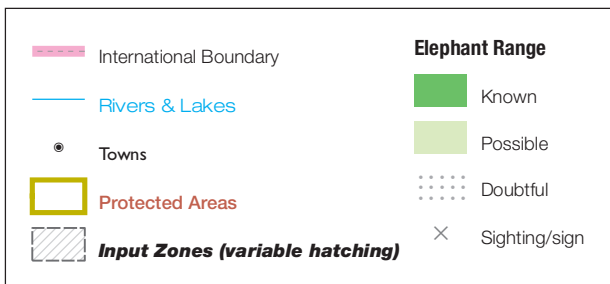
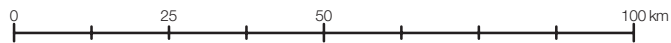
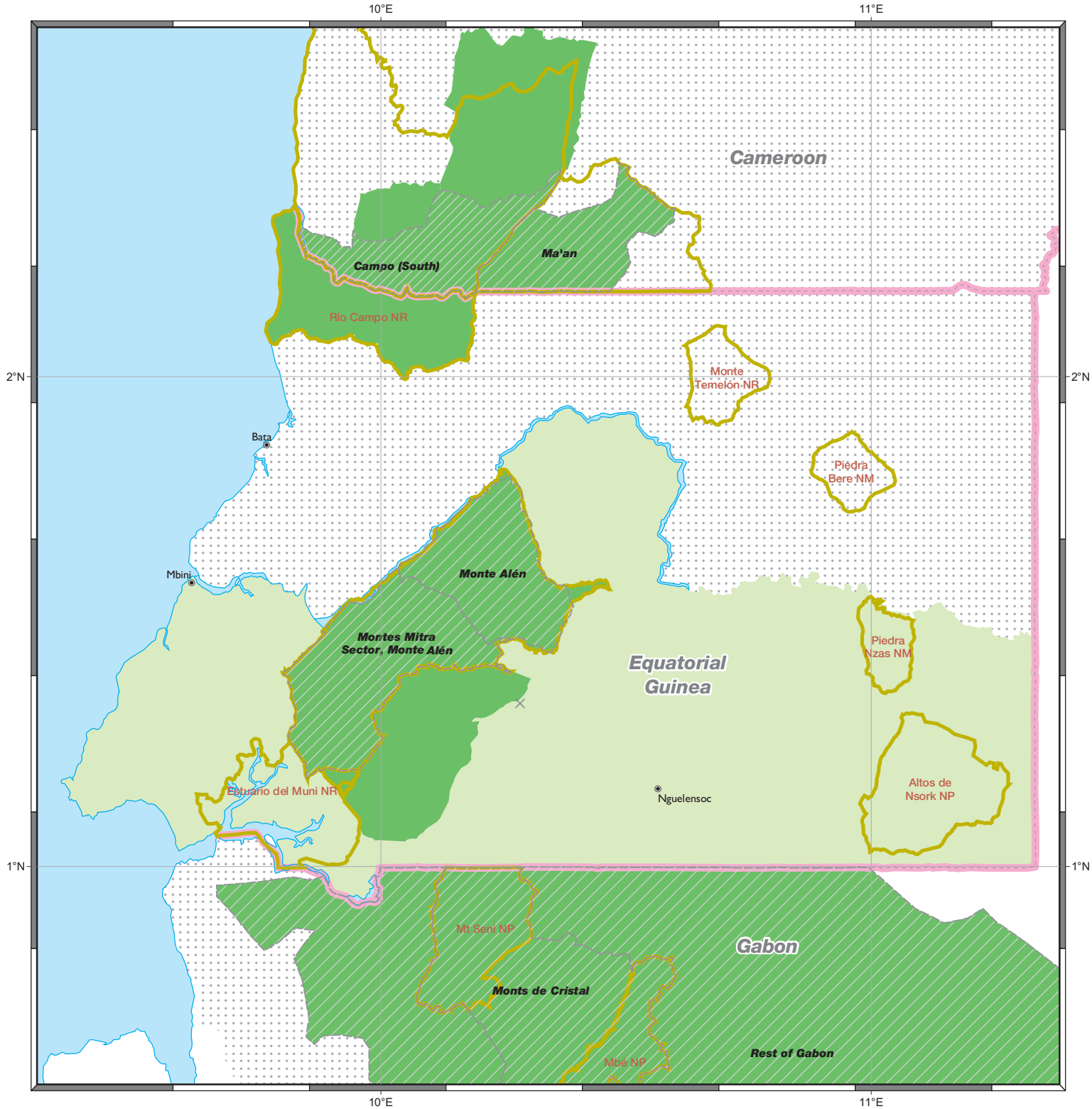
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Equatorial Guinea



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for  
protected area abbreviations.

## GABON

### General Statistics

Country area: 267,670 km<sup>2</sup>  
Range area (% of country): 218,985 km<sup>2</sup> (86%)  
Protected area coverage (% of country): 15%  
Protected range (% of known and possible range in protected areas): 17%  
Information Quality Index (IQI): 0.33  
CITES Appendix: I  
Listing Year: 1989

### Current Issues

Poaching for bushmeat and ivory is believed to be the chief threat to elephant populations in Gabon, although elephant meat is believed to play a relatively minor role in the bushmeat trade (Lahm, 2002). Poaching is also believed to have been exacerbated in recent years by the opening up of new areas for timber exploitation which, while generally resulting in improved habitat for elephants, also increases access for poachers and facilitates the movement of ivory and bushmeat to market centres.

A number of forest logging companies are nevertheless collaborating with the Government and conservation organizations in monitoring poaching and elephant presence or absence in their concessions. In addition, the Government of Gabon has established provincial wildlife brigades to fight poaching and the Directorate of Wildlife and Game is collaborating with the army on anti-poaching operations (Hakizumwami & Luhunu, 2005).

Gabon is part of the TRIDOM initiative, which aims to create a transboundary conservation area linking Minkébé National Park in Gabon with Odzala-Kokoua National Park in Congo and the Dja Forest Reserve, Nki and Boumba-Bek National Parks in Cameroon.

### Range Data

Elephants are believed to occur through much of Gabon, with the exception of a number of areas with high human population densities. Three-quarters of the country are forested, with a few islands of savanna mainly in the south. Only forest elephants (*Loxodonta africana cyclotis*) are believed to occur in Gabon, even in the savanna islands.

Most of the range map is still based on information provided by Lahm (2003), but an area corresponding to the Massif Chaillu, which lies on the border with Congo and to the east of the town of Tchibanga has been categorized as **NON-RANGE**, based on data from Sánchez Ariño (2004). The southeastern half of Plateaux Batéké National Park, where no signs of elephant presence were found in a recent survey (Bout, 2006), has been similarly categorized as **NON-RANGE**. A strip of land along the northern coast of Pongara National Park has been categorized as **DOUBTFUL** range, as the mangrove forest prevalent in the area is generally avoided by elephants (Latour, 2006).

### Population Data

A line transect dung count of Minkébé National Park, conducted in 2004 as part of the CITES MIKE programme, found high densities of elephants in the park and surrounding area, giving an estimate of 21,070 ± 7,942 (Blake, 2005).

A dung count of Lopé National Park conducted in 2005, returned an estimate of 2,350 elephants with an asymmetric confidence interval of 1,385 to 4,200 (Maisels et al., 2006). This replaces a previous dung count estimate of 8,132 with an asymmetric confidence interval of 5,229 to 11,766 (Thomas et al., 2001). The apparent difference in the estimates may be explained by the fact that the older survey extended well beyond the park boundaries and covered an area over three times as large.

## SUMMARY TOTALS FOR GABON

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Direct Sample Counts and Reliable Dung Counts	1,523	827	827	0
Other Dung Counts	0	22,630	7,965	0
Informed Guesses	0	0	19,119	969
Other Guesses	0	0	0	16,777
<b>TOTALS 2006</b>	<b>1,523</b>	<b>23,457</b>	<b>27,911</b>	<b>17,746</b>
<i>TOTALS 2002</i>	<i>0</i>	<i>8,132</i>	<i>14,712</i>	<i>58,309</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Different Technique	0	+22,630	+15,878	0
Different Area	+1,523	-7,305	-2,679	0
New Analysis	0	0	0	-40,563
<b>TOTAL CHANGE</b>	<b>+1,523</b>	<b>+15,325</b>	<b>+13,199</b>	<b>-40,563</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Total Range
Direct Sample Counts and Reliable Dung Counts	4,640	<b>4,640</b>
Other Dung Counts	13,843	<b>13,843</b>
Informed Guesses	17,278	<b>17,278</b>
Other Guesses	169,003	<b>169,003</b>
Unassessed Range	14,222	<b>14,222</b>
<b>TOTAL</b>	<b>218,985</b>	<b>218,985</b>

## GABON: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Djouah - Bélinga	<b>DT</b>	IG3	D	2002	4,035		Lahm & Barnes, quest. reply, 2006	2	4,339	13.6 E	1.2 N
Gamba Reserve Complex	—	IG3	D	1999	11,205	969*	Thibault et al., 2001	2	10,485	10.1 E	2.4 S
Ivindo National Park & western buffer zone	<b>DT</b>	DC2	C	2005	1,216	572	F.G. Maisels, pers. comm., 2006a	3	3,475	12.6 E	0.1 N
Lopé National Park	<b>DA</b>	DC2	B	2005	2,350	827	Maisels et al., 2006	2	4,486	11.5 E	0.6 S
Minkébé National Park	<b>DT</b>	DC2	C	2004	21,070	7,942	Blake, 2005	2	7,338	12.7 E	1.8 N
Monts de Cristal	<b>DT</b>	IG3	D	2001	1,396		Lahm & Barnes, quest. reply, 2006	3	2,083	10.3 E	0.7 N
Mwagne	<b>DT</b>	IG3	D	2001	2,483		Lahm & Barnes, quest. reply, 2006	3	473	13.8 E	0.5 N
Pongara National Park	<b>DT</b>	DC2	C	2006	344	152	Latour, 2006	3	380	9.4 E	0.1 N
Rest of Gabon Forest Range	NA	DC2	E	1988	16,777		Barnes et al., 1995	1	69,018	11.7 E	0.7 S

\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.



# Gabon



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Input Zones (variable hatching)
			Sighting/sign



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

Ivindo National Park was surveyed in 2005 using the line transect dung count method. This survey gave an estimate of 1,216 with an asymmetric confidence interval of 730 to 2,000 (F.G. Maisels, pers. comm., 2006a). Pongara National Park was also surveyed in 2006 using the same method, giving an estimate of 344 with an asymmetric confidence interval of 276 to 675 (Latour, 2006).

Surveys of Birougou and Loango National Parks were being conducted at the time of writing, but preliminary results suggest densities ranging between 0.1 and 0.4 elephants per km<sup>2</sup> in Bigougou and between 0.6 and 1.0 per km<sup>2</sup> in Loango (F.G. Maisels, pers. comm., 2006b).

Based on reconnaissance and systematic transect surveys, Lahm (2006) has provided INFORMED GUESSES for the Djouah-Belinga area as well as Monts de Cristal and Mwagne National Parks. The same informant has also surveyed a number of small areas in the west in recent years, but these have been left out as they overlapped with the Gamba complex, the estimate for which has been retained from the previous report.

With the exception of the estimate for Lopé, all new estimates for Gabon featured in this report replace parts of a nationwide elephant estimate from Barnes (1995, 1997). In order to avoid double counting, an estimate for the areas not covered by the recent surveys has been calculated by applying the density from the lowest elephant density stratum in Barnes (Barnes et al., 1995). The resulting estimate of 16,777 for the rest of the Gabon forest range appears under the SPECULATIVE category, as the original survey is over 10 years old. As a result of this, the numbers in the DEFINITE, PROBABLE and POSSIBLE categories for Gabon have increased since the previous report, but these increases are outweighed by a decrease in the SPECULATIVE category. None of the new surveys are comparable to the previous estimates, as different areas were covered and different methodologies were employed in some cases. It would therefore be inappropriate to make any comparisons in elephant numbers for Gabon between the previous and this report.

### *Cross-border Movements*

There may be some cross-border movement across the southern border of Equatorial Guinea with Gabon, around the Monts de Cristal area (Lahm & Barnes, quest. reply, 2006), although hunting pressure in the area may be restricting movement. There is also movement between Cameroon and Gabon to the north of Minkébé National Park (Lahm & Barnes, quest. reply, 2006; de Wachter, 2000). Elephants have been seen to cross between northeastern Gabon and northwest Congo across the Ivindo-Ayina and Djouah rivers (Lahm & Barnes, quest. reply, 2006). Movement may also occur between the Plateaux Batéké National Park and Congo, although elephant densities in this area are believed to be low (Lahm & Barnes, quest. reply, 2006). A recent survey in the Mayumba National Park (not shown on map), a coastal and marine national park in the southwest, adjacent to Conkouati-Douli National Park in Congo, confirmed elephant presence right up to the Gabon-Congo border, thus confirming continued elephant movement between the two countries (F.G. Maisels, pers. comm., 2006b).

# EASTERN AFRICA

## REGIONAL OVERVIEW

### General Statistics

Total Area: 6,182,037 km<sup>2</sup>  
Range area (% of region): 880,063 km<sup>2</sup> (16%)  
Protected area coverage (% of region): 7%  
Protected range (% of known and possible range in protected areas): 30%  
Information Quality Index (IQI): 0.36

### Current Issues

As elephant populations in Eastern Africa recover from the poaching episodes of the 1970s and 1980s, human population growth and the concomitant loss and fragmentation of habitats are now the chief threats facing elephants in the region. The resulting high levels of human-elephant conflict prevalent in many areas, coupled with the generalized lack of economic incentives for those sharing their resources with wildlife, highlight the need for sound land use planning policies and incentive systems to ensure the long-term viability of Eastern Africa's elephant populations. The viability of some populations, including those in Eritrea, Ethiopia, Rwanda, Somalia and certain parts of Uganda is already uncertain, while the status of elephants in Sudan remains unknown.

In 2007, Tanzania became the first country in the region to seek a downlisting of its elephant population from CITES Appendix I to Appendix II (see Tanzania section for details). While Tanzania is also the only country in the region to have developed and implemented a national elephant management policy (Department of Wildlife, 1995; Wildlife Division, 2001), Kenya is in the process of developing its own national elephant conservation strategy. As many of the challenges facing the conservation of elephants are common to several countries in the region, and since a number of important transboundary populations exist, the formulation of a regional strategy would be desirable.

### Range Data

Savanna elephants (*Loxodonta africana africana*) are found in the grasslands and woodlands that dominate the Eastern African landscape, as well as in coastal and montane forest areas. Remnants of Central African forest, along the western edge of the region, may hold forest elephants (*Loxodonta africana cyclotis*) or hybrids.

Elephant range in Eastern Africa is currently estimated to span over 880,000 km<sup>2</sup>, and accounts for 26% of continental range. The region ranks third in terms of range extent, behind Southern and Central Africa. The estimated range area has declined by 10% compared with the previous report, largely as a result of updates and improvements in the quality of information available. Approximately 30% of total range lies within designated protected areas.

Elephant distribution is relatively well known, with 57% of range being currently categorized as KNOWN, and three-quarters of the data being less than 10 years old. Considerable uncertainty remains, however, as to the distribution of elephants in southern Sudan and Somalia, as well as in unprotected parts of western Tanzania. It is noteworthy that Tanzania and Sudan together account for 80% of the region's estimated range area.

### Population Data

The overall quality of information for Eastern Africa, as measured by the IQI, has not changed substantially since the AESR 2002. The IQI for the region, which remains relatively low at 0.36, is only

higher than the score for Central Africa. This is due largely to the poor quality of information available for Sudan, which accounts for a sizeable proportion of continental and regional range.

Eastern Africa's largest known populations are found in Tanzania, Kenya and Uganda, with Tanzania alone holding about 80% of the regional population. Elephant population estimates are only available for 45% of the estimated range area (approximately 394,000 km<sup>2</sup>), but estimates for 86% of this area originate from systematic surveys and are therefore considered to be reliable. Out of 41 new estimates for Eastern African input zones featured in this report, 27 originate from systematic surveys.

Estimates from methodologically comparable, systematic surveys have caused the number of elephants under the DEFINITE category to increase by about 19,770. As a result of new estimates from repeated surveys, but also influenced by estimates from surveys conducted using different techniques or covering different areas, numbers in the PROBABLE and POSSIBLE categories have increased by about 11,340 and 12,610 respectively. Estimates from new guesses and from surveys conducted using different techniques are largely responsible for the decrease of nearly 2,200 in the SPECULATIVE category.

The combined estimate from methodologically comparable surveys (i.e. those labelled REPEAT SURVEY or RS in the tables of estimates; see Appendix II for a list of sites), which accounts for 78% of the regional DEFINITE plus PROBABLE estimate, has increased by 18% compared with the previous report. However, the actual difference of  $19,948 \pm 32,356$  in the methodologically comparable estimates for Eastern Africa is not statistically significant ( $t = 1.21, p > 0.10$ ). An analysis of changes in methodologically comparable estimates for Eastern and Southern Africa combined can be found in the Continental Overview section of this report.

### *Cross-border Movements*

Cross-border populations of elephants occur along the western border of the region with Central Africa and between its southern border and the Southern Africa region.

## SUMMARY TOTALS FOR EASTERN AFRICA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	24,003	0	0	0
Direct Sample Counts and Reliable Dung Counts	112,111	27,990	27,990	0
Other Dung Counts	449	1,053	462	0
Informed Guesses	922	0	6,671	1,534
Other Guesses	0	0	0	2,009
<b>TOTAL 2006</b>	<b>137,485</b>	<b>29,043</b>	<b>35,124</b>	<b>3,543</b>
<i>TOTALS 2002</i>	<i>117,716</i>	<i>17,702</i>	<i>22,511</i>	<i>5,738</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+22,019	+6,003	+5,929	-550
New Population	-326	+777	+789	+83
Different Technique	-1,202	+2,921	+2,698	-1,108
Different Area	-2,511	+2,509	+2,478	0
New Guess	+811	0	+2,563	-1,556
New Analysis	+978	-870	-859	0
Data Degraded	0	0	-985	+936
<b>TOTAL CHANGE</b>	<b>+19,769</b>	<b>+11,341</b>	<b>+12,613</b>	<b>-2,195</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	98,936	9,054	<b>107,989</b>
Direct Sample Counts and Reliable Dung Counts	213,940	11,840	<b>225,779</b>
Other Dung Counts	3,150	0	<b>3,150</b>
Informed Guesses	27,622	15,950	<b>43,572</b>
Other Guesses	10,082	3,089	<b>13,171</b>
Unassessed Range	145,148	341,252	<b>486,400</b>
<b>TOTAL</b>	<b>498,878</b>	<b>381,185</b>	<b>880,063</b>

## EASTERN AFRICA: COUNTRY AND REGIONAL TOTALS & DATA QUALITY

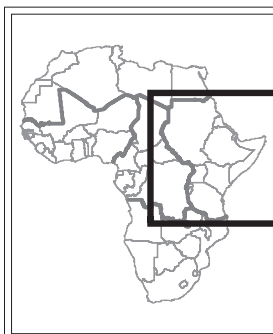
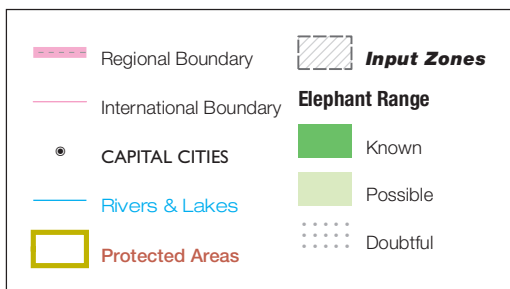
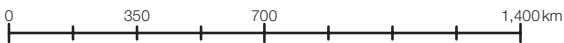
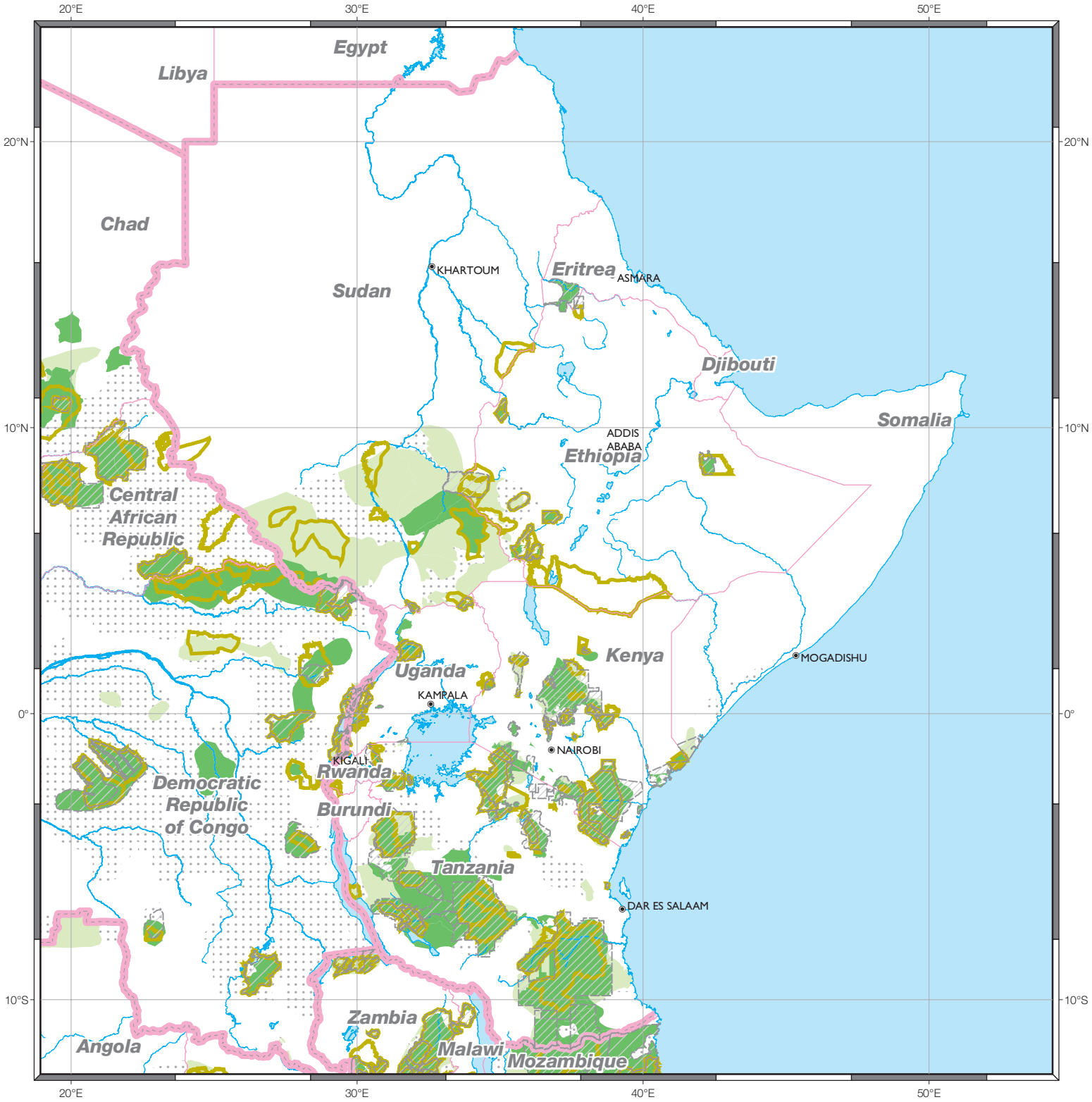
COUNTRY	ELEPHANT NUMBERS				RANGE AREA (km <sup>2</sup> )	% OF REGIONAL RANGE	% OF RANGE ASSESSED	IQI <sup>1</sup>	PFS <sup>2</sup>
	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE					
Eritrea	96	0	8	0	5,293	1	100	0.92	<b>3</b>
Ethiopia	634	0	920	206	38,365	4	68	0.24	<b>2</b>
Kenya	23,353	1,316	4,946	2,021	107,113	12	82	0.64	<b>2</b>
Rwanda	34	0	37	46	1,014	0	100	0.29	<b>4</b>
Somalia	0	0	0	70	4,526	1	68	0.00	<b>3</b>
Sudan	20	0	280	0	318,239	36	0	0.00	<b>1</b>
Tanzania	108,816	27,937	29,350	900	390,366	44	66	0.54	<b>1</b>
Uganda	2,337	1,985	1,937	300	15,148	2	74	0.49	<b>3</b>
<b>TOTAL*</b>	<b>137,485</b>	<b>29,043</b>	<b>35,124</b>	<b>3,543</b>	<b>880,063</b>	<b>26</b>	<b>45</b>	<b>0.36</b>	<b>2</b>

\* Note that totals for the Definite, Probable and Possible categories are derived by pooling the variances of individual estimates, as described under the Data Types and Categorization section. As a result, totals do not necessarily match the simple sum of the entries within a given category.

<sup>1</sup> **IQI: Information Quality Index.** This index quantifies overall data quality at the national and regional levels based on the precision of estimates and the proportion of assessed elephant range (i.e. range for which estimates are available). The IQI ranges from zero (no reliable information) to one (perfect information). See the Introduction section for a detailed explanation of how the IQI is calculated.

<sup>2</sup> **PFS: Priority for Future Surveys,** ranked from 1 to 5 (highest to lowest). Based on the IQI and the proportion of continental range accounted for by the country in question, the PFS is a measure of the importance and urgency for future population surveys, particularly in areas of unassessed range and areas not surveyed in the last 10 years or more. See Introduction for a more detailed explanation of how the priority ranking is derived.

# Eastern Africa



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.

# ERITREA

## *General Statistics*

Country area: 121,320 km<sup>2</sup>  
Range area (% of country): 5,293 km<sup>2</sup> (4%)  
Protected area coverage (% of country): 0%  
Protected range (% of known and possible range in protected areas): 0%  
Information Quality Index (IQI): 0.92  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Continued tensions between Eritrea and Ethiopia make conservation and research work difficult. The area in which elephants live continues to be unprotected, and conflicts with farmers are common.

Implementation of a plan to fit a number of elephants with radio collars to investigate their movement patterns met with unexpected delays and had not commenced at the time of writing.

## *Range Data*

Elephants in Eritrea are confined to the south of the Gash Barka District, along the Ethiopian border in the southwest of the country. The area where elephants are found is bound by the seasonal Gash River to the north and the permanent Setit River, which forms the border with Ethiopia, to the south.

No changes have been made to the range map for this report, and the information depicted is still based on a study of elephant sign and spoor conducted by Shoshani et al. (2004).

## *Population Data*

A systematic survey of the Gash-Setit population was planned for 2004 (Shoshani et al., 2004), but did not take place. Sightings of large groups continue to be regularly reported by farmers, United Nations personnel and researchers. A total of 83 elephants were seen during an expedition to the area in early 2003 (Hagos et al., 2003). Later in 2003, two distinct groups were photographed from the air, one composed of at least 79 elephants and a smaller one of at least 17. These sightings are believed to have nearly covered Eritrea's elephant population, estimated at around 100 animals, in its entirety (J. Shoshani, pers. comm., 2006; Shoshani et al., 2004). These sightings have been entered as an INFORMED GUESS, replacing a 2003 INFORMED GUESS by the same authors. Changes in the DEFINITE, POSSIBLE and SPECULATIVE categories therefore reflect better information, rather than changes in the size of the elephant population.

## *Cross-border Movements*

Eritrea's elephants form part of a single transboundary population that straddles the border with Ethiopia to the south. There appears to be a regular movement pattern, with elephants spending the dry season (October to March) in Eritrea and crossing the border twice every year to spend the wet season in Ethiopia (Shoshani et al., 2004). The mapped elephant range extends to the Sudanese border, but Shoshani et al. (2004) believe that elephants do not cross that border.



## SUMMARY TOTALS FOR ERITREA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	0	0	0	0
Informed Guesses	96	0	8	0
<b>TOTALS 2006</b>	<b>96</b>	<b>0</b>	<b>8</b>	<b>0</b>
<i>TOTALS 2002</i>	<i>83</i>	<i>0</i>	<i>17</i>	<i>20</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Guess	+13	0	-9	-20
<b>TOTAL CHANGE</b>	<b>+13</b>	<b>0</b>	<b>-9</b>	<b>-20</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Total Range
Aerial or Ground Total Counts	18	18
Informed Guesses	5,275	5,275
<b>TOTAL</b>	<b>5,293</b>	<b>5,293</b>

## ERITREA: ELEPHANT ESTIMATES

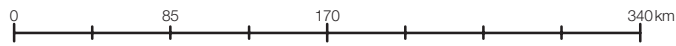
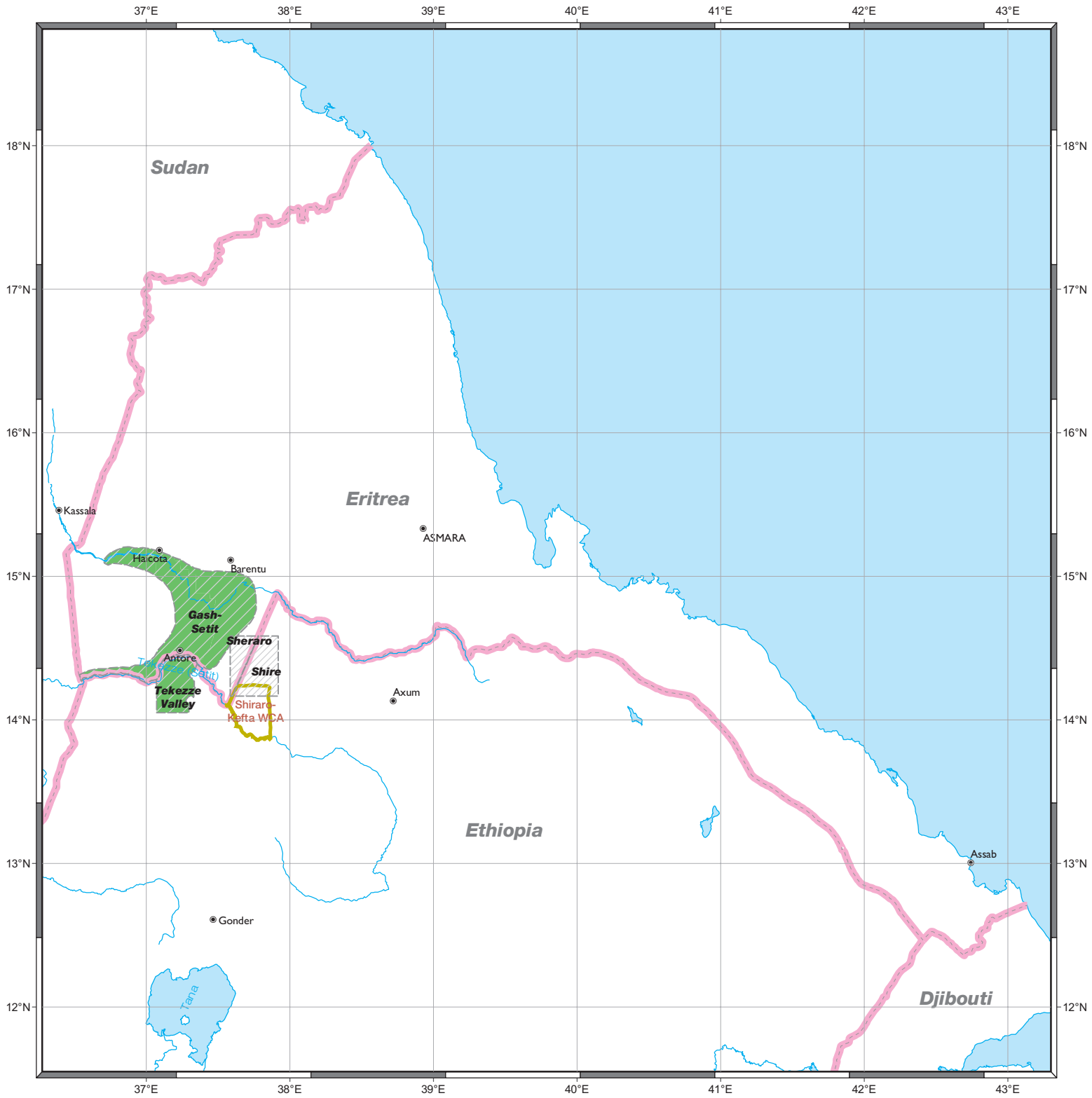
INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Gash-Setit	NG	IG3	D	2003	104		Shoshani et al., 2004	1	5,275	37.3 E	14.8 N
Sheraro	—	AT2	A	1997	0		Litoroh, 1997a		534	37.6 E	14.4 N

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

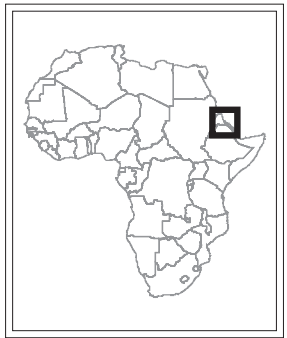
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Eritrea



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# ETHIOPIA

## *General Statistics*

Country area: 1,127,127 km<sup>2</sup>  
Range area (% of country): 38,365 km<sup>2</sup> (4%)  
Protected area coverage (% of country): 11%  
Protected range (% of known and possible range in protected areas): 61%  
Information Quality Index (IQI): 0.24  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Despite the creation of some new wildlife areas, resources for protection within reserves remain limited, and non-existent outside. In order to address this issue, the Ethiopian Government is experimenting with new management approaches in some of its parks and reserves. In 2005 the African Parks Foundation took over the management of Nechisar National Park. Although Nechisar does not have any elephants, development plans include the translocation of this and other species into the park. The management of Omo, a national park that is periodically visited by elephants, was also taken over by African Parks the following year. African Parks aims to generate revenue from tourism and to share benefits with local communities, but both projects have been controversial amidst claims that indigenous peoples were forcibly resettled or denied access to traditional subsistence resources (IUCN/CEESP, 2005).

At the 12<sup>th</sup> Meeting of the Conference of the Parties to CITES, held in Santiago, Chile in 2002, and following a 2002 report identifying it as having the largest unregulated ivory market in Eastern Africa (Milliken et al., 2002), Ethiopia was placed in a list of 10 “priority countries” where action was most needed to control the global ivory trade. At the 13<sup>th</sup> Meeting of the Conference of the Parties to CITES in 2004, Ethiopia remained on the global “priority list”, but more recent reports suggest that the country has made significant progress towards controlling its domestic ivory market (Milledge & Abdi, 2005).

Poaching is reported to continue in areas such as Gambella National Park (Y. Demeke, pers. comm., 2006), and there is still a need to accurately assess the status of elephant populations at the national level.

## *Range Data*

Most of Ethiopia’s elephant range is concentrated in the west. Elephant populations are small, fragmented and highly mobile, and their movements are poorly understood. Several areas previously classified as **POSSIBLE** range around Mizan Teferi Controlled Hunting Area and along the border with Sudan, have been re-categorized as **DOUBTFUL** range, based on the Landscan 2002 human population data set. This has reduced the estimated total range area for Ethiopia by around 13,000 km<sup>2</sup>.

A recent study has established that a remnant population in the newly created Chebera-Churchura Regional Park is resident in the park throughout the year. This population is believed to be isolated from the highly mobile population that visits the nearby Omo and Mago National Parks (M. Admassu, cited by Y. Demeke, pers. comm., 2006), and the area is now shown as **KNOWN** range.

The seasonal presence of elephants has been confirmed in the newly created Alataash Wildlife Conservation Area. They are said to come from Dinder National Park, across the border in Sudan. As the boundary for Alataash is currently unavailable, this is shown as a cross on the map.

As in the previous report, a number of crosses are also shown in areas where elephants are known to appear only sporadically. These include the Tama Wildlife Reserve, Murle Controlled Hunting Area and

## SUMMARY TOTALS FOR ETHIOPIA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	6	0	0	0
Informed Guesses	628	0	920	200
Other Guesses	0	0	0	6
<b>TOTALS 2006</b>	<b>634</b>	<b>0</b>	<b>920</b>	<b>206</b>
<i>TOTALS 2002</i>	<i>396</i>	<i>0</i>	<i>965</i>	<i>335</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Guess	+238	0	-45	-129
<b>TOTAL CHANGE</b>	<b>+238</b>	<b>0</b>	<b>-45</b>	<b>-129</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Informed Guesses	8,988	15,907	<b>24,895</b>
Other Guesses	1,129	0	<b>1,129</b>
Unassessed Range	646	11,695	<b>12,341</b>
<b>TOTAL</b>	<b>10,763</b>	<b>27,602</b>	<b>38,365</b>

## ETHIOPIA: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Babille Elephant Sanctuary	NG	IG3	D	2005	264		Y. Demeke, pers. comm., 2006	2	3,508	42.3 E	8.7 N
Chebera-Churchura Wildlife Reserve	—	IG3	D	2001	60		Chago et al., 2001	2	4,212	36.8 E	6.9 N
Dabus Valley Controlled Hunting Area	—	IG3	D	1998	200		M. Abdi, pers. comm., 1998	2	2,127	35.1 E	10.6 N
Gambella National Park	—	IG3	D	2002	200		EWCO, 2002	1	5,061	33.9 E	8.0 N
Mago & Omo National Parks	—	IG3	D	2002	324	200*	Demeke, 2003	1	6,230	36.0 E	5.8 N
Mizan Teferi Controlled Hunting Area	—	IG3	D	1998	500		M. Abdi, pers. comm., 1998	2	3,160	35.7 E	7.4 N
Shire	—	AT2	A	1997	6		Litoroh, 1997a	2	1,123	37.8 E	14.3 N
Tekezze Valley Wildlife Reserve	—	AT2	E	1996	6		Litoroh, 1997a	2	1,130	37.2 E	14.2 N

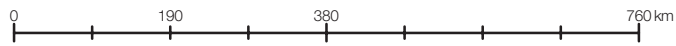
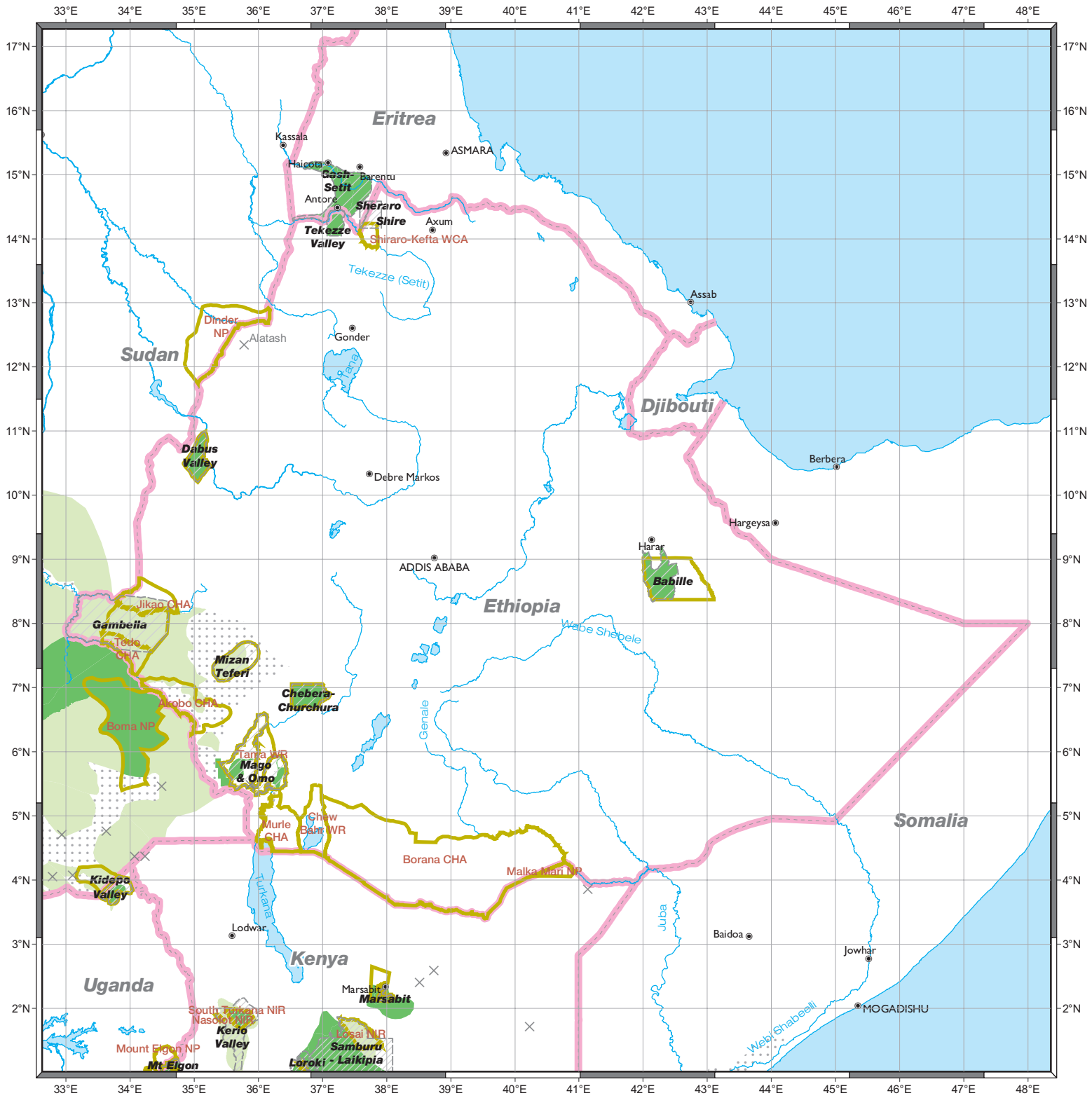
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

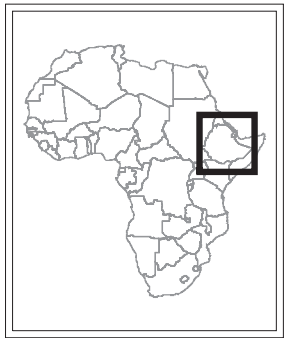
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Ethiopia



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

Borana Controlled Hunting Area, where a small number of elephants are thought to move along the Dawa River valley (Chago et al., 2001; Demeke, quest. reply, 2002).

### *Population Data*

No systematic surveys have been conducted in Ethiopia since 2002, and most estimates have been retained from the previous report. The only new figure for Ethiopia is an INFORMED GUESS for the Babille Elephant Sanctuary, where a long-term study reports an estimate of 264 elephants, of which 244 have been individually verified (Y. Demeke, pers. comm., 2006). This estimate replaces a 1998 INFORMED GUESS of 65 to 135 (F. Tekle, pers. comm., 1998).

The resident population in Mago National Park is now believed to be under 150 elephants (Y. Demeke, pers. comm., 2006), but the previous combined estimate for Mago and Omo (324 elephants) has been retained, since it is likely to include the mobile Omo population, which is not reflected elsewhere in the AED.

The Chebera-Churchura Regional Park population was incorrectly depicted in the previous report as being in the Chew Bahr Wildlife Reserve, on the border with Kenya. Although the estimate remains unchanged, the name and location have been corrected for this report.

There are no estimates of elephant abundance for nearly a third of Ethiopia's estimated elephant range. Most of the remaining two-thirds are only covered by INFORMED GUESSES.

### *Cross-border Movements*

A transboundary population occurs in the north, around the Shire Wildlife Reserve (recently renamed Shiraro-Kefta Wildlife Conservation Area). Elephants cross over the border into Eritrea, where they spend the dry season (November-April).

Although elephants were believed to have disappeared from Dinder National Park in Sudan by the early 1990s (Wildlife Conservation and National Parks Forces, 1991), signs of elephant presence continue to be reported in the newly created Alataash Wildlife Conservation Area (not shown on the map). It would appear that these elephants move to and from Dinder (Demeke, quest. reply, 2002; Mohammed & Kassa, 1998; Y. Demeke, pers. comm., 2006).

Elephants may also move between Ethiopia and Sudan in the Gambella area and further south, but the presence of camps of armed refugees near the border may restrict their movements (Thouless, 1995). A small population of between 50 and 100 elephants may still exist in the desert between Moyale and Mandera in northern Kenya, and it is possible that these move in and out of Ethiopia (Thouless et al., 2003).

Elephants in Omo National Park are not resident in the park, and are believed to arrive seasonally from neighbouring Sudan, in what presumably is a circular movement pattern connecting Omo National Park and Akobo Controlled Hunting Area in Ethiopia with Boma National Park in Sudan. Another suspected migration route would connect Omo with Sudan's Kidepo Game Reserve (Frederick, 2005).



# KENYA

## General Statistics

Country area: 582,650 km<sup>2</sup>  
Range area (% of country): 107,113 km<sup>2</sup> (19%)  
Protected area coverage (% of country): 8%  
Protected range (% of known and possible range in protected areas): 33%  
Information Quality Index (IQI): 0.64  
CITES Appendix: I  
Listing Year: 1989

## Current Issues

Human-elephant conflict continues to be among the most prominent issues affecting elephant conservation in Kenya. In 2003 the country embarked on a process to amend its current wildlife law, but progress has been hampered by controversy between proponents of consumptive utilization of wildlife and those against it. Meanwhile, another process was begun in 2005 to develop a national elephant conservation strategy.

An operation to translocate 400 elephants from the Shimba Hills National Reserve to Tsavo East National Park, budgeted at US\$3.2 million, commenced in August 2005. At the time of writing, a total of 150 elephants had been moved successfully (P. Omondi, pers. comm., 2006). An additional 150 elephants were being moved by lorry out of the fenced Ngulia Rhino sanctuary, situated in Tsavo East National Park, into the main park.

In October 2005 the Government issued a legal notice to revert the status of Amboseli National Park to a National Reserve, thus transferring the responsibility over its management to local Government. An injunction against the move was sought and obtained by a number of conservation lobby groups. At the time of writing, the situation remained unresolved due to delays in the legal process.

## Range Data

Kenya's elephants occur in both savanna and forest habitats, but are all believed to be savanna elephants (*Loxodonta africana africana*). The largest savanna ranges are those of the Tsavo ecosystem and the Samburu and Laikipia Districts. The main highland forest populations are those of the Aberdare range and Mount Kenya. There are other smaller, isolated populations in coastal forests and other inland areas.

A few new areas of range have been added to the map. An extensive survey of elephant sightings in Kenya's southern Rift Valley (Mwathie et al., 2006) has resulted in the eastward extension of the Nguruman range, the westward extension of the Amboseli range, and the addition of two small patches of range between the two ecosystems. Around this area, and to the north and west of it, a number of crosses corresponding to elephant sightings have been added. The eastern sector of the Tana River Primate Reserve has been categorized as **KNOWN** range based on information provided by Knocker (2005). Although elephants have been seen in the western sector of the reserve, they are not believed to be resident on the right bank of the river, and this area has been categorized as **POSSIBLE** range. Knocker (2005) has also provided additional information on the distribution of elephants in the in the Tana River Delta, and the map has been corrected accordingly.

## Population Data

Relatively little survey activity has taken place in Kenya since the last report. An aerial total count of Tsavo National Park conducted in 2005 returned an estimate of 10,397 elephants (Omondi & Bitok, 2005). This replaces an estimate of 9,211 from a 2002 survey (Omondi et al., 2002d). The survey included the South Kitui National Reserve, previously excluded from Tsavo counts. However, as no elephants were found in the area, South Kitui appears on the table with an estimate of zero.

While Samburu District has not been surveyed since 2002, three aerial sample counts have been conducted in Laikipia District since then, returning estimates of  $3,742 \pm 1,926$  in 2003,  $4,612 \pm 1,746$  in 2004 and  $4,652 \pm 2,002$  in 2005 (Georgiadis et al., 2003; Georgiadis et al., 2004). As none of these estimates are significantly different, and since elephants are known to move between Samburu and Laikipia, the combined total count estimate for both districts has been retained from the previous report.

An aerial sample count was conducted in Masai Mara by Kenya's Department of Resource Surveys and Remote Sensing (DRSRS) in 2004, but results were not available in time for this report. In consequence, the aerial total count estimate of 1,655 from the previous report has been retained.

The Amboseli Elephant Research Project (AERP) continues to maintain an individual registration record of elephants in the ecosystem. At the end of 2005, there were 1,417 individually registered elephants in the population (Poole, quest. reply, 2005). This figure replaces a 2002 estimate of 1,100 also provided by the AERP (C.J. Moss, pers. comm., 2003).

Three dung counts based on the "reconnaissance transect" method were conducted in the Aberdare ecosystem between 2003 and 2005. These surveys included, for the first time, the Kipipiri Forest Reserve (Bitok & Kones, 2005). As the method uses lines of least resistance and thus tends to result in considerable overestimates, only the lower confidence limit of the estimate has been used in this report, categorized as an **INFORMED GUESS**. The estimates from this survey must be treated with caution, as they are likely to remain on the high side. They replace a 1990 dung count estimate of  $1822 \pm 729$  (Blom et al., 1990) for the Aberdare National Park and a guess of 700 for the surrounding area (Butynski, 1999).

An **INFORMED GUESS** of 139 for Mount Elgon, obtained from a team who have been tracking elephants on the ground since 2002 (Bitok, 2002), replaces a 1999 **INFORMED GUESS** of 400 (Thouless et al., 2003). For Marsabit, an **INFORMED GUESS** of 150 provided by Omondi (2006), based on ground monitoring activities, replaces a 1999 **INFORMED GUESS** of 500 (P.O.M. Omondi, pers. comm., 1998).

In March 2005 a group of 120 elephants was sighted in Shompole, in the Nguruman area (Mwathé et al., 2006). While the informants believe that Chege's (1998) estimate of 150, featured in the previous report, may still represent a reasonable **INFORMED GUESS**, the 2005 sighting represents a more reliable and up-to-date minimum estimate for the Nguruman area (Mwathé et al., 2006), and has been used to replace Chege's estimate.

Knocker (2005) estimates there to be around 30 elephants in the Tana River Primate Reserve, and this is reflected in a new entry in the table of estimates. All other estimates have been retained from the previous report. The number of elephants under the **DEFINITE** category has increased by 1,317, largely due to reported increases in the Tsavo and Amboseli populations. Changes in the other three categories are, for the most part, given by new guesses and the degradation of old estimates to the **SPECULATIVE** category.

### *Cross-border Movements*

Cross-border movements occur mainly across the Kenya-Tanzania border, in the Serengeti-Mara, Tsavo-Mkomazi and Amboseli-Kilimanjaro ecosystems. There may also be movement of elephants between Boni National Reserve in northeastern Kenya and Lag Badana Bushbush in Somalia. It is also possible that elephants move between northern Kenya and Ethiopia, but the number involved is likely to be small (Thouless et al., 2003). Limited cross-border movements may occur between Kenya and Uganda in the vicinity of Kidepo National Park and on Mount Elgon. However, elephants have not been seen on the Ugandan side of the mountain for many years (F. Michelmores, pers. comm., 1998).

## SUMMARY TOTALS FOR KENYA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	20,376	0	0	0
Direct Sample Counts and Reliable Dung Counts	2,454	641	641	0
Other Dung Counts	434	675	412	0
Informed Guesses	89	0	3,893	988
Other Guesses	0	0	0	1,033
<b>TOTALS 2006</b>	<b>23,353</b>	<b>1,316</b>	<b>4,946</b>	<b>2,021</b>
<i>TOTALS 2002</i>	<i>22,036</i>	<i>1,101</i>	<i>3,097</i>	<i>2,572</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+1,452	0	0	0
New Population	0	0	+12	+55
Different Technique	-224	+215	+142	0
New Guess	+89	0	+2,636	-1,609
Data Degraded	0	0	-941	+1,003
<b>TOTAL CHANGE</b>	<b>+1,317</b>	<b>+215</b>	<b>+1,849</b>	<b>-551</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	68,714	8,846	<b>77,560</b>
Direct Sample Counts and Reliable Dung Counts	2,530	0	<b>2,530</b>
Other Dung Counts	2,357	0	<b>2,357</b>
Informed Guesses	4,276	43	<b>4,319</b>
Other Guesses	1,166	0	<b>1,166</b>
Unassessed Range	12,597	6,584	<b>19,181</b>
<b>TOTAL</b>	<b>91,640</b>	<b>15,473</b>	<b>107,113</b>

## KENYA: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LONG.	LAT.
Aberdare National Park	NG	IG3	D	2005	1,840	461*	Bitok & Kones, 2005	3	767	36.7 E	0.4 S
Aberdare (Outside)	NG	IG3	D	2005	1,700	472*	Bitok & Kones, 2005	3	663	36.7 E	0.6 S
Amboseli Ecosystem	RS	IR1	A	2005	1,417		Poole, quest. reply, 2005	2	5,547	37.4 E	2.6 S
Arabuko Sokoke Forest Reserve	—	DC1	B	2002	184	43	Litoroh, 2002b	3	415	39.9 E	3.3 S
Bisanadi National Reserve	—	AT2	A	2002	100		Omondi et al., 2002a	3	606	38.4 E	0.1 N
Boni & Doodori National Reserves	—	DC3	C	2000	50	46	M. Litoroh, pers. comm., 2003	2	1,643	41.2 E	1.8 S
Kerio Valley Conservation & dispersal areas	—	AT3	A	2002	490		Omondi et al., 2002b	2	4,616	35.7 E	1.6 N
Kipipiri Forest Reserve	NP	IG3	D	2005	13	25*	Bitok & Kones, 2005	4	43	36.6 E	0.4 S
Kora National Park	—	AT2	A	2002	5		Omondi et al., 2002a	3	1,789	38.7 E	0.2 S
Lamu District	—	AT3	A	2000	82		M. Litoroh, pers. comm., 2003	2	5,964	40.6 E	2.1 S
Loroki Forest	—	DC3	C	1997	210	354	Bitok et al., 1997	3	596	36.8 E	1.1 N
Marsabit National Park	NG	IG3	D	2005	150		P.O.M. Omondi, pers. comm., 2006	3	142	38.0 E	2.2 N
Masai Mara National Reserve	—	AT3	A	2002	1,655		Muriuki, 2002	3	1,510	35.1 E	1.5 S
Masai Mara (Outside)	—	AT3	A	2002	461		Muriuki, 2002	3	1,978	35.3 E	1.4 S
Mau Forest Complex	DD	DC3	E	1995	1,003		Njumbi et al., 1995	2	1,267	35.5 E	0.5 S
Meru National Park	—	AT2	A	2002	272		Omondi et al., 2002a	3	884	38.2 E	0.1 N
Meru North Dispersal Areas	—	AT3	A	2002	36		Omondi et al., 2002a	2	3,516	38.3 E	0.5 N
Mt Elgon National Park & Forest Reserve	NG	IG3	D	2002	139		Bitok, 2002	3	1,083	34.6 E	1.0 N
Mt Kenya National Park & Forest Reserve	—	DC1	B	2001	2,911	640	Vanleeuwe, 1997	2	2,007	37.4 E	0.2 S
Mwea National Reserve	—	GT1	A	1998	55		Manegene & Musoki, 1998	4	68	37.6 E	0.8 S
Nguruman	NG	IG3	D	2005	120	30*	Mwathie et al., 2006	2	2,197	36.0 E	1.8 S
North Kitui National Reserve	—	AT2	A	2002	0		Omondi et al., 2002a		745	38.5 E	0.3 S
Samburu - Laikipia Ecosystem	—	AT3	A	2002	5,447		Omondi et al., 2002c	1	28,530	37.3 E	0.8 N
Shimba Hills Ecosystem	DT	DC2	C	2002	649	151	Litoroh, 2002a	3	250	39.4 E	4.2 S
South Kitui National Reserve	NP	AT3	A	2005	0		Omondi & Bitok, 2005		1,827	38.8 E	1.8 S
Tana River Delta	—	IG3	D	2002	20		W.I. Knocker, pers. comm., 2003	3	145	40.4 E	2.5 S
Tana River Primate National Reserve	NP	OG3	E	2005	30		W.I. Knocker, pers. comm., 2005	4	72	40.1 E	1.8 S
Transmara Forest	—	DC3	C	1997	200	139	Wamukayo et al., 1997	3	300	Not Shown	
Tsavo National Park	RS	AT3	A	2005	9,021		Omondi & Bitok, 2005	2	20,812	38.6 E	3.0 S
Tsavo (Outside) Ecosystem	RS	AT3	A	2005	1,335		Omondi & Bitok, 2005	2	16,570	39.0 E	3.2 S

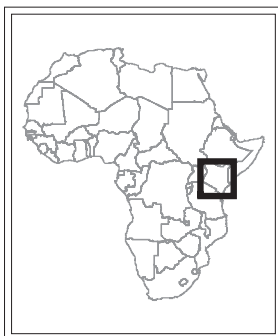
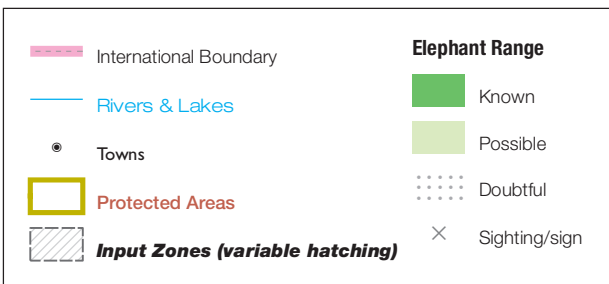
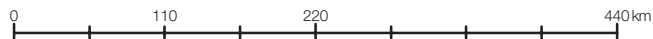
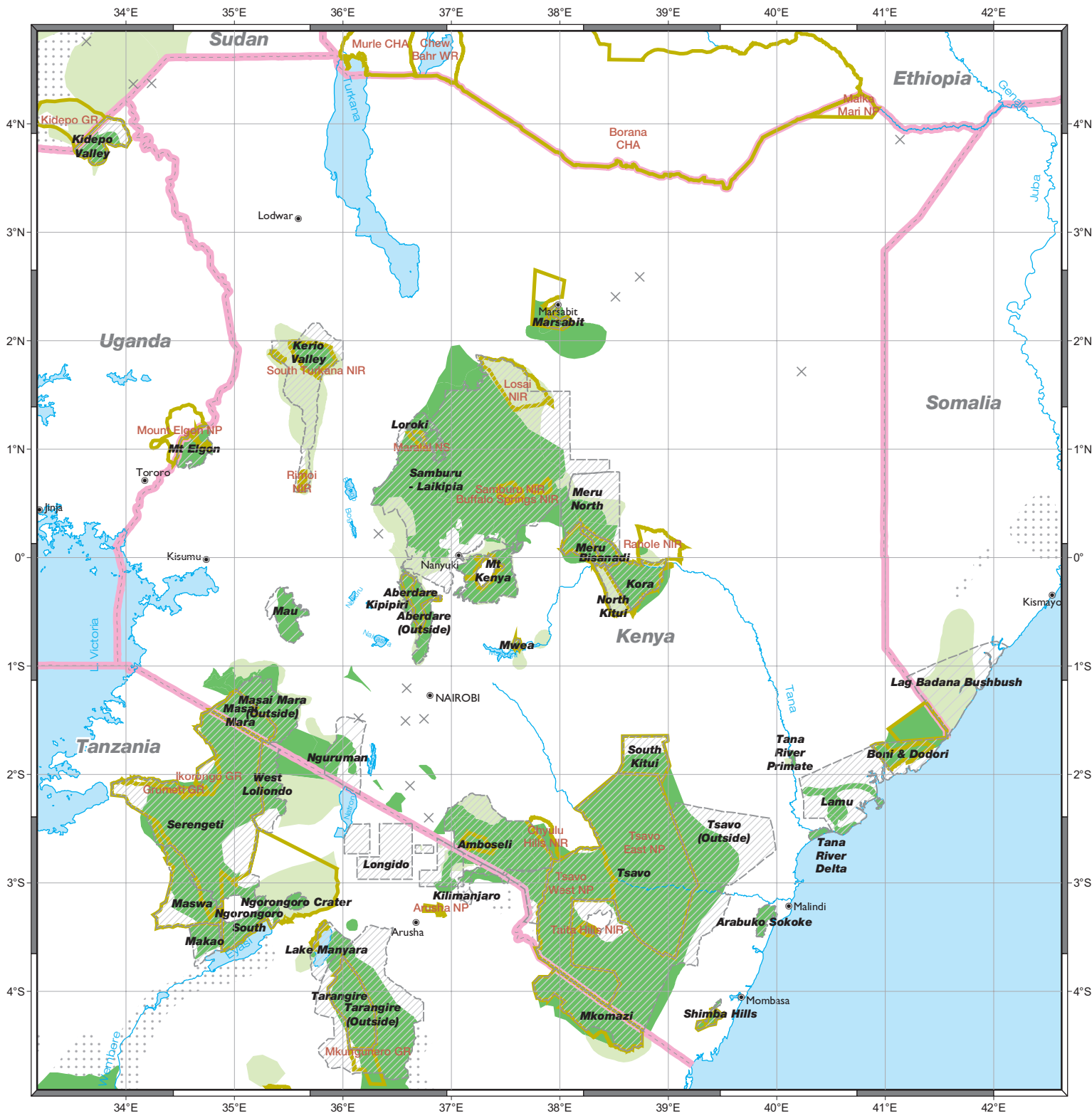
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Kenya



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

## R W A N D A

### *General Statistics*

Country area: 26,340 km<sup>2</sup>  
Range area (% of country): 1,014 km<sup>2</sup> (4%)  
Protected area coverage (% of country): 9%  
Protected range (% of known and possible range in protected areas): 100%  
Information Quality Index (IQI): 0.29  
CITES Appendix: I  
Listing Year: 1989

### *Current Issues*

Rwanda's elephant populations are small and fragmented, while human settlement is dense and widely distributed. Human-elephant conflict is prevalent in the environs of Akagera National Park, and farmers in the area are calling for the enactment of laws to address the problem of crop raiding.

### *Range Data*

Rwanda is one of Africa's smallest and yet most densely populated nations and natural habitats are scarce as a result. Only two fragments of elephant range remain: the Akagera National Park on the northeastern border with Tanzania, to which elephants were translocated in the mid-1970s, and the Parc National des Volcans, to which elephants have returned since the end of the civil war in the 1990s (Gray, quest. reply, 2005; Williamson et al., 2000). Elephants were no longer present in the Nyungwe Forest by the late 1990s (Plumptre et al., 2002).

### *Population Data*

A point transect dung survey conducted in 2003 returned an estimate of 89 elephants for the entire Virunga-Volcans range, thus including, in addition to the Parc National des Volcans, the Mikeno sector of Virunga National Park in Democratic Republic of Congo and Mgahinga National Park in Uganda (Owiunji et al., 2004). This estimate has been split between the three parks in proportion to their area, giving an estimate of 37 for the Parc National des Volcans. Dung density was found to be highest in the Mikeno sectors of the survey, close to ranger stations and where signs of human disturbance were lowest. The area used to extrapolate the elephant dung densities in the sampled plots included high altitude areas not normally visited by elephants and, as a result, the elephant population may have been overestimated in this survey. For these reasons, the estimate has been categorized as an **INFORMED GUESS** and used to replace a 1989 guess of 20-30 (Office Rwandais du Tourisme et des Parcs Nationaux, 1991). This replacement is the cause of an increase of 37 in the **POSSIBLE** category and a decrease of 20 in the **SPECULATIVE** category.

The estimate shown for Akagera Mutara has been retained unchanged from the previous report.

### *Cross-border Movements*

Elephants in the Parc National des Volcans are part of a single transboundary population that includes the Mgahinga Gorilla National Park in Uganda and the Mikeno sector of Virunga National Park in the Democratic Republic of Congo.

Elephants used to move between Akagera and Ibanda, Burigi and Biharamulo in Tanzania, but their passage is now restricted by high levels of refugee settlement on the Tanzanian side.

## SUMMARY TOTALS FOR RWANDA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Informed Guesses	34	0	37	46
<b>TOTALS 2006</b>	<b>34</b>	<b>0</b>	<b>37</b>	<b>46</b>
<i>TOTALS 2002</i>	<i>34</i>	<i>0</i>	<i>0</i>	<i>66</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Guess	0	0	+37	-20
<b>TOTAL CHANGE</b>	<b>0</b>	<b>0</b>	<b>+37</b>	<b>-20</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Total Range
Informed Guesses	1,014	<b>1,014</b>
<b>TOTAL</b>	<b>1,014</b>	<b>1,014</b>

## RWANDA: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Akagera-Mutara National Park	—	IG3	D	2002	34	46*	Lamprey, 2002	1	3,463	30.6 E	1.6 S
Volcans National Park	NG	IG3	D	2003	37		Gray, quest. reply, 2005	1	150	29.5 E	1.5 S

\* Range of informed guess

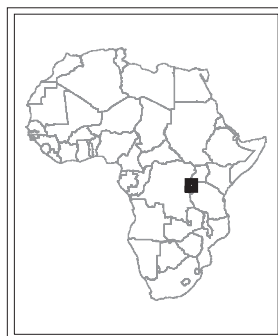
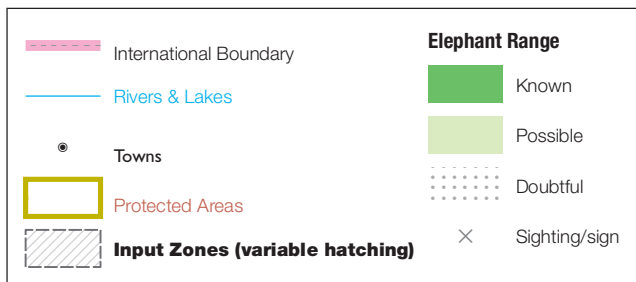
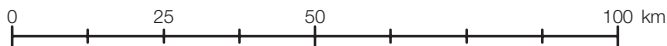
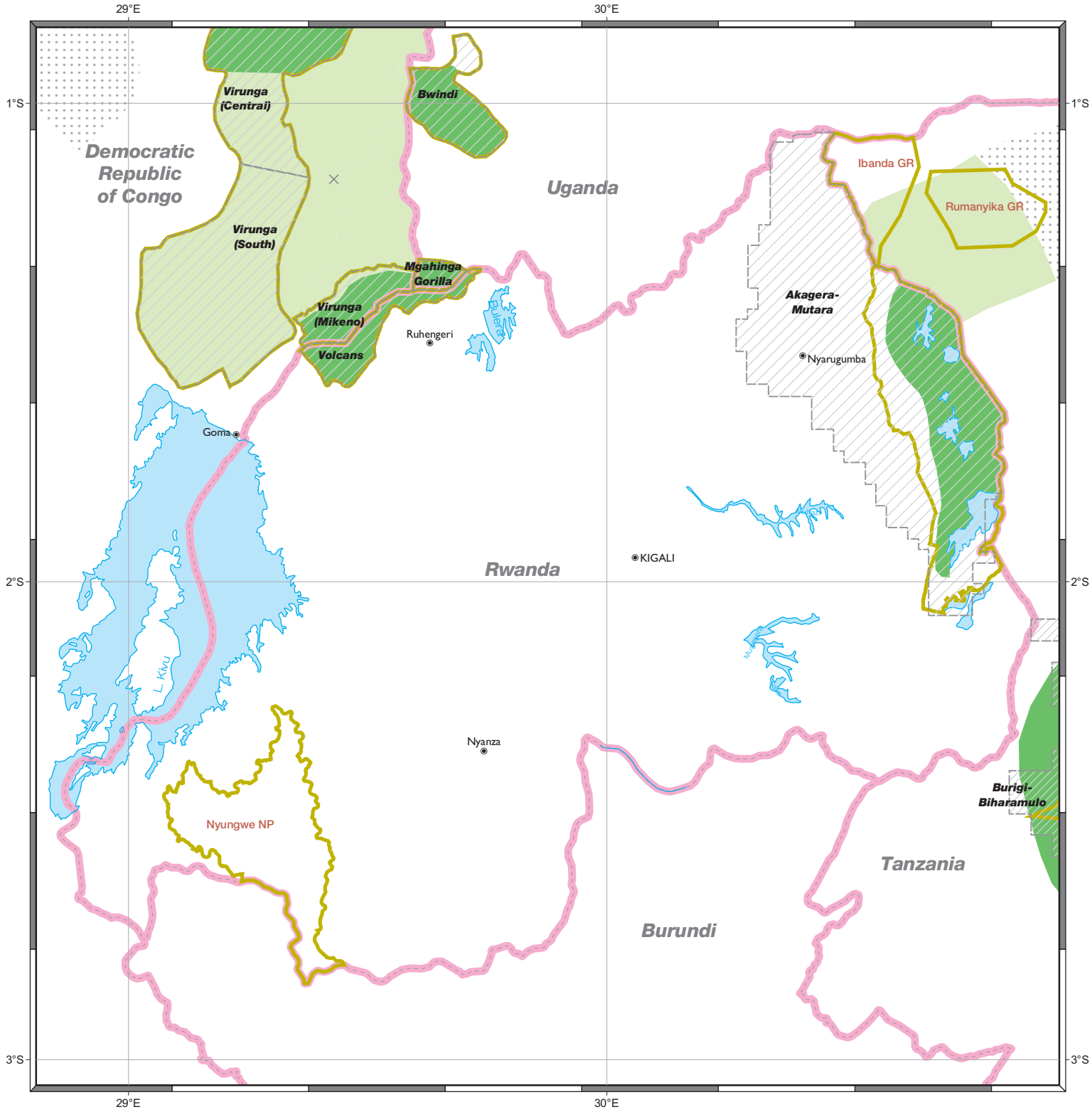
<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.



# Rwanda



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for  
protected area abbreviations.

## SOMALIA

### *General Statistics*

Country area: 637,660 km<sup>2</sup>  
Range area (% of country): 4,526 km<sup>2</sup> (1%)  
Protected area coverage (% of country): 0%  
Protected range (% of known and possible range in protected areas): 0%  
Information Quality Index (IQI): 0.00  
CITES Appendix: I  
Listing Year: 1989

### *Current Issues*

Ongoing instability in Somalia has made any conservation assessment work impossible for over 15 years. While a recent report found an abundance of ivory carvings for sale in Mogadishu markets, the ivory is thought to originate from other countries (Amir, 2006).

### *Range Data*

The presence of elephants in Somalia remains unknown, and only one area, in the far south of the country and adjacent to the border with Kenya, remains categorized as **POSSIBLE** range.

### *Population Data*

No new population estimates are available for Somalia. The only estimate remaining, that for Lag Badana Bushbush (Bauer, quest. reply, 1995), has been degraded to the category of **OTHER GUESSES**, as it is now over 10 years old.

### *Cross-border Movements*

Elephants in the northeastern corner of Kenya and the southern tip of Somalia once formed a continuous population, and while movement between the two areas may continue, information is lacking.

## SUMMARY TOTALS FOR SOMALIA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Other Guesses	0	0	0	70
<b>TOTALS 2006</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>70</b>
<i>TOTALS 2002</i>	<i>0</i>	<i>0</i>	<i>70</i>	<i>0</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Data Degraded	0	0	-70	+70
<b>TOTAL CHANGE</b>	<b>0</b>	<b>0</b>	<b>-70</b>	<b>+70</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Possible Range	Total Range
Other Guesses	3,089	<b>3,089</b>
Unassessed Range	1,436	<b>1,436</b>
<b>TOTAL</b>	<b>4,526</b>	<b>4,526</b>

## SOMALIA: ELEPHANT ESTIMATES

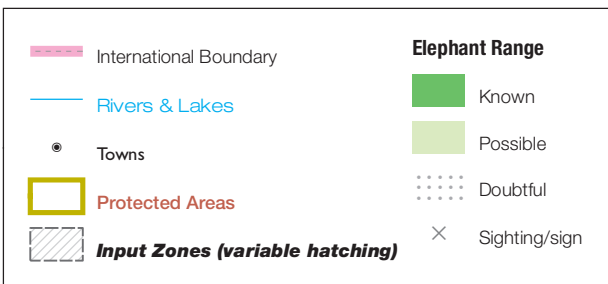
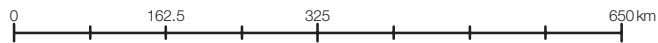
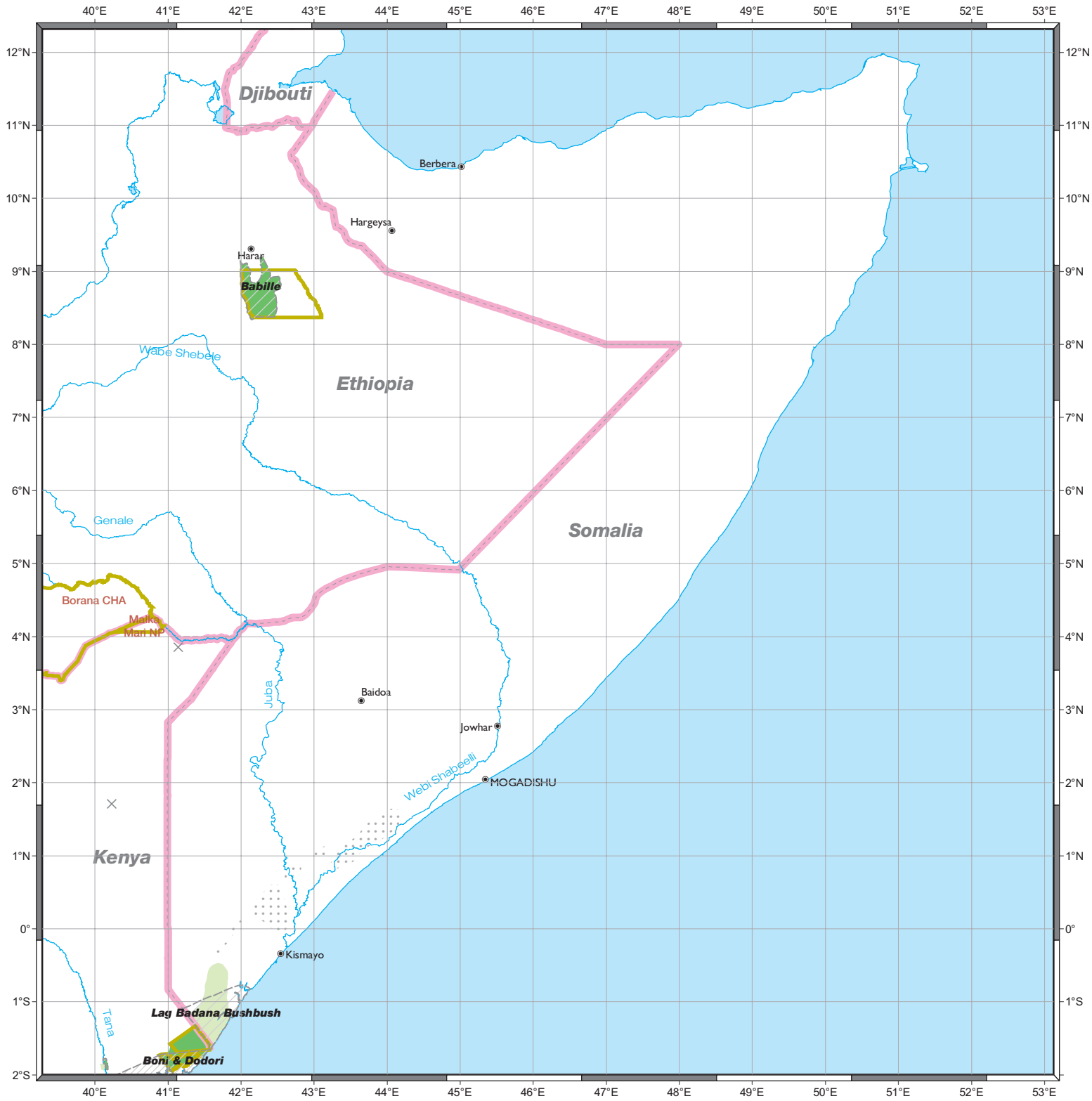
INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Lag Badana Bushbush	DD	IG3	E	1995	70		Bauer, quest. reply, 1995	1	4,500	41.7 E	1.1 S

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Somalia



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# SUDAN

## *General Statistics*

Country area: 2,505,810 km<sup>2</sup>  
Range area (% of country): 318,239 km<sup>2</sup> (13%)  
Protected area coverage (% of country): 4%  
Protected range (% of known and possible range in protected areas): 15%  
Information Quality Index (IQI): 0.00  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Refugees and internally displaced persons have begun to return to their homes in Southern Sudan after the signing of the Comprehensive Peace Agreement in January 2005. Elephants were reported to have thrived in areas previously depopulated by the war, and the consequences of the return of refugees to areas of elephant range have not been assessed.

A recent report identified Sudan as a key entrepôt in the international ivory trade (Martin, 2005a). Ivory from the Democratic Republic of Congo arrives in Khartoum where it is carved and sold, largely to Chinese contract workers, or re-exported.

## *Range Data*

Large, undisturbed and uninhabited areas of swamp, woodland and grassland could still provide suitable habitat for elephants in southern Sudan, but there remains little direct evidence or updated information on distribution (L.I. Ojok, pers. comm., 2002).

The range map for Sudan has nevertheless been considerably altered using data from the Landsat 2002 human population density data set (ORNL/GIST, 2002), resulting in the conversion of several large areas of KNOWN and POSSIBLE range into DOUBTFUL range (see Introduction section for rationale). Using the same data set, information on human settlement patterns previously provided by Gaunt (2002) has been refined and the range map altered accordingly. The resulting range map is similar to the depiction of elephant distribution in the Sudan section of the AED 1995 (Said et al., 1995). Several crosses have been added to the map in areas where recent elephant sightings have been made (Frederick, 2005; L.I. Ojok, pers. comm., 2004).

## *Population Data*

No quantitative survey work has been undertaken in Sudan since the early 1980s, and any information available on the status of elephants is based on anecdotal observations from local people and humanitarian relief workers. A wet season pilot survey of Nimule National Park conducted in 2000 estimated  $156 \pm 69$  elephants (Marjan et al., 2000), but the higher estimate of 300 from direct sightings made in 2001 (L.I. Ojok, pers. comm., 2002) has been retained from the previous report.

Recent visits to Southern (Delfino & Achaye, 2003) and Boma (Deng et al., 2001) National Parks found evidence of elephant presence in both parks, but no attempts were made to estimate elephant numbers. Virtually all of Sudan's range remains unassessed.

## *Cross-border Movements*

Elephants may still migrate between southeastern Sudan and western Ethiopia (Deng et al., 2001). Although elephants are thought to have disappeared from Dinder National Park, recent reports suggest that there is movement between that park and the newly created Alataash Wildlife Conservation Area in Ethiopia (Y. Demeke, pers. comm., 2006). There are unverified reports that elephants move into Sudan from Omo National Park in Ethiopia, possibly across the northwest corner of Kenya, and back into Sudan

## SUMMARY TOTALS FOR SUDAN

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Informed Guesses	20	0	280	0
<b>TOTALS 2006</b>	<b>20</b>	<b>0</b>	<b>280</b>	<b>0</b>
<i>TOTALS 2002</i>	<i>20</i>	<i>0</i>	<i>280</i>	<i>0</i>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Informed Guesses	779	0	779
Unassessed Range	53,356	264,104	317,460
<b>TOTAL</b>	<b>54,135</b>	<b>264,104</b>	<b>318,239</b>

## SUDAN: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Nimule National Park	—	IG3	D	2002	300		L.I. Ojok, pers. comm., 2002	3	779	32.0 E	3.7 N

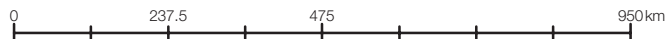
<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

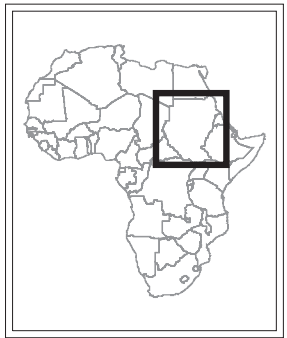
<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.



# Sudan



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

to reach the Kidepo Game Reserve, from which they could presumably also move to Kidepo Valley National Park in Uganda (Frederick, 2005).

Elephants also move between Nimule National Park and the Otze Forest in Uganda (F. Michelmore, pers. comm., 1998). While movements between Numatina Game Reserve in southwestern Sudan and the Central African Republic were reported recently (J. Garang, pers. comm., 2002), it is unlikely that many elephants remain on the western side of the border (I. Sánchez Ariño, pers. comm., 2004).

# TANZANIA

## *General Statistics*

Country area: 945,090 km<sup>2</sup>  
Range area (% of country): 390,366 km<sup>2</sup> (48%)  
Protected area coverage (% of country): 16%  
Protected range (% of known and possible range in protected areas): 37%  
Information Quality Index (IQI): 0.54  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Expansion of human settlement and farming are reported to be reducing the extent of elephant range, particularly along migratory routes and corridors (Mbano, quest. reply, 2006). Human-elephant conflict is prevalent in many areas, including east of the Selous ecosystem (Malima et al., 2005), west of the Serengeti (Walpole et al., 2004) and east of Ruaha-Rungwa (Mbano, quest. reply, 2006).

Tanzania has developed a National Elephant Management Plan (Wildlife Division, 2001) to supersede its 1995 Policy for Management of the African Elephant (Department of Wildlife, 1995). The new plan aims to protect elephant populations through sustainable utilization and community-based conservation schemes to promote benefit sharing, while controlling the numbers of elephants where appropriate (Wildlife Division, 2001).

In early 2007, Tanzania submitted a proposal for consideration at the 14<sup>th</sup> Meeting of the Conference of the Parties to CITES, to transfer its elephant population from Appendix I to Appendix II (Government of the United Republic of Tanzania, 2007). The proposal will be subject to review by a panel of experts, whose recommendations will be taken into account by the Conference of the Parties in June 2007.

## *Range Data*

Elephants are widely distributed in Tanzania, with major populations in the south and west. The range map has been altered using information from the Landsat 2002 human population density data set (ORNL/GIST, 2002). Based on this data set, several areas where the estimated human population density is above 15 persons per km<sup>2</sup> have been categorized as **DOUBTFUL** range (see Introduction section for rationale). This has resulted in the removal of over 60,000 km<sup>2</sup> of **POSSIBLE** range, mainly in the west. An area stretching to the southeast from Tarangire National Park towards Saadani Game Reserve has also been categorized as **DOUBTFUL** range, based on the Management Plan for Elephants in Tanzania (Wildlife Division, 2001). Information from the same source and from recent surveys (TAWIRI 2007) has been used to categorize an area between Ugalla River Game Reserve and the Katavi-Rukwa and Ruaha-Rungwa ecosystems as **KNOWN** range.

The Ruaha-Rungwa population is connected by a corridor to the range in Mikumi and Udzungwa Mountains National Parks (Mbano, quest. reply, 2006), and this is now shown as **KNOWN** range. The area of **KNOWN** range to the east of the Selous-Masasi corridor has been expanded, and an area of **DOUBTFUL** range has been created around the town of Tunduru (M. Mantheakis, pers. comm., 2005).

A number of crosses have been added to the map in and around Mahale Mountains National Park, corresponding to recent sightings or signs of elephant presence (Plumptre, quest. reply, 2005). A cross has also been added to the west of the town of Pangani, in northeastern Tanzania, where elephants are believed to move to and from the Saadani Game Reserve to the south (Foley & Foley, quest. reply, 2006).

Other crosses corresponding to recent sightings have been added north of Morogoro, west of Udzungwa Mountains National Park (D. Erickson et al., pers. comm., 2004) and south of Swaga Swaga Game Reserve (Foley & Foley, quest. reply, 2006).

### *Population Data*

Between August and November 2006, surveys of all of Tanzania's major elephant populations were conducted by the Tanzania Wildlife Research Institute (TAWIRI 2007).

An aerial sample count of the Selous ecosystem, including the Selous Game Reserve, Mikumi National Park, Kilombero Game Controlled Area and surrounding areas, returned an overall estimate of  $70,406 \pm 24,843$  (TAWIRI 2007). This estimate replaces estimates from methodologically comparable surveys conducted in 2002 in the Selous Game Reserve ( $39,907 \pm 11,464$ ) and surrounding areas ( $17,979 \pm 8,908$ ); the Mikumi National Park ( $1,144 \pm 923$ ) and its environs ( $578 \pm 594$ ); and the Kilombero Game Controlled Area ( $6,203 \pm 4,639$ ) (TAWIRI 2007).

An aerial sample count conducted in the Selous-Niassa corridor in 2006 returned an estimate of  $3,330 \pm 1,424$ . However, the north of the area surveyed overlaps with the Selous ecosystem census zone, and all the elephants counted in the Selous-Niassa corridor were in fact seen in the area of overlap (TAWIRI 2007). As the Selous estimate is therefore likely to include all the elephants estimated in the Selous-Niassa corridor, an estimate of zero has been entered in place of the estimate of  $2,486 \pm 937$  featured in the previous report (CIMU, 2001). This change has been categorized as a **NEW ANALYSIS** of previous data.

An estimate of  $35,409 \pm 11,507$  from an aerial sample count of the Ruaha-Rungwa ecosystem (TAWIRI 2007) has been used to replace estimates from a methodologically comparable survey of Ruaha National Park ( $11,827 \pm 4,161$ ), Rungwa Game Reserve ( $10,005 \pm 3,849$ ) and surrounding areas ( $2,271 \pm 1,520$ ) (CIMU 2002).

Aerial sample count estimates for Katavi National Park ( $4,102 \pm 1,615$ ), Rukwa Game Reserve ( $1,200 \pm 902$ ) and surrounding areas ( $915 \pm 606$ ) from a 2006 survey (TAWIRI, 2007) replace methodologically comparable estimates of  $4,897 \pm 4,465$  for Katavi National Park,  $263 \pm 339$  for Rukwa Game Reserve and  $591 \pm 804$  for the surrounding areas.

Aerial surveys conducted in and around Moyowosi, Kigosi and Ugalla River Game Reserves included previously unsurveyed areas outside the game reserves (TAWIRI 2007). An estimate of  $9,541 \pm 3,657$  for Moyowosi-Kigosi and surrounding areas to the north replaces a 2000 estimate of  $2,861 \pm 956$  (H. Frederick, pers. comm., 2003). The difference in the estimates may be partly explained by the fact that the 2006 survey covered a considerably larger area. The aerial sample count estimate for Ugalla River Game Reserve ( $4,133 \pm 1,778$ ) replaces a 1999 aerial survey estimate of  $1,911 \pm 1,313$  (S. Mduma, pers. comm., 2002b). The estimate of  $1,353 \pm 857$  for the area to the southeast of Ugalla River Game Reserve is a new entry in the table of estimates, while the estimate of  $4,635 \pm 3,028$  for the Sagara-Nyamangoma area replaces an **INFORMED GUESS** of between 800 and 1,600 for an overlapping area comprising the Niensi and Luganzo hunting blocks (D. Hurt, pers. comm., 2002).

Two aerial total counts have been conducted in the Serengeti ecosystem since the AESR 2002. Both surveys included areas that had not been covered for many years, such as the Maswa Game Reserve and parts of the Ngorongoro Conservation Area. Estimates for the Serengeti National Park were 1,806 in 2003 (CIMU, 2003b) and 1,472 in 2006 (TAWIRI 2007). The latter replaces an estimate of 1,631 from an aerial total count conducted in 2000 (TAWIRI, 2000b). The West Loliondo Game Controlled Area, which was included in the Serengeti survey zone in the AESR 2002, was estimated to have 422 elephants in 2003

## SUMMARY TOTALS FOR TANZANIA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	3,167	0	0	0
Direct Sample Counts and Reliable Dung Counts	105,594	27,937	27,937	0
Informed Guesses	55	0	1,413	300
Other Guesses	0	0	0	600
<b>TOTALS 2006</b>	<b>108,816</b>	<b>27,937</b>	<b>29,350</b>	<b>900</b>
<i>TOTALS 2002</i>	<i>92,453</i>	<i>17,231</i>	<i>18,501</i>	<i>2,285</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+18,138	+7,140	+7,279	-513
New Population	-258	+925	+943	0
Different Technique	-1,119	+692	+640	-872
Different Area	-1,986	+2,984	+3,042	0
New Guess	+814	0	0	0
New Analysis	+773	-1,035	-1,055	0
<b>TOTAL CHANGE</b>	<b>+16,363</b>	<b>+10,706</b>	<b>+10,849</b>	<b>-1,385</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	29,290	208	<b>29,498</b>
Direct Sample Counts and Reliable Dung Counts	205,092	11,476	<b>216,567</b>
Informed Guesses	6,151	0	<b>6,151</b>
Other Guesses	6,153	0	<b>6,153</b>
Unassessed Range	74,627	57,370	<b>131,997</b>
<b>TOTAL</b>	<b>321,313</b>	<b>69,053</b>	<b>390,366</b>

## TANZANIA: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Burigi-Biharamulo Ecosystem	—	AS3	B	2000	761	821	S. Mduma, pers. comm., 2002b	2	7,295	31.3 E	2.4 S
Inyonga Game Conservation Area	—	OG3	E	2002	600		G. Angelides, pers. comm., 2003	2	6,050	32.8 E	6.8 S
Katavi National Park	RS	AS2	B	2006	4,102	1,615	TAWIRI, 2007	3	4,272	31.3 E	6.9 S
Katavi-Rukwa (Outside)	RS	AS2	B	2006	915	606	TAWIRI, 2007	3	3,739	31.3 E	6.9 S
Kilimanjaro Forest Reserve	DT	IG3	D	2003	793		Munishi & Maganga, 2003	3	499	37.2 E	3.0 S
Lake Manyara National Park	DT	AT3	A	2006	36		TAWIRI, 2007	3	1,368	35.9 E	3.6 S
Longido Game Conservation Area	—	AT3	A	2002	70		CIMU, 2003a	3	6,909	36.5 E	2.8 S
Makao Hunting Block	DT	AT3	A	2006	0		TAWIRI, 2007		1,019	34.7 E	3.5 S
Maswa Game Reserve	RS'	AT3	A	2006	158		TAWIRI, 2007	3	2,200	34.6 E	3.1 S
Mkomazi Game Reserve	RS	AT3	A	2005	41		Omondi & Bitok, 2005	3	3,509	38.3 E	4.2 S
Moyowosi-Kigosi Game Reserve	DA	AS3	B	2006	9,541	3,657	TAWIRI, 2007	2	20,262	31.3 E	4.2 S
Ngorongoro Crater Conservation Area	NG	OG3	E	2006	0		Renaud et al., 2006		274	35.6 E	3.2 S
Ngorongoro South Conservation Area	RS'	AT3	A	2006	0		TAWIRI, 2007		4,275	35.1 E	3.4 S
Piti East Hunting Block	—	IG3	D	2002	200	100*	D. Hurt, pers. comm., 2002	3	2,223	33.3 E	7.1 S
Ruaha-Rungwa Ecosystem	RS	AS2	B	2006	35,409	11,507	TAWIRI, 2007	2	45,800	34.4 E	6.8 S
Rubondo Island National Park	—	IG3	D	2002	20		M. Borner, pers. comm., 2003	3	400	31.8 E	2.3 S
Rukwa Game Reserve	RS	AS2	B	2006	1,200	902	TAWIRI, 2007	3	3,666	31.9 E	7.2 S
Rungwa South Hunting Block	—	IG3	D	2002	400	200*	D. Hurt, pers. comm., 2002	3	3,658	33.6 E	7.6 S
Saadani Game Reserve	—	IG3	D	1998	55		S. Mduma, pers. comm., 2002b	3	2,753	38.8 E	6.0 S
Sagara-Nyamagoma	DT	AS3	B	2006	4,635	3,028	TAWIRI, 2007	2	12,726	31.2 E	5.2 S
Selous Ecosystem	RS	AS3	B	2006	70,406	24,843	TAWIRI, 2007	1	81,046	37.5 E	8.8 S
Selous-Masasi Corridor	—	AS2	B	2000	1,076	107	S. Mduma, pers. comm., 2002a	2	14,082	37.9 E	10.8 S
Selous-Niassa Corridor	NA	AS2	B	2000	0	0	TAWIRI, 2000		9,096	36.6 E	11.1 S
Serengeti National Park	RS	AT3	A	2006	1,472		TAWIRI, 2007	2	14,763	34.8 E	2.3 S
Tarangire National Park	DT	AT3	A	2006	1,119		TAWIRI, 2007	3	2,726	36.1 E	4.1 S
Tarangire (Outside)	DT	AT3	A	2006	183		TAWIRI, 2007	3	6,708	36.3 E	4.2 S
Ugalla River Game Reserve	RS	AS3	B	2006	4,133	1,778	TAWIRI, 2007	3	4,778	31.9 E	5.8 S
Ugalla River (Outside)	NP	AS3	B	2006	1,353	837	TAWIRI, 2007	3	5,498	32.6 E	6.1 S
West Loliondo Game Controlled Area	RS	AT3	A	2006	88		TAWIRI, 2007	4	422	35.3 E	2.1 S

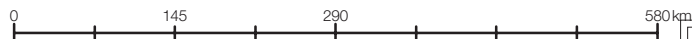
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

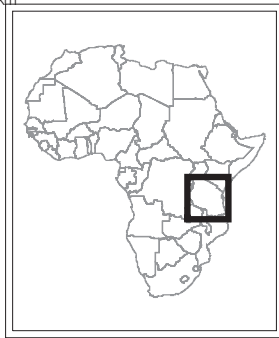
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Tanzania



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

(Conservation Information and Monitoring Unit, 2003b), but the more recent estimate of 88 from the 2006 survey is shown in the table of estimates instead. The Maswa Game Reserve and the southern part of Ngorongoro Conservation Area were also combined into a single survey zone in the AESR 2002, which featured a 1992 aerial total count estimate of 315 for these areas (B.P. Farm, pers. comm., 1995). The 2003 and 2006 total counts, conducted as part of the Serengeti survey, produced estimates of 132 and 158 respectively for the Maswa Game Reserve, and the latter figure is shown on the table of estimates. No elephants were seen in Ngorongoro South in either of the two recent surveys, and an estimate of zero therefore appears on the table for this area. The fluctuation in elephant numbers in the Serengeti ecosystem is likely to be influenced by elephant movements into the Masai Mara National Reserve in neighbouring Kenya.

Dry season aerial total counts of the Tarangire Ecosystem, conducted in 2004 (Conservation Information and Monitoring Unit, 2004) and 2006 (TAWIRI 2007), included, for the first time in many years, the Lake Manyara National Park in its entirety. Parts of Manyara were previously covered as part of the Tarangire ecosystem, but in this report Lake Manyara features as a separate entry in the table of estimates. The estimates of 1,119 for Tarangire National Park and of 183 for the surrounding areas, are from the 2006 survey and replace a 1999 aerial sample count estimate of  $2,855 \pm 1,961$  (Tanzania Wildlife Conservation Monitoring, 2000a). The combined estimate for the entire Tarangire ecosystem in 2004 was 1,880 (Conservation Information and Monitoring Unit, 2004).

The Mkomazi Game Reserve was covered as part of a 2005 transboundary aerial total count of the Tsavo ecosystem (Omondi & Bitok, 2005). The resulting estimate of 41 replaces a figure of 63 from a methodologically comparable survey conducted in 2002 (Omondi et al., 2002d).

An estimate of 759 for the western half of the Kilimanjaro Forest Reserve (Munishi & Maganga, 2003) replaces a 1990 dung count estimate of 220 (Tanzania Wildlife Conservation Monitoring, 1992). The new estimate is based on a reconnaissance survey, and although confidence intervals were provided, it has been categorized as an **INFORMED GUESS** due to the low sampling intensity and incomplete description of methods employed.

A dung count of the thickets around the town of Itigi to the north of the Ruaha-Rungwa ecosystem suggested a density of between 0.38 and 0.48 elephants per km<sup>2</sup> based (Shemdoe, 2004). The survey did not, however, produce an estimate of elephant numbers, and could not be included in the table. Part of this area was covered in the Ruaha-Rungwa aerial survey mentioned above.

Other estimates shown on the table have been retained from the previous report. The estimate in the **DEFINITE** category for Tanzania has increased by over 16,350, largely as a result of new estimates from methodologically comparable surveys. Estimates in the **PROBABLE** and **POSSIBLE** categories have increased by over 10,700 each, largely due to lower precision of repeated surveys and to surveys covering different areas, as well as to the inclusion of estimates from previously unsurveyed areas. The estimate in the **SPECULATIVE** category has decreased by nearly 1,400, as guesses and degraded estimates have been replaced by higher quality estimates.

Recent surveys of previously unsurveyed areas have shown that significant numbers of elephants remain outside national parks and game reserves in Tanzania. Although over 60% of the country's estimated elephant range is covered by good quality counts, over a third of the estimated range remains unassessed.



### *Cross-border Movements*

Elephants move between the Selous Game Reserve and the Niassa Game Reserve in northern Mozambique along corridors connecting the two ecosystems (Mpanduji et al., 2002). The elephants in the Longido-West Kilimanjaro area constitute a single transboundary population with the Amboseli ecosystem in Kenya. Between 150 and 400 elephants are found on the Tanzania side of the border at any one time (F. Nelson, pers. comm., 2003). Other transboundary populations shared with Kenya are those in the Serengeti-Mara and Tsavo-Mkomazi ecosystems. There may also be some movement of elephants between Ibanda Game Reserve in the northwest of the country and Akagera National Park in Rwanda, although refugee settlement is believed to have restricted passage routes in recent years.

# UGANDA

## *General Statistics*

Country area: 236,040 km<sup>2</sup>  
Range area (% of country): 15,148 km<sup>2</sup> (5%)  
Protected area coverage (% of country): 8%  
Protected range (% of known and possible range in protected areas): 76%  
Information Quality Index (IQI): 0.49  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Most of Uganda's elephant populations are fragmented and surrounded by cultivation. As a result, human-elephant conflict is common. Uganda is currently believed to be an important entrepôt for the international trafficking of ivory from the neighbouring Democratic Republic of Congo (TRAFFIC, 2004).

## *Range Data*

Elephants in Uganda are largely confined to protected areas along the west of the country, where forests alternate with savanna. Forest-savanna hybrids are believed to occur in the southwest (Plumptre, quest. reply, 2005). There are three major populations in the country, namely in the Queen Elizabeth Conservation Area, Murchison Falls Conservation Area and Kidepo Valley National Park. No elephants are thought to remain on the Ugandan side of Mount Elgon.

A number of changes have been made to the range map based on information from various sources. In Kidepo Valley, **KNOWN** range has been extended eastwards based on the results of a recent survey (Rwetsiba & Wanyama, 2005). **KNOWN** range has also been extended northward from Murchison Falls National Park all the way up to East Madi Wildlife Reserve, to which elephants from Murchison Falls move on occasion (Keigwin, quest. reply, 2005; R.H. Lamprey, pers. comm., 2006). The presence of elephants in the Rwenzori Mountains has been confirmed by Keigwin (2005), and the whole national park is now shown as **KNOWN** range. Elephants from Queen Elizabeth National Park move to Kalinzu and Kashoya-Kitomi Forest Reserves (Keigwin, quest. reply, 2005; R.H. Lamprey, pers. comm., 2006), and these areas are shown as **KNOWN** range. A small remnant population is found in the Katonga Game Reserve, east of Kibale National Park. This population is thought to have been once part of a larger population extending to Kibale National Park, but is now isolated (M. Polanski, pers. comm., 2004), and its range is also shown as **KNOWN**.

Elephant range in the Sango Bay area in the south has been modified with data from the Landsat 2002 human population density data set (ORNL/GIST, 2002), with part of the range area being categorized as **DOUBTFUL** (see Introduction section for rationale).

## *Population Data*

Systematic surveys of all major populations in Uganda were conducted between 2004 and 2005. An aerial sample count conducted in Murchison Falls Conservation Area returned an estimate of  $564 \pm 635$  (Rwetsiba & Wanyama, 2005), and this replaces an estimate of 692 from a 2002 aerial total count (Rwetsiba et al., 2002). The wide confidence limits around the estimate are explained by the fact that the 2005 sample count was not stratified, thus resulting in wide variation of elephant sightings between transects.

The estimate shown for Queen Elizabeth Conservation Area, obtained in a 2004 aerial sample count replaces a 2002 aerial total count estimate of 998 (Rwetsiba et al., 2002). An aerial total count estimate of 454 for Kidepo Valley National Park (Rwetsiba & Wanyama, 2005) replaces an **INFORMED GUESS** of 374 (D. Aleper, pers. comm., 2002). Finally, an estimate of  $393 \pm 210$  from a 2005 dung count of Kibale

## SUMMARY TOTALS FOR UGANDA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	454	0	0	0
Direct Sample Counts and Reliable Dung Counts	1,868	1,607	1,607	0
Other Dung Counts	15	378	210	0
Informed Guesses	0	0	120	0
Other Guesses	0	0	0	300
<b>TOTALS 2006</b>	<b>2,337</b>	<b>1,985</b>	<b>1,937</b>	<b>300</b>
<i>TOTALS 2002</i>	<i>2,064</i>	<i>0</i>	<i>210</i>	<i>460</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Population	0	0	+8	+40
Different Technique	+273	+1,985	+1,719	-200
<b>TOTAL CHANGE</b>	<b>+273</b>	<b>+1,985</b>	<b>+1,727</b>	<b>-160</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	914	0	<b>914</b>
Direct Sample Counts and Reliable Dung Counts	6,318	364	<b>6,682</b>
Other Dung Counts	794	0	<b>794</b>
Informed Guesses	1,138	0	<b>1,138</b>
Other Guesses	1,634	0	<b>1,634</b>
Unassessed Range	3,922	64	<b>3,986</b>
<b>TOTAL</b>	<b>14,720</b>	<b>428</b>	<b>15,148</b>

## UGANDA: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LONG.	LAT.
Bwindi Impenetrable Forest National Park	—	IG3	D	2002	30		A. McNeilage, pers. comm., 2003	2	336	29.7 E	1.0 S
Katonga Game Reserve	NP	OG3	E	2003	20	10*	M. Polanski, pers. comm., 2004	2	214	30.8 E	0.2 N
Kibale National Park	DT	DC3	C	2005	393	210	Wanyama, 2005	2	795	30.4 E	0.5 N
Kidepo Valley National Park	DT	AT3	A	2005	454		Rwetsiba & Wanyama, 2005	2	1,442	33.8 E	3.8 N
Mgahinga Gorilla National Park	NP	IG3	D	2003	10		Gray, quest. reply, 2005	3	67	29.6 E	1.4 S
Murchison Falls Conservation Area	DT	AS3	B	2005	516	635	Rwetsiba & Wanyama, 2005	1	4,064	31.8 E	2.2 N
Otze Forest	—	OG3	E	1998	200		F. Michelmore, pers. comm., 1998	2	200	31.9 E	3.7 N
Queen Elizabeth Conservation Area	DT	AS2	B	2006	2,959	1,476	Freeman, 2006	2	2,148	30.0 E	0.2 S
Rwenzori National Park	NP	OG3	E	2003	20		Keigwin, quest. reply, 2005	2	929	30.0 E	0.4 N
Sango Bay	—	OG3	E	1998	30		F. Michelmore, pers. comm., 1998	2	305	31.7 E	0.9 S
Semliki National Park	—	OG3	E	1998	30		F. Michelmore, pers. comm., 1998	2	195	30.0 E	0.8 N
Toro (Semliki Valley) Wildlife Reserve	—	IG3	D	1998	80		F. Michelmore, pers. comm., 1998	2	784	30.4 E	1.0 N

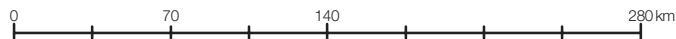
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

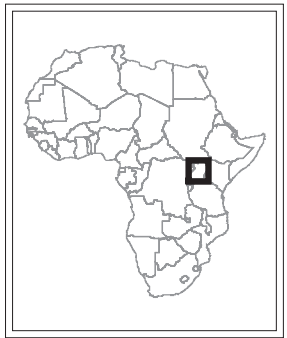
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Uganda



	International Boundary	<b>Elephant Range</b>	
	Rivers & Lakes		Known
	Towns		Possible
	Protected Areas		Doubtful
	<b>Input Zones (variable hatching)</b>		Sighting/sign



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

National Park (Wanyama, 2005) replaces an INFORMED GUESS of 100 (Cochrane, cited in Naughton et al., 1999).

Two guesses for previously unsurveyed areas, Rwenzori and Mgahinga Gorilla National Parks, appear on the table of estimates. The Mgahinga estimate was obtained from a dung point transect survey conducted in 2003, which returned an estimate of 89 elephants for the entire Virunga-Volcans range, thus including, in addition to Mgahinga, the Mikeno sector of Virunga National Park in the Democratic Republic of Congo and the Parc National des Volcans in Rwanda (Owiunji et al., 2004). This estimate has been split between the three parks in proportion to their area, giving an estimate of 10 for Mgahinga.

The number of elephants in the DEFINITE category for Uganda has decreased by 465, while the numbers in the PROBABLE and POSSIBLE categories have increased by about 2,000 each. These changes are due to the lower precision of recent aerial sample counts, compared to the aerial total counts featured in the previous report.

About half of Uganda's elephant range is covered by good quality estimates. The remaining range is split between areas covered by guesses and unsurveyed areas. The latter may be important as dispersal areas for Uganda's major elephant populations, but are not likely to contain large numbers of uncounted elephants.

### *Cross-border Movements*

It is believed that movement of elephants from Virunga National Park into Queen Elizabeth National Park may have increased in recent years as a result of armed conflict in eastern Democratic Republic of Congo (Keigwin, 2001). There is also evidence of elephant movement between Toro/Semliki and the northern sector of Virunga National Park in Democratic Republic of Congo (F. Michelmore, pers. comm., 1998), as well as between Kidepo National Park and adjacent range in southern Sudan (D. Aleper, pers. comm., 2002) and, sporadically, into northwestern Kenya (Thouless et al., 2003).

Elephants in Mgahinga Gorilla National Park move across the borders of Rwanda and the Democratic Republic of Congo (Gray, quest. reply, 2005). Movement between the Kenyan and Ugandan sides of Mount Elgon is unlikely, however, as elephants have not been seen on the Ugandan side for many years (F. Michelmore, pers. comm., 1998).

# SOUTHERN AFRICA

## REGIONAL OVERVIEW

### General Statistics

Total Area: 5,973,020 km<sup>2</sup>

Range area (% of region): 1,305,140 km<sup>2</sup> (28%)

Protected area coverage (% of region): 12%

Protected range (% of known and possible range in protected areas): 28%

Information Quality Index (IQI): 0.48

### Current Issues

Southern Africa holds the largest elephant populations on the continent, and many of the management challenges associated with high elephant densities in large populations are common to a number of countries in the region. As elephant numbers continue to increase in the region's largest populations, the debate on the need for management action has continued in a number of countries, particularly in South Africa.

In 2004, the Southern African Range States embarked on a process to develop a regional strategy for the management of elephants, and a draft strategy document was produced following a workshop held in 2005. The draft strategy aims to foster regional cooperation in elephant management and monitoring, calling for coordinated surveys across international boundaries. It is noteworthy that only three countries in Africa fund their regular elephant survey programmes out of their national budgets, and all three – Botswana, Namibia and South Africa – are in Southern Africa. Every other Range State in the region, and indeed on the continent, depends on external aid for elephant survey work.

Four countries in the region, namely Botswana (DG Ecological Consulting, 2003b), Namibia (Ministry of Environment and Tourism, 2005c), South Africa (South African National Parks, 2004b) and Zambia (Ministry of Tourism, Environment and Natural Resources, 2003) have recently developed or updated their respective national elephant management policies.

The development of transfrontier conservation areas has continued in Southern Africa. A Memorandum of Understanding was signed in late 2006 by Ministers from five Southern African countries to facilitate the development of the Kavango-Zambezi Transfrontier Conservation Area (KAZA TFCA). An area the size of Italy which holds nearly half of the continental elephant population, the KAZA TFCA spans some of the most important populations in Angola, Botswana, Namibia, Zambia and Zimbabwe.

The international sale of 50 tons of legally acquired ivory from Botswana, South Africa and Namibia, approved in 2002 at the 12<sup>th</sup> Meeting of the Conference of the Parties to CITES held in Santiago, Chile, was still pending at the time of writing, awaiting the finalization of an agreed baseline of data from the CITES MIKE Programme. At the 13<sup>th</sup> Meeting of the Conference of the Parties, held in Bangkok, Thailand, in 2004, a proposal was approved to allow Namibia non-commercial trade in individually marked and certified *ekipas*, a type of traditional ivory amulet (CITES, 2004).

In January 2007, a number of proposals were submitted for consideration at the 14<sup>th</sup> Meeting of the Conference of the Parties to CITES in The Hague, The Netherlands, in June 2007. Botswana and Namibia submitted a proposal to maintain their elephant populations, as well as those of South Africa and Zimbabwe, in CITES Appendix II, and to establish annual export quotas for these four countries to trade

in raw ivory to approved trading partners (Government of Botswana & Government of Namibia, 2007). Botswana submitted an additional proposal to be allowed to trade in hides and leather goods for commercial purposes; to be allocated an annual export quota of up to eight tons of Government-owned raw ivory to approved destinations; and to conduct a one-off sale of no more than 40 tons of raw ivory stocks to similarly approved destinations (Government of Botswana, 2007).

At the same time, Kenya and Mali submitted a proposal to bar any international trade in raw or worked ivory from any of the above four Southern African countries for a period of 20 years, except for raw ivory from hunting trophies for non-commercial purposes and the export of ivory pursuant to the conditional sale of government-owned ivory stocks from Botswana, Namibia and South Africa agreed at the 12<sup>th</sup> Meeting of the Conference of the Parties to CITES (Government of Kenya & Government of Mali, 2007).

### Range Data

Savanna elephants (*Loxodonta africana africana*) predominate throughout the region, although small populations of forest elephants are found in the Angolan exclave of Cabinda and perhaps also in northwestern Angola. With an estimated total elephant range spanning over 1.3 million km<sup>2</sup>, Southern Africa is the region with the largest elephant range area, and accounts for 39% of the continental total. While this is 22% less than the region's estimated range area in the AESR 2002, the difference is largely a result of better information, rather than a recent reduction in actual elephant range. Southern Africa is the region with the smallest proportion of elephant range in protected areas (28%).

The quality of range data varies considerably across the region. Although three-quarters of the range information is less than 10 years old, only 53% of total range currently falls within the KNOWN category. Although elephant range is expanding in Botswana and spreading into neighbouring countries such as Angola and Namibia, the overall range area may decline in future as more detailed information is obtained, particularly from Angola and Mozambique, where range data are least reliable, but which together account for 57% of the regional range estimate.

### Population Data

Southern Africa is the region with the highest overall quality of elephant information, as measured by the IQI. There is, however, wide variation amongst countries, with nearly perfect information available for Swaziland, South Africa, Zimbabwe and Botswana, but virtually no reliable information for Angola.

This report features 96 new estimates for Southern Africa, 84 of which originate from systematic counts. Overall, elephant population estimates are available for some 690,000 km<sup>2</sup>, or 53% of estimated elephant range in Southern Africa, with estimates from systematic surveys covering two-thirds of that area. Some countries such as South Africa, Botswana and Zimbabwe have complete coverage, in contrast with Angola, where estimates are only available for 5% of estimated elephant range.

Southern Africa also holds by far the largest number of elephants on the continent. At nearly 321,000, the number of DEFINITE plus PROBABLE elephants, is nearly twice as high as the corresponding number for Eastern Africa, the next most populous region with about 166,500 DEFINITE plus PROBABLE elephants. Over three-quarters of the regional DEFINITE plus PROBABLE population in Southern Africa occur in just two countries, namely Botswana and Zimbabwe. These two countries together also account for nearly 47% of the continental DEFINITE plus PROBABLE population.

The estimated number of DEFINITE elephants in Southern Africa has increased by over 51,000 (19%) compared to the previous report, largely as a result of higher estimates from recent, methodologically comparable surveys in Botswana, Namibia, South Africa, Zambia and Zimbabwe. The total number of elephants estimated in such surveys (namely from those sites marked REPEAT SURVEY or RS in the national



## SUMMARY TOTALS FOR SOUTHERN AFRICA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	18,431	0	0	0
Direct Sample Counts and Reliable Dung Counts	278,283	23,137	23,137	0
Other Dung Counts	27	49	9	0
Informed Guesses	977	0	1,588	201
Other Guesses	0	0	0	9,552
<b>TOTAL 2006</b>	<b>297,718</b>	<b>23,186</b>	<b>24,734</b>	<b>9,753</b>
<i>TOTALS 2002</i>	<i>246,592</i>	<i>23,722</i>	<i>26,098</i>	<i>7,508</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+47,808	+105	-137	0
New Population	+300	-48	+181	0
Different Technique	+448	+167	-709	-44
Different Area	+2,697	-951	-94	0
New Guess	-73	0	+85	+1,442
New Analysis	+26	-9	-11	-67
Population Lost	0	0	-28	0
Data Degraded	-79	+201	-651	+914
<b>TOTAL CHANGE</b>	<b>+51,126</b>	<b>-536</b>	<b>-1,364</b>	<b>+2,245</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	43,478	0	<b>43,478</b>
Direct Sample Counts and Reliable Dung Counts	397,261	23,300	<b>420,561</b>
Other Dung Counts	482	0	<b>482</b>
Informed Guesses	14,801	10,988	<b>25,789</b>
Other Guesses	134,788	69,029	<b>203,817</b>
Unassessed Range	102,833	508,179	<b>611,012</b>
<b>TOTAL</b>	<b>693,643</b>	<b>611,497</b>	<b>1,305,140</b>

## SOUTHERN AFRICA: COUNTRY AND REGIONAL TOTALS & DATA QUALITY

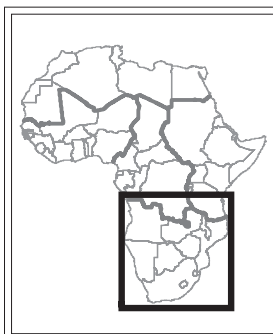
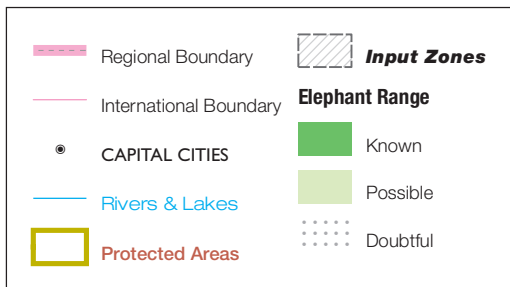
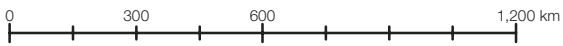
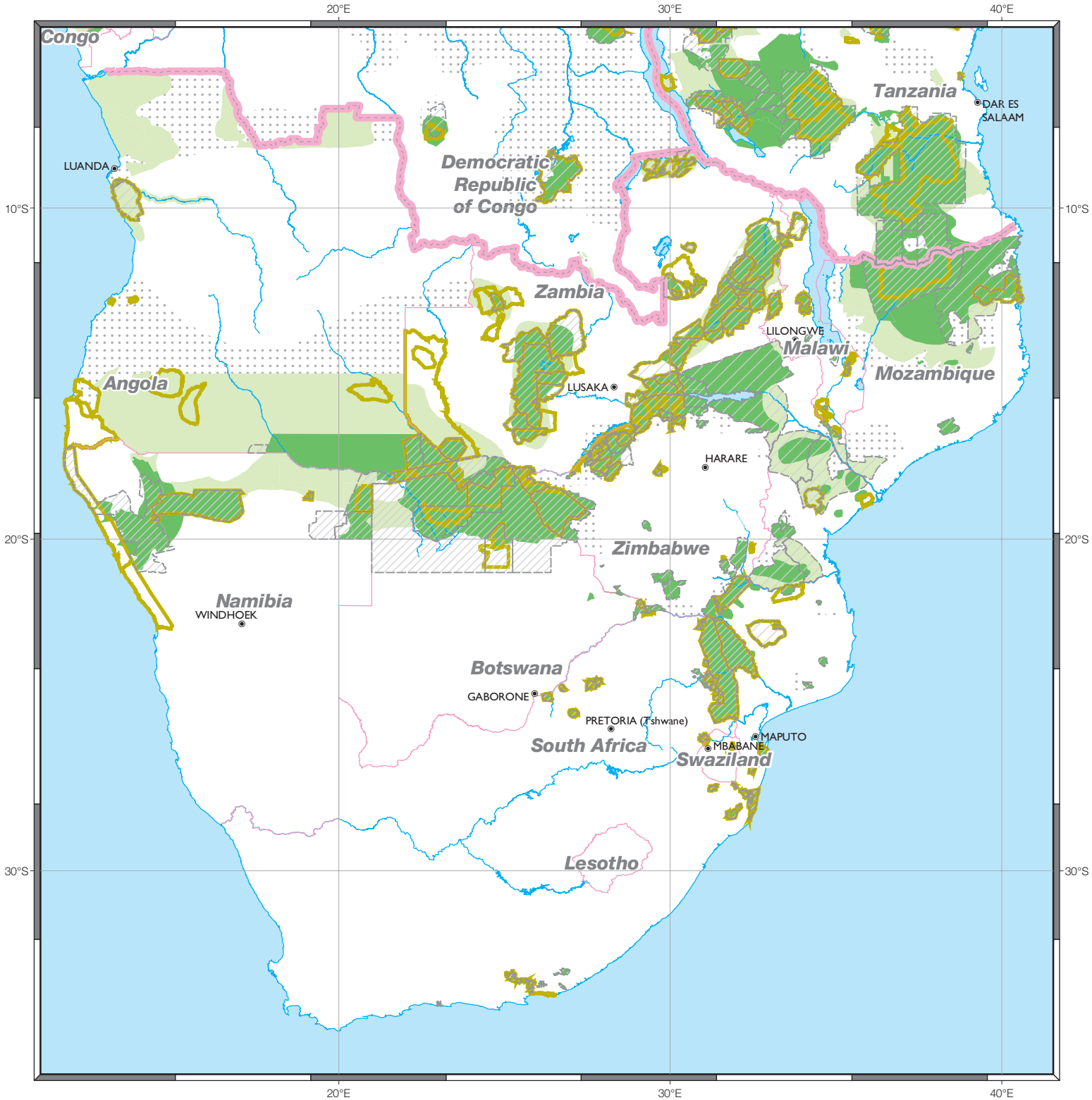
COUNTRY	ELEPHANT NUMBERS				RANGE AREA (km <sup>2</sup> )	% OF REGIONAL RANGE	% OF RANGE ASSESSED	IQI <sup>1</sup>	PFS <sup>2</sup>
	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE					
Angola	818	801	851	60	406,946	31	5	0.03	1
Botswana	133,829	20,829	20,829	0	100,265	8	99	0.87	2
Malawi	185	323	632	1,587	7,538	1	89	0.17	3
Mozambique	14,079	2,396	2,633	6,980	334,786	26	77	0.48	1
Namibia	12,531	3,276	3,296	0	146,921	11	55	0.46	2
South Africa	17,847	0	638	22	30,455	2	100	0.96	2
Swaziland	31	0	0	0	50	0	100	1.00	5
Zambia	16,562	5,948	5,908	813	201,247	15	61	0.47	1
Zimbabwe	84,416	7,033	7,367	291	76,931	6	99	0.91	2
<b>TOTAL*</b>	<b>297,718</b>	<b>23,186</b>	<b>24,734</b>	<b>9,753</b>	<b>1,305,140</b>	<b>39</b>	<b>53</b>	<b>0.48</b>	<b>1</b>

\* Note that totals for the Definite, Probable and Possible categories are derived by pooling the variances of individual estimates, as described under the Data Types and Categorization section. As a result, totals do not necessarily match the simple sum of the entries within a given category.

<sup>1</sup> **IQI: Information Quality Index.** This index quantifies overall data quality at the national and regional levels based on the precision of estimates and the proportion of assessed elephant range (i.e. range for which estimates are available). The IQI ranges from zero (no reliable information) to one (perfect information). See the Introduction section for a detailed explanation of how the IQI is calculated.

<sup>2</sup> **PFS: Priority for Future Surveys,** ranked from 1 to 5 (highest to lowest). Based on the IQI and the proportion of continental range accounted for by the country in question, the PFS is a measure of the importance and urgency for future population surveys, particularly in areas of unassessed range and areas not surveyed in the last 10 years or more. See Introduction for a more detailed explanation of how the priority ranking is derived.

# Southern Africa



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.

tables of estimates; see Appendix II for a list of sites) accounts for over three-quarters of the region's DEFINITE plus PROBABLE estimate. A comparison of estimates for these sites between this and the previous report, as described in Blanc et al. (2005), indicates a significant increase of  $46,354 \pm 30,588$  in the pooled comparable estimate since the AESR 2002 ( $t = 2.97$ ;  $p < 0.01$ ). This translates into an overall average annual rate of increase of 3.88% (95% CI of rate 1.06% to 6.39%) in the comparable populations.

The numbers of elephants in the PROBABLE and POSSIBLE categories have declined by about 540 and 1,360 respectively, reflecting a marginal overall improvement in the precision of estimates. The figure under the SPECULATIVE category, on the other hand, has increased by 2,245, primarily as a result of new guesses and the degradation of old estimates to the category of OTHER GUESSES.

### *Cross-border Movements*

Movements of elephants are known to occur between Mozambique and Tanzania (Eastern Africa). The only other area in Southern Africa where cross-border movement may take place is between northern Angola and the southwest of the Democratic Republic of Congo, but there are no reliable reports of such movements.

# ANGOLA

## General Statistics

Country area: 1,246,700 km<sup>2</sup>  
Range area (% of country): 406,946 km<sup>2</sup> (53%)  
Protected area coverage (% of country): 7%  
Protected range (% of known and possible range in protected areas): 9%  
Information Quality Index (IQI): 0.03  
CITES Appendix: I  
Listing Year: 1989

## Current Issues

Although conservation and monitoring work has begun after the end of hostilities in Angola, it has concentrated largely on the southeast, with little or no assessment effort taking place elsewhere. A detailed nationwide study of elephant distribution and density needs to be undertaken.

A project to clear landmines from the Luiana Partial Reserve got underway in 2005 as part of a plan to establish the Kavango Zambezi Transfrontier Conservation Area, which will span five countries and will cover part of the Upper Zambezi Basin, the Okavango Basin and the Okavango Delta.

A recent survey found over 1,500 kg of ivory openly for sale in Luanda. Although most of the stock is believed to originate in neighbouring Democratic Republic of Congo, it is thought that some of the ivory may be sourced within Angola, and particularly from the northwest and southeast of the country. Although Angola formally approved its membership of CITES in 2001, the decision has yet to be formally gazetted, and it therefore officially remains a non-party to the convention (Milliken et al., 2006).

A recent study found human-elephant conflict in the province of Cabinda to be widespread, and the severity of the problem is reported to be increasing (Heffernan, 2005). There have also been recent reports of crop raiding and destruction of property by elephants between Malengue and the Bicuar National Park (Anon., 2004).

## Range Data

Elephants are believed to be present in the far north and far south of the country. Forest elephants (*Loxodonta africana cyclotis*) are believed to occur in the northwest and savanna elephants (*Loxodonta africana africana*) in the northeast and south (Enock, quest. reply, 2002).

Two major changes have been made to the southern portion of the range map for Angola for this report, both based on information provided by Chase (2006). The area of **KNOWN** range around the Luiana Partial Reserve has been expanded northward and eastward, and the area of southern Angola north of the 15th parallel has been re-categorized as **DOUBTFUL** range. Nevertheless, a herd of elephants was reported in August 2004 in the village of Capembe, to the southwest of the town of Malengue (Anon., 2004), and this is shown as a cross on the map. Further southeast, also shown as a cross on the map, is a sighting of 17 elephants (in four herds) along the Cuito River, 120 km north of the Namibian border during a reconnaissance flight in November 2005 (Chase & Griffin, 2005b). The straight boundaries of these changes in the range map are a reflection of limited knowledge in this area and do not represent actual elephant distribution. The hard boundaries of elephant range along the border with the Democratic Republic of Congo to the north, and with Namibia to the south, on the other hand, reflect marked differences in human population densities on either side of the border.

The area of **KNOWN** range in the exclave of Cabinda has been extended to the southwest based on information in Heffernan (2005). Despite these updates, the range map for Angola remains, for the most part, highly speculative, with over three-quarters of the available range data being over 10 years old.

### *Population Data*

A series of surveys of the Luiana Partial Reserve have been conducted since 2003 by Chase and Griffin (2005b). The estimates from these surveys have consistently increased from 263 in 2003 to 1583 in 2005, suggesting that elephants are moving into Angola from neighbouring countries in increasing numbers. In all three surveys, elephants were found invariably in the southeastern sectors of the park, with no elephants detected in the western sector. In consequence, two entries are shown for Luiana in the table of estimates, one for Luiana (West) with an estimate of zero and another for Luiana (East) with an estimate of  $1,583 \pm 801$  from the 2005 survey. These replace an **INFORMED GUESS** of 100 by Hanks (J. Hanks, pers. comm., 2003). The resulting increases in the **DEFINITE**, **PROBABLE** and **POSSIBLE** categories reflect better information as well as the movement of elephants from other countries into Angola.

All other estimates for Angola remain unchanged from the previous report. Despite the considerable reduction in elephant distribution shown in this report, nearly 95% of Angola's estimated elephant range remains unsurveyed.

### *Cross-border Movements*

As mentioned above, there is evidence that elephants are moving into southeastern Angola from Botswana through neighbouring Namibia in increasing numbers. Cross-border movement is also possible between Luiana and Sioma Ngwezi National Park (Zambia).

Movement across Angola's northern border with the Democratic Republic of Congo is unlikely to take place, as elephants are no longer thought to occur in that part of the DRC, where human population densities are relatively high.

Elephant distribution in the exclave of Cabinda is spread along the border with Congo, and there is likely to be movement of elephants across that border (Heffernan, 2005).

## SUMMARY TOTALS FOR ANGOLA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	36	0	0	0
Direct Sample Counts and Reliable Dung Counts	782	801	801	0
Informed Guesses	0	0	50	0
Other Guesses	0	0	0	60
<b>TOTALS 2006</b>	<b>818</b>	<b>801</b>	<b>851</b>	<b>60</b>
<i>TOTALS 2002</i>	<i>36</i>	<i>0</i>	<i>150</i>	<i>60</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Different Technique	+782	+801	+701	0
<b>TOTAL CHANGE</b>	<b>+782</b>	<b>+801</b>	<b>+701</b>	<b>0</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	468	0	<b>468</b>
Direct Sample Counts and Reliable Dung Counts	10,510	3	<b>10,512</b>
Informed Guesses	0	8,396	<b>8,396</b>
Other Guesses	0	1,502	<b>1,502</b>
Unassessed Range	51,254	334,814	<b>386,068</b>
<b>TOTAL</b>	<b>62,232</b>	<b>344,714</b>	<b>406,946</b>

## ANGOLA: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Bongola Area	—	IG3	E	1992	60		Anstey, 1993	3	1,505	17.6 E	17.3 S
Cáua Camp	—	IR1	A	2002	36		P. Vaz Pinto, pers. comm., 2003	2	9,500	13.3 E	9.3 S
Luiana (East) Partial Reserve	<b>DT</b>	AS2	B	2005	1,583	801	Chase & Griffin, 2005b	3	4,032	22.8 E	17.4 S
Luiana (West) Partial Reserve	<b>DT</b>	AS2	B	2005	0		Chase & Griffin, 2005b		4,368	22.3 E	17.4 S
Quiçama National Park	—	IG3	D	2002	50		P. Vaz Pinto, pers. comm., 2003	2	9,500	13.6 E	9.8 S

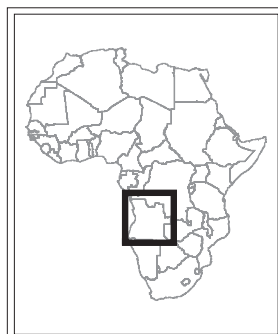
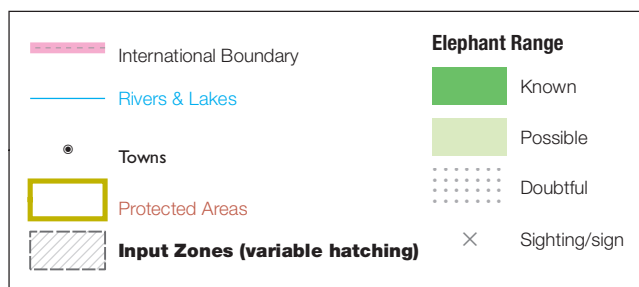
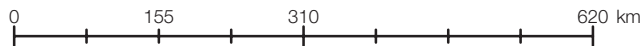
<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.



# Angola



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# BOTSWANA

## *General Statistics*

Country area: 600,370 km<sup>2</sup>

Protected area coverage (% of country): 18%

Range area (% of country): 100,265 km<sup>2</sup> (17%)

Protected range (% of known and possible range in protected areas): 19%

Information Quality Index (IQI): 0.87

CITES Appendix: II

Listing Year: 1997

## *Current Issues*

Botswana's elephant population continues to grow, and controversy over its impact on vegetation and biodiversity has become increasingly heated in recent years. There have been numerous calls for control measures to be put in place to prevent biodiversity loss, as changes to vegetation, particularly along the river fronts, have become more apparent. Some authors, however, believe that no action should be taken, and that the ecosystem is reverting to its condition before hunting reduced elephant numbers in the 19<sup>th</sup> century (Skarpe et al., 2004). Still other experts believe that Botswana's population is now beyond feasible control measures (Cumming & Jones, 2005), and that only a drought or disease outbreak can reduce the population.

These and other issues were addressed in a review of the 1991 Elephant Conservation and Management Plan (Department of Wildlife and National Parks, 1991), which resulted in a new draft policy and strategy for the conservation and management of elephants in Botswana (DG Ecological Consulting, 2003a,b). The primary objectives of the strategy are to reduce human-elephant conflict to acceptable levels; to prevent, reduce or reverse unacceptable elephant-induced environmental changes; to maximize benefits from sustainable utilization of elephants; and to protect elephants through law enforcement. The strategy sets targets to reduce human-elephant conflict, which is reportedly intensifying as the elephant population expands (DG Ecological Consulting, 2003a), with up to 40% of the potential annual harvests of subsistence farmers being destroyed by elephants in some areas (Mosojane, 2004). As the strategy awaits final approval and implementation, a number of measures aimed at reducing human-elephant conflict and the impact of the growing elephant population have been planned or taken. These include the granting in 2005 of citizen hunting permits for elephant in the Tuli area (Mojaphoko, pers comm. 2005), and a plan to translocate 500 elephants from Botswana to Gorongosa National Park in Mozambique, scheduled for 2004, but which did not take place.

A number of TFCAs are in the process of being established to provide for elephant dispersal beyond Botswana's borders. The largest of these will be the Kavango-Zambezi (KAZA) TFCA, which is expected to cover over 287,000 km<sup>2</sup>, and which will include parts of northern Botswana, the Luiana Partial Reserve in Angola, Sioma Ngwezi National Park in Zambia and Babwata National Park in Namibia. This TFCA is in its conceptual phase, and a Memorandum of Understanding between the Governments of these countries was signed in late 2006. The signing of a similar Memorandum of Understanding to pave the way for the creation of the Limpopo-Sashe TFCA met with unexpected delays in 2005 (Peace Parks Foundation, 2006). This TFCA will encompass the Tuli Game Reserve, the new Mapungubwe National Park in South Africa and the Tuli Circle Safari Area in Zimbabwe, and will include a large proportion of privately owned land in all three countries.

In 2006 Botswana notified CITES of an increase in its export quota for elephant trophies to 540 tusks (270 animals), up by 120 tusks from the quota it had maintained for the previous four years (UNEP-WCMC, 2006). In January 2007, Botswana submitted a proposal for consideration at the 14<sup>th</sup> Meeting of the

## SUMMARY TOTALS FOR BOTSWANA

<b>Data Category</b>	<b>DEFINITE</b>	<b>PROBABLE</b>	<b>POSSIBLE</b>	<b>SPECULATIVE</b>
Direct Sample Counts and Reliable Dung Counts	133,829	20,829	20,829	0
<b>TOTALS 2006</b>	<b>133,829</b>	<b>20,829</b>	<b>20,829</b>	<b>0</b>
<i>TOTALS 2002</i>	<i>100,629</i>	<i>21,237</i>	<i>21,237</i>	<i>0</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

<b>Cause of Change</b>	<b>DEFINITE</b>	<b>PROBABLE</b>	<b>POSSIBLE</b>	<b>SPECULATIVE</b>
Repeat Survey	+34,128	+643	+643	0
Different Technique	-928	-1,051	-1,051	0
<b>TOTAL CHANGE</b>	<b>+33,200</b>	<b>-408</b>	<b>-408</b>	<b>0</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

<b>Data Category</b>	<b>Known Range</b>	<b>Possible Range</b>	<b>Total Range</b>
Direct Sample Counts and Reliable Dung Counts	88,352	11,190	<b>99,543</b>
Unassessed Range	722	0	<b>722</b>
<b>TOTAL</b>	<b>89,075</b>	<b>11,190</b>	<b>100,265</b>

## BOTSWANA: ELEPHANT ESTIMATES

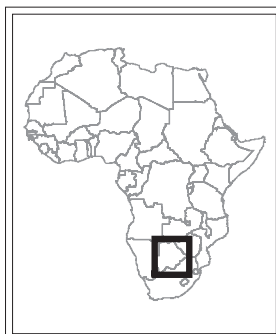
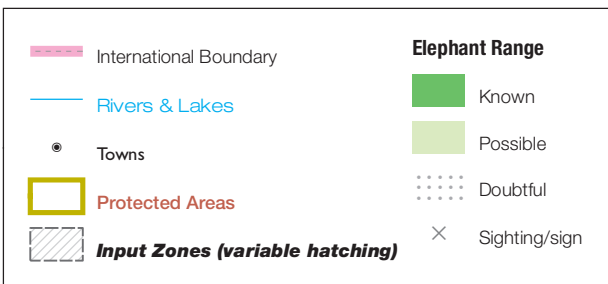
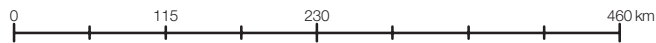
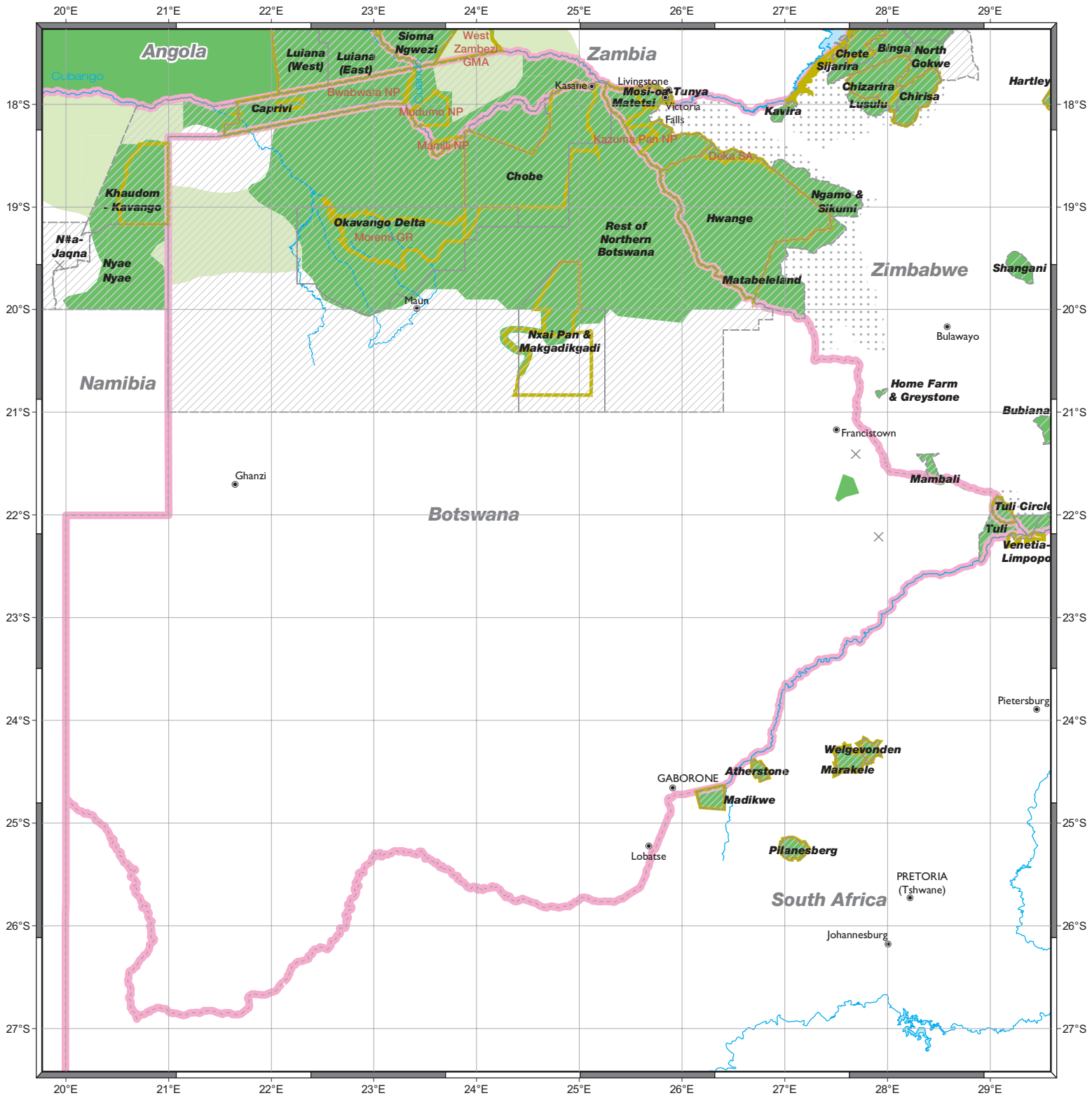
INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Chobe National Park & Environs	<b>RS</b>	AS2	B	2006	40,767	10,539	DWNP, 2006	2	12,195	24.6 E	18.5 S
Nxai Pan & Makgadikgadi National Parks	<b>RS</b>	AS3	B	2006	1,436	1,950	DWNP, 2006	2	11,476	24.8 E	20.4 S
Okavango Delta	<b>RS</b>	AS2	B	2006	31,191	7,191	DWNP, 2006	2	17,160	23.1 E	19.4 S
Rest of Northern Botswana	<b>RS</b>	AS2	B	2006	80,226	16,334	DWNP, 2006	1	18,303	23.5 E	19.7 S
Tuli Game Reserve	<b>DT</b>	AS2	B	2006	1,038	685	DWNP, 2006	2	3,510	29.1 E	22.2 S

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Botswana



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

Conference of the Parties to CITES, to be allowed to trade in hides and leather goods for commercial purposes; to be allocated an annual export quota of up to eight tons of Government-owned raw ivory of Botswana origin to approved destinations; and to conduct a one-off sale of no more than 40 tons of raw ivory stocks to similarly approved destinations (Government of Botswana, 2007).

### *Range Data*

Most of the country's elephant range is situated in the north and spans around 100,000 km<sup>2</sup>. The expansion of elephant range in Botswana continues, and portions of KNOWN range have been added to the southern sector of Nxai Pan National Park and along the watercourse marking the western boundary of Magkadigkadi National Park, where elephants were sighted in recent surveys and have become permanent residents (G.C. Craig, pers. comm., 2006). An area of range to the southeast of Maun, featured in the previous report, has been removed for lack of recent evidence of elephant presence (G.C. Craig, pers. comm., 2006). Nevertheless, elephant spoor has been regularly seen in a small holding close to Maun (D. Gibson, pers. comm. 2006).

The only other area where elephants occur in Botswana is considerably smaller than the northern range and lies in the eastern tip of the country, covering around 1,000 km<sup>2</sup> at the confluence of the Shashe and Limpopo rivers. Two small areas of KNOWN range have been added to the northwest of Tuli: a narrow strip along the Sashe River on the border with Zimbabwe and a small area south of Francistown (DG Ecological Consulting, 2003a; G.C. Craig, pers. comm., 2006; M.E. Gadd, pers. comm., 2006). In 2004, two elephants were shot on Wayside Farm, outside Francistown (Chase & Griffin, 2005a), and this is shown as a cross on the map. Another cross is shown further south, where elephants were seen in 2000 (M.E. Gadd, pers. comm., 2006).

### *Population Data*

Most of Botswana is covered by regular aerial sample counts that include the entire northern elephant range. Five surveys have been conducted since 2002, but the 2005 survey did not cover the entire survey area due to logistical problems (C. Taolo, pers. comm. 2006). The national estimates for the other surveys were 123,152 ± 17,152 in 2002 (Department of Wildlife and National Parks, 2002), 109,471 ± 18,443 in 2003 (Department of Wildlife and National Parks, 2003), 151,000 ± 20,004 in 2004 (Department of Wildlife and National Parks, 2004) and 154,658 ± 21,253 (Department of Wildlife and National Parks, 2006). The estimates presented here, obtained from the 2006 survey report, have been split to show separate figures for the survey blocks containing national parks and the Okavango Delta. These replace a 1999 combined aerial sample count estimate of 120,604 ± 21,237 (Department of Wildlife and National Parks, 1999). The estimate for the Tuli Game Reserve, also from the 2006 national survey, replaces an aerial total count estimate of 1,262 (Selier et al., 2002).

The number of elephants in the DEFINITE category has increased by over 33,000 as recorded by methodologically comparable surveys. The numbers in the PROBABLE and POSSIBLE categories have dropped by approximately 410 elephants each due to an overall increase in precision of the national estimate.

### *Cross-border Movements*

Elephants in northern Botswana are part of a larger population that stretches east into Zimbabwe (Craig, 1996b), north into the Caprivi Strip in Namibia and possibly into Zambia and Angola as well (Chase & Griffin, 2005a). It constitutes the largest known population of elephants in Africa, and one of the largest continuous stretches of KNOWN range on the continent. As part of a continuing westward expansion in northern Botswana, elephants are reported to be crossing into the Khaudom and Nyae Nyae areas of Namibia. Elephants also move from the eastern range portion of Botswana to Zimbabwe and into private reserves in northern Limpopo Province (South Africa).

# MALAWI

## *General Statistics*

Country area: 118,480 km<sup>2</sup>  
Range area (% of country): 7,538 km<sup>2</sup> (7%)  
Protected area coverage (% of country): 9%  
Protected range (% of known and possible range in protected areas): 84%  
Information Quality Index (IQI): 0.17  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Elephant populations in Malawi are small and fragmented, and are further threatened by encroachment. Human-elephant conflict is prevalent as a result, and poaching for meat and ivory is believed to be further reducing certain populations (Bhima et al., 2003). The long-term viability of several of Malawi's elephant populations is already in doubt.

In July 2006, 70 elephants from Liwonde National Park and Mangochi Forest Reserve were translocated to Majete Wildlife Reserve, where elephants had been absent for over 10 years (Sherry & Tattersall, 1996). The African Parks Foundation, which conducted the translocation, had taken over the management of Majete in 2003 (African Parks Foundation, 2006b).

## *Range Data*

Because of its small size and high human population densities, Malawi's elephants are almost entirely confined to protected areas, including national parks and forest reserves, with only a small part of range outside protected areas in the southeast (Bhima, 1996). The main elephant populations occur in Liwonde and Kasungu National Parks and the Nkhota-Kota and Vwaza Marsh Wildlife Reserves.

For this report, an area of **KNOWN** range has been added within the boundary of the Majete Wildlife Reserve, to which elephants have been recently translocated. The shape of **KNOWN** range in Thuma Forest Reserve has been altered with information from the Landscan 2002 human population density data set (ORNL/GIST, 2002; see Introduction section for rationale). Based on the same data, an area of **POSSIBLE** range to the north of Mangochi Forest Reserve has been categorized as **DOUBTFUL** range.

## *Population Data*

Aerial sample counts of Kasungu National Park and Vwaza Marsh Game Reserve were conducted in 2005 (Ferreira et al., 2005). Although relatively high sampling intensities were employed in these surveys, the lack of stratification resulted in wide confidence intervals around the estimates. In addition, neither of these surveys employed a radar altimeter, which further compromises the reliability of the estimates.

The Kasungu survey, with an estimate of  $58 \pm 218$ , replaces a 1995 aerial sample count estimate of  $391 \pm 349$ . As the lower confidence interval in the 2005 survey is larger than the estimate, the number of elephants seen in the survey (25) contributes to the **DEFINITE** category in the summary table. A dung count of Kasungu had been conducted in 2002, giving an estimate of 117 with an asymmetric confidence interval of 96 to 142, but this estimate only covered the southern part of the park (Bhima et al., 2003).

The survey of Vwaza Marsh could not be completed due to aircraft failure (Ferreira et al., 2005), and its estimate of 270 has been categorized as an **INFORMED GUESS** for this report, with the number of elephants seen in the survey (41) appearing under the **DEFINITE** category. This guess replaces a 1997 **INFORMED GUESS** of 35 (Gibson, 1997).

The same team also conducted a survey of Nyika National Park using a point transect design (Ferreira et al., 2005). The survey returned an estimate of zero, but the sampled area excluded the north of the park, where elephants are found. For this reason, the estimate of 339 from the previous report has been retained.

As mentioned under Current Issues above, 70 elephants were translocated from Liwonde National Park to a 140 km<sup>2</sup> fenced sanctuary within Majete Wildlife Reserve in July 2006. As the Majete population was previously extinct, a figure of 70 now appears as a new population in the table of estimates.

Prior to the Majete translocation, Liwonde National Park was said to hold in excess of 600 elephants (African Parks Foundation, 2006b), but no details could be obtained on the basis of the estimate. The difference between this figure and the 70 elephants translocated to Majete, (i.e. 530 elephants) has been entered for Liwonde in the category of OTHER GUESSES. This new estimate replaces a figure of 414 from an aerial sample count conducted in 1995 (Bhima, 1996).

The estimate of 1,037 for Nkhota-Kota Wildlife Reserve (Japan International Cooperation Agency & Government of Malawi, 1997) has been degraded to the category of OTHER GUESSES for the same reason, as it is now over 10 years old.

There have been substantial decreases in the estimates for the DEFINITE, PROBABLE and POSSIBLE categories compared to the previous report. These decreases in estimates are mainly due to the degradation of old data to the SPECULATIVE category or their replacement by low quality guesses. Estimates from recent systematic surveys only contribute marginally to these decreases. Although estimates are available for nearly 90% of Malawi's elephant range, over half of that area is covered by guesses.

### *Cross-border Movements*

Cross-border movement between Kasungu National Park in Malawi and the North Luangwa ecosystem was documented by Jachmann and Bell (1985), but a recent survey of Zambia's Lukusuzi National Park, across the border from Kasungu, failed to find any elephants in the park (Fourie et al., 2005). Furthermore, the area between the two parks is densely settled (Bhima et al., 2003), and it is unlikely that elephant movement continues.



## SUMMARY TOTALS FOR MALAWI

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Direct Sample Counts and Reliable Dung Counts	74	323	323	0
Informed Guesses	111	0	309	20
Other Guesses	0	0	0	1,567
<b>TOTALS 2006</b>	<b>185</b>	<b>323</b>	<b>632</b>	<b>1,587</b>
<i>TOTALS 2002</i>	<i>647</i>	<i>1,569</i>	<i>1,649</i>	<i>20</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	-18	-308	-94	0
New Population	+75	0	0	0
New Guess	-439	0	+165	+530
Data Degraded	-80	-938	-1,087	+1,037
<b>TOTAL CHANGE</b>	<b>-462</b>	<b>-1,246</b>	<b>-1,017</b>	<b>+1,567</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Direct Sample Counts and Reliable Dung Counts	2,908	0	<b>2,908</b>
Informed Guesses	1,511	0	<b>1,511</b>
Other Guesses	2,316	0	<b>2,316</b>
Unassessed Range	0	804	<b>804</b>
<b>TOTAL</b>	<b>6,735</b>	<b>804</b>	<b>7,538</b>

## MALAWI: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Kasungu National Park	RS'	AS1	B	2005	58	218	Ferreira et al., 2005	1	2,463	33.1 E	12.9 S
Liwonde National Park	NG	OG3	E	2006	530		African Parks Foundation, 2006b	2	538	35.3 E	14.9 S
Majete Wildlife Reserve	NP	IG3	D	2006	70		African Parks Foundation, 2006b	3	140	34.7 E	16.0 S
Nkhota-Kota Wildlife Reserve	DD	AS2	E	1995	1,037	1,511	JICA & Government of Malawi, 1997	1	1,802	34.0 E	12.9 S
Nyika National Park	—	AS1	B	1997	339	239	Gibson, 1997	1	3,134	33.8 E	10.6 S
Phirilongwe Forest Reserve	—	IG3	D	1998	50		S.M. Munthali, pers. comm., 1998	2	640	35.0 E	14.6 S
Thuma Forest Reserve	—	IG3	D	1998	30	20*	S.M. Munthali, pers. comm., 1998	2	370	34.2 E	13.9 S
Vwaza Marsh Wildlife Reserve	NG	IG3	D	2005	270		Ferreira et al., 2005	1	976	33.4 E	11.0 S

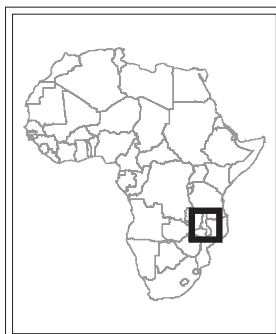
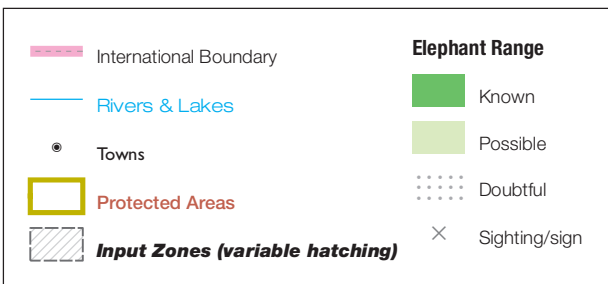
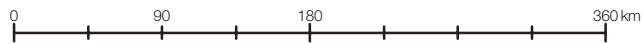
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Malawi



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for  
protected area abbreviations.

# MOZAMBIQUE

## *General Statistics*

Country area: 801,590 km<sup>2</sup>  
Range area (% of country): 334,786 km<sup>2</sup> (52%)  
Protected area coverage (% of country): 7%  
Protected range (% of known and possible range in protected areas): 15%  
Information Quality Index (IQI): 0.48  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

A June 2005 survey in Maputo found considerable amounts of carved ivory openly for sale and export, including in the departure lounge of the international airport. It is believed that most of the ivory originates from within the country. Although the report found Mozambique's implementation of its obligations under CITES to be lacking, two weeks before the survey, the Government had initiated a campaign to encourage owners of ivory to register and regularize their stocks, and a number of ivory seizures were made thereafter (Milliken et al., 2006).

The Maputo Special Reserve is being expanded to link it to the Futi corridor and the Tembe Elephant Park in South Africa as a transfrontier conservation area. An electric fence will be erected along the western boundary of the enlarged Maputo Special Reserve, and the fence on the northern boundary of the Tembe Elephant Park will be removed (Peace Parks Foundation, 2006).

A translocation of 500 elephants from Chobe National Park (Botswana) to Gorongosa National Park (Mozambique) was planned for 2004, but did not take place.

In 2006, the United States Government denied applications for CITES import permits for a number of elephant trophies, originating from areas other than the Niassa Game Reserve, on the grounds that there was insufficient information on elephant populations in such areas to set rational trophy quotas (Jackson, 2006). In 2005 Mozambique increased its CITES export quota from 20 to 80 tusks (40 animals) (UNEP-WCMC, 2006).

## *Range Data*

Reliable knowledge on the distribution of elephants in Mozambique is scanty in many areas. The country's most important population is in the far north, in and around the Niassa Game Reserve. Smaller known populations occur in the west and far south.

Two new areas of **KNOWN** range have been added to the north and to the east of Limpopo National Park, where elephants are known to be moving to (Anderson, quest. reply, 2005). Based on information provided by the same source, the area of range in Banhine National Park has been categorized as **DOUBTFUL**.

A total of 20 areas across the country have been categorized as **DOUBTFUL** range based on data from the Landsat ambient human population data set (ORNL/GIST, 2002). All areas re-categorized are estimated to have a human population density of at least 15 persons per km<sup>2</sup>, which makes elephant presence unlikely (see Introduction section for details). These changes reflect better information rather than recent real changes in elephant distribution. The Gilé Game Reserve, incorrectly shown as **NON-RANGE** in the previous report, is now depicted as **KNOWN** range.

## SUMMARY TOTALS FOR MOZAMBIQUE

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	630	0	0	0
Direct Sample Counts and Reliable Dung Counts	13,427	2,396	2,396	0
Informed Guesses	22	0	237	68
Other Guesses	0	0	0	6,912
<b>TOTALS 2006</b>	<b>14,079</b>	<b>2,396</b>	<b>2,633</b>	<b>6,980</b>
<i>TOTALS 2002</i>	<i>11,647</i>	<i>2,786</i>	<i>3,073</i>	<i>6,902</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+428	+749	+1,032	0
Different Technique	+730	0	+97	-4
Different Area	+1,254	-1,139	-1,569	0
New Guess	+19	0	0	+82
<b>TOTAL CHANGE</b>	<b>+2,432</b>	<b>-390</b>	<b>-440</b>	<b>+78</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	10,786	0	<b>10,786</b>
Direct Sample Counts and Reliable Dung Counts	48,309	0	<b>48,309</b>
Informed Guesses	4,831	2,592	<b>7,423</b>
Other Guesses	123,197	66,794	<b>189,991</b>
Unassessed Range	33,853	44,423	<b>78,276</b>
<b>TOTAL</b>	<b>220,977</b>	<b>113,809</b>	<b>334,786</b>

## MOZAMBIQUE: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LONG.	LAT.
Banhine National Park	NG	IG3	D	2005	0		Anderson, quest. reply, 2005		6,510	32.9 E	22.8 S
Cabo Delgado Province	—	OG3	E	1998	670		DNFFB, 1999	1	43,780	39.2 E	12.4 S
Cabora Bassa North	DA	AS2	B	2003	1,718	807	Dunham, 2004a	3	3,708	30.7 E	15.4 S
Gilé Game Reserve	—	IG3	D	2002	15	18*	C.P. Ntumi, pers. comm., 2003	3	2,100	38.4 E	16.6 S
Gorongosa National Park	NG	IG3	D	2004	22		Dunham, 2004b	3	3,689	34.3 E	18.8 S
Inhambane Province	—	OG3	E	1998	260		DNFFB, 1999	3	2,235	34.0 E	22.7 S
Limpopo National Park	DT	AT2	A	2006	630		Whyte, 2006	2	10,000	31.9 E	23.3 S
Magoé District	RS	AS2	B	2003	1,628	794	Dunham, 2004a	3	2,621	30.7 E	15.9 S
Manica Province	—	OG3	E	1998	260		DNFFB, 1999	1	36,441	33.5 E	19.1 S
Maputo GR & Futi Corridor	—	IG3	D	2002	200	50*	R. Morley, pers. comm., 2002	3	900	32.7 E	26.6 S
Mecuburi Forest Reserve	—	OG3	E	2002	5	5*	Anderson, quest. reply, 2002	4	195	39.0 E	14.3 S
Moribane-Chimanimani Forest Reserve	—	IG3	D	2002	22		C.P. Ntumi, pers. comm., 2003	4	185	33.4 E	19.5 S
Niassa Game Reserve & Buffer Zone	RS	AS2	B	2004	12,477	2,111	Craig & Gibson, 2004	2	42,612	37.2 E	12.1 S
Quirimbas National Park	NG	OG3	E	2005	2,000		Cumming & Jones, 2005	2	7,845	40.0 E	12.5 S
Sofala Province	—	OG3	E	1999	800	200*	DNFFB, 1999	2	33,138	34.5 E	18.8 S
Tete Province	—	OG3	E	1998	2,260	1650*	DNFFB, 1999	1	63,581	32.5 E	15.5 S
Zambezia Province	—	OG3	E	1998	657		DNFFB, 1999	1	01,289	35.9 E	17.8 S

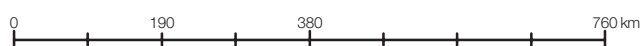
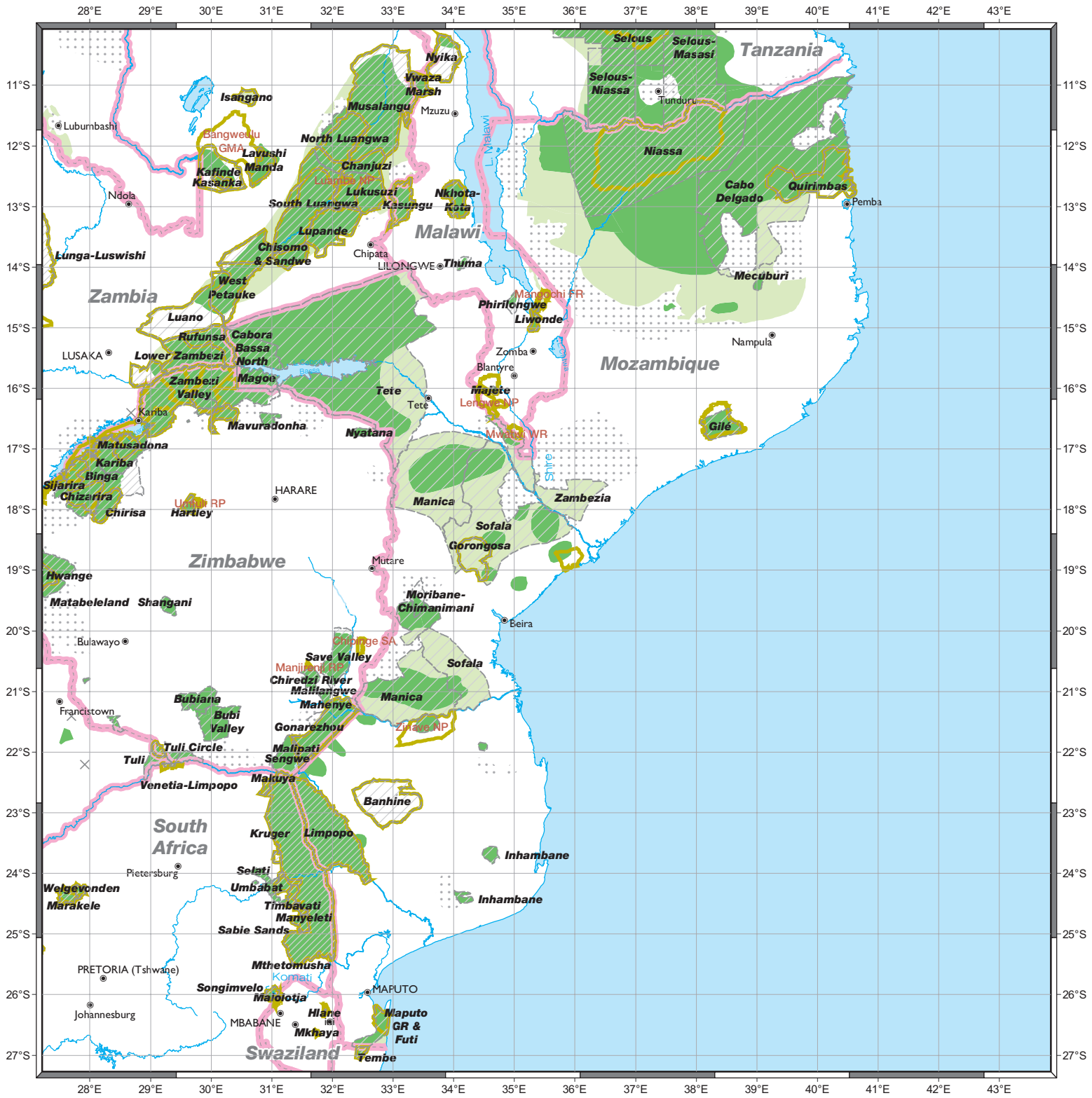
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

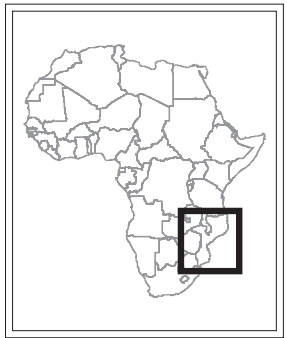
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Mozambique



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

## *Population Data*

An aerial sample count of Niassa Game Reserve and Buffer Zone (Craig & Gibson, 2004) estimated 12,477  $\pm$  2,111 elephants. Although this is lower than the estimate of 13,061  $\pm$  2,433 (Craig & Gibson, 2002) which it replaces, the difference between the two estimates is not statistically significant, and the low carcass counts in both surveys is indicative of a secure population.

Much of the Cabora Bassa North area was surveyed for the first time in 2003 as part of a cross-border aerial sample count covering the Zambezi Valley between Lakes Kariba and Cabora Bassa (Dunham, 2004a). The same survey also covered the Magoe South District, and the estimate for this area replaces a 2002 estimate of 1,264  $\pm$  1,359 from a similar survey (Mackie, 2001). These areas were surveyed again in 2005, but a survey report had not been produced at the time of writing.

The Limpopo National Park was systematically surveyed for the first time in 2006, as part of the regular aerial counts that cover Kruger National Park in South Africa. The estimate of 630 from this survey (Whyte, 2006) replaces an INFORMED GUESS of 150 to 200 (Anderson, quest. reply, 2002).

An aerial sample count of Gorongosa National Park conducted in 2004 failed to detect any elephants within the search strips, but a herd of 20-22 and a single bull were seen when flying back to camp (Dunham, 2004b). These sightings have been entered as an INFORMED GUESS in the table of estimates.

The previous estimate of 8 for Banhine National Park (Anderson, quest. reply, 2002) has been replaced by a new guess of zero, as elephants do not currently occur there (Anderson, quest. reply, 2005). All other estimates have been retained from the previous report.

The number of elephants in the DEFINITE category has increased by nearly 2,450, largely due to the inclusion of the considerably larger area covered by the Cabora Bassa (Magoe) North survey and new survey estimates for Limpopo. An overall increase in precision is responsible for the decreases of around 400 in the PROBABLE and POSSIBLE categories. Less than a fifth of Mozambique's elephant range is covered by good quality estimates, nearly 60% is covered by guesses, and the remaining quarter remains unassessed.

## *Cross-border Movements*

Elephants in the Niassa Game Reserve are part of a transboundary population whose range includes the Selous Game Reserve in Tanzania (Mpanduji et al., 2002), and which constitutes one of the most important populations on the continent.

Although most of the fence separating Limpopo National Park and Kruger National Park in South Africa has yet to be removed, elephants are reported to be moving out of Kruger and into Limpopo and north of it out of their own volition (Anderson, quest. reply, 2005; Marshall, 2005; Peace Parks Foundation, 2006).

It is expected that elephant movement between the Maputo Special Reserve and Tembe Elephant Park in South Africa will resume once the electric fence along Tembe's northern boundary is removed (Peace Parks Foundation, 2006).



# NAMIBIA

## General Statistics

Country area: 825,418 km<sup>2</sup>  
Range area (% of country): 146,921 km<sup>2</sup> (18%)  
Protected area coverage (% of country): 13%  
Protected range (% of known and possible range in protected areas): 23%  
Information Quality Index (IQI): 0.46  
CITES Appendix: II  
Listing Year: 1997

## Current Issues

Namibia has developed a national management plan for elephants. The plan foresees the devolution of authority to landowners, both communal and private, to manage elephants on their land as a pre-requisite for the adoption of successful adaptive co-management. It also calls for range expansion and the removal of veterinary fences that restrict elephant movement, but does not rule out management intervention to reduce populations in the future (Ministry of Environment and Tourism, 2005c).

New conservancies are being created north of Etosha National Park in areas into which elephant range has been expanding. The expansion of elephant range in the northeast, due largely to immigration from Botswana is causing levels of human-elephant conflict to escalate (Martin, 2005b; Ministry of Environment and Tourism, 2005a).

Namibia's proposal to be allowed to export individually marked and certified traditional ivory amulets, known as *ekipas*, for non-commercial purposes was approved at the 13<sup>th</sup> Meeting of the Conference of the Parties to CITES, held in 2004 in Bangkok, Thailand (CITES, 2004). In January 2007 Namibia and Botswana submitted a joint proposal to CITES to maintain their elephant populations, as well as those of South Africa and Zimbabwe, in Appendix II, and to establish annual export quotas for these four countries to trade in raw ivory to approved trading partners (Government of Botswana & Government of Namibia, 2007).

## Range Data

Elephants are only found in the north of the country. While large populations are found in Etosha National Park, Khaudom Game Reserve and the Caprivi region, Namibian elephants range widely in search of water depending on annual rainfall patterns, and have some of the largest home ranges recorded anywhere on the continent (Lindeque, 1995).

Few changes have been made to the range map for this report. Some areas of POSSIBLE range in the Caprivi strip have been re-categorized as KNOWN range (Kolberg, 2004; Martin, 2005b), and KNOWN range has been slightly extended to the northwest of Etosha (C.R. Thouless, pers. comm., 2006) and to the west of Khaudom Game Park (Kolberg, 2004). Five elephants were seen in a survey of the N#a-Jaqna Conservancy, to the southwest of Khaudom, and this sighting is shown as a cross on the map (Kolberg, 2004).

## Population Data

Aerial sample counts of all major elephant populations in Namibia were conducted between 2004 and 2005, as part of Namibia's regular survey programme. A 2004 survey of Etosha National Park estimated 2,057 ± 598 elephants in the park (Kilian & Kolberg, 2004). This replaces a 2002 aerial sample count estimate of 2,417 ± 663 (Kilian, 2003). The difference between the two estimates, however, is not statistically significant.

The estimate for Caprivi, on the other hand, has nearly doubled from the previous estimate of  $4,576 \pm 1,223$  (Ministry of Environment and Tourism, 1998) to  $8,725 \pm 2,206$  (Kolberg, 2004). This significant difference cannot be due to natural population increase alone and is most likely to have been influenced by elephant immigration from Botswana.

The estimate of  $1,966 \pm 973$  for Khaudom/Nyae-Nyae featured in the previous report, which originated from an aerial sample count conducted in 2000 (Craig, 2003), has been replaced by the results of two simultaneous surveys conducted in Khaudom/Kavango and Nyae-Nyae by different survey teams in 2004 (Kolberg, 2004; Stander, 2004). While the Nyae Nyae estimate of  $967 \pm 481$  from the 2004 survey is comparable in magnitude to the estimate of  $755 \pm 554$  from the 2000 survey (Craig, 2003), the 2004 Khaudom/Kavango estimate is nearly three times higher than corresponding estimate from the 2000 survey. This difference cannot be accounted for by natural population increase alone. The area surveyed was larger in 2004 than in 2000, but only by 10%. Thus, the difference in area is unlikely to be a major contributor to the difference in the estimates. Elephants are reported to be moving from Botswana into Khaudom in increasing numbers (Martin, 2005b), and this could account for much of the difference.

An estimate of  $210 \pm 157$  from a 2005 survey in Kunene (Ministry of Environment and Tourism, 2005b) replaces an estimate of  $663 \pm 790$  from an aerial sample count conducted in 2000 (Craig, 2003). Although the area covered in the earlier survey was nearly three times larger, the core elephant range was covered in its entirety in the 2005 survey, and the difference between the two estimates is not statistically significant.

An INFORMED GUESS of 20 for Mangetti Game Reserve (Martin, 2005b) replaces an aerial total count estimate of 19 (Lindeque et al., 1995), which would have otherwise been degraded to the category of OTHER GUESSES, as the estimate is over 10 years old.

The increase in the DEFINITE category is largely the result of new estimates from methodologically comparable surveys, while an overall decrease in precision has resulted in increases in the PROBABLE and POSSIBLE categories. It is worth stressing that all these changes are likely to have been influenced by elephant immigration from Botswana.

Nearly 45% of Namibia's elephant range remains unsurveyed. Although the much of the unsurveyed area is potentially important for elephant movements, only small numbers of elephants are likely to be found there at any one time.

### *Cross-border Movements*

The Caprivi Strip in Namibia is an extension of the northern Botswana population, and provides an important corridor for the movement of elephants between Zimbabwe, Botswana, Zambia and Angola (Craig, 1996a). There may also be movement between other areas in northern Namibia and southern Angola. As elephant range expands in northern Botswana, elephants are moving in increasing numbers into Khaudom/Nyae-Nyae in Namibia (Martin, 2005b).

## SUMMARY TOTALS FOR NAMIBIA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Direct Sample Counts and Reliable Dung Counts	12,531	3,276	3,276	0
Informed Guesses	0	0	20	0
<b>TOTALS 2006</b>	<b>12,531</b>	<b>3,276</b>	<b>3,296</b>	<b>0</b>
<i>TOTALS 2002</i>	<i>7,769</i>	<i>1,872</i>	<i>1,872</i>	<i>0</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+4,760	+2,579	+3,157	0
New Population	+4	+159	+402	0
Different Area	+13	-1,334	-2,205	0
New Guess	-16	0	+70	0
<b>TOTAL CHANGE</b>	<b>+4,762</b>	<b>+1,404</b>	<b>+1,424</b>	<b>0</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Direct Sample Counts and Reliable Dung Counts	73,567	6,964	<b>80,531</b>
Informed Guesses	359	0	<b>359</b>
Unassessed Range	15,082	50,949	<b>66,031</b>
<b>TOTAL</b>	<b>89,008</b>	<b>57,913</b>	<b>146,921</b>

## NAMIBIA: ELEPHANT ESTIMATES

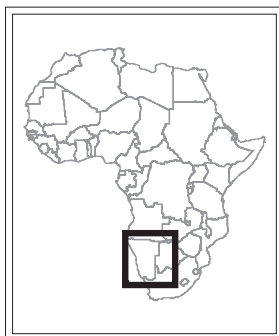
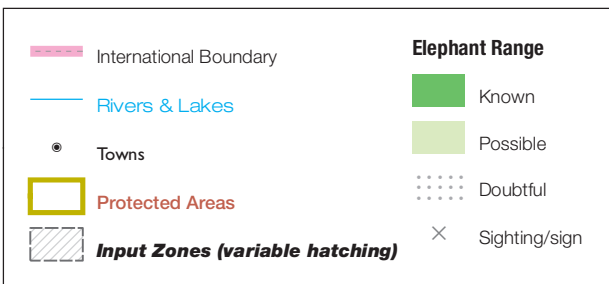
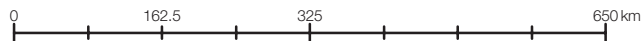
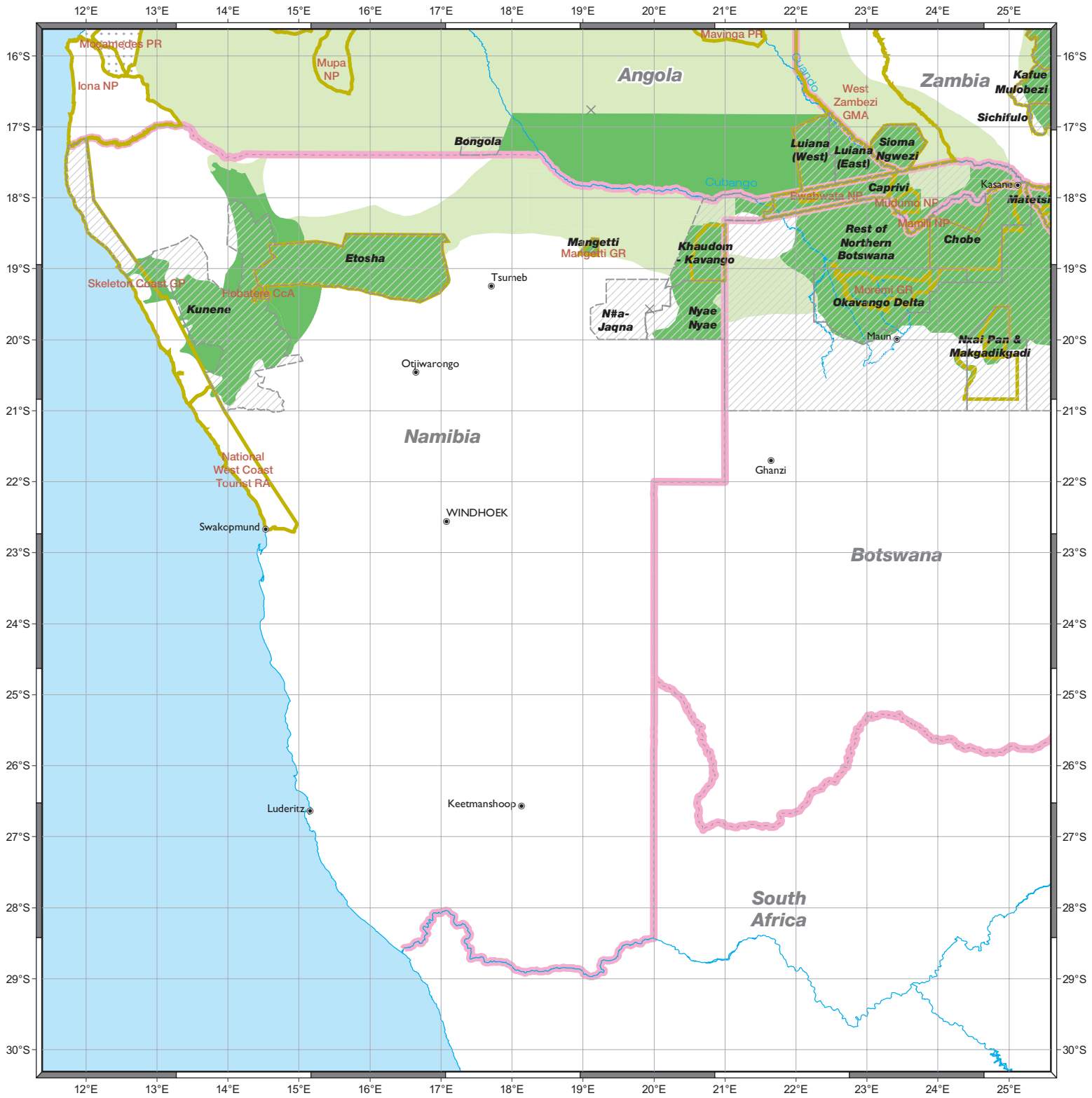
INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Caprivi Region	RS	AS2	B	2004	8,725	2,206	Kolberg, 2004	2	17,943	23.5 E	17.9 S
Etosha National Park	RS	AS1	B	2004	2,057	598	Kilian & Kolberg, 2004	2	18,551	15.9 E	19.0 S
Khaudom - Kavango	RS	AS2	B	2004	3,787	2,289	Kolberg, 2004	2	10,485	20.8 E	18.6 S
Kunene	DA	AS1	B	2005	210	157	MET, 2005b	1	31,144	13.7 E	19.3 S
Mangetti Game Reserve	NG	IG3	D	2005	20		MET, 2005	3	762	19.1 E	18.7 S
N#a-Jaqna Conservancy	NP	AS2	B	2004	61	115	Kolberg, 2004	2	9,143	19.6 E	19.6 S
Nyae Nyae Conservancy	RS	AS1	B	2004	967	481	Stander, 2004	2	2,957	20.5 E	19.6 S

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Namibia



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

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## SOUTH AFRICA

### *General Statistics*

Country area: 1,219,912 km<sup>2</sup>  
Range area (% of country): 30,455 km<sup>2</sup> (2%)  
Protected area coverage (% of country): 4%  
Protected range (% of known and possible range in protected areas): 85%  
Information Quality Index (IQI): 0.96  
CITES Appendix: II  
Listing Year: 2000

### *Current Issues*

As elephant populations in South Africa continue to grow, arguments between those in favour of the resumption of culling and those against it have become increasingly heated (Cumming & Jones, 2005). A consultative process, convened by South African National Parks (SANParks) in 2004, reviewed the opinions of scientists and stakeholders on both sides of the debate (South African National Parks, 2004a, 2005). In 2005, SANParks put forward a recommendation to the Minister of Environmental Affairs and Tourism that culling be resumed (Mabunda, 2005), as envisaged by the Policy for Elephant Management in Kruger National Park (South African National Parks, 2004b). A decision was postponed pending further consultation with an international panel of elephant experts. In 2006, the panel issued a statement of scientific consensus which, rather than supporting a particular management action, recommended the establishment of a long-term research programme to better understand the consequences of any management action that may be taken.

### *Range Data*

South Africa's elephants are confined to protected areas and private reserves, largely in the north and east of the country, although some populations remain – and others are being newly established – in the far south. The largest portion of elephant range falls within and around Kruger National Park, from where most of the elephants in populations elsewhere in the country have been translocated.

Some new areas of **KNOWN** range have been added to the AED as a result of recent translocations and new information. These include the Kapama, Kwandwe, Kariega, Shamwari, Lalibela, Mthetomusha and Great Fish River Game Reserves.

### *Population Data*

A complete update of all populations in South Africa has been obtained from SANParks (Whyte, 2006) and the Elephant Management and Owners Association (Elephant Management and Owners Association, 2005). Most surveys in South Africa are aerial total counts conducted from helicopters, and therefore appear under the **DEFINITE** category in the summary table. The estimates for some reserves for which detailed census methods could not be obtained have been classified as **INFORMED GUESSES**. At the request of their owners, private reserves holding 50 or fewer elephants are grouped under one overall estimate and are not shown on the map.

The elephant population in Kruger National Park and its environs has continued to grow in recent years. At the time of the 2005 census, the population in the park stood at 12,467 elephants (I.J. Whyte, pers. comm., 2005), up by nearly 2,000 from the figure of 10,459 featured in the previous report. The slightly lower estimate of 12,427 from the 2006 survey (Whyte, 2006), featured in this report, is likely to have resulted from net emigration to neighbouring private reserves and the Limpopo National Park in Mozambique. The population in the entire Kruger ecosystem, including the surrounding private reserves, increased from 12,439 in 2002, to 14,735 in 2005 (I.J. Whyte, pers. comm., 2005), and then to 15,387 in 2006 (Whyte, 2006).

The population at Addo Elephant National Park has also continued to increase, from 337 in 2002 to 459 in 2005. As a result of higher estimates from these and other populations, the number of elephants in the DEFINITE category has increased by nearly 3,800 compared to the previous report.

### *Cross-border Movements*

Movement of elephants out of Kruger National Park into Mozambique is reported to have increased recently (Anderson, quest. reply, 2005), facilitated by the removal of an additional 30 km of the fence that separates Kruger from Limpopo National Park in Mozambique.

Elephants from Botswana and possibly Zimbabwe have moved into the Mapungubwe National Park, raising some concern about their potential impact on woodlands (South African National Parks, 2006).



## SUMMARY TOTALS FOR SOUTH AFRICA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	17,501	0	0	0
Informed Guesses	346	0	638	22
<b>TOTALS 2006</b>	<b>17,847</b>	<b>0</b>	<b>638</b>	<b>22</b>
<i>TOTALS 2002</i>	<i>14,071</i>	<i>0</i>	<i>855</i>	<i>0</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+3,489	0	0	0
New Population	+180	0	0	0
Different Technique	+71	0	-100	0
New Guess	+36	0	-51	+22
Population Lost	0	0	-66	0
<b>TOTAL CHANGE</b>	<b>+3,776</b>	<b>0</b>	<b>-217</b>	<b>+22</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Total Range
Aerial or Ground Total Counts	29,204	<b>29,204</b>
Informed Guesses	1,251	<b>1,251</b>
<b>TOTAL</b>	<b>30,455</b>	<b>30,455</b>

## SOUTH AFRICA: ELEPHANT ESTIMATES

INPUT_ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LONG.	LAT.
Addo Elephant National Park	RS	IR1	A	2005	459		EMOA, 2005	2	1,250	25.5 E	33.3 S
Atherstone Nature Reserve	RS	AT3	A	2005	60		EMOA, 2005	3	136	26.8 E	24.5 S
Balule Nature Reserve	RS	AT3	A	2006	457		Whyte, 2006	3	400	31.0 E	24.2 S
Great Fish River Reserve Complex	NP	IR1	A	2005	2		EMOA, 2005	3	440	26.8 E	33.1 S
Greater St Lucia Wetland Park (Managed Nature Reserve)	RS	AT3	A	2005	45		EMOA, 2005	3	539	32.5 E	27.9 S
Hluhluwe-Imfolozi Game Reserve	NG	IG3	D	2004	346	22*	EMOA, 2005	2	965	31.9 E	28.3 S
Itala Nature Reserve	RS	GT1	A	2005	84		EMOA, 2005	3	297	31.3 E	27.5 S
Kapama Private Game Reserve	NP	IR1	A	2005	36		EMOA, 2005	3	246	31.1 E	24.4 S
Kariega Private Game Reserve	NP	IR1	A	2005	11		EMOA, 2005	3	190	26.7 E	33.5 S
Klaserie Private Nature Reserve	RS	AT2	A	2006	569		Whyte, 2006	2	628	31.2 E	24.2 S
Knysna Forest Reserve	RS	IR1	A	2005	4		EMOA, 2005	3	126	23.0 E	34.0 S
Kruger National Park	RS	AT2	A	2006	12,427		Whyte, 2006	1	19,624	31.5 E	24.0 S
Kwandwe Private Game Reserve	NP	IR1	A	2005	29		EMOA, 2005	3	158	26.6 E	33.1 S
Lalibela Private Game Reserve	NP	IR1	A	2005	11		EMOA, 2005	3	75	26.2 E	33.5 S
Letaba Game Ranch	PL	GT1	A	2006	0		Whyte, 2006		420	31.1 E	23.7 S
Madikwe Nature Reserve	RS	AT3	A	2005	455		EMOA, 2005	2	700	26.3 E	24.8 S
Makalali Private Game Reserve	RS	GT1	A	2005	72		EMOA, 2005	3	140	30.7 E	24.2 S
Makuya National Park	RS	AT2	A	2006	54		Whyte, 2006	3	165	30.9 E	22.6 S
Manyeleti Game Reserve	DT	AT2	A	2006	71		Whyte, 2006	3	228	31.5 E	24.6 S
Marakele National Park	RS	IR1	A	2005	110		EMOA, 2005	3	380	27.6 E	24.4 S
Mkuzi Game Reserve	RS	IR1	A	2005	37		EMOA, 2005	3	380	32.3 E	27.7 S
Mthetomusha Nature Reserve	NP	IR1	A	2005	30		EMOA, 2005	3	80	31.3 E	25.5 S
Phalaborwa Mining Company	RS	AT2	A	2006	77		Whyte, 2006	4	41	31.2 E	24.0 S
Pilanesberg National Park	RS	AT3	A	2005	140		EMOA, 2005	3	553	27.1 E	25.2 S
Pongola Nature Reserve	RS	IR1	A	2005	55		EMOA, 2005	3	119	32.0 E	27.4 S
Private Reserves	NG	IG3	D	2005	578		EMOA, 2005	1	4,000	Not	Shown
Sabie Sands Game Reserve	RS	AT2	A	2006	857		Whyte, 2006	3	572	31.5 E	24.8 S
Selati Game Reserve	RS	GT1	A	2005	85		EMOA, 2005	3	300	30.8 E	24.0 S
Shamwari Game Reserve	NP	IR1	A	2005	61		EMOA, 2005	3	200	26.1 E	33.4 S
Songimvelo Game Reserve	NG	IG3	D	2005	60		EMOA, 2005	2	490	31.0 E	26.0 S
Tembe Elephant Park	RS	IR1	A	2005	167		Morley, 2005	3	300	32.5 E	26.9 S
Timbavati Private Nature Reserve	RS	AT2	A	2006	712		Whyte, 2006	3	494	31.3 E	24.4 S
Umbabat Private Nature Reserve	RS	AT2	A	2006	163		Whyte, 2006	3	144	31.4 E	24.1 S
Venetia-Limpopo National Park	RS	AT3	A	2005	61		EMOA, 2005	3	91	29.3 E	22.2 S
Welgevonden Private Game Reserve	RS	AT3	A	2005	100		EMOA, 2005	3	330	27.8 E	24.3 S

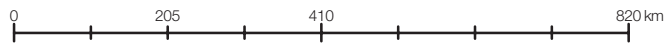
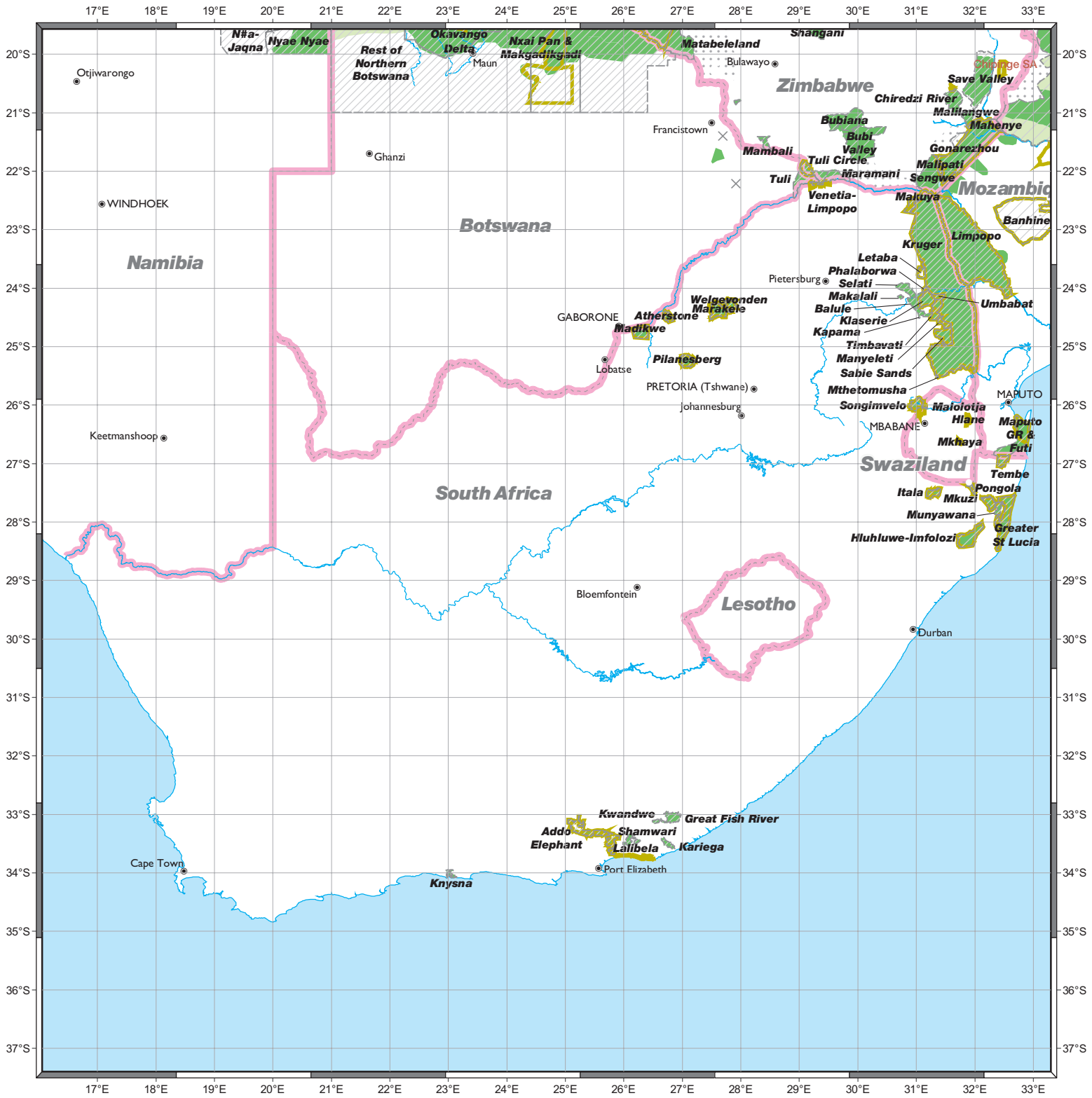
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

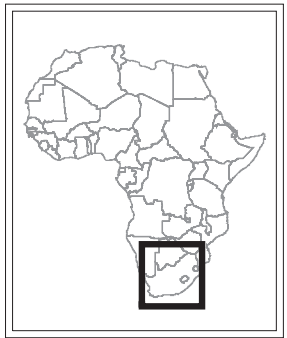
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# South Africa



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# SWAZILAND

## *General Statistics*

Country area: 17,360 km<sup>2</sup>  
Range area (% of country): 50 km<sup>2</sup> (1%)  
Protected area coverage (% of country): 5%  
Protected range (% of known and possible range in protected areas): 81%  
Information Quality Index (IQI): 1.00  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Conservation priorities in the Hlane and Mkhaya parks concentrate on the black rhino population and tree-nesting vultures, and the management aims to minimize impact on these species by controlling elephant numbers (Reilly, quest. reply, 2005).

Three elephants in Malolotja Nature Reserve, originally from the adjacent Songimvelo Nature Reserve in South Africa, are reported to be coming into conflict with communities to the east of the reserve (Reilly, quest. reply, 2005) and to be causing some impact on the woodland within Malolotja (Mtui & Owen-Smith, 2006).

There is ongoing controversy between the Swaziland National Trust Commission (SNTC), Yonge Nawe – a local environmental NGO – and Big Game Parks of Swaziland (BGP), which manages the Hlane and Mkhaya parks. SNTC and Yonge Nawe have challenged the status of BGP as Swaziland's delegated CITES national management and scientific authority and have questioned plans for the enlargement of Mkhaya (Douglas Consulting & LKM, 2004; Reilly, quest. reply, 2005).

## *Range Data*

Elephant distribution is well understood in Swaziland, being mainly restricted to fenced enclosures within Hlane Royal National Park and Mkhaya Game Reserve. The enclosures only occupy a fraction of the reserves (6% and 19% respectively).

Three elephants from Songimvelo Game Reserve in South Africa use the Komati Valley in the Malolotja Nature Reserve as part of their range (Reilly, quest. reply, 2005). This area has been added to the map as KNOWN range.

## *Population Data*

Individual registration of all elephants is maintained for the Hlane and Mkhaya populations. Eleven elephants from these two reserves were exported to zoos in the United States in 2003 (Reilly, quest. reply, 2005). The consequent reduction in the population figures from the 39 reported in the AESR 2002 is reflected in the summary table. An estimate of three elephants from Malolotja Nature Reserve has been added to the table of estimates (Reilly, quest. reply, 2005).

## *Cross-border Movements*

In January 2005 an elephant from the Pongola Nature Reserve in South Africa crossed into Swaziland near Lavumisa and moved north past Maloma to Kubuta, where it turned back and returned to Pongola after being radio-collared in Swaziland (Reilly, quest. reply, 2005).

## SUMMARY TOTALS FOR SWAZILAND

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	28	0	0	0
Informed Guesses	3	0	0	0
<b>TOTALS 2006</b>	<b>31</b>	<b>0</b>	<b>0</b>	<b>0</b>
<i>TOTALS 2002</i>	<i>39</i>	<i>0</i>	<i>0</i>	<i>0</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	-11	0	0	0
New Population	+3	0	0	0
<b>TOTAL CHANGE</b>	<b>-8</b>	<b>0</b>	<b>0</b>	<b>0</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Total Range
Aerial or Ground Total Counts	22	<b>22</b>
Informed Guesses	28	<b>28</b>
<b>TOTAL</b>	<b>50</b>	<b>50</b>

## SWAZILAND: ELEPHANT ESTIMATES

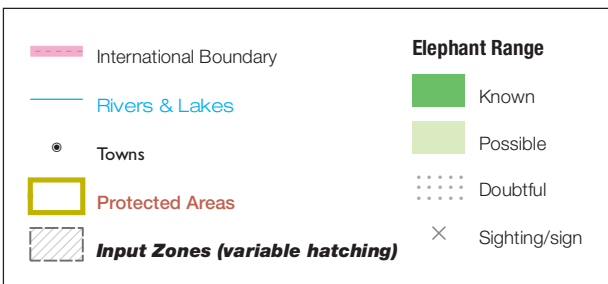
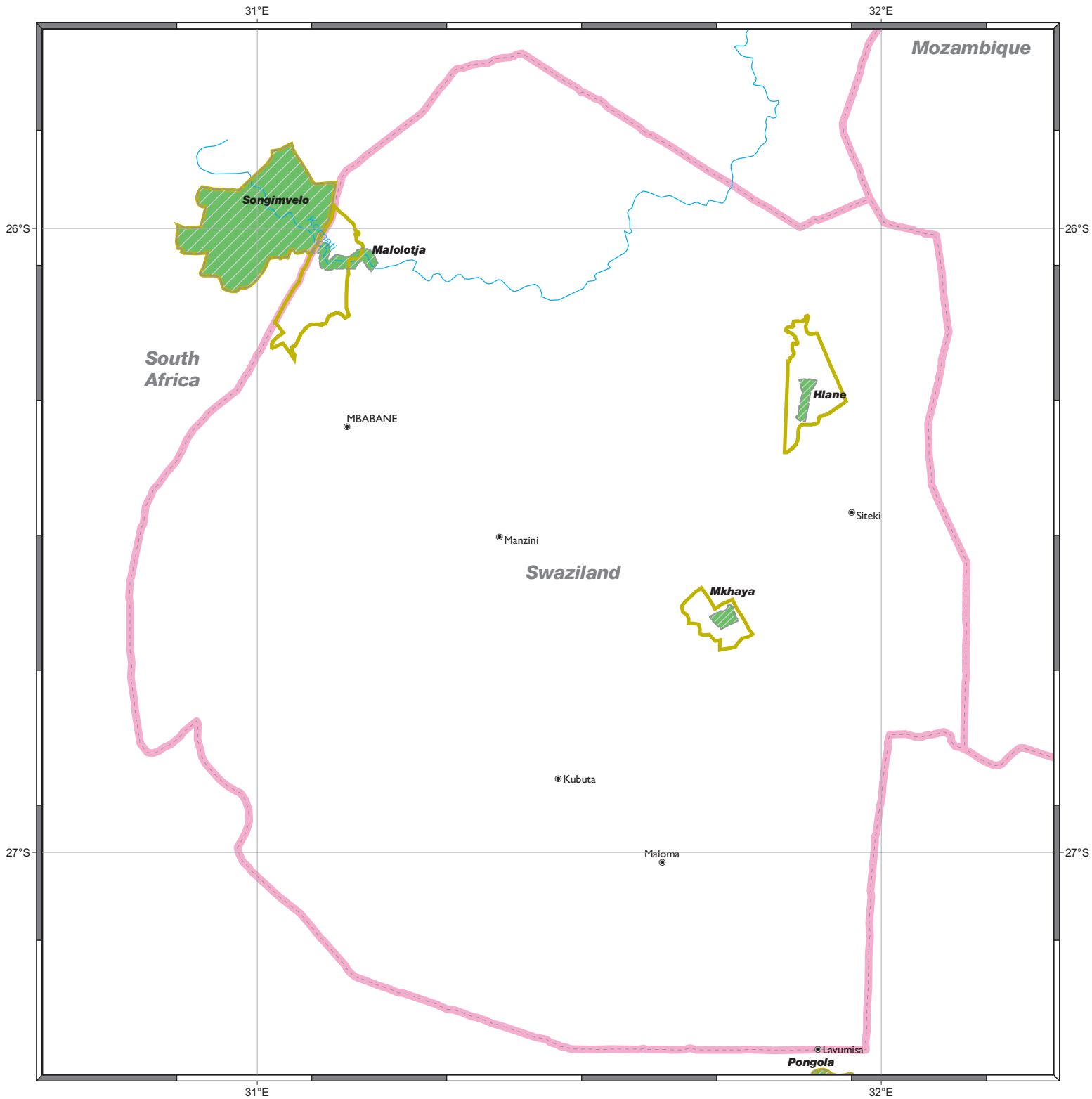
INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Hlane Royal National Park	<b>RS</b>	IR1	A	2005	13		Reilly, quest. reply, 2005	1	142	31.9 E	26.3 S
Malolotja Nature Reserve	<b>NP</b>	IG3	D	2005	3		Reilly, quest. reply, 2005	1	28	31.1 E	26.0 S
Mkhaya Nature Reserve	<b>RS</b>	IR1	A	2005	15		Reilly, quest. reply, 2005	1	65	31.7 E	26.6 S

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Swaziland



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# ZAMBIA

## *General Statistics*

Country area: 752,610 km<sup>2</sup>  
Range area (% of country): 201,247 km<sup>2</sup> (28%)  
Protected area coverage (% of country): 31%  
Protected range (% of known and possible range in protected areas): 77%  
Information Quality Index (IQI): 0.47  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

In 2003 Zambia developed a national Elephant Policy and Action Plan (Ministry of Tourism, Environment and Natural Resources, 2003). The policy identifies human-elephant conflict and poaching as the major threats to elephant populations in Zambia, and proposes improved land use planning, decentralized decision-making processes and revenue sharing from the sustainable use of elephants as the principal means to mitigate these problems.

As envisaged by the policy, and after a ban of 21 years, sport hunting of elephants was reopened in August 2005, and Zambia notified the CITES Secretariat that it would maintain an annual export quota of 40 tusks (20 animals) as hunting trophies (UNEP-WCMC, 2006).

## *Range Data*

Elephants in Zambia are distributed in four major populations, namely in the Luangwa Valley, the Kafue ecosystem and nearby West Lunga, the Lower Zambezi Valley and Sioma Ngwezi and its environs. A number of smaller populations are scattered along the country's borders.

The shape of the range map for Zambia has not changed substantially since the last report, but a number of areas have been categorized as **DOUBTFUL** range. These include an area along the shores of Lake Kariba (G.C. Craig, pers. comm., 2006; Ministry of Tourism, Environment and Natural Resources, 2003), a strip adjacent to the Mukungule Game Management Area (E. van der Westhuizen, pers. comm., 2006), and two areas on the eastern side of the Luangwa Valley, where human population density is estimated to exceed 15 persons per km<sup>2</sup> (ORNL/GIST, 2002; see Introduction section for details on rationale).

## *Population Data*

Most of the Luangwa Valley has been systematically surveyed in the last five years. Two aerial sample counts were conducted in North Luangwa National Park and surrounding areas, in 2003 (van der Westhuizen, 2003) and 2005. The result from the latter survey, however, is believed to be a considerable overestimate, perhaps caused by the use of a different survey crew (E. van der Westhuizen, pers. comm., 2006). For this reason, the results of the 2003 survey have been used in this report, replacing an aerial total count conducted in 2000 (Aucamp, 2000). The elephant population in North Luangwa is currently believed to be stable or increasing (E. van der Westhuizen, pers. comm., 2006).

A 2004 aerial sample count covered several game management areas in the Luangwa Valley (Simwanza, 2004b). This survey excluded the Luambe National Park, last surveyed by Jachmann (1999a), when it was counted as a single block together with the southern sector of Lumimba Game Management Area. This southern sector was included in the 2004 survey and appears on the table as Mwanya hunting block. Despite occasional sightings, elephants have been largely absent from Luambe National Park for many years. For this reason, the 1999 estimate for Luambe has been removed from the table of estimates. There are nevertheless reports that elephants are beginning to return to Luambe, and it would be important for this park to be systematically surveyed as part of an ecosystem-wide survey of the Luangwa Valley.



## SUMMARY TOTALS FOR ZAMBIA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Direct Sample Counts and Reliable Dung Counts	16,229	5,899	5,899	0
Other Dung Counts	27	49	9	0
Informed Guesses	306	0	0	0
Other Guesses	0	0	0	813
<b>TOTALS 2006</b>	<b>16,562</b>	<b>5,948</b>	<b>5,908</b>	<b>813</b>
<i>TOTALS 2002</i>	<i>12,457</i>	<i>6,961</i>	<i>7,631</i>	<i>235</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+1,953	+37	-45	0
New Population	+36	-85	+179	0
Different Technique	-41	+1,100	-1,632	0
Different Area	+1,806	-2,029	-231	0
New Guess	+326	0	0	+119
New Analysis	+29	-37	+5	+477
Data Degraded	-3	0	0	-19
<b>TOTAL CHANGE</b>	<b>+4,105</b>	<b>-1,013</b>	<b>-1,723</b>	<b>+578</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Direct Sample Counts and Reliable Dung Counts	109,944	5,143	<b>115,087</b>
Other Dung Counts	482	0	<b>482</b>
Informed Guesses	75	0	<b>75</b>
Other Guesses	6,851	734	<b>7,585</b>
Unassessed Range	1,204	76,814	<b>78,018</b>
<b>TOTAL</b>	<b>118,556</b>	<b>82,692</b>	<b>201,247</b>

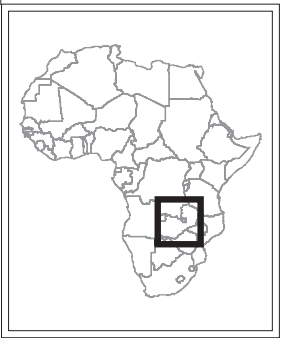
## ZAMBIA: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Chanjuzi Hunting Block	<b>RS</b>	AS3	B	2004	65	81	Simwanza, 2004b	3	600	32.6 E	12.3 S
Chiawa Game Management Area	<b>RS</b>	AS2	B	2003	45	53	Dunham, 2004a	3	900	28.9 E	15.8 S
Chisomo & Sandwe Game Management Area	—	AS2	B	1999	128	155	Jachmann & Phiri, 1999a	3	750	30.9 E	13.8 S
Isangano National Park	DD	GT1	E	1993	3		Tembo, quest. reply, 1993	3	840	30.6 E	11.2 S
Kafinde Game Management Area	—	IG3	E	1991	50		Tembo, quest. reply, 1993	2	3,860	30.1 E	12.4 S
Kafue National Park	<b>DA</b>	AS2	B	2004	6,306	5,227	Simwanza, 2004a	2	22,400	25.9 E	15.2 S
Kasanka National Park	NA	DC2	C	1999	76	9	Jachmann & Phiri, 1999b	3	390	30.2 E	12.6 S
Kasonso-Busanga Game Management Area	<b>RS</b>	AS2	B	2004	401	378	Simwanza, 2004a	2	7,780	25.6 E	14.1 S
Katokota Game Ranch	—	AT3	E	1991	19		Tembo, quest. reply, 1993	5	15	28.0 E	16.8 S
Lavushi Manda National Park	—	IG3	E	1991	15		Tembo, quest. reply, 1993	3	1,500	30.8 E	12.4 S
Lower Zambezi National Park	<b>RS</b>	AS2	B	2003	1,477	744	Dunham, 2004a	2	4,084	29.7 E	15.5 S
Luano Game Management Area	—	IG3	E	1996	150		Jachmann, 1996	2	8,930	29.6 E	14.8 S
Luawata Hunting Block	<b>RS</b>	AS2	B	2003	968	652	van der Westhuizen, 2003	3	1,092	31.9 E	12.3 S
Lukusuzi National Park	<b>RS</b>	AS1	B	2005	0	0	Fourie et al., 2005		3,200	32.6 E	12.8 S
Lunga-Luswishi Game Management Area	<b>RS</b>	AS2	B	2004	195	169	Simwanza, 2004a	2	13,340	26.9 E	13.8 S
Lupande Game Management Area	—	AS2	B	2002	975	586	Dunham & Simwanza, 2002	2	4,959	32.0 E	13.3 S
Mosi-oa-Tunya National Park	NG	IG3	D	2006	306		Chase, 2006	4	66	25.8 E	17.9 S
Mukungule Game Management Area	<b>RS</b>	AS2	B	2003	156	119	van der Westhuizen, 2003	3	788	32.0 E	11.7 S
Mulobezi Game Management Area	<b>RS</b>	AS2	B	2004	55	96	Simwanza, 2004a	2	3,420	25.4 E	16.5 S
Mumbwa Game Management Area	<b>DT</b>	AS2	B	2004	181	208	Simwanza, 2004a	2	3,370	26.4 E	15.1 S
Musalangu Game Management Area	<b>DA</b>	AS2	B	2004	1,011	898	Simwanza, 2004b	3	2,190	32.8 E	11.2 S
Mwanya Hunting Block	<b>DA</b>	AS3	B	2004	503	237	Simwanza, 2004b	3	860	32.3 E	12.7 S
Mweru wa Ntipa Ecosystem	<b>NP</b>	AS2	B	2003	0		Simwanza, 2003		7,274	29.8 E	8.7 S
Namwala Game Management Area	<b>DT</b>	AS2	B	2004	127	134	Simwanza, 2004a	2	3,600	26.3 E	15.5 S
Nchete Island Wildlife Sanctuary	—	AT3	E	1991	49		Tembo, quest. reply, 1993	4	25	27.6 E	17.4 S
Nkala Game Management Area	<b>NP</b>	AS2	B	2004	210	306	Simwanza, 2004a	4	194	26.0 E	16.0 S
North Luangwa National Park	<b>RS</b>	AS3	B	2003	3,235	695	van der Westhuizen, 2003	2	4,688	32.2 E	11.9 S
Nsumbu National Park	<b>DT</b>	AS2	B	2003	65	92	Simwanza, 2003	3	2,063	30.4 E	8.8 S
Nyampala Game Management Area	<b>DA</b>	AS2	B	2004	284	133	Simwanza, 2004b	4	330	31.7 E	12.5 S
Rufunsa Game Management Area	<b>RS</b>	AS2	B	2003	0		Dunham, 2004a		3,128	30.0 E	15.2 S
Sekula Island Wildlife Sanctuary	—	AT3	E	1991	7		Tembo, quest. reply, 1993	5	10	27.5 E	17.4 S
Sichifulo Game Management Area	<b>RS</b>	AS2	B	2004	0		Simwanza, 2004a		3,600	25.7 E	16.8 S
Sioma Ngwezi National Park	<b>RS</b>	AS2	B	2005	385	371	Chase & Griffin, 2005b	2	4,377	23.4 E	17.3 S
South Luangwa National Park	—	AS2	B	2002	4,459	1,519	Dunham & Simwanza, 2002	2	8,448	31.6 E	13.1 S
West Lunga National Park	—	AS3	E	1996	520		C.M. Phiri, pers. comm., 1998	3	1,684	24.8 E	12.8 S
West Petauke Game Management Area	—	AS2	B	1999	897	1,399	Jachmann & Phiri, 1999a	3	905	30.3 E	14.3 S

# Zambia



	International Boundary	<b>Elephant Range</b>		Known
	Rivers & Lakes		Possible	
	Towns		Doubtful	
	Protected Areas		Sighting/sign	
	<b>Input Zones (variable hatching)</b>			



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

South Luangwa National Park has not been surveyed since 2002, and the estimate shown on the table has been retained from the previous report. A 2005 aerial survey of Lukusuzi National Park failed to find any elephants in the park (Fourie et al., 2005), and an estimate of zero appears on the table.

An aerial sample count was conducted in the Kafue ecosystem in 2004 (Simwanza, 2004a). Estimates from this survey replace a number of ground and aerial sample counts conducted between 1997 and 2001 (Fairall & Kampamba, 2001; Jachmann, 2000; Zyambo, 1997). Another aerial sample count covering much of Kafue National Park, conducted in two stages between September and November 2004, gave a combined estimate of  $1510 \pm 61$  (van Aarde & Guldemon, 2004; van Aarde et al., 2004). Elephant density for the extreme northern sector of the park, which was not covered in the survey, was extrapolated from the rest of the survey area to yield an overall estimate of  $1,738 \pm 355$ . This survey, however, suffered from technical and design limitations, and has not been used for this report.

The Lower Zambezi National Park was surveyed, together with its surrounding Game Management Areas, as part of a 2003 transboundary survey that also covered adjacent areas in Mozambique and Zimbabwe (Dunham, 2004a). The results of this survey replace estimates from methodologically comparable surveys conducted by Phiri (1996). These areas were surveyed again in 2005, but a survey report had not been produced at the time of writing.

Three aerial sample counts were conducted in Sioma Ngwezi National Park since the last report: one in January 2004, which returned an estimate of  $1,212 \pm 920$  (Chase et al., 2004), another in August 2004 ( $899 \pm 755$ ) and a third in November 2005 ( $385 \pm 389$ ) (Chase & Griffin, 2005b). Despite being lower than the previous two, the estimate from the most recent (2005) survey is shown in the table of estimates. The use of this result, which replaces an estimate of 250 (Mwiya, 1996) is justified by the fact that none of the differences between the estimates from the last three surveys are statistically significant. This lack of significance is due to the wide confidence limits in all three estimates, which may have been brought about by elephant distribution clustering around the centre of the park (Chase et al., 2004).

The Mweru wa Ntipa ecosystem was surveyed in its entirety for the first time in 2003 (Simwanza, 2003). The survey also covered the Nsumbu National Park, the population of which had last been estimated at 45 in 1998 (L. Saiwana, pers. comm., 1998).

The number of elephants in the DEFINITE category has increased by over 4,100 from the previous report, whereas the PROBABLE and POSSIBLE categories have declined by about 1,000 and 1,700 respectively. These changes arise from methodologically comparable surveys, as well as from surveys conducted over different areas or using different techniques. While nearly 60% of Zambia's estimated elephant range is currently covered by good quality estimates, no figures are available for most of the remaining range. It is likely, however, that a more detailed knowledge of elephant presence around protected areas will cause the proportion of unassessed range to decline.

### *Cross-border Movements*

Elephant range in southwestern Zambia is contiguous with range in Angola's Luiana Reserve (Chase & Griffin, 2005b) and with northern Botswana through the Caprivi Strip in Namibia. Elephant movement also occurs between Zambia, Zimbabwe and Mozambique in the Zambezi Valley. It is not known whether movement continues between the North Luangwa ecosystem and Kasungu National Park in Malawi.

# ZIMBABWE

## *General Statistics*

Country area: 390,580 km<sup>2</sup>  
Range area (% of country): 76,931 km<sup>2</sup> (29%)  
Protected area coverage (% of country): 13%  
Protected range (% of known and possible range in protected areas): 58%  
Information Quality Index (IQI): 0.91  
CITES Appendix: II  
Listing Year: 1997

## *Current Issues*

The Department of National Parks and Wildlife Management completed its transition into the present National Parks and Wildlife Management Authority (NPWMA) in 2004. The new authority is no longer funded from the national budget and must raise its own revenue. Major cuts in NPWMA's operating budget have been necessitated by a decline in tourist revenues in recent years, and this has resulted in a decreased capacity to manage elephant populations.

Three consecutive droughts between 2002 and 2005 caused a number of elephants in Hwange and other areas to die of starvation (Dunham et al., 2006b). This, together with reports of an increasing incidence in human-elephant conflict, kindled the debate on whether elephant numbers should be reduced through culling.

Poaching in the Sebungwe region is reported to have increased in recent years. A recent survey of the area recorded a 2.5-fold increase in the number of dead elephants since 2001, suggesting a notable increase in elephant mortality in the last five years. A high incidence in illegal activity was also recorded in parts of survey zone, suggesting that illegal killing is at least partly responsible for the estimated increase in elephant mortality (Dunham et al., 2006a).

## *Range Data*

The majority of Zimbabwe's elephants are found in and around protected areas along the borders with neighbouring countries. There are four major populations, namely Northwest Matabeleland, Sebungwe, the Zambezi Valley and Gonarezhou. Most of the central highveld and eastern highlands are extensively settled and farmed, and have long been devoid of elephants.

All areas previously depicted as POSSIBLE range have been categorized as DOUBTFUL based on Landsat 2002 human population density data (ORNL/GIST, 2002; see Introduction section for rationale) and information provided by C. Craig (2006). The area corresponding to Matibi II communal lands was incorrectly depicted as range in previous reports, but now appears as DOUBTFUL range. No other changes have been made to the range map.

## *Population Data*

A survey of Northwest Matabeleland in 2006 could not be completed due to technical difficulties, and only covered 65% of the area surveyed in previous counts (Dunham et al., 2006b). The estimate for the areas covered, which excluded the northern sectors of Hwange National Park and the Matetsi complex, was 25,087 ± 5,301. This is not significantly different from the estimate of 26,602 ± 4,155 for the exact same areas obtained in the previous survey, conducted in 2001 (Dunham, 2002). In view of this, estimates from the 2001 survey have been retained from the previous report. Nevertheless, it is worth noting that the 2006 survey recorded a considerable increase in the carcass ratio (i.e., the proportion of dead to dead plus live elephants), from 3.2% in 2001 to 5.6% in 2006. A tenth of the estimated number of dead elephants in the 2006 survey were found to have their tusks intact, suggesting that they may have died of natural causes, possibly drought-related (Dunham et al., 2006b).

An aerial sample count of the Sebungwe region conducted in late 2006 (Dunham et al., 2006a) gave an overall estimate of  $15,024 \pm 2,133$ . Results from this survey replace estimates from a methodologically comparable survey conducted in 2001 (Mackie, 2002b). Although considerable increases in elephant mortality and illegal activities were recorded, with a carcass ratio of 15.6% for the study area (see Current Issues above), the estimate of live elephants in 2006 did not differ significantly from that in 2001 (Dunham et al., 2006a).

The Zambezi Valley area was surveyed as part of a 2003 aerial sample count that also included adjacent populations in Mozambique and Zambia. This survey returned an estimate of  $19,981 \pm 2,392$  for the Zimbabwe portion (Dunham, 2004a), and the estimate replaces a 2001 aerial sample count estimate of  $19,227 \pm 2,493$ . Another survey of the same area was conducted in 2005, but no report had yet been produced at the time of writing.

An aerial survey of Gonarezhou was planned for 2006, but had to be postponed until 2007 due to technical difficulties. An aerial sample count of the Save Valley Conservancy, conducted in 2003, gave an estimate of  $527 \pm 310$  (Dunham, 2003), and this replaces the previous aerial sample count estimate of  $535 \pm 318$ .

Both the AED 1998 and the AESR 2002 showed an incorrect estimate of 33 elephants for Matibi II communal lands. The correct estimate of zero (Davies et al., 1996) is now shown in the table of estimates.

Estimates from surveys conducted since the previous report, all of which are comparable in design and intensity to previous counts, have resulted in an increase of about 2,850 in the DEFINITE category. The marginal decline in the PROBABLE and POSSIBLE categories is brought about by a minor increase in precision and the correction of the Matibi II estimate.

### *Cross-border Movements*

All of Zimbabwe's major elephant populations are located along the border with neighbouring countries, and movements can be expected to take place across all of them, except across Lake Kariba (Cumming & Jones, 2005; Dunham et al., 2006a). The population in Hwange National Park and surrounding areas is part of a much larger population that spans the borders of Zimbabwe, Botswana, Namibia (Cumming & Jones, 2005) and perhaps also Angola. Elephants are also known to move between Zimbabwe, Zambia and Mozambique along the Zambezi Valley in the north, and to Botswana and South Africa in the south (Selier et al., 2002).

## SUMMARY TOTALS FOR ZIMBABWE

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	236	0	0	0
Direct Sample Counts and Reliable Dung Counts	83,991	7,033	7,033	0
Informed Guesses	189	0	334	91
Other Guesses	0	0	0	200
<b>TOTALS 2006</b>	<b>84,416</b>	<b>7,033</b>	<b>7,367</b>	<b>291</b>
<i>TOTALS 2002</i>	<i>81,555</i>	<i>7,039</i>	<i>7,373</i>	<i>291</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+2,864	-4	-4	0
New Analysis	-3	-2	-2	0
<b>TOTAL CHANGE</b>	<b>+2,861</b>	<b>-6</b>	<b>-6</b>	<b>0</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	2,998	0	<b>2,998</b>
Direct Sample Counts and Reliable Dung Counts	63,671	0	<b>63,671</b>
Informed Guesses	6,746	0	<b>6,746</b>
Other Guesses	2,423	0	<b>2,423</b>
Unassessed Range	717	375	<b>1,092</b>
<b>TOTAL</b>	<b>76,555</b>	<b>375</b>	<b>76,931</b>

## ZIMBABWE: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LONG.	LAT.
Binga Communal Lands	RS	AS2	B	2006	431	373	Dunham et al., 2006a	2	2,217	27.9 E	17.4 S
Bubi Valley Conservancy	—	IG3	D	2001	53		Dunham & Mackie, 2002	2	2,895	30.1 E	21.5 S
Bubiana Conservancy	—	IG3	D	2001	50	50*	Dunham & Mackie, 2002	2	1,772	29.8 E	21.1 S
Chete Safari Area	RS	AS2	B	2006	971	310	Dunham et al., 2006a	3	1,260	27.8 E	17.4 S
Chewore IV	—	AS1	B	2001	580	335	Mackie, 2002a	3	610	29.9 E	16.2 S
Chiredzi River Conservancy	—	GT1	A	2001	28		Dunham & Mackie, 2002	3	895	31.6 E	20.8 S
Chirisa Safari Area	RS	AS2	B	2006	4,231	1,260	Dunham et al., 2006a	2	1,529	28.3 E	17.9 S
Chizarira National Park	RS	AS1	B	2006	3,071	1,117	Dunham et al., 2006a	2	2,084	27.9 E	17.8 S
Doma Safari Area	—	AS2	B	2001	336	383	Mackie, 2002a	3	975	30.2 E	16.4 S
Gonarezhou National Park	—	AS2	B	2001	4,987	1,577	Dunham & Mackie, 2002	2	4,987	31.9 E	21.6 S
Hartley Safari Area	—	IG3	D	2001	100	20*	Dunham & Mackie, 2002	3	445	29.6 E	17.9 S
Home Farm & Greystone Ranches	—	IG3	D	2001	3	1*	Dunham & Mackie, 2002	4	60	27.9 E	20.8 S
Hwange National Park & Safari Area	—	AS2	B	2001	44,492	5,770	Dunham & Mackie, 2002	2	12,900	26.6 E	19.1 S
Kariba Communal Lands	RS	AS2	B	2006	3,715	1,033	Dunham et al., 2006a	2	3,224	28.4 E	17.1 S
Kavira Forest Land	—	IG3	D	2001	100		Dunham & Mackie, 2002	3	287	27.0 E	18.1 S
Lusulu	—	AS2	B	2001	33	63	Mackie, 2002b	3	543	27.8 E	18.0 S
Mahenye Ward	—	AS2	B	2001	0		Dunham & Mackie, 2002		221	32.4 E	21.2 S
Malilangwe Conservancy	—	AT3	A	2001	116		Dunham & Mackie, 2002	3	425	31.9 E	21.1 S
Malipati Safari Area	—	AS2	B	2001	5	9	Dunham & Mackie, 2002	3	175	31.4 E	21.9 S
Mambali Communal Lands	—	AT3	A	2001	10		Dunham & Mackie, 2002	3	327	28.4 E	21.5 S
Maramani Communal Lands	—	AT3	A	2001	0		Dunham & Mackie, 2002		367	29.4 E	22.1 S
Matabeleland Communal Lands	—	AS2	B	2001	64	79	Dunham & Mackie, 2002	2	3,110	27.1 E	19.6 S
Matetsi Safari Complex	—	AS2	B	2001	4,201	1,670	Dunham & Mackie, 2002	2	4,399	25.7 E	18.2 S
Matibi II Communal Lands	NA	AS2	E	1996	0		Davies et al., 1996		400	31.7 E	21.5 S
Matusadona National Park	RS	AS2	B	2006	1,925	443	Dunham et al., 2006a	2	1,413	28.6 E	17.0 S
Mavuradonha Wilderness Area	—	AS2	B	2001	13	26	Dunham & Mackie, 2002	3	617	30.9 E	16.5 S
Mukwiche Area	—	AS1	B	2001	228	296	Mackie, 2002a	3	337	29.9 E	16.4 S
Ngamo & Sikumi State Forests	—	AS2	B	2001	553	496	Dunham & Mackie, 2002	2	2,344	27.3 E	18.8 S
North Gokwe Communal Lands	RS	AS2	B	2006	192	172	Dunham et al., 2006a	2	3,082	28.5 E	17.5 S
Nyatana Wildlife Management Area	—	IG3	D	2001	150		Dunham & Mackie, 2002	3	651	32.5 E	16.7 S
Protea Farm	—	IG3	D	2001	7		Dunham & Mackie, 2002	5	14	29.6 E	16.5 S
Save Valley Conservancy	RS	AS1	B	2003	527	310	Dunham, 2003	2	3,047	32.1 E	20.4 S
Sengwe Communal Land	—	OG3	E	2001	200		Dunham & Mackie, 2002	2	2,422	31.3 E	22.1 S
Sentinel & Nottingham Ranches	—	AT3	A	2001	82		Dunham & Mackie, 2002	3	568	29.6 E	22.1 S
Shangani Ranch	—	IG3	D	2001	60	20*	Dunham & Mackie, 2002	3	628	29.3 E	19.6 S
Sijarira Forest Area	RS	AS2	B	2006	488	333	Dunham et al., 2006a	3	270	27.5 E	17.6 S
Tuli Circle Safari Area	—	AT3	A	2001	0		Dunham & Mackie, 2002		416	29.1 E	22.0 S
Zambezi Valley	RS	AS2	B	2003	19,981	2,392	Dunham, 2004a	1	16,476	29.7 E	16.1 S

\* Range of informed guess

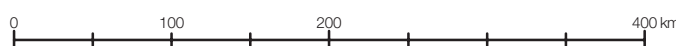
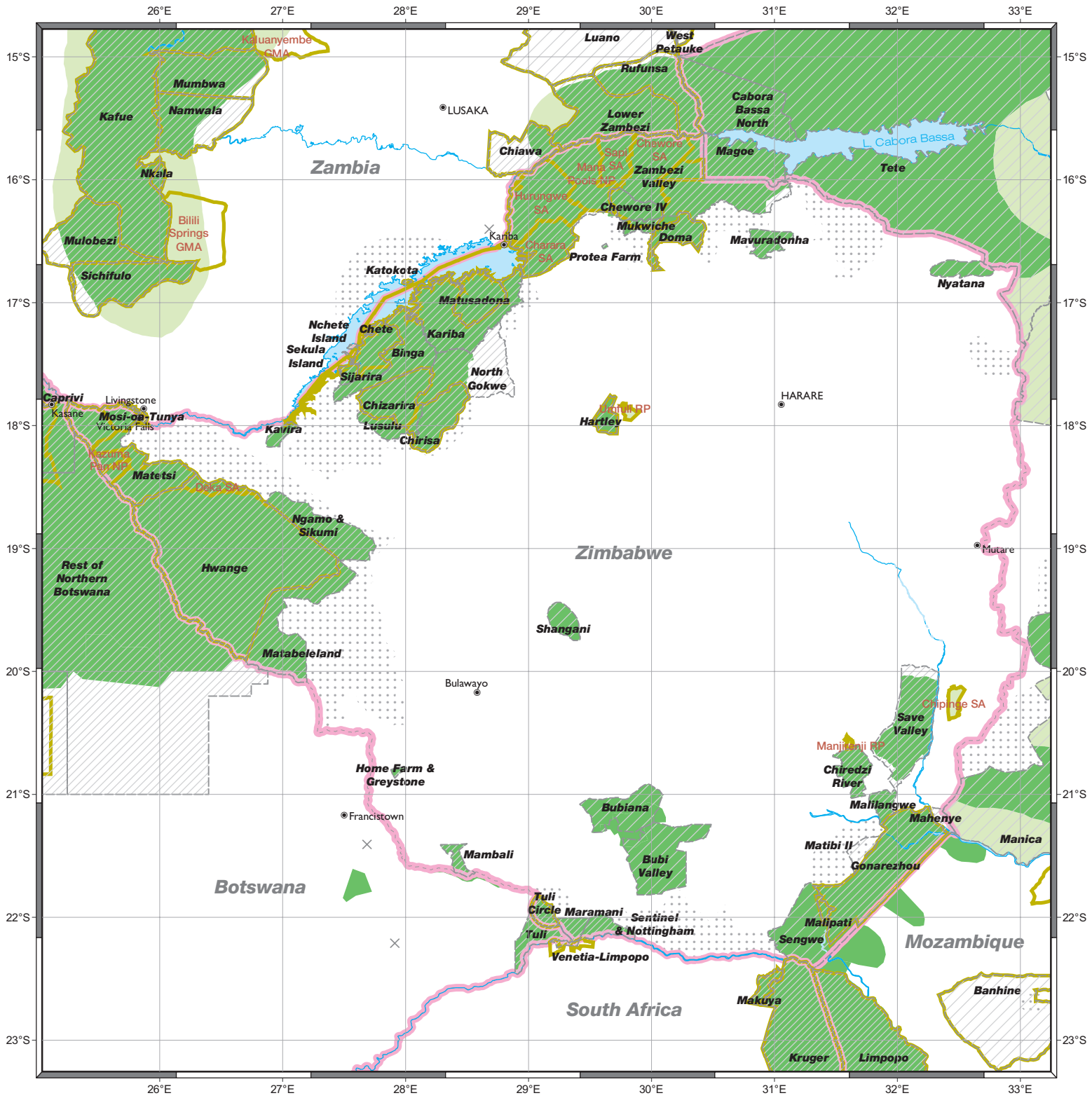
<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

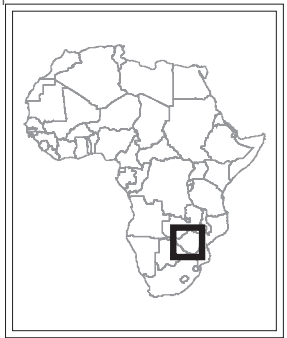
<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.



# Zimbabwe



	International Boundary	<b>Elephant Range</b>	
	Rivers & Lakes		Known
	Towns		Possible
	Protected Areas		Doubtful
	<b>Input Zones (variable hatching)</b>		Sighting/sign



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# WEST AFRICA

## REGIONAL OVERVIEW

### General Statistics

Total Area: 5,096,660 km<sup>2</sup>

Range area (% of region): 175,545 km<sup>2</sup> (4%)

Protected area coverage (% of region): 7%

Protected range (% of known and possible range in protected areas): 56%

Information Quality Index (IQI): 0.44

### Current Issues

The common challenges which have long been facing all West African Range States are linked to small and isolated populations surrounded by growing human populations. Human-elephant conflict and encroachment are pervasive problems throughout the region. These common challenges led to the development in 1999 of a regional strategy for the conservation of elephants in West Africa (AfESG, 1999), which has since become a reference tool for the development of elephant conservation projects and programmes throughout the region. Five action plans for the management of transfrontier elephant conservation and migration corridors in West Africa were developed in 2003 (Sebogo & Barnes, 2003).

An updated version of the strategy received governmental endorsement through the signing, in November 2005, of an interstate Memorandum of Understanding under the aegis of the Economic Community of West African States (ECOWAS) and the Convention on Migratory Species (CMS). Through the agreement, 12 ECOWAS member states agreed to work together to protect elephant habitats, boost numbers in fragile populations and set up elephant 'conservation corridors' in important transboundary areas. Senegal, which did not originally sign the memorandum, has recently expressed its commitment to doing so.

Many countries have continued to develop national elephant conservation strategies within the framework of the West Africa Elephant Conservation Strategy (AfESG, 1999). So far, five countries, namely, Ghana (Wildlife Division, 2000), Burkina Faso (Belemsobgo et al., 2003), Togo (Ministère de l'Environnement et des Ressources Forestières, 2003), Côte d'Ivoire (Ministère des Eaux et Forêts, 2004) and Niger (Direction de la Faune, de la Pêche et de la Pisciculture, 2004) have developed national strategies and are at various stages in their implementation; three countries (Guinea, Benin and Liberia) have successfully raised funds and organized strategic planning workshops; a further three countries (Mali, Nigeria and Sierra Leone) have embarked on the process but have yet to raise sufficient funds to hold workshops. No progress has been made in the remaining two countries (Guinea Bissau and Senegal).

### Range Data

Elephant range in West Africa is found in small fragments scattered across the region, in forest, savanna and other habitats. It is the only region outside Central Africa where a sizeable proportion of elephant range occurs in tropical forests. While it was traditionally believed that both forest elephants (*Loxodonta africana cyclotis*) and savanna elephants (*Loxodonta africana africana*) occurred in West Africa, recent genetic evidence suggests that a single form, whose taxonomic status remains to be ascertained, is found in the region (Eggert et al., 2002).

Elephant range is less extensive in West Africa than in any other region, covering approximately 175,500 km<sup>2</sup>, or 5% of the continental range estimate. This estimate is about 21% less than the estimated range area for the region in the AESR 2002. The difference is due to better information, and is mainly attributable to

## SUMMARY TOTALS FOR WEST AFRICA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	6,001	0	0	0
Direct Sample Counts and Reliable Dung Counts	947	375	375	0
Other Dung Counts	125	360	96	0
Informed Guesses	414	0	658	308
Other Guesses	0	0	0	2,631
<b>TOTAL 2006</b>	<b>7,487</b>	<b>735</b>	<b>1,129</b>	<b>2,939</b>
<i>TOTALS 2002</i>	<i>5,458</i>	<i>1,188</i>	<i>3,039</i>	<i>3,498</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+13	0	0	0
New Population	+30	0	+9	+12
Different Technique	+1,963	-453	-1,732	-485
New Guess	+22	0	+13	-107
Population Lost	0	0	0	-159
Data Degraded	0	0	-200	+181
<b>TOTAL CHANGE</b>	<b>+2,029</b>	<b>-453</b>	<b>-1,910</b>	<b>-559</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	25,117	3,280	<b>28,397</b>
Direct Sample Counts and Reliable Dung Counts	5,123	0	<b>5,123</b>
Other Dung Counts	8,205	24	<b>8,229</b>
Informed Guesses	52,380	1,267	<b>53,647</b>
Other Guesses	8,075	13,017	<b>21,093</b>
Unassessed Range	26,499	32,557	<b>59,056</b>
<b>TOTAL</b>	<b>125,399</b>	<b>50,146</b>	<b>175,545</b>

## WEST AFRICA: COUNTRY AND REGIONAL TOTALS & DATA QUALITY

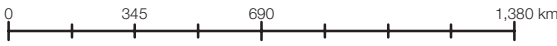
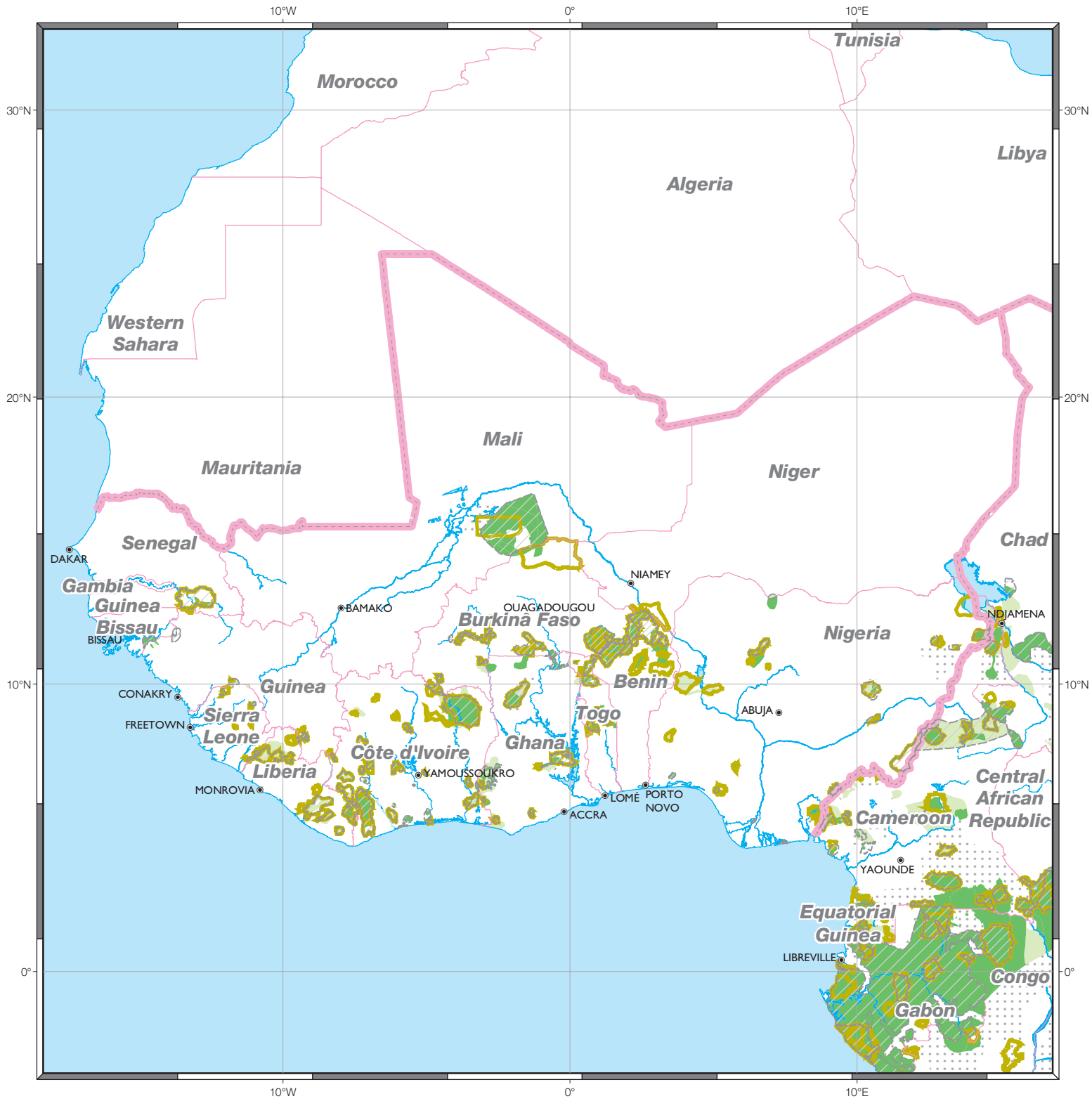
COUNTRY	ELEPHANT NUMBERS				RANGE AREA (km <sup>2</sup> )	% OF REGIONAL RANGE	% OF RANGE ASSESSED	IQI <sup>1</sup>	PFS <sup>2</sup>
	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE					
Benin	1,223	0	0	0	13,673	8	51	0.51	<b>3</b>
Burkina Faso	4,154	320	520	0	19,872	11	72	0.64	<b>2</b>
Côte d'Ivoire	188	152	119	506	33,985	19	72	0.25	<b>2</b>
Ghana	789	387	241	12	23,301	13	42	0.35	<b>2</b>
Guinea	135	79	79	57	1,524	1	78	0.47	<b>4</b>
Guinea Bissau	0	0	7	13	1,346	1	100	0.00	<b>3</b>
Liberia	0	0	0	1,676	15,977	9	60	0.00	<b>2</b>
Mali	357	0	141	156	31,878	18	100	0.55	<b>2</b>
Niger	85	0	17	0	2,683	2	100	0.83	<b>3</b>
Nigeria	348	0	105	375	22,968	13	37	0.16	<b>2</b>
Senegal	1	0	0	9	1,090	1	100	0.10	<b>4</b>
Sierra Leone	0	0	80	135	1,804	1	59	0.00	<b>3</b>
Togo	4	0	61	0	5,444	3	69	0.04	<b>3</b>
<b>TOTAL*</b>	<b>7,487</b>	<b>735</b>	<b>1,129</b>	<b>2,939</b>	<b>175,545</b>	<b>5</b>	<b>66</b>	<b>0.44</b>	<b>3</b>

\* Note that totals for the Definite, Probable and Possible categories are derived by pooling the variances of individual estimates, as described under the Data Types and Categorization section. As a result, totals do not necessarily match the simple sum of the entries within a given category.

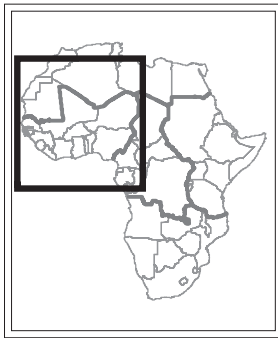
<sup>1</sup> **IQI: Information Quality Index.** This index quantifies overall data quality at the national and regional levels based on the precision of estimates and the proportion of assessed elephant range (i.e. range for which estimates are available). The IQI ranges from zero (no reliable information) to one (perfect information). See the Introduction section for a detailed explanation of how the IQI is calculated.

<sup>2</sup> **PFS: Priority for Future Surveys,** ranked from 1 to 5 (highest to lowest). Based on the IQI and the proportion of continental range accounted for by the country in question, the PFS is a measure of the importance and urgency for future population surveys, particularly in areas of unassessed range and areas not surveyed in the last 10 years or more. See Introduction for a more detailed explanation of how the priority ranking is derived.

# West Africa



	Regional Boundary		<b>Input Zones</b>
	International Boundary		<b>Elephant Range</b>
	CAPITAL CITIES		Known
	Rivers & Lakes		Possible
	Protected Areas		Doubtful



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.

the categorization as DOUBTFUL range of several areas, mainly in Nigeria, Benin and Ghana, where human population density is estimated to exceed 15 persons per km<sup>2</sup> (ORNL/GIST, 2002) and makes the continued presence of elephants unlikely (see Introduction section for details).

Although KNOWN range represents 71% of total regional range, the current occurrence of elephants in many areas, particularly in Liberia, Sierra Leone and small habitat fragments in Nigeria and Côte d'Ivoire, remains uncertain. Virtually all of the POSSIBLE range data for West Africa is more than 10 years old. Nearly three-quarters of the total range area is distributed among five countries, namely, Côte d'Ivoire, Mali, Ghana, Nigeria and Burkina Faso.

West Africa is the only region where a higher proportion of elephant range (60%) is found inside designated protected areas than outside. Many of these protected areas, however, are forest reserves, which only afford limited protection.

### *Population Data*

Many elephant populations in the region are probably not viable because they are genetically isolated, their numbers are small, and their sex ratios and age structures have been distorted by hunting. The single largest population is that of the “WAPOK” (“W”-Arly-Pendjari-Oti-Mandori-Kéran) complex, which straddles the borders between Benin, Burkina Faso, Niger and Togo. This population alone holds more than half of the region’s known elephants and is covered by good quality systematic surveys.

Estimates of elephant abundance are available for 66% of elephant range in West Africa, making it the region with the largest proportion of range for which population estimates are available, although nearly two-thirds of that area is only covered by guesses. However, out of 32 post-2002 estimates included in this report, the majority (26) originate from systematic surveys, and include two previously unsurveyed areas.

Elephant numbers in the DEFINITE category have increased by over 2,000 compared with the previous report, largely due to the replacement of previous estimates by more reliable estimates from aerial total counts, particularly in the WAPOK complex. The associated increase in precision is the cause of the declines in the PROBABLE, POSSIBLE and SPECULATIVE categories.

The combined estimate from methodologically comparable surveys between the previous and this report (i.e. those labelled repeat survey or “RS” in the national tables of estimates) only accounts for 35% of the regional DEFINITE plus PROBABLE estimate. Consequently, a statistical comparison between these estimates, such as described by Blanc et al. (2005), would not be meaningful at a regional scale.

### *Cross-border Movements*

Limited movements of elephants may take place between West and Central Africa, specifically between Nigeria, Cameroon and Chad.

# BENIN

## General Statistics

Country area: 112,620 km<sup>2</sup>  
Range area (% of country): 13,673 km<sup>2</sup> (15%)  
Protected area coverage (% of country): 24%  
Protected range (% of known and possible range in protected areas): 71%  
Information Quality Index (IQI): 0.51  
CITES Appendix: I  
Listing Year: 1989

## Current Issues

Human population pressure and encroachment into elephant habitats are the most important threats facing elephant conservation in Benin. A 2003 survey covering all of Benin's elephant habitats found high levels of human settlement within protected areas, largely by cotton farmers and traditional transhumant livestock herders. This is despite a wildlife law passed in 2000 regulating human settlement and establishing buffer zones around protected areas.

In an attempt to reduce encroachment pressure in protected areas, Benin is promoting the involvement of local communities in the management of protected areas, through the creation of Village Associations for the Management of Wildlife Reserves (AVIGREF). Seventy eight of these associations participate in the management of the "W" National Park and its periphery, and receive 30% of the revenues generated by the park and adjacent hunting zones. In addition, the AVIGREF co-manage eco-tourism and hunting activities, and undertake the maintenance of trails and watering holes in the park. Revenues are then invested in communal projects or distributed in the form of work contracts to local communities (El Hadj Issa & Novelli, 2004).

Funding for the development of a national strategy for the conservation of elephants in Benin was secured in 2004, and a workshop was held in the same year. In addition, Benin is one of the countries involved in a regional action plan for the conservation of transfrontier elephant conservation corridors in West Africa.

## Range Data

Elephants are restricted to the north of Benin, but much of the range is only used seasonally by elephants. A number of areas in northeastern Benin have been categorized as **DOUBTFUL** range, based on Landsat 2002 human population density data (ORNL/GIST, 2002; see Introduction section for details on rationale). The western part of the Pendjari Biosphere Reserve has also been categorized as **DOUBTFUL** (P. Bouché, pers. comm., 2005). This was corroborated by the results of a 2003 ecosystem-wide survey (Bouché et al., 2004b).

## Population Data

Much of Benin's elephant range was systematically surveyed in a transboundary aerial total count, extending across to Burkina Faso, Niger and Togo, conducted in 2003 by the CITES MIKE Programme (Bouché et al., 2004b). Estimates from this survey replace aerial sample counts conducted by *Ecosystèmes Protégés en Afrique Sabélienne* (ECOPAS) in 2002 (Rouamba & Hien, 2002; Rouamba et al., 2002). In April 2006 an aerial survey was conducted in the Pendjari Biosphere Reserve, which estimated 1,808 ± 213 elephants (Sinsin et al., 2006), but the results of the aforementioned ecosystem-wide survey have been used despite their being slightly more dated.

Changes in the **DEFINITE**, **PROBABLE** and **POSSIBLE** estimates for Benin between the AESR 2002 and this report are a result of an increase in precision caused by the use of more reliable survey techniques. Little can therefore be said about actual changes in elephant numbers in Benin, which, in any case, are likely to fluctuate through transboundary movements. Although nearly half of the range estimate for the country

remains unsurveyed, most of this range is likely to be only seasonal and most of the elephants that use it are likely to have been counted in surveyed areas.

### *Cross-border Movements*

Benin's elephants are part of West Africa's largest elephant population, which spans the borders of Benin, Burkina Faso, Niger and Togo.



## SUMMARY TOTALS FOR BENIN

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	1,223	0	0	0
<b>TOTALS 2006</b>	<b>1,223</b>	<b>0</b>	<b>0</b>	<b>0</b>
<i>TOTALS 2002</i>	<i>1,101</i>	<i>504</i>	<i>504</i>	<i>0</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Population	0	0	0	0
Different Technique	+122	-504	-504	0
<b>TOTAL CHANGE</b>	<b>+122</b>	<b>-504</b>	<b>-504</b>	<b>0</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	7,005	0	7,005
Unassessed Range	6,073	595	6,668
<b>TOTAL</b>	<b>13,078</b>	<b>595</b>	<b>13,673</b>

## BENIN: ELEPHANT ESTIMATES

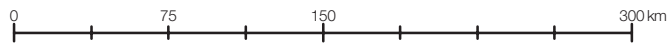
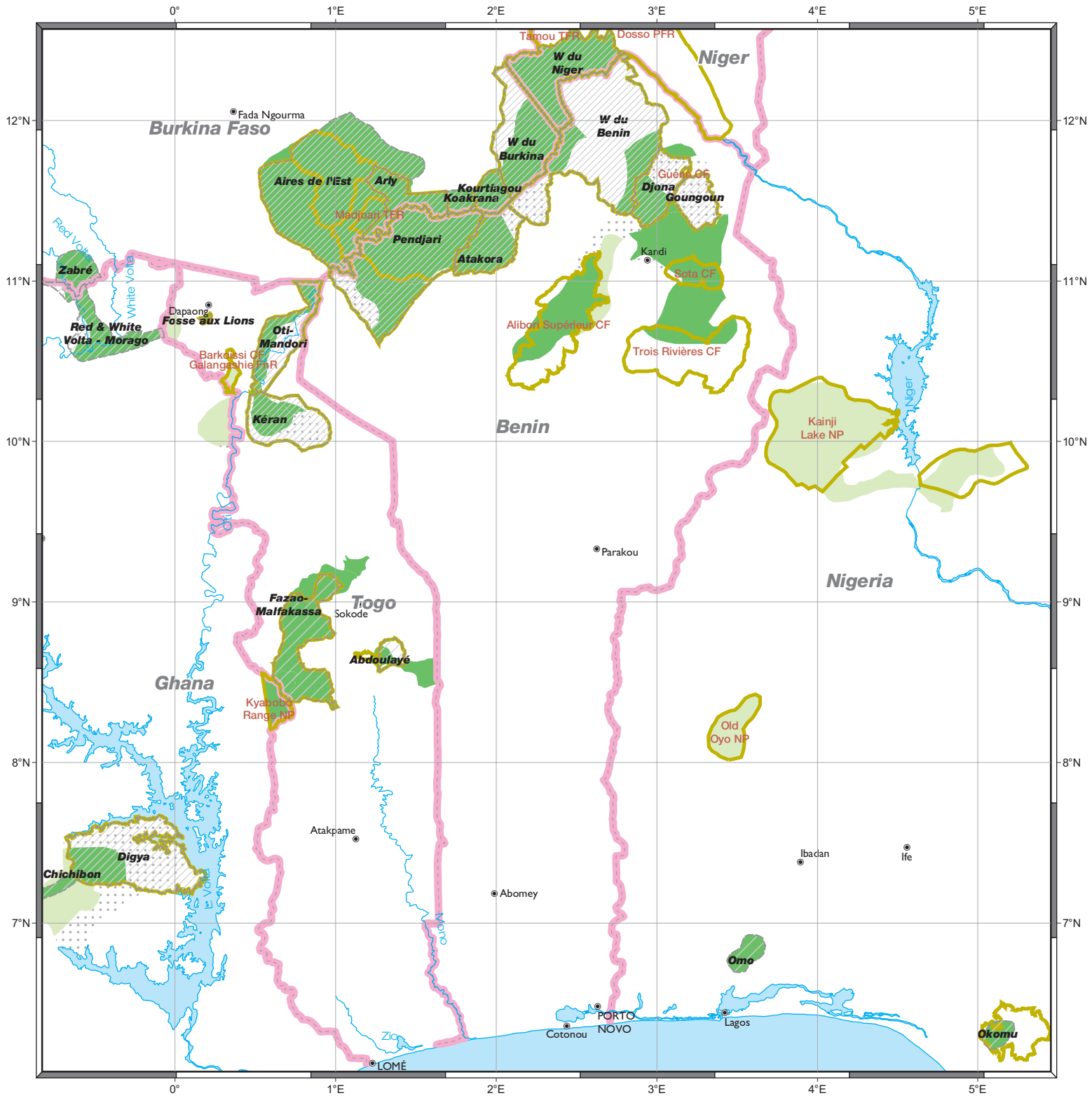
INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Atakora Hunting Zones	<b>DT</b>	AT2	A	2003	343		Bouché et al., 2004b	2	1,356	2.0 E	11.2 N
Djona Hunting Zone	<b>DT</b>	AT2	A	2003	36		Bouché et al., 2004b	2	1,216	3.0 E	11.6 N
Goungoun Classified Forest	<b>NP</b>	AT2	A	2003	0		Bouché et al., 2004b		806	3.2 E	11.5 N
Pendjari Biosphere Reserve	<b>DT</b>	AT2	A	2003	788		Bouché et al., 2004b	1	2,827	1.4 E	11.1 N
W du Benin National Park	<b>DT</b>	AT2	A	2003	56		Bouché et al., 2004b	1	5,872	2.6 E	11.9 N

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

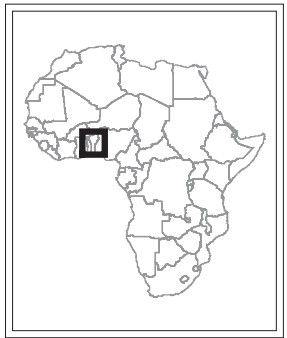
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Benin



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# BURKINA FASO

## General Statistics

Country area: 274,200 km<sup>2</sup>  
Range area (% of country): 19,872 km<sup>2</sup> (7%)  
Protected area coverage (% of country): 15%  
Protected range (% of known and possible range in protected areas): 73%  
Information Quality Index (IQI): 0.64  
CITES Appendix: I  
Listing Year: 1989

## Current Issues

In 2003, Burkina Faso finalized a strategy and plan for the sustainable management of elephants (Belemsobgo et al., 2003). The strategy identifies pressure on land and elephant habitats, prompted by human demographic growth and the consequent expansion of agricultural land, poaching and institutional weakness as the main threats to elephant populations in the country. The strategy takes a participative approach and recognizes the necessity to integrate elephant management at various geographical scales, from the site to the regional level.

Two projects to secure transfrontier elephant migration corridors that include Burkina Faso have begun recently. These initiatives, spearheaded and coordinated by IUCN, are being implemented in Burkina Faso by the *Partenariat pour l'Amélioration de la Gestion des Ecosystèmes Naturels* (PAGEN). In the north of the country, PAGEN is working to secure the areas used by the Gourma elephants when they cross the border from Mali. Similarly, PAGEN works on Burkina Faso's southern border to secure transfrontier migration corridors with Ghana.

The ongoing political instability in neighbouring Côte d'Ivoire is reported to be causing elephants to move to neighbouring countries, including Burkina Faso, and this is said to have aggravated human-elephant conflict in the southwest.

## Range Data

Elephant populations in Burkina Faso are distributed in six areas, mainly in the south.

The information displayed on the range map is virtually unchanged from the AESR 2002, except for the addition of a number of crosses based on data from Bouché (2004; P. Bouché, pers. comm., 2005). An aerial survey conducted in 2005 revealed the presence of elephants in the Mare aux Hippopotames Biosphere Reserve. It is not clear, however, whether this is a resident population or whether it originates from the nearby Mohoun complex (Bouché, 2005). Until this is conclusively determined, the presence of elephants there has also been entered as a point sighting in the AED.

## Population Data

Arly and "W" National Parks and their surrounding hunting areas (Aires de l'Est) were surveyed in 2003 as part of an ecosystem-wide aerial total count extending to parts of Benin, Niger and Togo conducted under the auspices of the CITES MIKE Programme (Bouché et al., 2004b). Estimates from this survey replace aerial sample count estimates for Arly and "W" National Parks, Koakrana and Konkombouri Hunting Zones, and Kourtiagou, Ouamou, Pagou-Tandougou, Pama and Singou Partial Faunal Reserves (Bouché et al., 2000).

Aerial total counts have also been recently conducted in a number of areas in the south and west. Total counts of the previously unsurveyed Mare aux Hippopotames Biosphere Reserve and the Comoé-Leraba Forest were conducted in 2005 (Bouché, 2005). The estimate of three from the latter replaces an INFORMED GUESS of 26 (Traore, 1998) for the smaller area referred to as Diefoula Classified Forest in the

## SUMMARY TOTALS FOR BURKINA FASO

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	3,933	0	0	0
Direct Sample Counts and Reliable Dung Counts	221	320	320	0
Informed Guesses	0	0	200	0
<b>TOTALS 2006</b>	<b>4,154</b>	<b>320</b>	<b>520</b>	<b>0</b>
<i>TOTALS 2002</i>	<i>2,031</i>	<i>833</i>	<i>1,059</i>	<i>0</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Population	+41	0	0	0
Different Technique	+2,082	-513	-539	0
<b>TOTAL CHANGE</b>	<b>+2,123</b>	<b>-513</b>	<b>-539</b>	<b>0</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	11,110	0	<b>11,110</b>
Direct Sample Counts and Reliable Dung Counts	2,283	0	<b>2,283</b>
Informed Guesses	600	264	<b>863</b>
Unassessed Range	4,474	1,141	<b>5,615</b>
<b>TOTAL</b>	<b>18,468</b>	<b>1,405</b>	<b>19,872</b>

## BURKINA FASO: ELEPHANT ESTIMATES

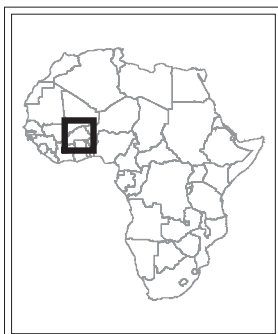
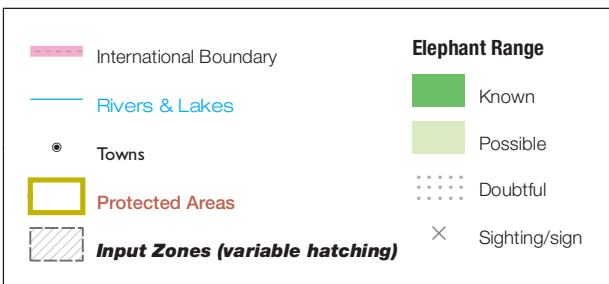
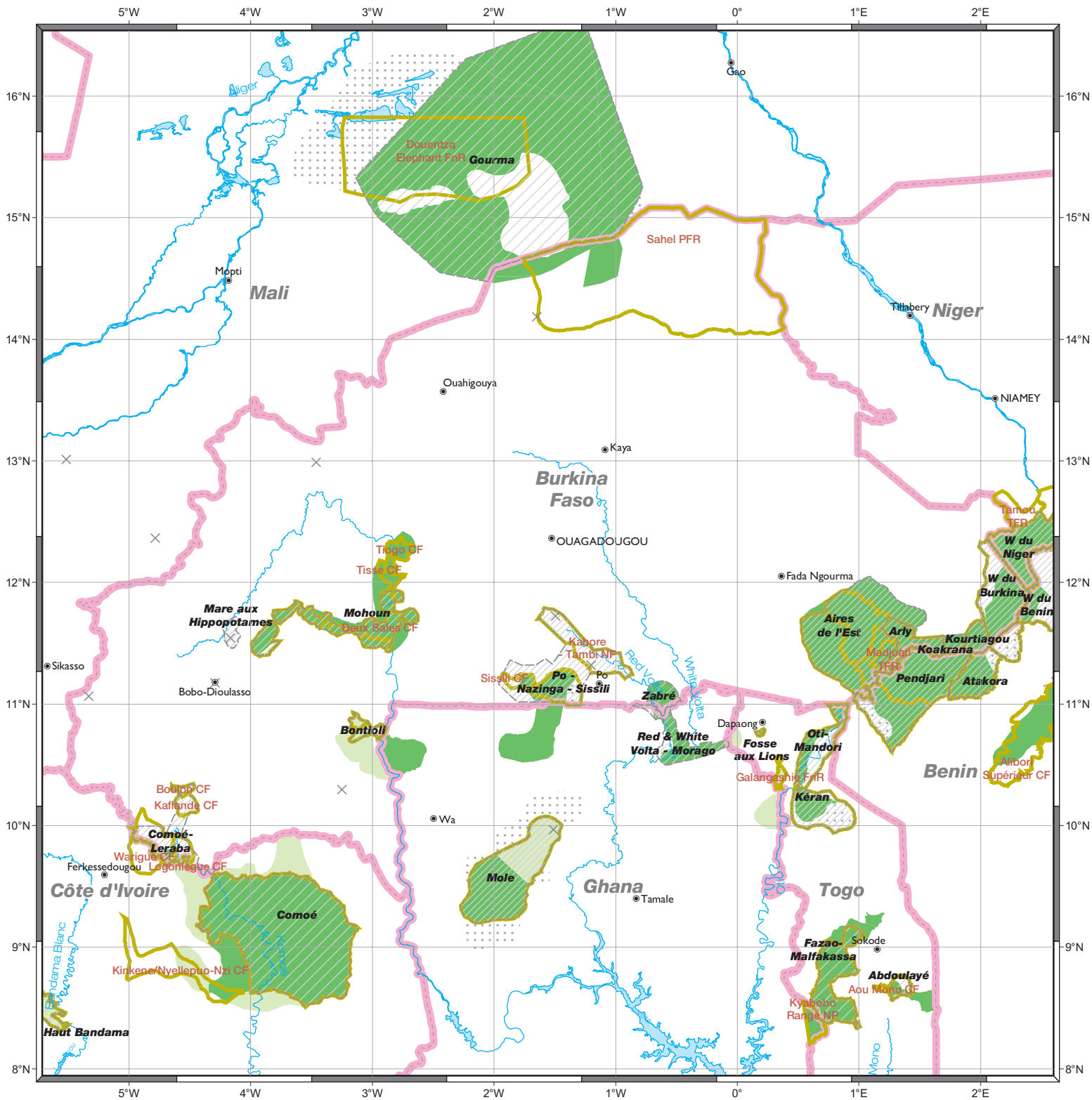
INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Aires de l'Est Hunting Areas	<b>DT</b>	AT2	A	2003	2,119		Bouché et al., 2004b	1	6,077	1.0 E	11.6 N
Arly National Park	<b>DT</b>	AT2	A	2003	422		Bouché et al., 2004b	2	1,224	1.4 E	11.5 N
Bontioli Partial & Total Faunal Reserve	—	IG3	D	1998	50		Chardonnet, quest. reply, 1998	2	420	3.1 W	10.8 N
Comoé-Leraba Classified Forests	<b>DT</b>	AT2	A	2005	3		Bouché, 2005	2	1,204	4.6 W	9.9 N
Koakrana Hunting Zone	<b>DT</b>	AT2	A	2003	0		Bouché et al., 2004b		229	1.8 E	11.5 N
Kourtiagou Partial Faunal Reserve	<b>DT</b>	AT2	A	2003	0		Bouché et al., 2004b		485	2.0 E	11.5 N
Mare aux Hippopotames Biosphere Reserve	<b>NP</b>	AT2	A	2005	46		Bouché, 2005	3	192	4.2 W	11.6 N
Mohoun Protected Area Complex	—	AS1	B	2002	541	320	Belemsobgo, 2002	1	3,296	3.3 W	11.6 N
Po - Nazinga - Sissili Ecosystem	<b>DT</b>	AT2	A	2003	603		Bouché et al., 2004a	1	6,093	1.5 W	11.3 N
W du Burkina National Park	<b>DT</b>	AT2	A	2003	740		Bouché et al., 2004b	2	2,412	2.2 E	11.9 N
Zabré Department	—	IG3	D	1998	150		Chardonnet, quest. reply, 1998	2	600	0.6 W	11.1 N

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Burkina Faso



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

AESR 2002. Finally, a census conducted in the Po-Nazinga-Sissili ecosystem (Bouché et al., 2004a) covered a larger area than the survey which it replaces, namely an aerial sample count of Nazinga Game Ranch and Sissili Classified Forest (Cornelis, 2000).

Estimates for Bontioli, Mohoun and Zabré have been retained from the previous report. The number of elephants under the DEFINITE category has increased by over 2,100 since the AESR 2002. This increase is partly matched by decreases in the PROBABLE and POSSIBLE categories, as would be expected given the use of more precise aerial survey techniques (aerial total counts) than was the case in the past. The change in the DEFINITE category may also be partly explained by the movement of elephants across international borders. It is nevertheless widely believed that elephant numbers are indeed increasing in parts of the country.

Reliable estimates of elephant abundance currently cover over 72% of the range estimate for Burkina Faso, and although this percentage has increased since the previous report, the number of elephants in newly surveyed areas only makes a minimal contribution to the change in the DEFINITE category.

### *Cross-border Movements*

Most of Burkina Faso's elephants are likely to be part of important transboundary populations. Elephants are known to migrate between Gourma in Mali and the Sahel Partial Faunal Reserve in northern Burkina Faso (Blake et al., 2003). There are also wet season movements between Nazinga Game Ranch, northern Ghana and Togo, as well as between Zabré and the Red Volta - White Volta - Morago ecosystem in Ghana (Chardonnet & Koalo, quest. reply, 1998; Okoumassou et al., 1998). Movement from Côte d'Ivoire's Comoé National Park into the Comoé-Leraba Forest is believed to have increased in recent years as a result of insecurity in that country (Bouché, 2005).



# CÔTE D'IVOIRE

## *General Statistics*

Country area: 322,460 km<sup>2</sup>  
Range area (% of country): 33,985 km<sup>2</sup> (11%)  
Protected area coverage (% of country): 10%  
Protected range (% of known and possible range in protected areas): 69%  
Information Quality Index (IQI): 0.25  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Ongoing instability in Côte d'Ivoire, particularly in the north and west, continues to make conservation and monitoring work difficult. Nevertheless, a national elephant management strategy was drafted following a workshop in December 2003, and endorsed by the Minister for Water and Forests in August 2004 (Ministère des Eaux et Forêts, 2004). The strategy sets out to protect remaining elephant populations by improving habitats, reducing poaching and human-elephant conflict, rationalizing legislation, investing in elephant population research, enhancing institutional capacity and fostering cross-border cooperation. The strategy presents a 10 year plan for its implementation, with a budget of 13 million CFA, much of which will have to be sourced from international donors.

However, with only one population likely to have over 100 individuals at present, the future for elephants in Côte d'Ivoire appears bleak, as small populations face an increased risk of extinction (Barnes, 1999).

Despite its small elephant populations, Côte d'Ivoire had one of the largest domestic ivory markets in West Africa before the conflict started (Courouble et al., 2003). The limited legislation which exists to regulate the market is not fully implemented and is generally ineffective. While it is believed that the conflict may have suppressed the domestic ivory market, it could re-emerge once political stability returns (Milliken, 2002).

## *Range Data*

Elephants are found in small, isolated forest and savanna sites scattered throughout the country, largely in forest reserves and protected areas. Most of these have not been studied for many years, and elephant presence is only confirmed in seven sites (Fischer, 2005).

## *Population Data*

Under the auspices of the CITES MIKE programme, samples for genetic dung counts were collected in Taï and Marahoué National Parks prior the outbreak of hostilities in 2002 (Eggert, 2004a,b; Nandjui et al., 2004). The results of these surveys were not available in time for the previous report of the AED, but are now featured in the table of estimates, replacing INFORMED GUESSES of 75 (B. Hoppe-Dominik, pers. comm., 2003) and 50 (Alers, cited in Douglas-Hamilton et al., 1992) respectively.

The only other new estimate arising from a systematic survey is the result of a dung count conducted in Azagny National Park (Nandjui, 2003), which replaces a 1987 guess of 60 by Lauginie (cited in Douglas-Hamilton et al., 1992).

A guess of 60 for the Fresco Classified Forest (Ministère des Eaux et Forêts, 2004) replaces an earlier (1991) guess of 150 (Alers, cited in Douglas-Hamilton et al., 1992). The new figure may still be an overestimate, however, as Kouadio (cited in Fischer, 2005) believes there are "very few" elephants left in the area.

An aerial survey of Comoé, planned for 2002 by the CITES MIKE programme but cancelled due to the outbreak of hostilities, had still not been conducted by the end of 2005. Fischer (2005) believes the current elephant population in Comoé to stand at between 10 and 20 individuals. This estimate replaces a 1998 guess of 200 by the same author (F. Fischer, pers. comm., 1998). It is said that elephants from Comoé may have moved across the border to Burkina Faso to escape the conflict.

The only other changes to the table of estimates are a guess of 20 for the Haut Bandama Fauna and Flora Reserve (Bouché, 2002a) and the degradation of estimates for Beki-Bossematie and Songan-Tamin-Mabi-Yaya to the category of OTHER GUESSES, as they are now more than 10 years old.

All other estimates remain unchanged from the previous report. Many of these estimates are now more than 15 years old and are very unreliable. No estimates are available for 28% of elephant range. A national survey of elephant populations was to be conducted in 2004-2005, but this was not possible due to ongoing political instability.

The numbers of elephants in the DEFINITE and PROBABLE categories have increased by 125 and 152 respectively as a result of improved estimates for Taï, Marahoué and Azagny. However, this is exceeded by decreases in the POSSIBLE (-241) and SPECULATIVE (-160) categories, which result from updated guesses and the degradation of old estimates to the SPECULATIVE category.

### *Cross-border Movements*

Côte d'Ivoire shares several elephant populations with neighbouring countries. There are cross-border movements between Comoé and southern Burkina Faso (Chardonnet & Koalo, quest. reply, 1998; Traore, 1998), between Djambamakrou and Bia in Ghana and possibly between Goin-Cavally and Grebo (Liberia) (A. Nandjui, pers. comm., 2006).

## SUMMARY TOTALS FOR CÔTE D'IVOIRE

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	11	0	0	0
Other Dung Counts	125	152	79	0
Informed Guesses	52	0	40	10
Other Guesses	0	0	0	496
<b>TOTALS 2006</b>	<b>188</b>	<b>152</b>	<b>119</b>	<b>506</b>
<i>TOTALS 2002</i>	<i>63</i>	<i>0</i>	<i>360</i>	<i>666</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Different Technique	+125	+152	+4	-135
New Guess	0	0	-190	-80
Data Degraded	0	0	-55	+55
<b>TOTAL CHANGE</b>	<b>+125</b>	<b>+152</b>	<b>-241</b>	<b>-160</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	134	0	<b>134</b>
Other Dung Counts	5,501	0	<b>5,501</b>
Informed Guesses	12,849	0	<b>12,849</b>
Other Guesses	2,217	3,659	<b>5,876</b>
Unassessed Range	2,135	7,489	<b>9,624</b>
<b>TOTAL</b>	<b>22,836</b>	<b>11,149</b>	<b>33,985</b>

## CÔTE D'IVOIRE: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Abokouamékro Faunal Reserve	—	GT1	A	2000	11		Kobon, quest. reply, 2002	3	135	5.1 W	6.9 N
Azagny National Park	DT	DC3	C	2003	65	52	Nandjui, 2003	3	218	4.9 W	5.2 N
Beki-Bossematie Classified Forest	DD	IG3	E	1993	35		Theuerkauf et al., 2001	2	389	3.5 W	6.6 N
Bolo Forest	—	OG3	E	1989	5		Merz & Hoppe-Dominik, 1991	3	88	5.8 W	5.2 N
Comoé National Park	NG	IG3	D	2002	10	10*	Fischer, 2005	1	11,500	3.7 W	9.1 N
Davo Forest	—	OG3	E	1989	20		Merz & Hoppe-Dominik, 1991	3	126	6.1 W	5.8 N
Djambakrou Forest	—	OG3	E	1989	30		Merz & Hoppe-Dominik, 1991	3	274	3.2 W	6.4 N
Duekoué Forest	—	OG3	E	1997	6		Kobon, quest. reply, 2002	2	536	7.1 W	6.7 N
Fresco Classified Forest	NG	OG3	E	1998	60		Ministère des Eaux et Forêts, 2004	2	2,229	5.8 W	5.1 N
Go-Bodienou Forest	—	OG3	E	1989	20		Merz & Hoppe-Dominik, 1991	2	600	5.0 W	5.4 N
Goin-Cavally Classified Forest	—	OG3	E	1989	70		Merz & Hoppe-Dominik, 1991	2	1,890	7.8 W	6.2 N
Haut Bandama Fauna & Flora Reserve	NG	OG3	E	2002	20		Bouché, 2002a	2	1,300	5.7 W	8.5 N
Haut Sassandra Classified Forest	—	IG3	D	1997	30		Kobon, quest. reply, 2002	2	1,024	7.0 W	7.2 N
Keregbo Forest	—	OG3	E	1989	30		Merz & Hoppe-Dominik, 1991	3	213	3.8 W	7.5 N
Marahoué National Park	DT	GD3	C	2002	159	54	Eggert, 2004b	2	1,010	6.0 W	7.1 N
Mont Péko National Park	—	OG3	E	2000	40		Kobon, quest. reply, 2002	2	340	7.3 W	7.0 N
Mont Sangbé National Park	—	IG3	D	2001	47		Lauginie et al., 2001	2	950	7.3 W	8.0 N
Niegré Classified Forest	—	OG3	E	1989	50		Merz & Hoppe-Dominik, 1991	2	1,056	6.2 W	5.4 N
Okromodou Forest	—	OG3	E	1989	50		Merz & Hoppe-Dominik, 1991	2	945	5.6 W	5.3 N
Scio Classified Forest	—	OG3	E	1989	30		Merz & Hoppe-Dominik, 1991	2	1,338	7.8 W	6.8 N
Songan-Tamin-Mabi-Yaya Classified Forest	DD	IG3	E	1993	20		Theuerkauf et al., 2001	2	1,698	3.4 W	5.9 N
Taï National Park	DT	GD3	C	2002	53	26	Eggert, 2004a	1	6,410	7.1 W	5.6 N
Téné Forest	—	IG3	D	1998	5		Kobon, quest. reply, 2002	5	4	5.4 W	6.5 N
Tiapleu Forest	—	OG3	E	1989	10		Merz & Hoppe-Dominik, 1991	2	380	8.2 W	7.5 N

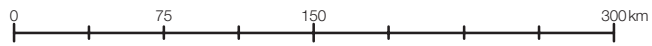
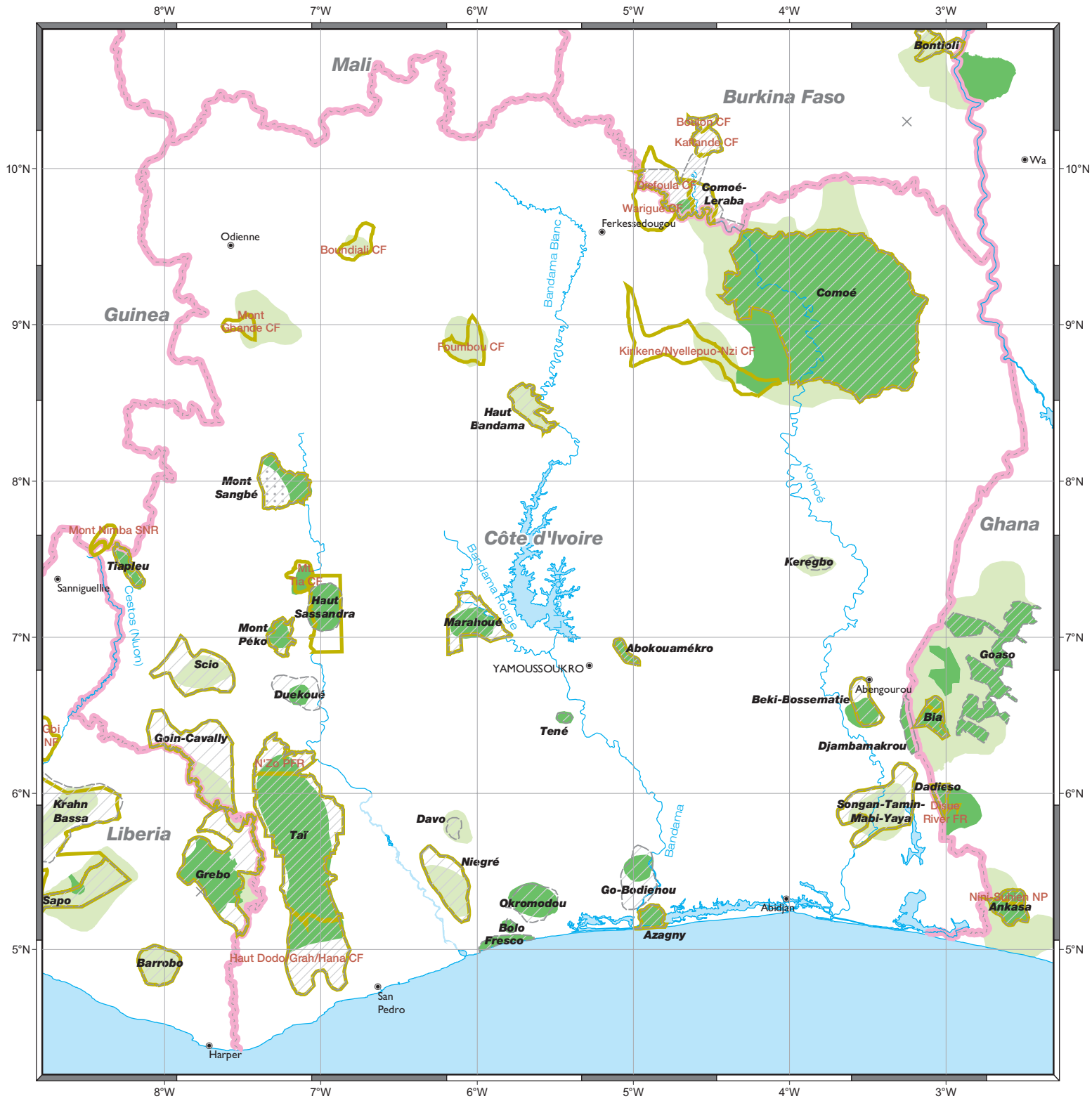
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Côte d'Ivoire



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# GHANA

## *General Statistics*

Country area: 238,540 km<sup>2</sup>  
Range area (% of country): 23,301 km<sup>2</sup> (13%)  
Protected area coverage (% of country): 5%  
Protected range (% of known and possible range in protected areas): 28%  
Information Quality Index (IQI): 0.35  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Ghana was the first country in West Africa to develop a national strategy for the conservation of elephants (Wildlife Division, 2000), but limited resources seem to have slowed down its implementation. Nevertheless, recent reports indicate a renewed interest in Government circles to speed up its execution.

Meanwhile, elephants in Ghana continue to be under pressure from habitat fragmentation and high human population densities. Shifting cultivation up to the boundaries of protected areas exacerbates the problem of crop raiding by elephants, which is severe wherever elephants occur in Ghana (Barnes, 2002b).

## *Range Data*

Elephant range in Ghana is entirely fragmented and largely confined to protected areas. In Mole National Park, elephants are largely restricted to the southern sector, which is shown as **KNOWN** range. The northern sector has been categorized as **POSSIBLE** range, and areas around the park as **DOUBTFUL** range (Bouché, 2002b; Mackie, 2004). A recent survey sighted one group in the north (Bouché, 2006), and this is shown as a cross on the map.

Elephants have not been seen for several years in an area connecting the Dadieso Forest Reserve with the Bia and Goaso ranges (Ayesu, 2003; Sam et al., 2003), and this has been removed from the map. A recent survey of Digya National Park (Kumordzi & Danquah, 2006) found signs of elephant presence to be restricted to the southwestern corner of the park. This area has been categorized as **KNOWN** range, while the remainder of the park has been classified as **DOUBTFUL** range.

Nearly the half of the range information for Ghana currently falls under the **POSSIBLE** category and nearly 40% is over 10 years old. Much of the remaining (**KNOWN**) range data was obtained between 1999 and 2002.

## *Population Data*

Three aerial surveys have been conducted in Mole National Park since the last report. The first of these, a combined aerial total, aerial sample and ground sample count, was conducted in 2002 under the auspices of the CITES MIKE Programme. A total estimate for the aerial and ground surveys was never produced, and only a combined figure of  $368 \pm 495$  for the two aerial survey methods was reported (Bouché, 2002b). In 2004 a stratified aerial sample survey was conducted in the park, giving an estimate of  $259 \pm 222$  (Mackie, 2004), but the difference between this and the 2002 estimate is not statistically significant. Finally, an aerial total count conducted in March 2006 returned an estimate of 401 (Bouché, 2006), and this has been used to replace an estimate of  $589 \pm 218$  from a 1993 aerial sample count (J. Grainger, pers. comm., 1994).

A dung count of Digya National Park conducted in 2006 returned an estimate of  $357 \pm 54$  (Kumordzi & Danquah, 2006). This estimate replaces an **INFORMED GUESS** of 200 (Sam, 1994a).

## SUMMARY TOTALS FOR GHANA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	401	0	0	0
Direct Sample Counts and Reliable Dung Counts	388	179	179	0
Other Dung Counts	0	208	55	0
Informed Guesses	0	0	7	0
Other Guesses	0	0	0	12
<b>TOTALS 2006</b>	<b>789</b>	<b>387</b>	<b>241</b>	<b>12</b>
<i>TOTALS 2002</i>	<i>530</i>	<i>428</i>	<i>1,100</i>	<i>303</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Population	0	0	+7	0
Different Technique	+259	-41	-854	-300
Data Degraded	0	0	-11	+9
<b>TOTAL CHANGE</b>	<b>+259</b>	<b>-41</b>	<b>-859</b>	<b>-291</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	2,628	1,710	<b>4,338</b>
Direct Sample Counts and Reliable Dung Counts	2,348	0	<b>2,348</b>
Other Dung Counts	2,704	24	<b>2,728</b>
Informed Guesses	140	0	<b>140</b>
Other Guesses	320	0	<b>320</b>
Unassessed Range	4,720	8,707	<b>13,426</b>
<b>TOTAL</b>	<b>12,860</b>	<b>10,441</b>	<b>23,301</b>

## GHANA: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Ankasa Conservation Area	—	DC3	C	2001	21	15	Danquah et al., 2001	2	509	2.6 W	5.3 N
Bia National Park & Resource Reserve	<b>DT</b>	DC2	C	2004	115	29	Sam et al., 2006	3	306	3.1 W	6.5 N
Chichibon Corridor	DD	IG3	E	1994	12	3*	Sam & Wilson, 1994	2	290	0.7 W	7.3 N
Dadieso Forest Reserve	<b>NP</b>	IG3	D	2002	7		Ayesu, 2003	3	195	3.0 W	6.0 N
Digya National Park	<b>DT</b>	DC1	B	2006	357	54	Kumordzi & Danquah, 2006	2	3,478	0.3 W	7.4 N
Goaso Forest Reserves Complex	<b>DT</b>	DC3	C	2004	72	44	Sam, 2004	2	2,035	2.7 W	6.8 N
Kakum Conservation Area	<b>DT</b>	DC1	B	2004	164	36	Danquah, 2004	3	366	1.3 W	5.5 N
Mole National Park	<b>DT</b>	AT2	A	2006	401		Bouché, 2006	2	4,504	1.9 W	9.6 N
Red & White Volta - Morago Ecosystem	—	DC3	B	1998	46	167	Sam, 1998	2	1,370	0.5 W	10.7 N

\* Range of informed guess

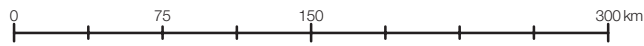
<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.



# Ghana



African Elephant Specialist Group

	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

A dung count of the Bia Conservation Area, conducted in 2004, used two different models to estimate elephant numbers, namely, a steady state model and a rainfall model. The steady state model gave an estimate of  $146 \pm 39$ , while the estimate from the rainfall model was 115 with an asymmetric confidence interval of 90 to 148 (Sam et al., 2006). The estimate used in this report is that of the more precise rainfall model, and it replaces a 1999 dung count figure of 108 (Sam, 2000), which was categorized in the previous report as an INFORMED GUESS for lack of an estimate of precision.

The Goaso Forest Reserve Complex was also covered as part of the Bia survey. The survey only found sufficiently high dung densities to calculate an estimate of elephant numbers in the northwest of the reserve, but the surveyors assume that elephants use the entire complex as part of their habitat, and hence the estimate was applied over the entire area surveyed. As in the case of Bia, two different models were used to estimate elephant numbers. In this case, the steady state model, which gave an estimate of  $72 \pm 44$ , was used in preference to the rainfall model (57, 95% CL 33 to 100), as no coefficient of variation was provided for the latter (Sam, 2004). This estimate replaces a 1994 INFORMED GUESS of 500 to 800 elephants (M.K. Sam, pers. comm., 1995).

A dung count of the previously unassessed Dadieso and Disue Forest Reserves failed to detect any elephant dung, but footprints of at least seven elephants were seen (Ayesu, 2003), and this figure appears as an INFORMED GUESS in the table of estimates.

The number of DEFINITE elephants in the summary table has increased by 259 compared to the previous report, due to the new estimate from the Digya National Park survey. The higher precision of the Mole survey, together with lower dung count estimates for Kakum and Goaso, result in decreases of 41 and 859 in the PROBABLE and POSSIBLE categories respectively. The replacement of estimates for Goaso and Digya with higher quality estimates, coupled with the degradation to the SPECULATIVE category of the estimate for Chichibon, which is now more than 10 years old, result in a net decrease of 291 in this category.

### *Cross-border Movements*

Ghana shares several elephant populations with neighbouring countries. Elephants move between Ghana and Burkina Faso, across the eastern border with Togo (Okoumassou et al., 1998), and possibly across the western border with Côte d'Ivoire. The corridor between Togo and Ghana is protected by forest reserves in Ghana, but is under threat from expanding agriculture on the Togolese side (Sam et al., 1998).

# GUINEA

## *General Statistics*

Country area: 245,860 km<sup>2</sup>  
Range area (% of country): 1,524 km<sup>2</sup> (1%)  
Protected area coverage (% of country): 6%  
Protected range (% of known and possible range in protected areas): 36%  
Information Quality Index (IQI): 0.47  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

The Ziama Forest Reserve is under pressure from growing human populations, habitat compression and increased cultivation up to the edges of the reserve. The imminent repatriation of refugees back to neighbouring Liberia may somewhat reduce this pressure in the short term (Barnes & Nandjui, 2005).

Crop raiding by elephants is a continuing problem in the area (Barnes & Nandjui, 2005). In 1996, conflict resolution committees were established to deal with the problem. Composed of representatives from the local population with arbitration from forest authorities, these committees monitor the frequency and severity of crop raids and propose solutions, which may include compensation, on a case-by-case basis.

Guinea is in the process of developing a national elephant conservation strategy. A workshop was held in 2004 and a strategy document was being drafted at the time of writing. In addition, an action plan to establish and secure a corridor between Ziama and Wenegisi Mountain in Liberia's North East Forest has been recently developed (Sebogo, 2006).

## *Range Data*

The Ziama Massif, one of the last two remaining dense moist forests in Guinea, is home to what may be the country's only remaining viable elephant population. The shape of the Ziama range has been altered for this report based on the information from a 2004 survey (Barnes & Nandjui, 2005).

Three new small areas of **KNOWN** range have been added in the northwest, adjacent to the Corubal-Dulombi area of Guinea Bissau, based on recent data collected by Brugière et al. (2006). The same authors believe that elephants no longer occur in the Sansalé area, and range there has been categorized as **DOUBTFUL**.

It is not known whether elephants still occur in the Ouré Kaba area, on the border with Sierra Leone. In the absence of recent information, this area has been retained as **POSSIBLE** range.

## *Population Data*

A dung count of the Ziama Forest Reserve conducted in 2004 (Barnes & Nandjui, 2005) provided the first reliable estimate of elephant numbers in Ziama. The figure of 214 from this survey replaces a 1998 dung count estimate of 108 (Direction Nationale des Forêts et Faune, 1999). Although both estimates originate from dung counts, they should not be directly compared, as the survey techniques were sufficiently different to render any comparison meaningless. The higher and more precise 2004 estimate is responsible for the increases in the **DEFINITE** and **PROBABLE** categories, as well as for the decrease in the **POSSIBLE** category shown in the summary table.

In the previous two reports, a combined estimate of 140 appeared for both the Ouré Kaba and Sansalé areas. As elephants are no longer thought to occur in the Sansalé area, the estimate has been split between the two sites in proportion to their area, and the Sansalé portion has been given an estimate of zero. This results in a decrease of 83 in the **SPECULATIVE** category.

### *Cross-border Movements*

Elephants had long been absent from Ziama until 1996, when it is thought they arrived from neighbouring Liberia (Direction Nationale des Forêts et Faune & Kreditanstalt für Wiederaufbau, 1997; Sagnah & Sagnah, 2000). It is expected that movement across the border will increase when the recently developed action plan to establish a corridor between Ziama and Wenegisi Mountain is implemented (Sebogo, 2006).

A recent study (Brugière et al., 2006) found indirect evidence of transboundary movement between northwest Guinea and southeast Guinea Bissau. Elephants from Niokolo-Koba in Senegal have not been seen on the Guinea side of the border since the early 1990s (Litoroh et al., 2002).

## SUMMARY TOTALS FOR GUINEA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Direct Sample Counts and Reliable Dung Counts	135	79	79	0
Other Guesses	0	0	0	57
<b>TOTALS 2006</b>	<b>135</b>	<b>79</b>	<b>79</b>	<b>57</b>
<i>TOTALS 2002</i>	<i>0</i>	<i>0</i>	<i>108</i>	<i>140</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Different Technique	+135	+79	-29	0
Population Lost	0	0	0	-83
<b>TOTAL CHANGE</b>	<b>+135</b>	<b>+79</b>	<b>-29</b>	<b>-83</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Direct Sample Counts and Reliable Dung Counts	491	0	<b>491</b>
Other Guesses	0	691	<b>691</b>
Unassessed Range	342	0	<b>342</b>
<b>TOTAL</b>	<b>833</b>	<b>691</b>	<b>1,524</b>

## GUINEA: ELEPHANT ESTIMATES

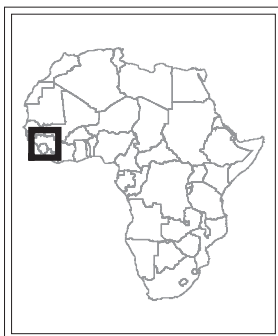
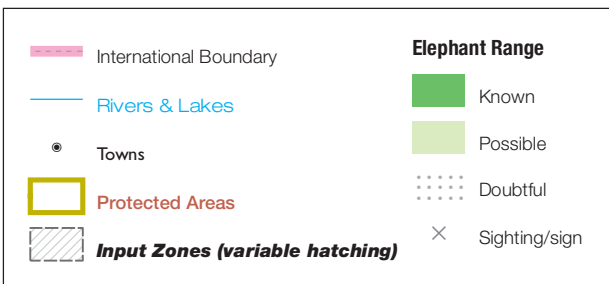
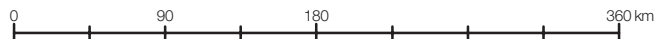
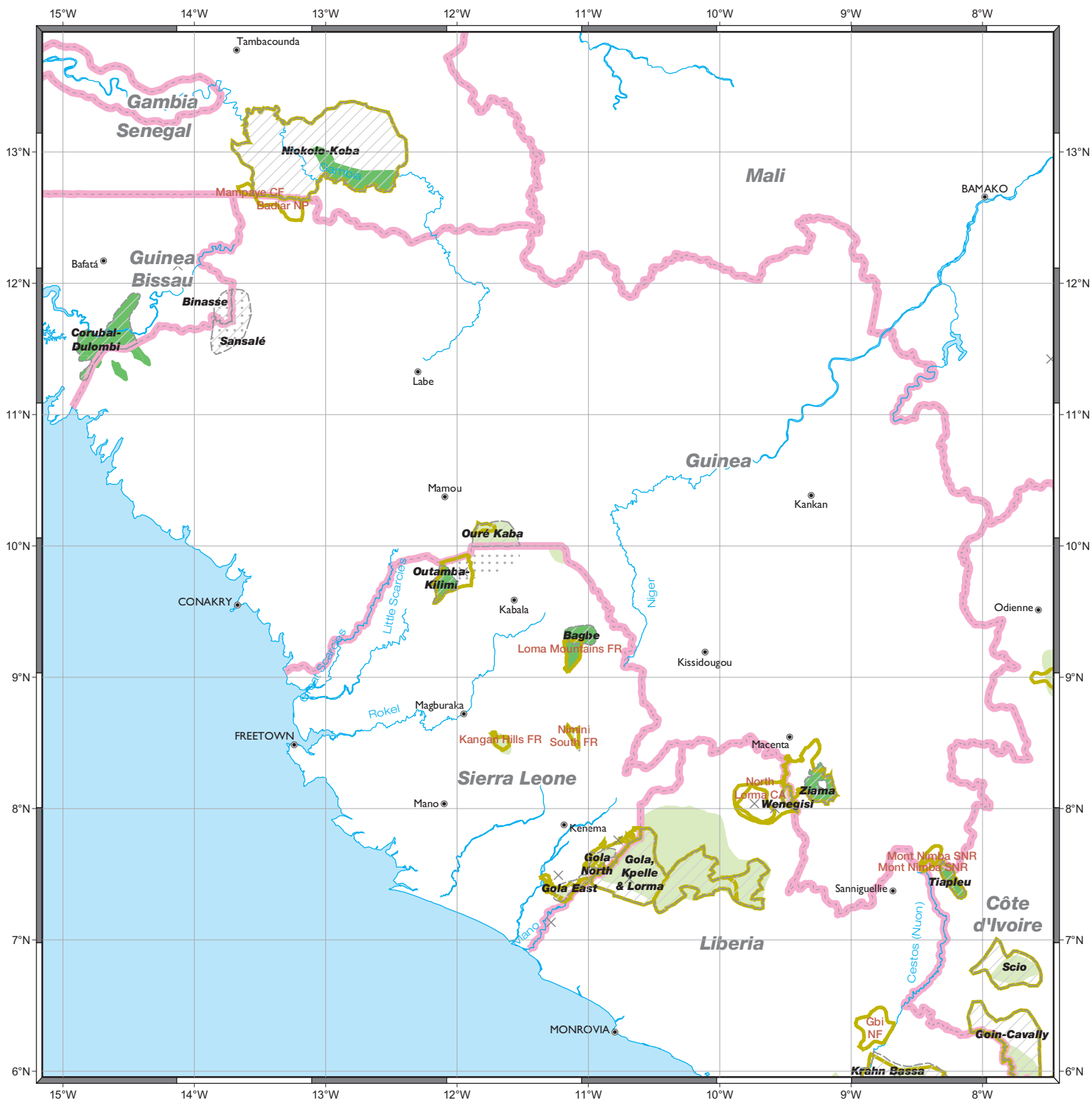
INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Ouré Kaba	—	OG3	E	1998	57		Sagnah, quest. reply, 1998	1	691	11.7 W	10.1 N
Sansalé	PL	OG3	E	1998	0		Sagnah, quest. reply, 1998		1,014	13.7 W	11.7 N
Ziama Strict Nature Reserve	<b>DT</b>	DC2	B	2004	214	79	Barnes & Nandjui, 2005	1	455	9.2 W	8.2 N

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Guinea



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# GUINEA BISSAU

## *General Statistics*

Country area: 36,120 km<sup>2</sup>  
Range area (% of country): 1,346 km<sup>2</sup> (1%)  
Protected area coverage (% of country): 0%  
Protected range (% of known and possible range in protected areas): 0%  
Information Quality Index (IQI): 0.00  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

The small size of Guinea Bissau's elephant population makes its long term viability unlikely. Pressure for land remains intense and there are plans to build a road through the remaining elephant range (Brugière et al., 2006).

A plan to create a national park in the Corubal-Dulombi area was formulated in the 1990s, but was never completed due to civil unrest. Nevertheless, if a planned project to create a transboundary protected area between Guinea Bissau and Guinea is implemented, several core areas devoted to the conservation of biodiversity would be created to include parts of remaining elephant range (Brugière et al., 2006).

## *Range Data*

A recent study of elephant distribution based on hunter interviews concluded that only a small elephant population remains in the southeast of Guinea Bissau (Brugière et al., 2006). An area of **KNOWN** range, based on point records from this study, has been added to the map. Two of the records, further to the north and separated from the main range area, appeared to belong to a transient animal and are shown as crosses on the map. The authors of the study believe that elephants are no longer found in the Binasse area, and this has been categorized as **DOUBTFUL** range.

## *Population Data*

Brugière et al. (2006) believe that a minimum of seven elephants and no more than 20 remain in the Corubal-Dulombi area. This information has been entered as an **INFORMED GUESS**. The estimate of 35 for the Binasse area featured in the previous report (Sournia, cited in Douglas-Hamilton et al., 1992) has been replaced by an estimate of zero, as elephants are no longer believed to occur there (Brugière et al., 2006).

## *Cross-border Movements*

Recent evidence suggests that elephants from the Corubal-Dulombi area move seasonally across the border to Guinea (Brugière et al., 2006), corroborating previous observations by da Silva Naga (2001).



## SUMMARY TOTALS FOR GUINEA BISSAU

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Informed Guesses	0	0	7	13
Other Guesses	0	0	0	0
<b>TOTALS 2006</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>13</b>
<i>TOTALS 2002</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>35</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Population	0	0	+7	+13
Population Lost	0	0	0	-35
<b>TOTAL CHANGE</b>	<b>0</b>	<b>0</b>	<b>+7</b>	<b>-22</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Total Range
Informed Guesses	1,346	<b>1,346</b>
<b>TOTAL</b>	<b>1,346</b>	<b>1,346</b>

## GUINEA BISSAU: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Binasse Area	PL	OG3	E	2004	0		Brugière et al., in press		330	13.8 W	11.8 N
Corubal-Dulombi Area	NP	IG3	D	2004	7	13*	Brugière et al., in press	1	1,342	14.7 W	11.6 N

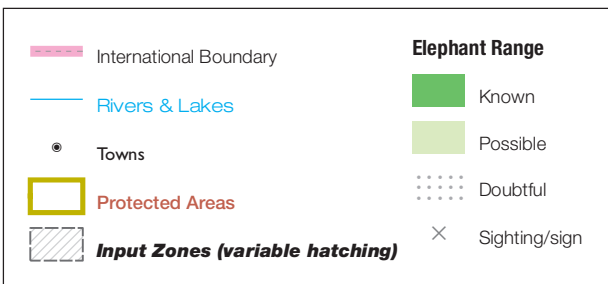
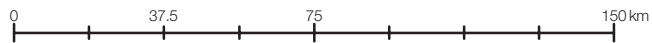
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Guinea Bissau



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# LIBERIA

## *General Statistics*

Country area: 111,370 km<sup>2</sup>  
Range area (% of country): 15,977 km<sup>2</sup> (19%)  
Protected area coverage (% of country): 15%  
Protected range (% of known and possible range in protected areas): 64%  
Information Quality Index (IQI): 0.00  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Rapid assessment surveys of some of the most important forest areas in Liberia have been conducted in recent years. Several areas originally proposed for national park status in the early 1990s were found to be disturbed by extensive logging. While other areas visited appeared relatively intact, elephant was the most likely species to be absent out of six charismatic species monitored (buffalo, chimpanzee, elephant, leopard, pigmy hippopotamus and slender-snouted crocodile). Hunter interviews suggest disturbance caused by logging operations as the most common cause for the absence of elephants (Waitkuwait et al., 2003). Hunting for bushmeat and human resettlement in rural areas after the civil war are also believed to have contributed to the disappearance of elephants from these areas.

In 2005, up to 5,000 squatters and ex-combatants, who had occupied parts of Sapo National Park in search of gold, were peacefully evicted from the park. Another survey in late 2005 found small scale miners and prospecting activities for large scale mining in the Gola National Forest (Barrie et al., 2005).

A workshop was held in Monrovia in 2005 to develop a national elephant conservation strategy, with financial support from the United States Fish and Wildlife Service and technical input from the AfESG. The drafting of the policy document was in progress at the time of writing. The AfESG has also assisted in the development of an action plan to establish an elephant corridor between Wenegisi Mountain in Liberia's North East Forest and the Zياما Reserve in neighbouring Guinea (Sebogo, 2006).

## *Range Data*

The Liberia Forest Re-assessment Project found elephants to be absent from a number of areas where they had been present in the early 1990s (Waitkuwait et al., 2003). These areas, which include parts of the Krahn Bassa and Grebo forests, have now been categorized as **NON-RANGE**. Around two-thirds of the remaining range data is over 15 years old and remains speculative. A related assessment of the Gola, North Lorma and Grebo National Forests found evidence of continued elephant presence at all three sites (Barrie et al., 2005). These records are depicted as crosses on the map, as only small portions of these forests were visited. The map also shows a cross in the northwest, near the border with Sierra Leone and to the west of Gola, where crop raiding by elephants is reported to be a problem (Humanitarian Information Centres, 2005).

## *Population Data*

No quantitative surveys have been conducted in Liberia since 1991, and all estimates have been retained from the previous report. These estimates remain highly speculative. A survey of Sapo National Park had been planned under the CITES MIKE Programme, but could not be conducted due to ongoing instability at the time.

## *Cross-border Movements*

Little information is available on cross-border movements, although it is likely that elephants move between Grebo and Goin-Cavally in Côte d'Ivoire (A. Nandjui, pers. comm., 2006), and between the Gola National Forest and the Gola North Forest Reserve in Sierra Leone. Elephants in the Zياما Forest in Guinea are reported to have moved there from Liberia during the civil war.

## SUMMARY TOTALS FOR LIBERIA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Other Guesses	0	0	0	1,676
<b>TOTALS 2006</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,676</b>
<i>TOTALS 2002</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1,676</i>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Other Guesses	1,368	8,169	<b>9,537</b>
Unassessed Range	85	6,355	<b>6,440</b>
<b>TOTAL</b>	<b>1,453</b>	<b>14,524</b>	<b>15,977</b>

## LIBERIA: ELEPHANT ESTIMATES

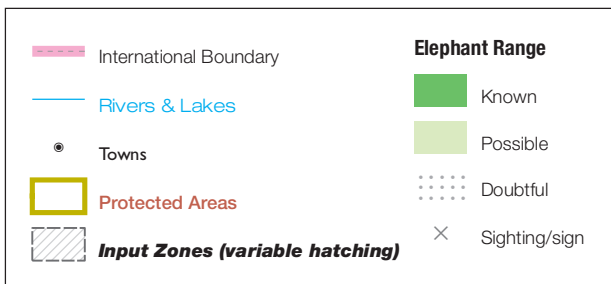
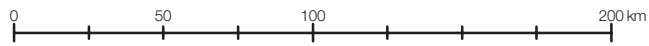
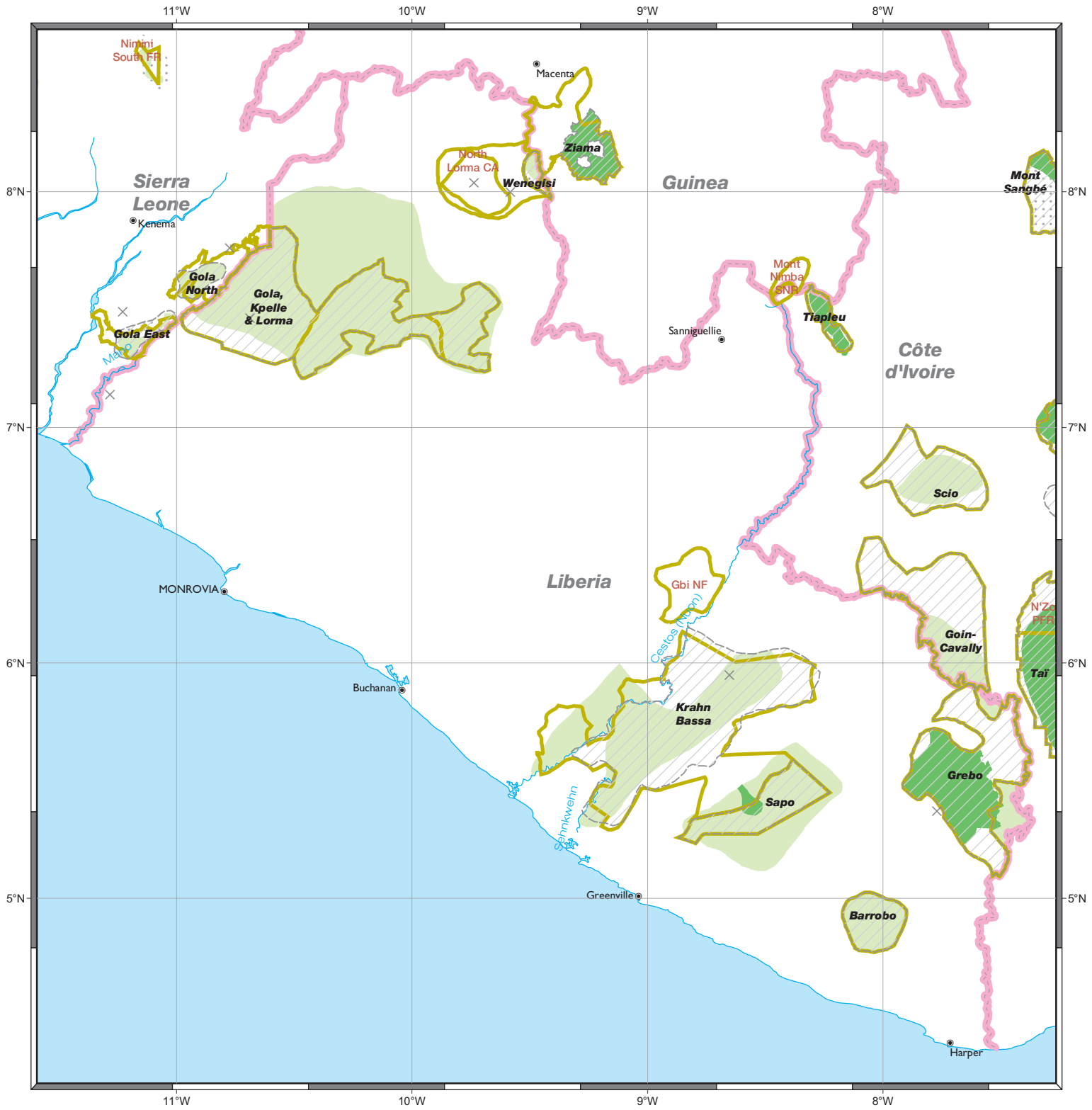
INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Barrobo National Forest	—	OG3	E	1990	100		Anstey & Dunn, 1991	2	640	8.0 W	4.9 N
Gola, Kpelle & Lorma National Forests	—	OG3	E	1990	500		Anstey & Dunn, 1991	1	4,255	10.4 W	7.5 N
Grebo National Forest	—	OG3	E	1990	230		Anstey & Dunn, 1991	1	2,510	7.6 W	5.5 N
Krahn Bassa National Forest	—	OG3	E	1990	500		Anstey & Dunn, 1991	1	5,142	8.8 W	5.8 N
Sapo National Park	—	DC3	E	1989	313	304	Barnes & Dunn, 2002	2	1,292	8.5 W	5.4 N
Wenegisi National Forest	—	OG3	E	1990	33		Anstey & Dunn, 1991	3	130	9.5 W	8.1 N

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Liberia



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# MALI

## General Statistics

Country area: 1,240,000 km<sup>2</sup>  
Range area (% of country): 31,878 km<sup>2</sup> (2%)  
Protected area coverage (% of country): 3%  
Protected range (% of known and possible range in protected areas): 25%  
Information Quality Index (IQI): 0.55  
CITES Appendix: I  
Listing Year: 1989

## Current Issues

The expansion of agriculture onto elephant migration routes is a major threat facing Mali's elephants. As a result, human-elephant conflict continues to be an important threat to elephants in the Gourma region and beyond, affecting both pastoralists and agriculturalists (F. Dakouo, pers. comm., 2004; Nomba, 2000; Nomoko, 2006). It is feared that if the elephant migration route is blocked by expanding cultivation, elephants will be unable to obtain the resources they need and will eventually disappear from the area (Barnes et al., 2006).

The implementation of a five-year project named '*Projet de Conservation et Valorisation de la Biodiversité du Gourma Malien*' commenced recently thanks to funding from the World Bank. Amongst other objectives, the project recognizes the Gourma elephants as a unique resource and intends to work with the local people to ensure their conservation. Mali is also planning to develop a national elephant strategy, and funding for a workshop is being sought.

## Range Data

Elephants in Mali are largely confined to a single population in the Gourma, an arid area in the Sahel on the border with Burkina Faso. The Gourma elephants are the continent's most northerly population and, together with Namibia's Kunene elephants, the most adapted to arid conditions.

The area of KNOWN range has been further extended for this report through information from an ongoing radio-collaring and individual registration study (E.M. Hema et al., pers. comm., 2006). Two portions of this range are seldom or never visited by elephants, and they have been categorized as NON-RANGE. A small number of elephants may still be present in southwestern Mali, in the districts of Sikasso and Mopti. There have been recent sightings and reports of elephant damage in these areas (F. Dakouo, pers. comm., 2004; Nomoko, 2006). These are shown as crosses on the map.

## Population Data

An individual registration study in the Gourma has identified a minimum of 357 elephants, with an estimated 141 calves and other family members not individually registered. Partial registration suggests there may be an additional 156 elephants in the population. An estimate of 498 to 654 has been entered as an INFORMED GUESS, replacing a 2002 waterhole aerial count and an INFORMED GUESS for the areas not covered in the flights (Blake et al., 2003).

The new estimate for Gourma has resulted in increases in the DEFINITE, POSSIBLE and SPECULATIVE categories. These increases are a result of more comprehensive information, rather than a recorded increase in the actual elephant population.

## Cross-border Movements

The Gourma elephants move anticlockwise in search of water in a roughly circular migration that takes them into northern Burkina Faso (Blake et al., 2003; Jachmann, 1991; Spinage, 1985) and covers nearly 38,000 km<sup>2</sup>. Elephants seen in southwestern Mali in recent years are said to have come from Côte d'Ivoire or western Burkina Faso, but this has not been verified (F. Dakouo, pers. comm., 2004; Nomoko, 2006).



## SUMMARY TOTALS FOR MALI

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Informed Guesses	357	0	141	156
<b>TOTALS 2006</b>	<b>357</b>	<b>0</b>	<b>141</b>	<b>156</b>
<i>TOTALS 2002</i>	<i>322</i>	<i>0</i>	<i>28</i>	<i>25</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Guess	+35	0	+113	+131
<b>TOTAL CHANGE</b>	<b>+35</b>	<b>0</b>	<b>+113</b>	<b>+131</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Total Range
Informed Guesses	31,878	<b>31,878</b>
<b>TOTAL</b>	<b>31,878</b>	<b>31,878</b>

## MALI: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Gourma	NG	IG3	D	2006	498	156*	E.M. Hema et al., pers. comm., 2006	1	37,991	1.9 W	15.5 N

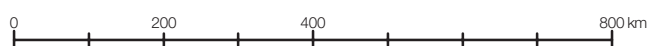
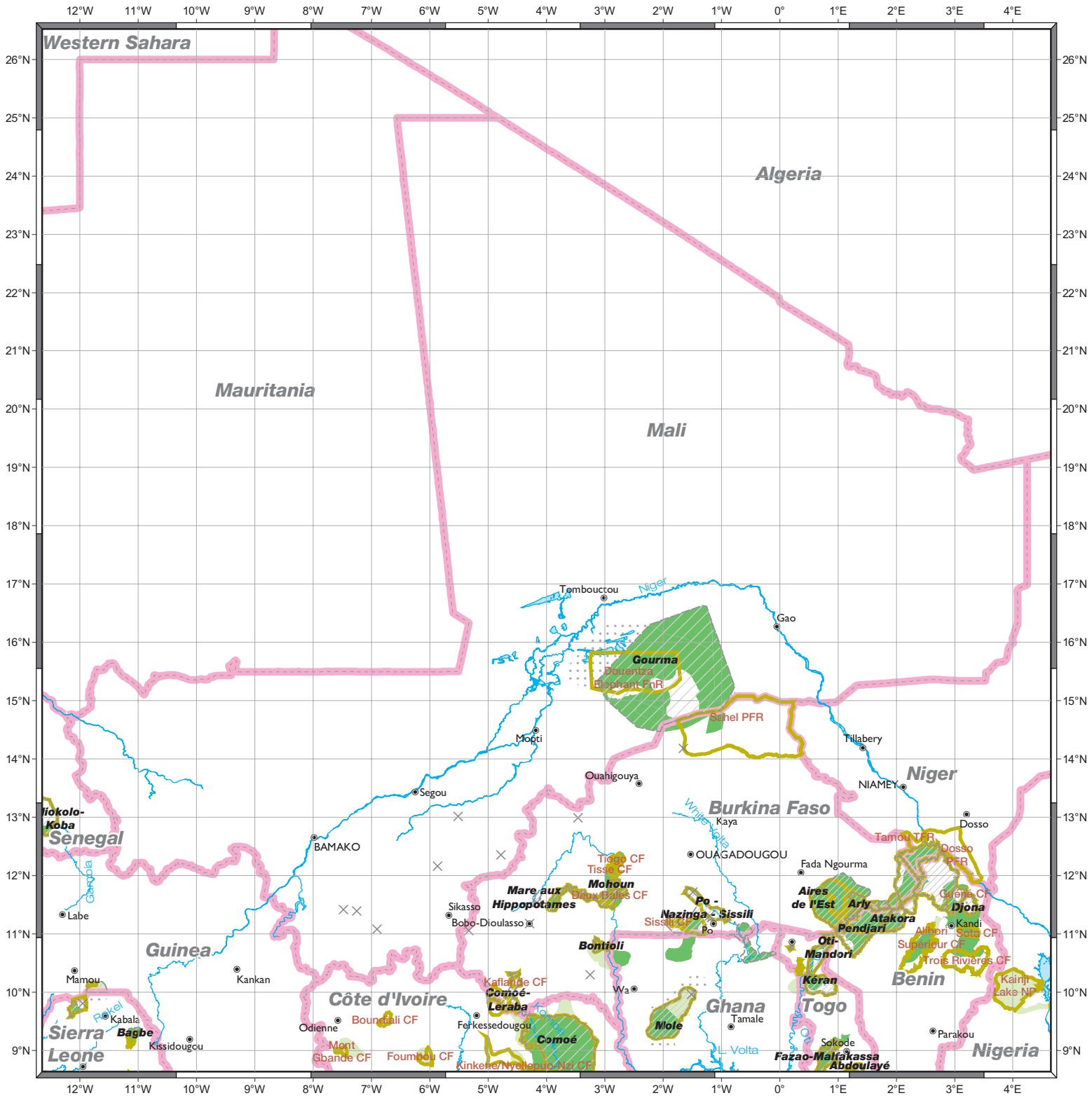
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

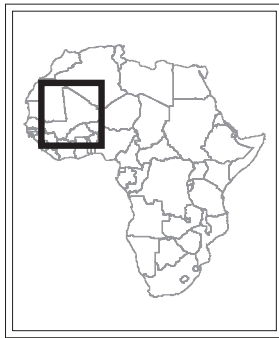
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Mali



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# NIGER

## *General Statistics*

Country area: 1,267,000 km<sup>2</sup>  
Range area (% of country): 2,683 km<sup>2</sup> (0%)  
Protected area coverage (% of country): 9%  
Protected range (% of known and possible range in protected areas): 87%  
Information Quality Index (IQI): 0.83  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Niger has recently developed a national elephant management strategy. The strategy document identifies poaching, human-elephant conflict and lack of institutional capacity as some of the key factors affecting elephant populations in the country. In addition to reducing the impact of these challenges, the strategy's objectives include the improvement of knowledge on the status of elephant populations and fostering cross-border cooperation in elephant management.

## *Range Data*

Only two elephant populations are found in Niger, both in the south. The larger population is located in the southwest, within the boundary of the Parc "W", a transfrontier park shared with Burkina Faso and Benin. The second, much smaller, population occurs in the Babban Rafi Forest, and is part of Nigeria's Rongou Forest population (Direction de la Faune, Pêche et Pisciculture, 1991). Although there is recent information indicating the continued presence of elephants in Babban Rafi, the area remains categorized as POSSIBLE range for lack of detailed information on elephant distribution. The depiction of these ranges has not changed in the AED range map since the AED 1995 (Said et al., 1995).

## *Population Data*

A 2003 aerial total count of the "W" complex returned an estimate of 85 for the Niger sector. Although this contrasts with the previous aerial sample count estimate of  $743 \pm 306$  (Rouamba et al., 2002), the estimate for the entire park "W" has not changed considerably between the two surveys, highlighting the transboundary nature of its elephant population.

The population in Babban Rafi is currently believed to stand at 17 animals (A.M. Issa, pers. comm., 2005). This estimate has been categorized as an INFORMED GUESS and replaces a 1992 estimate of 100 (Seydou, quest. reply, 1998).

As a result of the new estimates, numbers for Niger have declined in all four categories. Much of the difference, however, is likely to be the result of transboundary movements rather than to genuine changes in elephant numbers.

## *Cross-border Movements*

The Park "W" population straddles the borders of Niger, Benin and Burkina Faso and, together with other adjacent protected areas, now represents the largest elephant range in West Africa, both in terms of extent and numbers of elephants (Bouché et al., 2004b).

Although the Babban Rafi population is believed to move between southern Niger and northern Nigeria, information on the movement patterns is contradictory. Some authors maintain that elephants spend most of their time in Niger (Seydou, 1997), whereas others suggest that they only visit Niger in the dry season, and only began doing so in 1986 (Direction de la Faune, Pêche et Pisciculture, 1991).

## SUMMARY TOTALS FOR NIGER

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	85	0	0	0
Informed Guesses	0	0	17	0
<b>TOTALS 2006</b>	<b>85</b>	<b>0</b>	<b>17</b>	<b>0</b>
<i>TOTALS 2002</i>	<i>136</i>	<i>214</i>	<i>214</i>	<i>100</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Different Technique	-51	-214	-214	0
New Guess	0	0	+17	-100
<b>TOTAL CHANGE</b>	<b>-51</b>	<b>-214</b>	<b>-197</b>	<b>-100</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	2,333	0	<b>2,333</b>
Informed Guesses	0	350	<b>350</b>
<b>TOTAL</b>	<b>2,333</b>	<b>350</b>	<b>2,683</b>

## NIGER: ELEPHANT ESTIMATES

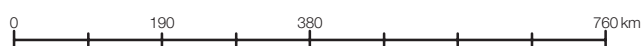
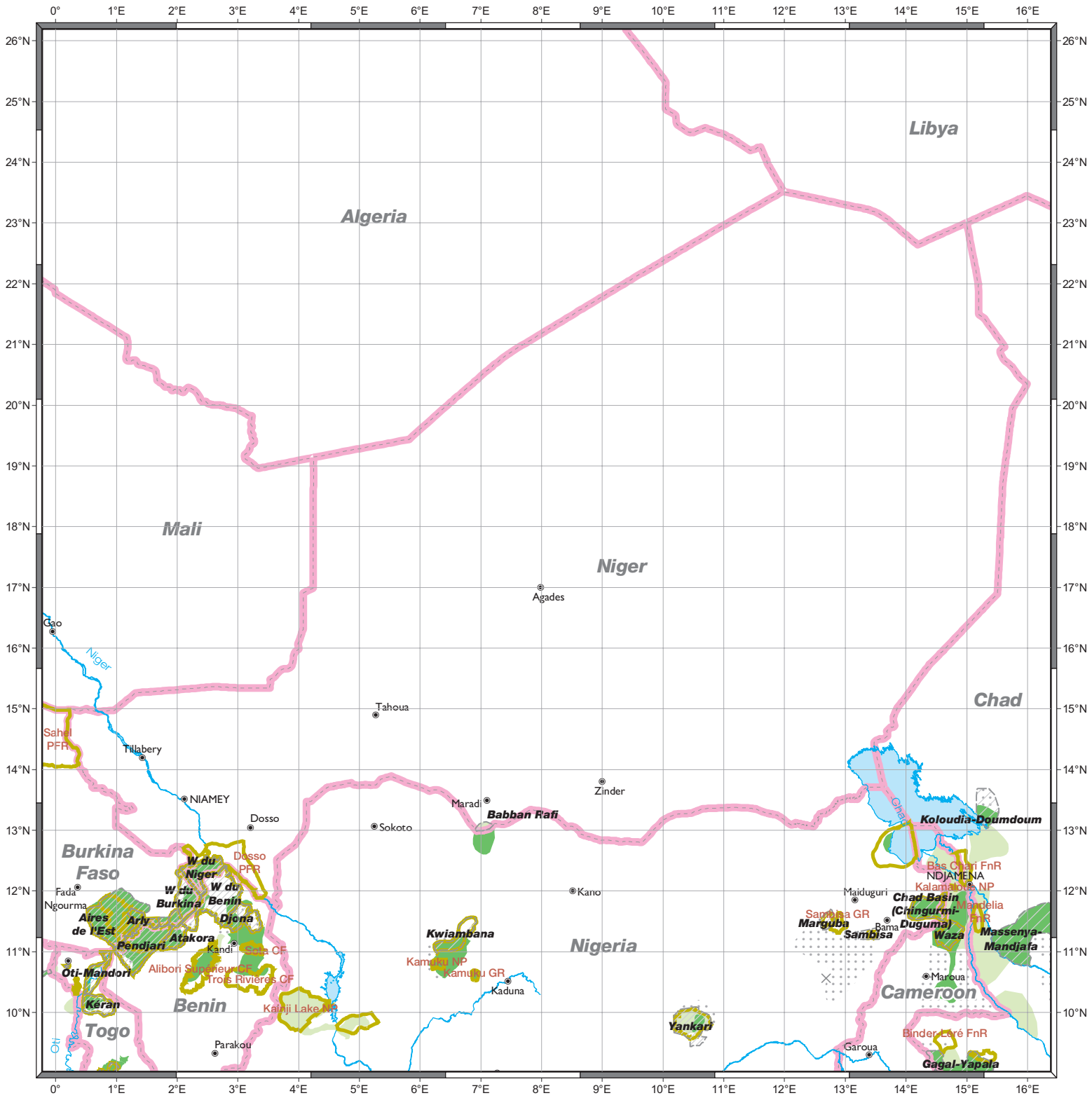
INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Babban Rafi Forest	NG	IG3	D	2005	17		A.M. Issa, pers. comm., 2005	1	430	7.0 E	13.1 N
W du Niger National Park	DT	AT2	A	2003	85		Bouché et al., 2004b	1	2,294	2.4 E	12.3 N

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

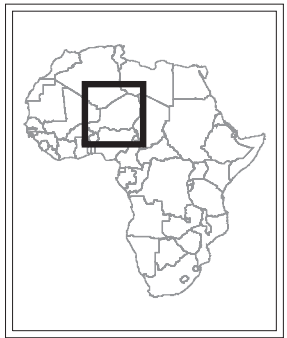
<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Niger



	International Boundary		<b>Elephant Range</b> Known
	Rivers & Lakes		Possible
	Towns		Doubtful
	Protected Areas		Sighting/sign
	<b>Input Zones (variable hatching)</b>		



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

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# NIGERIA

## *General Statistics*

Country area: 923,770 km<sup>2</sup>  
Range area (% of country): 22,968 km<sup>2</sup> (5%)  
Protected area coverage (% of country): 3%  
Protected range (% of known and possible range in protected areas): 70%  
Information Quality Index (IQI): 0.16  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Most elephant populations are small, fragmented and probably not viable in the long term. Only the Yankari population in northern Nigeria has good prospects for survival, but encroachment and poaching continue to be a threat to elephants in the park (Omondi et al., 2006b).

Nigeria seems to have made little progress in regulating its large domestic ivory market. The size of the market appears to be increasing, and the country continues to be an important entrepôt in the international trade. Most of the ivory traded in Nigeria is believed to originate from Central Africa (Courouble et al., 2003; TRAFFIC, 2004).

Donors rejected a first proposal for the development of a national strategy for the conservation of Nigeria's elephants, but the search for funds continues.

## *Range Data*

Nigeria's elephants live in small, relict populations, divided between forests in the south and savannas in the north. Nigeria is Africa's most populous country, and the fragmentation of elephant range is an inevitable consequence of increasing human density, agriculture and settlement.

Changes to the range map include the categorization of several areas as **DOUBTFUL** range in areas where human population density is estimated to exceed 15 persons per km<sup>2</sup> (ORNL/GIST, 2002; see Introduction section for rationale). Such areas include the environs of Yankari and Cross River National Parks.

The last two aerial surveys conducted in Yankari suggest that elephants are concentrated in the southeast of the park, where there is least disturbance from human activity (Nicholas, 1999; Omondi et al., 2006b). This area has been categorized as **KNOWN** range, while the rest of Yankari has been reverted to **POSSIBLE** range.

An aerial survey of Sambisa and Marguba Reserves found no elephants and heavy human settlement (Omondi et al., 2006a). Local informants indicated that elephants may no longer be found in their traditional range, save perhaps for a small group to the south of the area covered by the survey. The approximate location of this group is shown as a cross on the map, while the range area depicted in the previous report has been categorized as **DOUBTFUL**.

## *Population Data*

An aerial total count of Yankari National Park conducted in July 2006 by the CITES MIKE programme gave an estimate of 348 (Omondi et al., 2006b). This replaces the aerial total count estimate of 328 featured in the previous report (Nicholas, 1999).

An aerial survey of the Sambisa and Marguba Reserves returned an estimate of zero (Omondi et al., 2006b). As elephants may no longer occur in these reserves, this figure replaces an **INFORMED GUESS** of 150 to

250 that included a sighting of at least 130 elephants (Gawaisa, quest. reply, 1998). This replacement is primarily responsible for the net decline of 130 elephants in the DEFINITE category.

All other estimates have been retained from the previous report, but estimates for the Chingurmi-Duguma sector of the Chad Basin National Park, Kwiambana Game Reserve, Omo Forest Reserve and Taylor Creek have been degraded to the category of OTHER GUESSES, as they are more than 10 years old. The degradation of these estimates has resulted in a decrease of 235 in the POSSIBLE category and contributed to a net increase of 75 in the SPECULATIVE category.

### *Cross-border Movements*

A migratory population may still move between Chad Basin National Park and Waza National Park in Cameroon (Bita, 1997; Halla, 2002), but recent reliable information is lacking. Elephants may also move between Nigeria and the Baban Rafi Forest in Niger (Seydou, quest. reply, 1998), and between the Cross River National Park (Oban Division) and Korup National Park in Cameroon (Tooze, 1994).

## SUMMARY TOTALS FOR NIGERIA

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	348	0	0	0
Informed Guesses	0	0	105	100
Other Guesses	0	0	0	275
<b>TOTALS 2006</b>	<b>348</b>	<b>0</b>	<b>105</b>	<b>375</b>
<i>TOTALS 2002</i>	<i>478</i>	<i>0</i>	<i>340</i>	<i>300</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Repeat Survey	+20	0	0	0
Different Technique	-150	0	0	-100
Data Degraded	0	0	-235	+175
<b>TOTAL CHANGE</b>	<b>-130</b>	<b>0</b>	<b>-235</b>	<b>+75</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	495	1,570	<b>2,065</b>
Informed Guesses	1,801	653	<b>2,454</b>
Other Guesses	3,821	142	<b>3,964</b>
Unassessed Range	7,030	7,456	<b>14,486</b>
<b>TOTAL</b>	<b>13,147</b>	<b>9,821</b>	<b>22,968</b>

## NIGERIA: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Andoni Island	—	IG3	D	2002	6	4*	Mshelbwala et al., 2002	3	215	7.5 E	4.5 N
Chad Basin (Chingurmi-Duguma) National Park Sector	DD	IG3	E	1994	100		Mshelbwala, 1998	2	2,160	14.4 E	11.7 N
Cross River (Okwangwo) National Park	—	DC3	D	1998	74	56*	Obot et al., 1998	2	239	9.2 E	6.3 N
Gashaka-Gumti National Park	—	IG3	D	2002	20	30*	R. Barnwell, pers. comm., 2002	1	5,860	11.7 E	7.5 N
Kambari	—	IG3	D	1998	5	10*	Gawaisa, quest. reply, 1998	2	2,000	10.6 E	8.8 N
Kwiambana Game Reserve	DD	IG3	E	1993	80	40*	Hurst, quest. reply, 1994	2	1,715	6.6 E	11.3 N
Marguba Forest Reserve	<b>DT</b>	AT3	A	2006	0		Omondi et al., 2006a		710	12.7 E	11.5 N
Okomu Game Sanctuary	—	OG3	E	1991	40		NRCC, 1991	2	1,082	5.1 E	6.3 N
Omo Forest Reserve	DD	IG3	E	1994	30	20*	Mshelbwala, 1998	2	1,300	3.6 E	6.8 N
Sambisa	<b>DT</b>	AT3	A	2006	0		Omondi et al., 2006a		647	13.4 E	11.3 N
Taylor Creek	DD	IG3	E	1993	25		Thouless, 1993	3	145	6.4 E	5.2 N
Yankari National Park	<b>RS</b>	AT3	A	2006	348		Omondi et al., 2006b	2	3,224	10.5 E	9.8 N

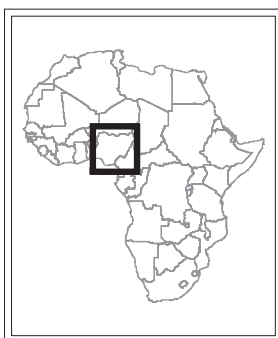
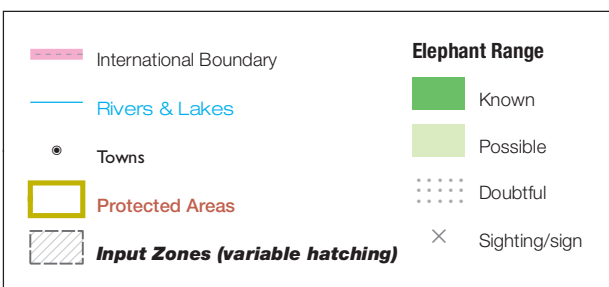
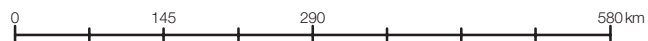
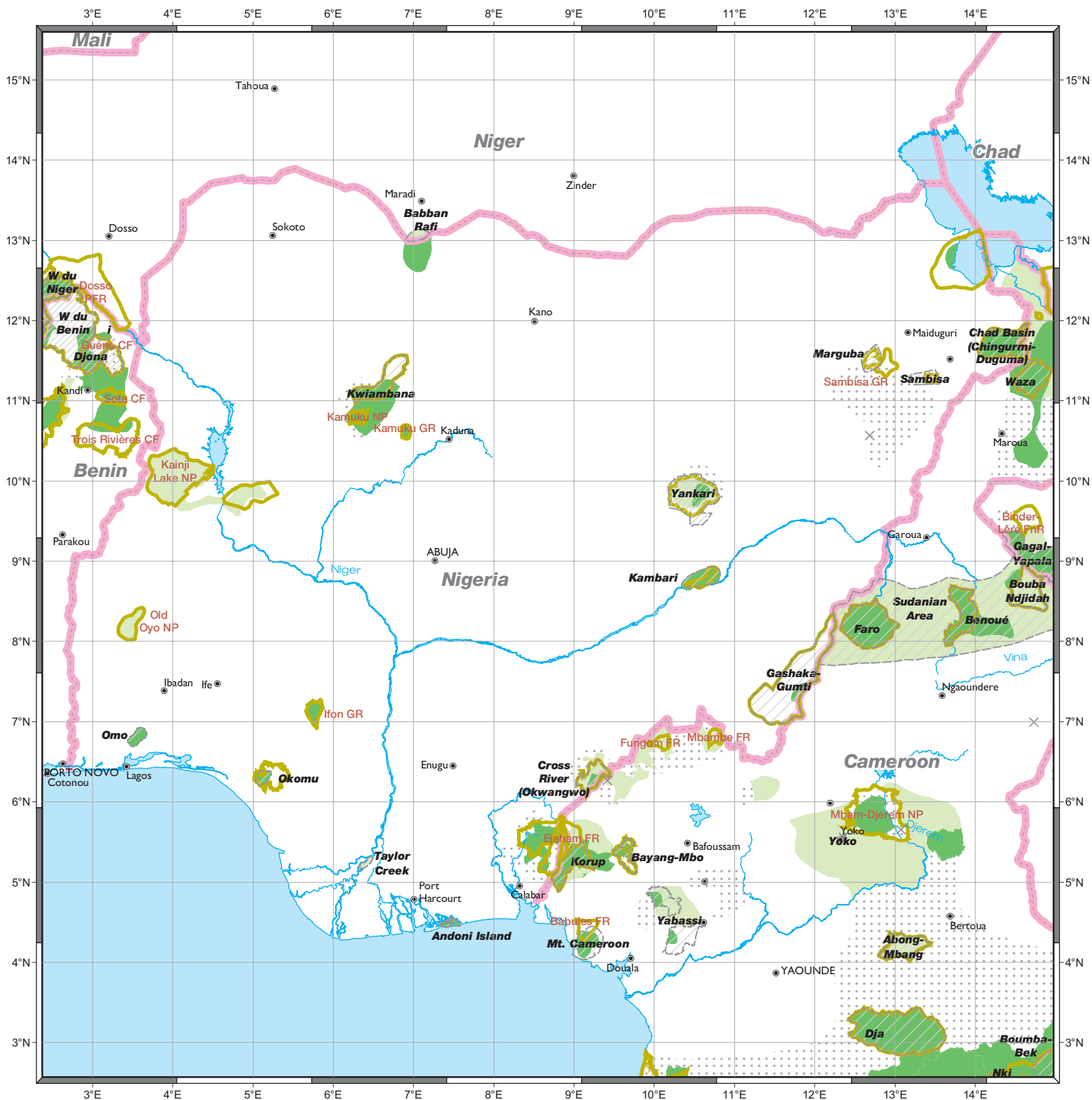
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Nigeria



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# SENEGAL

## *General Statistics*

Country area: 196,190 km<sup>2</sup>  
Range area (% of country): 1,090 km<sup>2</sup> (4%)  
Protected area coverage (% of country): 16%  
Protected range (% of known and possible range in protected areas): 100%  
Information Quality Index (IQI): 0.10  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Elephants appear to be on the brink of disappearing in Senegal. A recent survey found Niokolo-Koba National Park in a serious state of deterioration. Illegal activity was widespread, including cattle grazing, commercial timber exploitation and wildlife poaching. In addition, a planned road improvement project further threatens the integrity of the park. The World Heritage Committee requested the Senegalese authorities to produce a full report on the status of wildlife populations in Niokolo-Koba by the end of January 2007 (UNESCO, 2006). The African Parks Foundation is expected to take over the management of Niokolo-Koba National Park in the hopes of gaining some control over the situation and safeguarding what remains with a view to future recovery.

Despite its unviable elephant population, Senegal continues to harbour one of the key unregulated domestic ivory markets in Africa. Ivory originating largely from Central Africa is carved in Senegal and sold to foreign nationals with little or no interference from the authorities (Courouble et al., 2003).

## *Range Data*

Niokolo-Koba National Park is the last place in Senegal where elephants may still be found. An extensive ground survey, conducted in 2006, found signs of elephant presence to be restricted to the south of the park (Renaud et al., 2006). The area where these signs were found is shown on the map as **KNOWN** range, while the rest of the park has been categorized as **NON-RANGE**.

## *Population Data*

Aerial and ground surveys of the Niokolo-Koba National Park were jointly conducted by the African Parks Foundation and Senegal's Directorate of National Parks in 2006 (Renaud et al., 2006). No elephants were seen in the aerial survey, making it the fifth consecutive aerial survey of Niokolo-Koba in which no elephants were found (Mauvais, 2002). Six traces of elephant were seen during the ground survey, and surveyors believe there to be at least one, and at most 10, elephants left in the park. This has been entered as an **INFORMED GUESS**, which replaces a guess of between 3 and 50 (Mauvais, 2002). As a result of this new guess, the number of elephants in the **DEFINITE** category has declined by one, while the number under the **SPECULATIVE** category has dropped by 39.

## *Cross-border Movements*

It is unlikely that elephants move between Niokolo-Koba and Guinea, as there have been no records of elephant presence on the Guinea side since the early 1990s (Litoroh et al., 2002). There has been some discussion on the possibility of establishing a transboundary park to include Niokolo-Koba and Badiar National Park in Guinea (UNESCO, 2006).

## SUMMARY TOTALS FOR SENEGAL

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Informed Guesses	1	0	0	9
<b>TOTALS 2006</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>9</b>
<i>TOTALS 2002</i>	<i>2</i>	<i>0</i>	<i>0</i>	<i>48</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Guess	-1	0	0	-39
<b>TOTAL CHANGE</b>	<b>-1</b>	<b>0</b>	<b>0</b>	<b>-39</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Total Range
Informed Guesses	1,090	1,090
<b>TOTAL</b>	<b>1,090</b>	<b>1,090</b>

## SENEGAL: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Niokolo-Koba National Park	NG	IG3	D	2006	1	9*	Renaud et al., 2006	1	8,282	13.0 W	13.0 N

\* Range of informed guess

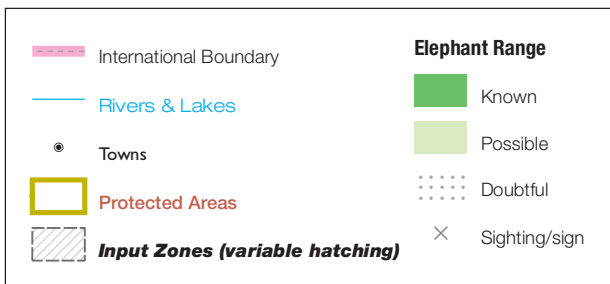
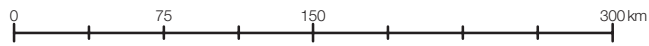
<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS<sup>+</sup> denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.



# Senegal



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for  
protected area abbreviations.

# SIERRA LEONE

## *General Statistics*

Country area: 71,740 km<sup>2</sup>  
Range area (% of country): 1,804 km<sup>2</sup> (4%)  
Protected area coverage (% of country): 3%  
Protected range (% of known and possible range in protected areas): 56%  
Information Quality Index (IQI): 0.00  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Although once widespread, firearms are now becoming increasingly rare, thanks to a vigorous firearm collection programme organized by the United Nations. This is likely to reduce hunting and poaching pressure on elephants.

The infrastructure in parks such as Outamba-Kilimi was severely impacted by the civil war, and little or no equipment is available for park staff to conduct their duties. A project to stop legal and illegal logging in the Gola Forest and to transform it into a community-managed national park recently received endorsement from the Government.

A National Biodiversity Strategy and Action Plan, released in 2003, calls for a nationwide census of large mammals, including elephants, to be conducted as a matter of priority. Sierra Leone is in the process of developing a national strategy for the conservation of elephants, and funding is being sought for a workshop.

## *Range Data*

Recent and reliable information on elephant distribution is lacking, but elephants are known to remain in a number of forest fragments scattered throughout the eastern half of the country. A recent survey of Outamba-Kilimi National Park only found evidence of elephant presence in the southwestern half of the park (Danquah & Nandjui, *quest. reply*, 2006), and the area depicted as **KNOWN** range has been corrected accordingly.

Some areas in and around the Nimini South and Gola East Forest Reserves appear to be densely settled, according to the Landsat 2002 human population density database (ORNL/GIST, 2002), and have been categorized as **DOUBTFUL** range (see Introduction section for details on rationale). The presence of elephants in the Gola forests is supported by recent reports of elephant crop raiding and other forms of human-elephant conflict (Mansaray, 2004). These are shown as crosses on the map.

## *Population Data*

A dung survey of Outamba-Kilimi National Park was conducted in 2005, but no estimate of elephant numbers was produced due to the low dung encounter rate and the lack of an estimate of dung decay (Karimu, 2005). Based on a pilot survey in Outamba-Kilimi between February and April 2006, Nandjui & Danquah (2006) estimate there to be 80 to 100 elephants in the park. This estimate has been categorized as an **INFORMED GUESS**, and replaces a 1994 guess of 50 (Grubb et al., 1998).

The estimate of 5 – 45 for Bagbe River Forest featured in the previous report (A. Kortenhoven, *pers. comm.*, 2002), has been degraded to the category of **OTHER GUESSES**, as it is now more than 10 years old. All other estimates for Sierra Leone have been retained from the previous report.

## *Cross-border Movements*

Elephants may move from Sierra Leone into Guinea and Liberia, but there is no information available.

## SUMMARY TOTALS FOR SIERRA LEONE

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Informed Guesses	0	0	80	20
Other Guesses	0	0	0	115
<b>TOTALS 2006</b>	<b>0</b>	<b>0</b>	<b>80</b>	<b>135</b>
<i>TOTALS 2002</i>	<i>0</i>	<i>0</i>	<i>5</i>	<i>205</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
New Guess	0	0	+80	-30
Data Degraded	0	0	-5	-40
<b>TOTAL CHANGE</b>	<b>0</b>	<b>0</b>	<b>+75</b>	<b>-70</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Informed Guesses	358	0	<b>358</b>
Other Guesses	349	356	<b>705</b>
Unassessed Range	265	476	<b>742</b>
<b>TOTAL</b>	<b>972</b>	<b>832</b>	<b>1,804</b>

## SIERRA LEONE: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Bagbe River Forest	DD	IG3	E	1995	5	45*	A. Kortenhoven, pers. comm., 2002	1	349	11.1 W	9.3 N
Gola East Forest Reserve	—	OG3	E	1987	60		Grubb et al., 1998	1	287	11.1 W	7.4 N
Gola North Forest Reserve	—	OG3	E	1987	50		Grubb et al., 1998	1	242	10.9 W	7.6 N
Outamba-Kilimi	NG	IG3	D	2006	80	20*	A. Nandjui & E.K.A. Danquah, pers. comm., 2006	1	358	12.1 W	9.7 N

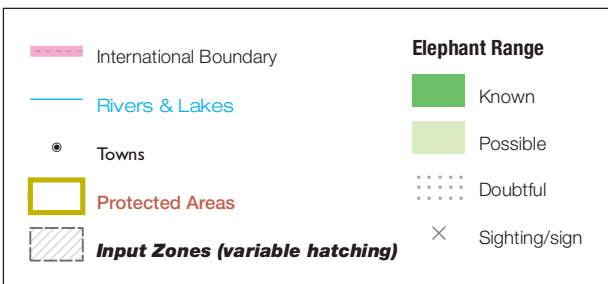
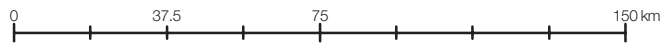
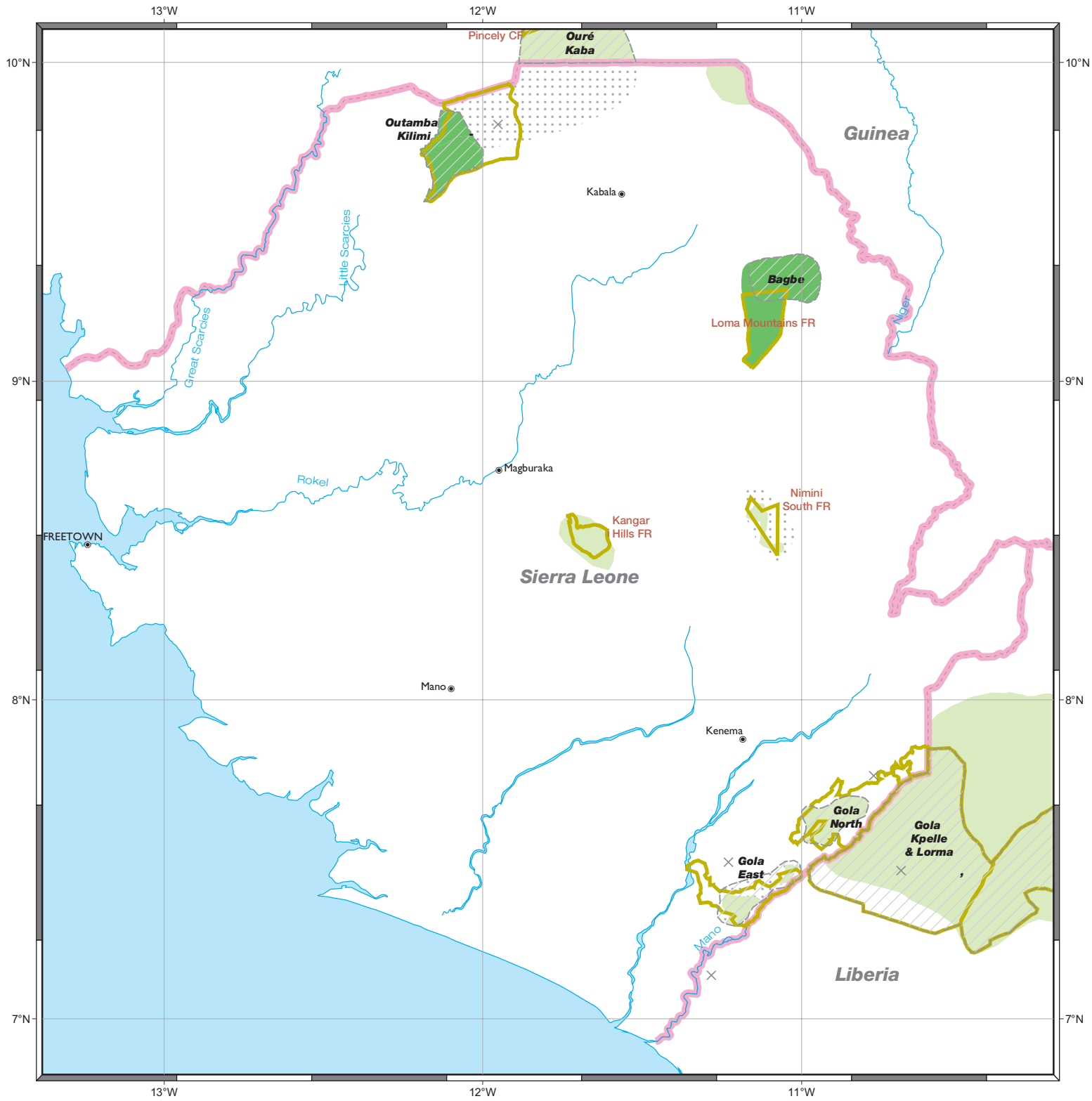
\* Range of informed guess

<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.

# Sierra Leone



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

# TOGO

## *General Statistics*

Country area: 56,790 km<sup>2</sup>  
Range area (% of country): 5,444 km<sup>2</sup> (10%)  
Protected area coverage (% of country): 13%  
Protected range (% of known and possible range in protected areas): 79%  
Information Quality Index (IQI): 0.04  
CITES Appendix: I  
Listing Year: 1989

## *Current Issues*

Elephant movements, coupled with Togo's high human population density and the decreased availability of natural habitat have brought the country's elephants into direct, and in places severe, conflict with humans (Kotchikpa & Durlot, 2002). Dense settlement may eventually eliminate transboundary elephant movement in and out of Togo.

In 2003 Togo published its newly developed national strategy for the conservation of its elephant populations. The strategy identifies human demographic pressure, habitat degradation, poaching, lack of means and capacity, as well as inadequate legislation, as the key threats to elephant populations (Ministère de l'Environnement et des Ressources Forestières, 2003). The strategic objectives include improving scientific information on elephant populations, improving institutional capacity and involving local populations in elephant management, mitigating human-elephant conflict, and reducing poaching. Funds for the implementation of the strategy have not been forthcoming so far.

## *Range Data*

There are two main areas of elephant range, one in and around Kéran National Park and Outi-Mandouri Faunal Reserve in the north, and the other in the Fazao-Malfakassa massif in the centre of the country. In the drier, northern half, elephants migrate in search of water and visit the area only seasonally (Kotchikpa & Durlot, 2002). The only permanent ranges are currently Fazao-Malfakassa and Abdoulayé Faunal Reserves.

The only change to Togo's range map in this report consists in the reduction of **KNOWN** range in a densely settled area to the southeast of Kéran National Park. Based on the Landsat 2002 human population density data set (ORNL/GIST, 2002) and recent satellite imagery, this area has been categorized as **DOUBTFUL** range (see Introduction section for details on rationale).

## *Population Data*

A transboundary aerial total count covering the entire "WAPOK" complex found no elephants in northern Togo (Bouché et al., 2004b). Estimates of zero from this survey replace **INFORMED GUESSES** of 16 and 35 for Kéran (Okoumassou, quest. reply, 2002) and Oti-Mandouri (Okoumassou, 1995) respectively. **INFORMED GUESSES** for Abdoulayé Faunal Reserve, Fazao-Malfakassa and Fosse aux Lions National Parks have been retained from the previous report (2002).

These changes, which result in a decline of 51 in the **POSSIBLE** category, are likely to be due to seasonal elephant movements, rather than to a decline in Togo's population.

## *Cross-border Movements*

Togo's small and fragmented populations of elephants range widely in search of water during the dry season, especially in the north. A study of elephant movements in Togo confirmed the seasonal passage between Togo and Ghana, Benin and Burkina Faso (Kotchikpa & Durlot, 2002), but dense human settlement may be restricting their movement.

## SUMMARY TOTALS FOR TOGO

Data Category	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Aerial or Ground Total Counts	0	0	0	0
Informed Guesses	4	0	61	0
<b>TOTALS 2006</b>	<b>4</b>	<b>0</b>	<b>61</b>	<b>0</b>
<i>TOTALS 2002</i>	<i>4</i>	<i>0</i>	<i>112</i>	<i>0</i>

## INTERPRETATION OF CHANGES IN ESTIMATES FROM PREVIOUS REPORT

Cause of Change	DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
Different Technique	0	0	-51	0
<b>TOTAL CHANGE</b>	<b>0</b>	<b>0</b>	<b>-51</b>	<b>0</b>

## AREA OF RANGE COVERED BY EACH DATA CATEGORY (km<sup>2</sup>)

Data Category	Known Range	Possible Range	Total Range
Aerial or Ground Total Counts	1,412	0	<b>1,412</b>
Informed Guesses	2,319	0	<b>2,319</b>
Unassessed Range	1,375	339	<b>1,714</b>
<b>TOTAL</b>	<b>5,105</b>	<b>339</b>	<b>5,444</b>

## TOGO: ELEPHANT ESTIMATES

INPUT ZONE	CAUSE OF CHANGE <sup>1</sup>	SURVEY DETAILS <sup>2</sup>			NUMBER OF ELEPHANTS		SOURCE	PFS <sup>3</sup>	AREA (km <sup>2</sup> )	MAP LOCATION	
		TYPE	RELIAB.	YEAR	ESTIMATE	95% C.L.				LON.	LAT.
Abdoulayé Faunal Reserve	—	IG3	D	2002	4		Okoumassou, quest. reply, 2002	2	300	1.3 E	8.7 N
Fazao-Malfakassa National Park	—	IG3	D	2002	61		Okoumassou, quest. reply, 2002	1	1,920	0.8 E	8.7 N
Fosse aux Lions National Park	—	IG3	D	2002	0		Okoumassou, quest. reply, 2002		17	0.2 E	10.8 N
Kéran National Park	<b>DT</b>	AT2	A	2003	0		Bouché et al., 2004b		1,402	0.7 E	10.1 N
Oti-Mandori Faunal Reserve	<b>DT</b>	AT2	A	2003	0		Bouché et al., 2004b		1,484	0.7 E	10.6 N

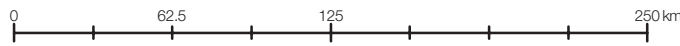
<sup>1</sup> Key to Causes of Change: DA: Different Area; DD: Data Degraded; DT: Different Technique; NA: New Analysis; NG: New Guess; NP: New population; PL: Population Lost; RS: Repeat Survey (RS' denotes a repeat survey that is not statistically comparable for reasons such as different season); —: No Change

<sup>2</sup> Key to Survey Types: AS: Aerial Sample Count; AT: Aerial Total Count; DC: Dung Count; GD: Genetic Dung Count; GS: Ground Sample Count; GT: Ground Total Count; IG: Informed Guess; IR: Individual Registration; OG: Other Guess. Survey Type is followed by an indicator of survey quality, ranked from 1 to 3 (best to worst). Survey Reliability is keyed A-E (best to worst)

<sup>3</sup> PFS: Priority for Future Surveys, ranked from 1 to 5 (highest to lowest). Based on the precision of estimates and the proportion of national range accounted for by the site in question, PFS is a measure of the importance and urgency for future population surveys. All areas of unassessed range have a priority of 1. See Introduction for details on how the PFS is derived.



# Togo



	International Boundary	<b>Elephant Range</b>	
	Rivers & Lakes		Known
	Towns		Possible
	Protected Areas		Doubtful
	<b>Input Zones (variable hatching)</b>		Sighting/sign



African Elephant Specialist Group

Sources:  
African Elephant Database  
Digital Chart of the World

This map is unprojected.  
Scale is indicative only.  
See Appendix IV for protected area abbreviations.

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# APPENDIX I

## INFORMATION QUALITY INDEX AND PRIORITIES FOR FUTURE SURVEYS

COUNTRY	REGION	PROBABLE FRACTION	ASSESSED RANGE FRACTION	IQI	CHANGE ON PREVIOUS REPORT	CONTINENTAL RANGE FRACTION	PRIORITY FOR FUTURE SURVEYS
Angola	S	0.64	0.05	<b>0.03</b>	+0.03	12.20%	<b>1</b>
Sudan	E	0.07	0.00	<b>0.00</b>	+0.00	9.54%	<b>1</b>
Tanzania	E	0.82	0.66	<b>0.54</b>	+0.11	11.70%	<b>1</b>
Mozambique	S	0.63	0.77	<b>0.48</b>	+0.05	10.04%	<b>1</b>
Democratic Republic of Congo	C	0.44	0.40	<b>0.18</b>	+0.02	7.91%	<b>1</b>
Gabon	C	0.35	0.94	<b>0.33</b>	+0.25	6.56%	<b>1</b>
Zambia	S	0.77	0.61	<b>0.47</b>	+0.09	6.03%	<b>1</b>
Chad	C	0.60	0.26	<b>0.15</b>	+0.08	4.48%	<b>1</b>
Cameroon	C	0.06	0.45	<b>0.03</b>	-0.06	3.55%	<b>1</b>
Congo	C	0.78	0.23	<b>0.18</b>	+0.14	4.07%	<b>1</b>
Namibia	S	0.83	0.55	<b>0.46</b>	-0.08	4.40%	<b>2</b>
Kenya	E	0.78	0.82	<b>0.64</b>	+0.01	3.21%	<b>2</b>
Botswana	S	0.88	0.99	<b>0.87</b>	+0.02	3.01%	<b>2</b>
Central African Republic	C	0.54	0.95	<b>0.51</b>	+0.33	2.20%	<b>2</b>
Zimbabwe	S	0.92	0.99	<b>0.91</b>	+0.28	2.31%	<b>2</b>
Ethiopia	E	0.36	0.68	<b>0.24</b>	+0.13	1.15%	<b>2</b>
Côte d'Ivoire	W	0.35	0.72	<b>0.25</b>	+0.21	1.02%	<b>2</b>
Mali	W	0.55	1.00	<b>0.55</b>	-0.31	0.96%	<b>2</b>
Nigeria	W	0.42	0.37	<b>0.16</b>	-0.04	0.69%	<b>2</b>
Ghana	W	0.82	0.42	<b>0.35</b>	+0.18	0.70%	<b>2</b>
Liberia	W	0.00	0.60	<b>0.00</b>	0.00	0.48%	<b>2</b>
South Africa	S	0.96	1.00	<b>0.96</b>	+0.02	0.91%	<b>2</b>
Equatorial Guinea	C	0.00	0.13	<b>0.00</b>	0.00	0.45%	<b>2</b>
Burkina Faso	W	0.90	0.72	<b>0.64</b>	+0.04	0.60%	<b>2</b>
Uganda	E	0.66	0.74	<b>0.49</b>	-0.23	0.45%	<b>3</b>
Benin	W	1.00	0.51	<b>0.51</b>	+0.12	0.41%	<b>3</b>
Malawi	S	0.19	0.89	<b>0.17</b>	-0.30	0.23%	<b>3</b>
Togo	W	0.06	0.69	<b>0.04</b>	+0.02	0.16%	<b>3</b>
Somalia	E	0.00	0.68	<b>0.00</b>	0.00	0.14%	<b>3</b>
Eritrea	E	0.92	1.00	<b>0.92</b>	+0.23	0.16%	<b>3</b>
Sierra Leone	W	0.00	0.59	<b>0.00</b>	0.00	0.05%	<b>3</b>
Niger	W	0.83	1.00	<b>0.83</b>	+0.31	0.08%	<b>3</b>
Guinea Bissau	W	0.00	1.00	<b>0.00</b>	0.00	0.04%	<b>3</b>
Guinea	W	0.61	0.78	<b>0.47</b>	+0.47	0.05%	<b>4</b>
Senegal	W	0.10	1.00	<b>0.10</b>	+0.06	0.03%	<b>4</b>
Rwanda	E	0.29	1.00	<b>0.29</b>	-0.02	0.03%	<b>4</b>
Swaziland	S	1.00	1.00	<b>1.00</b>	+0.00	0.00%	<b>5</b>

## APPENDIX II

### COMPARABLE ESTIMATES FROM EASTERN AND SOUTHERN AFRICA

<b>Eastern Africa</b>	SURVEY ZONE	YEAR	METH.	EST.	95% CL
<b>Kenya</b>	Amboseli	2002	IR1	1,100	
		2005	IR1	1,417	
	Tsavo	2002	AT3	8,344	
		2005	AT3	9,021	
	Tsavo (Outside)	2002	AT3	877	
		2005	AT3	1,335	
<b>Tanzania</b>	Selous	2002	AS3	65,811	± 15,281
		2006	AS3	70,406	± 24,843
	Serengeti	2000	AT3	1,631	
		2006	AT3	1,560	
	Rukwa	2002	AS3	263	± 339
		2006	AS2	1,200	± 902
	Ruaha-Rungwa	2002	AS3	24,103	± 5,869
		2006	AS2	35,409	± 11,507
	Mkomazi	2002	AT3	63	
		2005	AT3	41	
	Katavi-Rukwa (Outside)	2002	AS3	591	± 804
		2006	AS2	915	± 606
	Katavi	2002	AS3	4,897	± 4,465
		2006	AS2	4,102	± 1,615
	Ugalla River	1999	AS3	1,911	± 1,313
2006		AS3	4,133	± 1,778	
Totals for Eastern African sites:		<b>2002</b>		<b>109,591</b>	± <b>17,040</b>
		<b>2006</b>		<b>129,539</b>	± <b>27,505</b>
Total difference for Eastern African sites:		<b>3.99</b>		<b>19,948</b>	± <b>32,356 NS</b>

No rates of change calculated for Eastern Africa for lack of a significant result

Percentage of regional DEFINITE plus PROBABLE estimate accounted for by comparable estimates: 77.79%

<b>Southern Africa</b>	SURVEY ZONE	YEAR	METH.	EST.	95% CL
<b>Botswana</b>	Northern Botswana	1999	AS2	120,604	± 21,237
		2006	AS3	153,620	± 20,818
<b>Mozambique</b>	Niassa	2002	AS2	13,061	± 2,433
		2004	AS2	12,477	± 2,111
	Magoé	2001	AS2	1,264	± 1,359
		2003	AS2	1,628	± 794
<b>Namibia</b>	Khaudom/Nyae-Nyae	2000	AS2	1,966	± 973
		2004	AS1	4,754	± 2,339
	Etosha	2002	AS1	2,417	± 663
		2004	AS1	2,057	± 598
	Caprivi	1998	AS2	4,576	± 1,223
		2004	AS2	8,725	± 2,206
<b>South Africa</b>	Balule	2002	AT3	80	
		2006	AT3	457	

\* statistically significant difference

NS not significant

## South Africa

Marakele	2002	AT3	121		
	2005	IR1	110		
Makuya	2002	AT2	27		
	2006	AT2	54		
Makalali	2002	GT1	59		
	2005	GT1	72		
Madikwe	2002	AT3	318		
	2005	AT3	455		
Kruger	2002	AT2	10,459		
	2006	AT2	12,427		
Knysna	2002	IR1	4		
	2005	IR1	4		
Klaserie	2002	AT2	467		
	2006	AT2	569		
Greater St Lucia	2002	AT3	31		
	2005	AT3	45		
Atherstone	2002	AT3	32		
	2005	AT3	60		
Addo Elephant	2002	IR1	337		
	2005	IR1	459		
Phalaborwa	2002	AT2	23		
	2006	AT2	77		
Pilanesberg	2002	AT3	142		
	2005	AT3	140		
Itala	2002	GT1	61		
	2005	GT1	84		
Venetia-Limpopo	2002	AT3	59		
	2005	AT3	61		
Mkuzi	2002	IR1	28		
	2005	IR1	37		
Welgevonden	2002	AT3	67		
	2005	AT3	100		
Umbabat	2002	AT2	88		
	2006	AT2	163		
Timbavati	2002	AT2	372		
	2006	AT2	712		
Tembe	2002	AT3	140		
	2005	IR1	167		
Selati	2002	GT1	56		
	2005	GT1	85		
Sabie Sands	2002	AT2	757		
	2006	AT2	857		
Pongola	2002	IR1	33		
	2005	IR1	55		
<b>Swaziland</b>	Mkhaya	2002	IR1	19	
		2005	IR1	15	
	Hlane	2002	IR1	20	
		2005	IR1	13	
<b>Zambia</b>	Mukungule	2001	AS3	156	± 112
		2003	AS2	156	± 119
	Mulobezi	1997	AS2	0	
		2004	AS2	55	± 96

\* statistically significant difference

NS not significant

<b>Zambia</b>	Sioma Ngwezi	1996	AT3	250		0
		2005	AS2	385	±	371
	Sichifulo	1997	AS2	374	±	686
		2004	AS2	0		
	Rufunsa	1996	AS3	0		
		2003	AS2	0		
	Chanjuzi	2001	AS3	114	±	214
		2004	AS3	65	±	81
	Lunga-Luswishi	1997	AS2	0		
		2004	AS2	195	±	169
	Lukusuzi	1994	AS2	110	±	190
		2005	AS1	0		0
	Luawata	2001	AS3	189	±	274
		2003	AS2	968	±	652
	Lower Zambezi	1996	AS2	232	±	457
		2003	AS2	1,477	±	744
	Kasonso-Busanga	1997	AS2	0		
		2004	AS2	401	±	378
	Chiawa	1996	AS2	48	±	102
		2003	AS2	45	±	53
North Luangwa	2001	AS3	3,750	±	1,076	
	2003	AS3	3,235	±	695	
<b>Zimbabwe</b>	Sijarira	2001	AS2	33	±	33
		2006	AS2	488	±	333
	Save Valley	2001	AS1	535	±	318
		2003	AS1	527	±	310
	North Gokwe	2001	AS2	791	±	621
		2006	AS2	192	±	172
	Matusadona	2001	AS2	1,716	±	603
		2006	AS2	1,925	±	443
	Kariba	2001	AS2	2,373	±	802
		2006	AS2	3,715	±	1,033
	Chizarira	2001	AS2	5,011	±	1,171
		2006	AS1	3,071	±	1,117
	Chete	2001	AS2	1,219	±	542
		2006	AS2	971	±	310
	Zambezi Valley	2001	AS2	19,297	±	2,493
		2003	AS2	19,981	±	2,392
	Binga	2001	AS2	836	±	385
		2006	AS2	431	±	373
	Chirisa	2001	AS2	1,977	±	1,091
		2006	AS2	4,231	±	1,260
Totals for Southern African sites:		<b>2002</b>		<b>196,699</b>	±	<b>21,780</b>
		<b>2005</b>		<b>243,053</b>	±	<b>21,477</b>
Total difference for Southern African sites:		<b>5.56</b>		<b>46,354</b>	±	<b>30,588 *</b>

Average annual rate of increase for Southern African sites: 3.88% (CI 1.06% to 6.39%)

Percentage of regional DEFINITE plus PROBABLE estimate accounted for by comparable estimates: 75.74%

\* statistically significant difference  
NS not significant

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Summary for Southern and Eastern African sites combined

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	MEDIAN YEAR	ESTIMATE	95% CL
Totals for all sites listed	<b>2002</b>	<b>306,290 ± 27,654</b>	
	<b>2005</b>	<b>372,592 ± 34,897</b>	
Total difference for sites listed	<b>4.99</b>	<b>66,302 ± 44,525 *</b>	

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Average annual rate of increase for all sites: 4.00% (CI 1.14% to 6.58%)

Percentage of continental DEFINITE plus PROBABLE estimate accounted for by comparable estimates: 67.14%

\* statistically significant difference  
 NS not significant

# APPENDIX III

## ALPHABETICAL LIST OF PROTECTED AREAS IN ELEPHANT RANGE

Protected Area	Area (km <sup>2</sup> )	Year Created	IUCN Categ.	Country (Region)
Abdoulayé Faunal Reserve	300	1951	IV	Togo (West Africa)
Aberdare National Park	766	1950	II	Kenya (Eastern Africa)
Abokouamékro Faunal Reserve	135	1993	?	Côte d'Ivoire (West Africa)
Abong-Mbang Forest Reserve	1,540	?	VI	Cameroon (Central Africa)
Abou Telfane Faunal Reserve	1,100	1955	IV	Chad (Central Africa)
Addo Elephant National Park	1,250	1931	II	South Africa (Southern Africa)
Akagera National Park	1,018	1934	II	Rwanda (Eastern Africa)
Akobo Controlled Hunting Area	5,049	1973	VI	Ethiopia (Eastern Africa)
Alibori Supérieur Classified Forest	2,560	1995	VI	Benin (West Africa)
Altos de Nsork National Park	691	2000	II	Equatorial Guinea (Central Africa)
Amboseli National Park	392	1974	II	Kenya (Eastern Africa)
Andre Felix National Park	1,700	1960	II	Central African Republic (Central Africa)
Ankasa Game Production Reserve	343	1976	VI	Ghana (West Africa)
Aou Mono Classified Forest	65	?	VI	Togo (West Africa)
Aouk-Aoukale Faunal Reserve	3,300	1939	IV	Central African Republic (Central Africa)
Arly National Park	930	1954	II	Burkina Faso (West Africa)
Arusha National Park	132	1967	II	Tanzania (Eastern Africa)
Assin-Attandanso Game Production Reserve	140	1991	VI	Ghana (West Africa)
Atakora Hunting Zone	1,220	1954	VI	Benin (West Africa)
Atherstone Nature Reserve	136	1990	IV	South Africa (Southern Africa)
Avakaba Presidential Park	2,500	1980	IV	Central African Republic (Central Africa)
Azagny National Park	190	1981	II	Côte d'Ivoire (West Africa)
Babille Elephant Sanctuary	6,982	1970	II	Ethiopia (Eastern Africa)
Babules Forest Reserve	530	?	VI	Cameroon (Central Africa)
Badiar National Park	382	1985	II	Guinea (West Africa)
Bahr Salamat Faunal Reserve	20,600	1964	IV	Chad (Central Africa)
Bamingui-Bangoran National Park	10,700	1933	II	Central African Republic (Central Africa)
Bandingilo Game Reserve	16,500	1986	II	Sudan (Eastern Africa)
Bangassou Forest Reserve	16,600	?	VI	Central African Republic (Central Africa)
Bangweulu Game Management Area	6,570	1971	VI	Zambia (Southern Africa)
Banhine National Park	7,000	1972	II	Mozambique (Southern Africa)
Banyang-Mbo Wildlife Sanctuary	691	1996	VI	Cameroon (Central Africa)
Barkoissi Classified Forest	25	?	VI	Togo (West Africa)
Barrobo National Forest	640	?	VI	Liberia (West Africa)
Bas Chari Faunal Reserve	975	?	IV	Chad (Central Africa)
Beki-Bossematie Classified Forest	389	?	VI	Côte d'Ivoire (West Africa)
Bengangai Game Reserve	170	1939	IV	Sudan (Eastern Africa)
Benoué National Park	1,800	1968	II	Cameroon (Central Africa)
Bia Game Production Reserve	228	1974	VI	Ghana (West Africa)
Bia National Park	78	1974	II	Ghana (West Africa)

Protected Area	Area (km <sup>2</sup> )	Year Created	IUCN Categ.	Country (Region)
Biharamulo Game Reserve	1,300	1959	IV	Tanzania (Eastern Africa)
Bikuar National Park	7,900	1964	II	Angola (Southern Africa)
Billi Springs Game Management Area	3,080	1971	VI	Zambia (Southern Africa)
Bili-Uere Hunting Reserve	6,000	?	VI	Democratic Republic of Congo (Central Africa)
Binder-Léré Faunal Reserve	1,350	1974	IV	Chad (Central Africa)
Bire Kpatuos Game Reserve	445	1939	VI	Sudan (Eastern Africa)
Biringou National Park	708	2002	II	Gabon (Central Africa)
Bisanadi National Reserve	606	1979	VI	Kenya (Eastern Africa)
Boma National Park	22,800	1986	II	Sudan (Eastern Africa)
Bomu Strict Nature Reserve	10,700	?	I	Democratic Republic of Congo (Central Africa)
Boni National Reserve	1,339	1976	VI	Kenya (Eastern Africa)
Bontoli Total Faunal Reserve	127	1957	IV	Burkina Faso (West Africa)
Bontoli Partial Faunal Reserve	295	1957	IV	Burkina Faso (West Africa)
Borana Controlled Hunting Area	45,366	1973	VI	Ethiopia (Eastern Africa)
Bouba Ndjidah National Park	2,200	1968	II	Cameroon (Central Africa)
Boumba-Bek National Park	2,500	2005	VI	Cameroon (Central Africa)
Boundiali Classified Forest	350	?	VI	Côte d'Ivoire (West Africa)
Bufalo Partial Reserve	400	1974	IV	Angola (Southern Africa)
Buffalo Springs National Reserve	131	1985	II	Kenya (Eastern Africa)
Bugungu Wildlife Reserve	553	1968	IV	Uganda (Eastern Africa)
Burigi Game Reserve	2,200	1972	IV	Tanzania (Eastern Africa)
Bushimae Hunting Zone	600	?	VI	Democratic Republic of Congo (Central Africa)
Bwabwata National Park	5,828	2002	II	Namibia (Southern Africa)
Bwindi Impenetrable Forest National Park	336	1991	II	Uganda (Eastern Africa)
Campo Faunal Reserve	3,000	?	IV	Cameroon (Central Africa)
Campo Ma'an National Park	2,550	2000	II	Cameroon (Central Africa)
Chad Basin National Park	2,300	?	II	Nigeria (West Africa)
Charara Safari Area	1,694	1975	VI	Zimbabwe (Southern Africa)
Chete Safari Area	1,081	1975	VI	Zimbabwe (Southern Africa)
Chew Bahr Wildlife Reserve	4,212	1973	IV	Ethiopia (Eastern Africa)
Chewore Safari Area	3,390	1964	VI	Zimbabwe (Southern Africa)
Chiawa Game Management Area	900	?	VI	Zambia (Southern Africa)
Chibwika-Ntambu Game Management Area	1,550	1971	VI	Zambia (Southern Africa)
Chimalavera Regional Nature Park	100	1974	V	Angola (Southern Africa)
Chipinge Safari Area	261	1975	VI	Zimbabwe (Southern Africa)
Chirisa Safari Area	1,713	1975	VI	Zimbabwe (Southern Africa)
Chisomo Game Management Area	3,390	1971	VI	Zambia (Southern Africa)
Chizarira National Park	1,910	1975	II	Zimbabwe (Southern Africa)
Chizera Game Management Area	2,280	1971	VI	Zambia (Southern Africa)
Chobe National Park	10,570	1968	II	Botswana (Southern Africa)
Chyulu Hills National Reserve	471	1983	II	Kenya (Eastern Africa)
Comoé National Park	11,500	1968	II	Côte d'Ivoire (West Africa)
Counkouati-Douli National Park	5,045	2000	II	Congo (Central Africa)
Cross River National Park	4,000	1991	II	Nigeria (West Africa)
Dabus Valley Controlled Hunting Area	1,227	1973	VI	Ethiopia (Eastern Africa)
Dadieso Forest Reserve	171	1977	UA	Ghana (West Africa)

Protected Area	Area (km <sup>2</sup> )	Year Created	IUCN Categ.	Country (Region)
Dande Safari Area	523	1975	VI	Zimbabwe (Southern Africa)
Deka Safari Area	510	1975	VI	Zimbabwe (Southern Africa)
Deux Bales Classified Forest	566	1967	IV	Burkina Faso (West Africa)
Dibon Classified Forest	225	?	VI	Burkina Faso (West Africa)
Diefoula Classified Forest	880	?	VI	Burkina Faso (West Africa)
Digya National Park	3,478	1971	II	Ghana (West Africa)
Dimonika Biosphere Reserve	1,225	1988	IV	Congo (Central Africa)
Disue River Forest Reserve	24	1943	UA	Ghana (West Africa)
Dja Faunal Reserve	5,260	1950	IV	Cameroon (Central Africa)
Djoli Kera Forest Reserve	950	?	VI	Chad (Central Africa)
Djona Hunting Zone	1,880	1980	VI	Benin (West Africa)
Dodori National Reserve	877	1976	VI	Kenya (Eastern Africa)
Doma Safari Area	945	1975	VI	Zimbabwe (Southern Africa)
Dosso Partial Faunal Reserve	4,075	1962	IV	Niger (West Africa)
Douentza Elephant Faunal Reserve	12,000	1959	IV	Mali (West Africa)
Dzanga-Ndoki National Park	1,220	1990	II	Central African Republic (Central Africa)
Dzanga-Sangha Special Reserve	3,359	1990	VI	Central African Republic (Central Africa)
Ejaham Forest Reserve	715	?	VI	Cameroon (Central Africa)
Estuario del Muni Nature Reserve	600	2000	IV?	Equatorial Guinea (Central Africa)
Etosha National Park	22,270	1907	II	Namibia (Southern Africa)
Faro National Park	3,300	1980	II	Cameroon (Central Africa)
Fazao-Malfakassa National Park	1,920	1951	II	Togo (West Africa)
Fosse aux Lions National Park	17	1954	II	Togo (West Africa)
Foumbou Classified Forest	480	?	VI	Côte d'Ivoire (West Africa)
Fungom Forest Reserve	360	?	VI	Cameroon (Central Africa)
Galangashie Faunal Reserve	75	1954	IV	Togo (West Africa)
Gambella National Park	5,061	1974	II	Ethiopia (Eastern Africa)
Gangala-na-bodio Hunting Reserve	9,859	?	VI	Democratic Republic of Congo (Central Africa)
Garamba National Park	4,920	1938	II	Democratic Republic of Congo (Central Africa)
Gashaka-Gumti National Park	5,860	1991	II	Nigeria (West Africa)
Gbi National Forest	610	?	VI	Liberia (West Africa)
Gilé Game Reserve	2,100	1960	IV	Mozambique (Southern Africa)
Goin-Cavally and Goin-Debe Classified Forest	1,890	?	VI	Côte d'Ivoire (West Africa)
Gola National Forest	2,071	?	VI	Liberia (West Africa)
Gola East and West Forest Reserve	295	?	VI	Sierra Leone (West Africa)
Gola North Forest Reserve	480	?	VI	Sierra Leone (West Africa)
Gola North Extension Forest Reserve	70	?	VI	Sierra Leone (West Africa)
Gonarezhou National Park	5,053	1975	II	Zimbabwe (Southern Africa)
Gorongosa National Park	3,750	1960	II	Mozambique (Southern Africa)
Goungoun Classified Forest	732	1950	VI	Benin (West Africa)
Greater St. Lucia Wetland Park	2,587	1895	II	South Africa (Southern Africa)
Grebo National Forest	2,604	?	VI	Liberia (West Africa)
Gribingui-Bamingui Faunal Reserve	4,380	1940	IV	Central African Republic (Central Africa)
Grumeti Game Reserve	2,000	1994	IV	Tanzania (Eastern Africa)
Guéné Classified Forest	13	1942	VI	Benin (West Africa)
Hartley Safari Area	445	1975	VI	Zimbabwe (Southern Africa)



Protected Area	Area (km <sup>2</sup> )	Year Created	IUCN Categ.	Country (Region)
Haut Bandama Fauna and Flora Reserve	1,230	1973	I	Côte d'Ivoire (West Africa)
Haut Dodo/Grah/Hana Classified Forest	1,905	?	VI	Côte d'Ivoire (West Africa)
Haut Sassandra Classified Forest	1,024	?	VI	Côte d'Ivoire (West Africa)
Hlane Royal National Park	142	1967	VI	Swaziland (Southern Africa)
Hluhluwe-Umfolozi Park	965	1989	II	South Africa (Southern Africa)
Hobatere Concession Area	230	?	UA	Namibia (Southern Africa)
Hurungwe Safari Area	2,878	1975	VI	Zimbabwe (Southern Africa)
Hwange National Park	14,651	1949	II	Zimbabwe (Southern Africa)
Ibanda Game Reserve	200	1974	IV	Tanzania (Eastern Africa)
Ifon Game Reserve	500	?	IV	Nigeria (West Africa)
Iguela Hunting Area	1,800	1962	VI	Gabon (Central Africa)
Ikorongo Game Reserve	3,000	1994	IV	Tanzania (Eastern Africa)
Iona National Park	15,150	1964	VI	Angola (Southern Africa)
Isangano National Park	840	1972	II	Zambia (Southern Africa)
Itala Nature Reserve	297	1972	II	South Africa (Southern Africa)
Ivindo National Park	3,000	2002	II	Gabon (Central Africa)
Jikao Controlled Hunting Area	3,375	1973	VI	Ethiopia (Eastern Africa)
Kafinda Game Management Area	3,860	1971	VI	Zambia (Southern Africa)
Kafue National Park	22,400	1951	II	Zambia (Southern Africa)
Kahuzi-Biega National Park	6,000	1975	II	Democratic Republic of Congo (Central Africa)
Kainji Lake National Park	5,320	1975	II	Nigeria (West Africa)
Kakum National Park	207	1991	II	Ghana (West Africa)
Kalamaloue National Park	45	1972	II	Cameroon (Central Africa)
Kalinzu Forest Reserve	141	?	UA	Uganda (Eastern Africa)
Kalio Classified Forest	275	?	VI	Burkina Faso (West Africa)
Kaluanyembe Game Management Area	3,425	?	VI	Zambia (Southern Africa)
Kambari Game Reserve	414	1969	IV	Nigeria (West Africa)
Kamnarok National Reserve	50	1983	VI	Kenya (Eastern Africa)
Kamuku Game Reserve	200	?	IV	Nigeria (West Africa)
Kamuku National Park	1,211	1999	II	Nigeria (West Africa)
Kangari Hills Forest Reserve	86	1924	VI	Sierra Leone (West Africa)
Kansonso-Busanga Game Management Area	7,780	1971	VI	Zambia (Southern Africa)
Kaputa Game Management Area	3,600	1971	VI	Zambia (Southern Africa)
Kariba Recreation Park	2,830	1979	V	Zimbabwe (Southern Africa)
Karuma Wildlife Reserve	696	1964	IV	Uganda (Eastern Africa)
Kasanka National Park	390	1972	II	Zambia (Southern Africa)
Kashoya-Kitomi Forest Reserve	385	1932	UA	Uganda (Eastern Africa)
Kasungu National Park	2,316	1970	II	Malawi (Southern Africa)
Katavi National Park	4,241	1974	II	Tanzania (Eastern Africa)
Katokota Game Ranch	15	?	UA	Zambia (Southern Africa)
Kazuma Pan National Park	313	1975	II	Zimbabwe (Southern Africa)
Kéran National Park	1,636	1977	II	Togo (West Africa)
Khaudom Game Park	3,842	1989	IV	Namibia (Southern Africa)
Kibale National Park	766	1993	II	Uganda (Eastern Africa)
Kidepo Game Reserve	1,975	1975	VI	Sudan (Eastern Africa)
Kidepo Valley National Park	1,416	1962	II	Uganda (Eastern Africa)

Protected Area	Area (km <sup>2</sup> )	Year Created	IUCN Categ.	Country (Region)
Kigezi Wildlife Reserve	850	1952	IV	Uganda (Eastern Africa)
Kigosi Game Reserve	7,000	1983	IV	Tanzania (Eastern Africa)
Kilombero Conservation Area	7,282	?	IV	Tanzania (Eastern Africa)
Kinkene/Nyellepuo-Nzi Classified Forest	1,865	?	VI	Côte d'Ivoire (West Africa)
Kizigo Game Reserve	4,000	1982	IV	Tanzania (Eastern Africa)
Klaserie Private Nature Reserve	628	?	UA	South Africa (Southern Africa)
Kogyae Strict Nature Reserve	386	1971	I	Ghana (West Africa)
Konkombouri Partial Faunal Reserve	1,300	1954	IV	Burkina Faso (West Africa)
Kora National Reserve	1,788	1989	II	Kenya (Eastern Africa)
Korup National Park	1,259	1986	II	Cameroon (Central Africa)
Koukourou-Bamingui Faunal Reserve	1,100	1940	IV	Central African Republic (Central Africa)
Kourtiagou Partial Faunal Reserve	510	1957	IV	Burkina Faso (West Africa)
Kpelle National Forest	1,749	?	VI	Liberia (West Africa)
Krahn Bassa National Forest	5,142	?	VI	Liberia (West Africa)
Kruger National Park	19,624	1926	II	South Africa (Southern Africa)
Kwiambana Game Reserve	1,715	?	IV	Nigeria (West Africa)
Kyabobo Range National Park	415	?	II	Ghana (West Africa)
Kyambura Wildlife Reserve	213	1965	IV	Uganda (Eastern Africa)
Laba Classified Forest	150	?	VI	Burkina Faso (West Africa)
Lac Lobéké National Park	1,839	2001	II	Cameroon (Central Africa)
Lac Télé Community Reserve	4,390	2002	VI?	Congo (Central Africa)
Lake Manyara National Park	330	1960	II	Tanzania (Eastern Africa)
Lavushi Manda National Park	1,500	1972	II	Zambia (Southern Africa)
Lefini Faunal Reserve	4,595	1951	IV	Congo (Central Africa)
Lengwe National Park	887	1970	II	Malawi (Southern Africa)
Letaba Ranch Private Game Reserve	420	1981	IV	South Africa (Southern Africa)
Limpopo National Park	10,736	2001	II	Mozambique (Southern Africa)
Liwonde National Park	538	1973	II	Malawi (Southern Africa)
Loango National Park	1,550	2002	II	Gabon (Central Africa)
Logoniegue Classified Forest	355	?	VI	Burkina Faso (West Africa)
Loma Mountains Forest Reserve	332	1952	II	Sierra Leone (West Africa)
Lopé National Park	5,000	2002	II	Gabon (Central Africa)
Lorma National Forest	435	?	VI	Liberia (West Africa)
Losai National Reserve	1,806	1976	VI	Kenya (Eastern Africa)
Lower Zambezi National Park	4,092	1983	II	Zambia (Southern Africa)
Luama Hunting Zone	3,435	1935	VI	Democratic Republic of Congo (Central Africa)
Luambe National Park	254	1972	II	Zambia (Southern Africa)
Luano Game Management Area	8,930	1971	VI	Zambia (Southern Africa)
Luiana Partial Reserve	8,400	1966	IV	Angola (Southern Africa)
Lukusuzi National Park	2,720	1972	II	Zambia (Southern Africa)
Lukwakwa Game Management Area	2,540	1971	VI	Zambia (Southern Africa)
Lukwati Game Reserve	1,201	?	IV	Tanzania (Eastern Africa)
Lumimba Game Management Area	4,500	1971	VI	Zambia (Southern Africa)
Lunga-Luswishi Game Management Area	13,340	1971	VI	Zambia (Southern Africa)
Lupande Game Management Area	4,840	1971	VI	Zambia (Southern Africa)
Madikwe Nature Reserve	700	1992	IV	South Africa (Southern Africa)

Protected Area	Area (km <sup>2</sup> )	Year Created	IUCN Categ.	Country (Region)
Mago National Park	2,162	1978	II	Ethiopia (Eastern Africa)
Mahale Mountains National Park	1,577	1985	II	Tanzania (Eastern Africa)
Maiko National Park	10,830	1970	II	Democratic Republic of Congo (Central Africa)
Majete Wildlife Reserve	700	1955	IV	Malawi (Southern Africa)
Makgadikgadi National Park	4,877	1992	II	Botswana (Southern Africa)
Makuya Park	165	1994	IV	South Africa (Southern Africa)
Malipati Safari Area	154	1975	VI	Zimbabwe (Southern Africa)
Malka Mari National Park	876	1989	II	Kenya (Eastern Africa)
Malolotja Nature Reserve	182	1972	IV	Swaziland (Southern Africa)
Mamili National Park	1,010	1990	II	Namibia (Southern Africa)
Mampaye Classified Forest	80	?	VI	Senegal (West Africa)
Mana Pools National Park	2,196	1975	II	Zimbabwe (Southern Africa)
Mandelia Faunal Reserve	1,380	1969	IV	Chad (Central Africa)
Mangetti Game Reserve	420	?	UA	Namibia (Southern Africa)
Mangochi Forest Reserve	325	1924	UA	Malawi (Southern Africa)
Manjirenji Recreation Park	34	?	V	Zimbabwe (Southern Africa)
Manovo-Gounda-Saint Floris National Park	17,400	1933	II	Central African Republic (Central Africa)
Manyeleti Game Reserve	228	1967	IV	South Africa (Southern Africa)
Mapungubwe National Park	210	2004	II	South Africa (Southern Africa)
Maputo Game Reserve	900	1969	IV	Mozambique (Southern Africa)
Marahoué National Park	1,010	1968	II	Côte d'Ivoire (West Africa)
Marakele National Park	380	1987	II	South Africa (Southern Africa)
Maralal National Sanctuary	155	1988	IV	Kenya (Eastern Africa)
Maro Classified Forest	475	?	VI	Burkina Faso (West Africa)
Marromeu Game Reserve	1,100	?	IV	Mozambique (Southern Africa)
Marsabit National Reserve	1,554	1949	II	Kenya (Eastern Africa)
Marsabit National Park	350	1967	II	Kenya (Eastern Africa)
Masai Mara National Reserve	1,510	1974	II	Kenya (Eastern Africa)
Massif du Ziama Strict Nature Reserve	1,123	1943	I	Guinea (West Africa)
Maswa Game Reserve	2,200	1962	IV	Tanzania (Eastern Africa)
Matetsi Safari Area	2,955	1975	VI	Zimbabwe (Southern Africa)
Matusadona National Park	1,407	1975	II	Zimbabwe (Southern Africa)
Mavinga Partial Reserve	5,950	1966	IV	Angola (Southern Africa)
Mbambe Forest Reserve	305	?	VI	Cameroon (Central Africa)
Mbam-Djerem National Park	4,170	2000	II	Cameroon (Central Africa)
Mbarizunga Game Reserve	615	1939	VI	Sudan (Eastern Africa)
Mbé National Park	600	2002	II	Gabon (Central Africa)
Mengame Wildlife Sanctuary	1,218	2001	UA	Cameroon (Central Africa)
Meru National Park	870	1966	II	Kenya (Eastern Africa)
Mgahinga Gorilla National Park	67	1991	II	Uganda (Eastern Africa)
Mikumi National Park	3,230	1964	II	Tanzania (Eastern Africa)
Minkébé National Park	7,567	2002	II	Gabon (Central Africa)
Mizan-Teferi Controlled Hunting Area	3,146	1985	VI	Ethiopia (Eastern Africa)
Mkhaya Nature Reserve	65	1981	VI	Swaziland (Southern Africa)
Mkomazi Game Reserve	3,000	1951	IV	Tanzania (Eastern Africa)
Mkungunero Game Reserve	768	0	IV	Tanzania (Eastern Africa)

Protected Area	Area (km <sup>2</sup> )	Year Created	IUCN Categ.	Country (Region)
Mkuzi Game Reserve	380	1912	II	South Africa (Southern Africa)
Moçamedes Partial Reserve	4,450	1960	IV	Angola (Southern Africa)
Mole National Park	4,840	1971	II	Ghana (West Africa)
Mongokele Forest Reserve	850	?	UA	Cameroon (Central Africa)
Mont Fouari Faunal Reserve	156	1958	IV	Congo (Central Africa)
Mont Gbande Classified Forest	225	?	VI	Côte d'Ivoire (West Africa)
Mont Mavoubou Hunting Reserve	420	1955	IV	Congo (Central Africa)
Mont Nimba Strict Nature Reserve	50	1944	I	Côte d'Ivoire (West Africa)
Mont Nimba Strict Nature Reserve	130	1944	I	Guinea (West Africa)
Mont Péko National Park	340	1968	II	Côte d'Ivoire (West Africa)
Mont Sangbe National Park	950	1976	II	Côte d'Ivoire (West Africa)
Monte Alén National Park	2,000	1990	II	Equatorial Guinea (Central Africa)
Moremi Game Reserve	4,968	1965	IV	Botswana (Southern Africa)
Mosi-oa-Tunya National Park	66	1972	II	Zambia (Southern Africa)
Moukalaba Hunting Area	200	1962	VI	Gabon (Central Africa)
Moukalaba-Dougoua National Park	4,495	2002	II	Gabon (Central Africa)
Mount Elgon National Park	169	1968	II	Kenya (Eastern Africa)
Mount Elgon National Park	1,264	?	II	Uganda (Eastern Africa)
Mount Kenya National Park	718	1949	II	Kenya (Eastern Africa)
Mt Seni National Park	600	2002	II	Gabon (Central Africa)
Mt. Tia Classified Forest	163	1980	UA	Côte d'Ivoire (West Africa)
Mudumo National Park	320	1990	II	Namibia (Southern Africa)
Muhesi Game Reserve	2,000	1994	IV	Tanzania (Eastern Africa)
Mulobezi Game Management Area	3,420	1971	VI	Zambia (Southern Africa)
Mumbwa Game Management Area	3,370	1971	VI	Zambia (Southern Africa)
Munyamadzi Game Management Area	3,300	1971	VI	Zambia (Southern Africa)
Mupa National Park	6,600	1964	VI	Angola (Southern Africa)
Murchison Falls National Park	3,795	1952	II	Uganda (Eastern Africa)
Murle Controlled Hunting Area	4,172	1973	VI	Ethiopia (Eastern Africa)
Musalangu Game Management Area	17,350	1971	VI	Zambia (Southern Africa)
Musele-Matebo Game Management Area	3,700	1971	VI	Zambia (Southern Africa)
Mwabvi Wildlife Reserve	135	1953	IV	Malawi (Southern Africa)
Mwagne National Park	1,132	2002	II	Gabon (Central Africa)
Mwea National Reserve	68	1976	VI	Kenya (Eastern Africa)
Mweru wa Ntipa National Park	3,134	1972	II	Zambia (Southern Africa)
Namwala Game Management Area	3,600	1971	VI	Zambia (Southern Africa)
Nana-Barya Faunal Reserve	2,300	1960	IV	Central African Republic (Central Africa)
Nasolot National Reserve	194	1979	II	Kenya (Eastern Africa)
National West Coast Tourist Recreation Area	7,800	1973	V	Namibia (Southern Africa)
Nazinga Game Ranch	940	?	VI	Burkina Faso (West Africa)
Ngorongoro Conservation Area	8,300	1959	VI	Tanzania (Eastern Africa)
Ngove-Ndogo Hunting Area	2,500	1962	VI	Gabon (Central Africa)
Niassa Game Reserve	15,000	1960	IV	Mozambique (Southern Africa)
Niégré Classified Forest	1,056	?	VI	Côte d'Ivoire (West Africa)
Nimini South Forest Reserve	26	1	UA	Sierra Leone (West Africa)
Nimule National Park	410	1954	II	Sudan (Eastern Africa)

Protected Area	Area (km <sup>2</sup> )	Year Created	IUCN Categ.	Country (Region)
Nini-Suhien National Park	160	1976	II	Ghana (West Africa)
Niokolo-Koba National Park	9,130	1954	II	Senegal (West Africa)
Nkala Game Management Area	194	1971	VI	Zambia (Southern Africa)
Nkhota-Kota Wildlife Reserve	1,802	1954	IV	Malawi (Southern Africa)
Nki National Park	1,815	2005	VI	Cameroon (Central Africa)
North East National Forest	130	?	VI	Liberia (West Africa)
North Kitui National Reserve	745	1979	VI	Kenya (Eastern Africa)
North Lorma Conservation Area	675	?	UA	Liberia (West Africa)
North Luangwa National Park	4,636	1972	II	Zambia (Southern Africa)
Nouabalé-Ndoki National Park	3,866	1994	II	Congo (Central Africa)
Nsumbu National Park	2,063	1985	II	Zambia (Southern Africa)
Numatina Game Reserve	3,865	1939	VI	Sudan (Eastern Africa)
Nxai Pan National Park	2,770	1971	II	Botswana (Southern Africa)
Nyanga Nord Faunal Reserve	77	1958	IV	Congo (Central Africa)
Nyanga Sud Faunal Reserve	230	1958	IV	Congo (Central Africa)
Nyika National Park	3,134	1965	II	Malawi (Southern Africa)
N'Zo Partial Faunal Reserve	950	1972	IV	Côte d'Ivoire (West Africa)
Oandjia-Vakaga Faunal Reserve	1,300	1925	IV	Central African Republic (Central Africa)
Odzala - Kokoua National Park	13,546	2001	II	Congo (Central Africa)
Okapi National Park	13,700	1992	II	Democratic Republic of Congo (Central Africa)
Okomu Forest Reserve	1,082	1978	II	Nigeria (West Africa)
Old Oyo National Park	2,530	1991	II	Nigeria (West Africa)
Omo National Park	4,068	1966	II	Ethiopia (Eastern Africa)
Oti-Mandouri Faunal Reserve	1,478	?	IV	Togo (West Africa)
Ouanga Plain Faunal Reserve	200	1966	IV	Gabon (Central Africa)
Outamba-Kilimi National Park	808	1986	IV	Sierra Leone (West Africa)
Pa Classified Forest	120	?	VI	Burkina Faso (West Africa)
Pama Partial Faunal Reserve	2,230	1955	IV	Burkina Faso (West Africa)
Pendjari Hunting Zone	1,750	1980	VI	Benin (West Africa)
Pendjari National Park	2,755	1954	II	Benin (West Africa)
Phalaborwa Mining Co. Private Reserve	41	?	UA	South Africa (Southern Africa)
Piedra Nzas Natural Monument	190	2000	III?	Equatorial Guinea (Central Africa)
Pilanesberg National Park	553	1979	IV	South Africa (Southern Africa)
Pincely Classified Forest	130	?	VI	Guinea (West Africa)
Pleateaux Batéké National Park	1,748	2002	II	Gabon (Central Africa)
Pongara National Park	962	2002	II	Gabon (Central Africa)
Pongolapoort Nature Reserve	119	1979	II	South Africa (Southern Africa)
Queen Elizabeth National Park	2,343	1952	II	Uganda (Eastern Africa)
Quiçama National Park	9,500	1957	II	Angola (Southern Africa)
Quirimbas National Park	7,500	2002	II	Mozambique (Southern Africa)
Radom National Park	12,500	1980	II	Sudan (Eastern Africa)
Rahole National Reserve	1,270	1976	VI	Kenya (Eastern Africa)
Rimoi National Reserve	55	1983	VI	Kenya (Eastern Africa)
Río Campo Nature Reserve	762	2000	IV?	Equatorial Guinea (Central Africa)
Ruaha National Park	10,300	1964	II	Tanzania (Eastern Africa)
Rubi-Tele Hunting Zone	9,080	1930	VI	Democratic Republic of Congo (Central Africa)

Protected Area	Area (km <sup>2</sup> )	Year Created	IUCN Categ.	Country (Region)
Rubondo Island National Park	457	1977	II	Tanzania (Eastern Africa)
Rufunsa Game Management Area	2,328	?	VI	Zambia (Southern Africa)
Rukwa Game Reserve	4,109	?	IV	Tanzania (Eastern Africa)
Rumanyika Game Reserve	800	1974	IV	Tanzania (Eastern Africa)
Rungwa Game Reserve	9,000	1974	IV	Tanzania (Eastern Africa)
Rwenzori Mountains National Park	386	1991	II	Uganda (Eastern Africa)
Saadani Game Reserve	510	1968	IV	Tanzania (Eastern Africa)
Sabie Sand Game Reserve	572	?	UA	South Africa (Southern Africa)
Sahel Partial Faunal Reserve	16,000	1970	IV	Burkina Faso (West Africa)
Salonga Nord National Park	19,000	1970	II	Democratic Republic of Congo (Central Africa)
Salonga Sud National Park	17,000	1970	II	Democratic Republic of Congo (Central Africa)
Sambisa Game Reserve	525	?	IV	Nigeria (West Africa)
Samburu National Reserve	165	1985	II	Kenya (Eastern Africa)
Sandwe Game Management Area	1,530	1971	VI	Zambia (Southern Africa)
Sapi Safari Area	1,180	1975	VI	Zimbabwe (Southern Africa)
Sapo National Park	1,292	1983	II	Liberia (West Africa)
Scio Classified Forest	1,338	?	VI	Côte d'Ivoire (West Africa)
Selous Game Reserve	44,000	1967	IV	Tanzania (Eastern Africa)
Semliki National Park	195	1993	II	Uganda (Eastern Africa)
Semliki Valley (Toro) Wildlife Reserve	518	1929	IV	Uganda (Eastern Africa)
Serengeti National Park	14,763	1957	II	Tanzania (Eastern Africa)
Sette-Cama Hunting Area	2,000	1962	VI	Gabon (Central Africa)
Shaba National Reserve	239	1974	II	Kenya (Eastern Africa)
Shambe Game Reserve	620	1985	II	Sudan (Eastern Africa)
Shimba Hills National Reserve	193	1968	II	Kenya (Eastern Africa)
Shiraro-Kefta Wildlife Conservation Area	753	1973	IV	Ethiopia (Eastern Africa)
Sichifula Game Management Area	3,600	1971	VI	Zambia (Southern Africa)
Singou Partial Faunal Reserve	1,920	1955	IV	Burkina Faso (West Africa)
Siniaka-Minia Faunal Reserve	4,260	1965	IV	Chad (Central Africa)
Sioma Ngwezi National Park	5,276	1972	II	Zambia (Southern Africa)
Sissili Classified Forest	285	?	VI	Burkina Faso (West Africa)
Skeleton Coast Game Park	16,390	1971	II	Namibia (Southern Africa)
Songan-Tamin-Mabi-Yaya Classified Forest	1,698	?	VI	Côte d'Ivoire (West Africa)
Songimvelo Game Reserve	490	1983	IV	South Africa (Southern Africa)
Sorobouli Classified Forest	200	?	VI	Burkina Faso (West Africa)
Sota Classified Forest	530	1947	VI	Benin (West Africa)
South Kitui National Reserve	1,833	1979	VI	Kenya (Eastern Africa)
South Luangwa National Park	9,050	1972	II	Zambia (Southern Africa)
South Turkana National Reserve	1,091	1979	II	Kenya (Eastern Africa)
Southern National Park	23,000	1939	II	Sudan (Eastern Africa)
Taï National Park	3,500	1973	II	Côte d'Ivoire (West Africa)
Taita Hills National Reserve	165	?	II	Kenya (Eastern Africa)
Tama Wildlife Reserve	3,269	1973	IV	Ethiopia (Eastern Africa)
Tamou Total Faunal Reserve	777	1962	IV	Niger (West Africa)
Tarangire National Park	2,600	1970	II	Tanzania (Eastern Africa)
Tedo Controlled Hunting Area	2,347	1973	VI	Ethiopia (Eastern Africa)

Protected Area	Area (km <sup>2</sup> )	Year Created	IUCN Categ.	Country (Region)
Tembe Elephant Park	300	1983	IV	South Africa (Southern Africa)
Tiappleu Classified Forest	280	1932	UA	Côte d'Ivoire (West Africa)
Timbavati Private Nature Reserve	785	?	UA	South Africa (Southern Africa)
Tiogo Classified Forest	300	?	VI	Burkina Faso (West Africa)
Tisse Classified Forest	185	?	VI	Burkina Faso (West Africa)
Tondwa Game Management Area	540	1971	VI	Zambia (Southern Africa)
Trois Rivières Classified Forest	3,549	1949	VI	Benin (West Africa)
Tsavo East National Park	11,747	1948	II	Kenya (Eastern Africa)
Tsavo West National Park	9,065	1948	II	Kenya (Eastern Africa)
Tui Classified Forest	460	?	VI	Burkina Faso (West Africa)
Tuli Safari Area	416	1975	VI	Zimbabwe (Southern Africa)
Udzungwa Mountains National Park	1,900	1992	II	Tanzania (Eastern Africa)
Ugalla River Game Reserve	5,000	1965	IV	Tanzania (Eastern Africa)
Umbabat Private Nature Reserve	144	?	UA	South Africa (Southern Africa)
Umfuli Recreation Park	115	?	V	Zimbabwe (Southern Africa)
Upemba National Park	11,730	1939	II	Democratic Republic of Congo (Central Africa)
Vassako-Bolo Strict Nature Reserve	860	1960	I	Central African Republic (Central Africa)
Victoria Falls Natural Monument	20	1952	III	Zimbabwe (Southern Africa)
Virunga National Park	7,800	1925	II	Democratic Republic of Congo (Central Africa)
Virunga (Secteur Mikeno) National Park	256	1969	II	Democratic Republic of Congo (Central Africa)
Volcans National Park	150	1929	II	Rwanda (Eastern Africa)
Vwaza Marsh Wildlife Reserve	986	1977	IV	Malawi (Southern Africa)
W du Benin National Park	5,020	1954	II	Benin (West Africa)
W du Burkina National Park	2,368	1954	II	Burkina Faso (West Africa)
W du Niger National Park	2,200	1954	II	Niger (West Africa)
Waka National Park	1,069	2002	II	Gabon (Central Africa)
Warigue Classified Forest	645	?	VI	Côte d'Ivoire (West Africa)
Waza National Park	1,700	1968	II	Cameroon (Central Africa)
Welgevonden Private Game Reserve	330	?	UA	South Africa (Southern Africa)
West Lunga National Park	1,684	1972	II	Zambia (Southern Africa)
West Petauke Game Management Area	4,140	1971	VI	Zambia (Southern Africa)
West Zambezi Game Management Area	38,070	1971	VI	Zambia (Southern Africa)
Wonga-Wongue Presidential Reserve	3,800	1971	IV	Gabon (Central Africa)
Yamba Berete Forest Reserve	550	?	VI	Chad (Central Africa)
Yankari National Reserve	2,254	1991	II	Nigeria (West Africa)
Yata-Ngaya Faunal Reserve	4,200	1960	IV	Central African Republic (Central Africa)
Zakouma National Park	3,000	1963	II	Chad (Central Africa)
Zambezi National Park	563	1979	II	Zimbabwe (Southern Africa)
Zemongo Faunal Reserve	10,100	1925	IV	Central African Republic (Central Africa)
Zeraf Game Reserve	8,085	1939	VI	Sudan (Eastern Africa)
Zinave National Park	5,000	1972	II	Mozambique (Southern Africa)

# APPENDIX IV

## ACRONYMS & ABBREVIATIONS

AED	African Elephant Database
AERP	Amboseli Elephant Research Project (Kenya)
AESR	African Elephant Status Report
AfESG	African Elephant Specialist Group
AfRSG	African Rhino Specialist Group
ARF	Assessed Range Fraction
AS	Aerial Sample Count
AT	Aerial Total Count
AVIGREF	Associations villageoises pour la gestion des réserves de faune (Benin)
BGP	Big Game Parks of Swaziland
BR	Biosphere Reserve
BtR	Botanical Reserve
CA	Conservation Area
CAR	Central African Republic
CARPE	Central African Regional Program for the Environment
CBFP	Congo Basin Forest Partnership
CcA	Concession Area
CEESP	Commission on Environmental, Economic and Social Policy
CF	Classified Forest
CFA	Central Africa Franc
CHA	Controlled Hunting Area
CI	Confidence interval
CIMU	Conservation Information and Monitoring Unit (Tanzania)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CL	Confidence limit
CMS	Convention on Migratory Species
COMIFAC	Conference of Ministers in Charge of Forests in Central Africa
CR	Community Reserve
CRF	Continental Range Fraction
DA	Different Area
DC	Dung Count
DD	Data Degraded
DEFRA	Department for Environment, Food and Rural Affairs (United Kingdom)
DFPN	Direction de la Faune et des Parcs Nationaux (Cameroon)
DNFFB	Direcção Nacional de Florestas e Fauna Bravia (Mozambique)
DRC	Democratic Republic of Congo
DRSRS	Department of Resource Surveys and Remote Sensing (Kenya)
DRWG	Data Review Working Group
DT	Different Technique
DWNP	Department of Wildlife and National Parks (Botswana)
EC	Elephant Corridor
ECOPAS	Ecosystèmes Protégés en Afrique Sahélienne (West Africa)



ECOWAS	Economic Community of West African States
ELESMAP	Southern African Elephant Survey and Monitoring Programme
EMOA	Elephant Management and Owners Association (South Africa)
ES	Elephant Sanctuary
ESRI	Environmental Systems Research Institute
EWCO	Ethiopia Wildlife Conservation Organization
FFR	Fauna and Flora Reserve
FnR	Faunal Reserve
FR	Forest Reserve
GD	Genetic Dung Count
GEMS	Global Environment Monitoring System
GIS	Geographical Information System
GMA	Game Management Area
GmR	Game Ranch
GP	Game Park
GPR	Game Production Reserve
GR	Game Reserve
GRID	Global Resource Information Database
GS	Ground Sample Count
GS	Game Sanctuary
GT	Ground Total Count
HA	Hunting Area
HR	Hunting Reserve
HZ	Hunting Zone
IFR	Integral Forest Reserve
IG	Informed Guess
INDEFOR	National Institute for Forestry Development (Equatorial Guinea)
INR	Integral Nature Reserve
IQI	Information Quality Index
IR	Individual registration
IUCN	The World Conservation Union
JICA	Japan International Cooperation Agency
KAZA TFCA	Kavango-Zambezi Transfrontier Conservation Area (Southern Africa)
LAT	Latitude
LON	Longitude
MET	Ministry of Environment and Tourism (Namibia)
MIKE	Monitoring the Illegal Killing of Elephants
NA	New Analysis
NF	National Forest
NG	New Guess
NGO	Non-Governmental Organization
NIR	National Reserve
NM	Natural Monument
NNR	National Nature Reserve
NP	National Park
NP	New Population
NPe	(National Park Extension)
NPWMA	National Parks and Wildlife Management Authority (Zimbabwe)

NR	Nature Reserve
NRCC	Natural Resources Conservation Council
NS	National Sanctuary
OG	Other Guess
ORNL/GIST	Geographic Information Science and Technology Group at the Oak Ridge National Laboratory (United States of America)
PAGEN	Partenariat pour l'Amélioration de la Gestion des Ecosystèmes Naturels (Burkina Faso)
pers. comm.	Personal communication
PF	Probable Fraction
PFR	Partial Faunal Reserve
PFS	Priority for Future Surveys
PGR	Private Game Reserve
Pk	Park
PL	Population Lost
PNE	Protected Natural Environment
PNR	Private Nature Reserve
PR	Partial Reserve
PrP	Presidential Park
PRP	Percentage Relative Precision
PrR	Presidential Reserve
PvR	Private Reserve
Quest. reply	Questionnaire reply
RA	Recreation Area
RC	Reserve Complex
RDBMS	Relational database management system
RNP	Regional Nature Park
RP	Recreation Park
RS	Repeat survey
RyNP	Royal National Park
SA	Safari Area
SANParks	South African National Parks
SF	State Forest
SNR	Strict Nature Reserve
SNTC	Swaziland National Trust Commission
SR	Special Reserve
SSC	Species Survival Commission
Sty	Sanctuary
TAWIRI	Tanzania Wildlife Research Institute
TFCA	Transfrontier Conservation Area
TFR	Total Faunal Reserve
TRIDOM	Dja-Odzala-Minkébé Tri-National Park
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USFWS	United States Fish and Wildlife Service
WA	Wilderness Area
WCA	Wildlife Conservation Area
WCMC	World Conservation Monitoring Centre
WCS	Wildlife Conservation Society (United States of America)

WP	Wetland Park
WR	Wildlife Reserve
WS	Wildlife Sanctuary
WWF	World Wide Fund for Nature

