

The IUCN Species Survival Commission

# African Elephant Database

## 1995

M.Y. Said, R.N. Chunge, G.C. Craig,  
C.R. Thouless, R.F.W. Barnes and H.T. Dublin



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The World Conservation Union

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African Elephant Specialist Group  
Species Survival Commission  
THE WORLD CONSERVATION UNION

in collaboration with

Global Resource Information Database  
UNITED NATIONS ENVIRONMENT PROGRAMME



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# INTRODUCTION

## HISTORICAL BACKGROUND

The African elephant (*Loxodonta africana*) is the largest living land mammal. The species once inhabited most of the continent, from the Mediterranean coast down to its southern tip (Cumming *et al.*, 1990). By about 1600 there were no more elephants in north Africa and the picture of elephant range today is one of scattered, fragmented populations south of the Sahara Desert.

Historically, the continental decline of the African elephant population and the contraction of its range are associated with the ivory trade over several centuries, coupled with human population expansion and desertification (Cumming *et al.*, 1990). It has been speculated that elephant population decline since the 19th century was linked to both the ivory trade and habitat loss, but since 1979 up to the late 1980s was mainly attributable to illegal hunting of elephants for ivory (Milner-Gulland and Beddington, 1993a, 1993b). Parker and Graham (1989), however, argued that declining elephant population trends were the result of complex historical processes between humans and elephants, involving competition for fertile land and water, not simply the result of human greed and the rising price of ivory.

During the 1970s and 1980s there was increasing public concern for the fate of the African elephant but data were lacking to support the speculations of serious population decline. It became essential to organise information comprehensively in an attempt to verify the situation. Attempts to estimate Africa's elephant population can be traced back to 1976, when the African Elephant Survey and Conservation Programme was implemented, with sponsorship from the World Wildlife Fund (WWF), the New York Zoological Society (NYZS) and the International Union for Conservation of Nature and Natural Resources (IUCN), now referred to as the World Conservation Union. It involved questionnaire distribution, survey work, and compilation of information on elephant range, numbers and trends (Douglas-Hamilton, 1977-1979). Under the same programme, a concurrent study of the ivory trade was carried out on

behalf of the US Fish and Wildlife Service (Douglas-Hamilton, 1979; Parker, 1979). The programme publicised major declines in elephant populations in many African countries during the 1970s. All this information was reviewed in 1980 by the African Elephant Specialist Group of the Species Survival Commission (SSC) of IUCN at a meeting in Nairobi, Kenya, and again, along with additional questionnaire responses, in 1981 in Hwange, Zimbabwe (Cumming and Jackson, 1984). In 1987, at an African Elephant and Rhino Specialist Group (AERSG) meeting in Nyeri, Kenya, combined data from AERSG questionnaire returns as well as the preliminary results from the UNEP/GRID database project of Burrill and Douglas-Hamilton (1987), were used to produce population estimates (Cumming *et al.*, 1990). The comparison of estimates suggested that elephant populations had more than halved in several areas between the years 1981 and 1987 (Cumming *et al.*, 1990). Meanwhile, Caughley *et al.* (1990) provided evidence for local population increase in some countries, which was not reflected by the continental trend of overall decline.

In 1989 the African elephant was placed on Appendix I of the Convention of International Trade in Endangered Flora and Fauna (CITES), as a result of the data showing population decline on the continent as a whole. The ruling was effected in 1990, meaning that no elephant products could be traded internationally among Parties to the Convention. However, most governments in southern Africa's elephant range states did not support the change to Appendix I, arguing that elephant populations in their countries were stable or increasing, largely due to good management, and that the apparent continental decline in elephant numbers was not indicative of local trends. This led to division between those for and against the ban, which in turn disrupted the activities of the AERSG until the early 1990s. Public interest in the fate of the African elephant has remained high and the species has retained an Appendix I CITES listing with unsuccessful proposals to CITES between 1990 and 1994 to downlist specific populations, primarily in southern Africa.

Perhaps partly as a result of the controversy which surrounded the build up to the implementation of the international ivory trade ban, there is a persistent desire for regular updates on the status of elephant populations, particularly at the continental level. However, because of a number of limitations which are outlined below, the production of a continental total is difficult and can be inherently misleading. Most information on elephant numbers on the continent has been guesswork and has not formed a suitable basis from which to determine population trends over time, or to discern the effects of policy or management. In fact, data conducive to trend analysis are only available from a few key populations and performing such analyses on other populations is inappropriate and may provide spurious results. In this update of the African Elephant Database (AED), an attempt has been made to produce a continental overview which more accurately reflects the variety in data quality from different sources of information.

## **REASONS TO COLLECT DATA ON ELEPHANT RANGE AND NUMBERS**

Information on elephant range and numbers is vital for the effective conservation and management of Africa's remaining elephants. As indicated by the historical background, there are biological, economic and sociopolitical reasons for counting elephants. More than ever, wildlife management authorities are being asked whether elephant numbers are increasing or decreasing and whether elephant populations should be controlled to reduce conflict and to relax the pressure on habitats. The elephant is a "keystone" species, playing a pivotal role in structuring both plant and animal communities (Shoshani, 1993) and dominating the biomass in the habitats it occupies (White, 1994). The impact of the African elephant on its habitat can be both beneficial (Chapman *et al.*, 1992; Ruggiero and Fay, 1994) and destructive, especially on trees, when high densities of elephants build up in confined areas (Craig, 1993a; Tchamba and Mahamat, 1992; Swanepoel, 1993). It is pertinent to ask how large a protected area should be to conserve a certain biological diversity, or, more specifically, to support a viable elephant population (Armbruster and Lande, 1993); this in turn points to the need to define a minimum viable population for elephant conservation (Sukumar, 1993).

Non-protected areas constitute the majority of elephant range and national wildlife authorities are faced with the

issue of management outside national parks and reserves as well as within. There is more conflict between man and elephants, especially in agricultural areas which were formally uninhabited by humans, presenting a difficult challenge to conservationists (Kangwana, 1995). Thus there is clearly a need for defined management objectives for both protected and non-protected areas of elephant range (Lindsay, 1993; Lindeque, 1995), which cannot be drawn up without accurate information on elephant distribution and numbers.

## **THE NEED FOR A CONTINENTAL APPROACH**

The status of the African elephant varies significantly across its range, and the long-term survival of individual 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 should be achieved. However, it is difficult 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.

This is because elephants migrate long distances across protected area boundaries and international boundaries and a policy or management decision made in one country can affect cross-border elephant populations as well as remote populations in other countries. Policies concerned with ivory management and trade, in particular, transcend political boundaries drawn on a map. Trading by one country may affect poaching or smuggling in others, or one country may fear that trading in another may affect poaching and smuggling within its borders. Changing land-use patterns, different approaches to tourism and trophy hunting between neighbouring states and any policy decisions which directly or indirectly lead to fluctuations in the price of ivory, are all factors which can ultimately affect the future of the continent's elephant population. Furthermore, civil and international wars often lead to the mass migration of refugees into previously uninhabited areas of elephant range with inevitable impact on any elephant populations which are encountered. These factors all make it difficult to compartmentalise elephant management into political units. While regional initiatives, such as the ELESMAF programme which involves most southern African range states, are necessary to census and manage shared, cross-border populations, a continental perspective is also important.

## THE AFRICAN ELEPHANT DATABASE

The AED is a computerised information system which stores population estimates and associated geographic information for the African elephant, *Loxodonta africana*.

The AED project was initiated in 1986 by Iain Douglas-Hamilton, in response to the perceived need to develop a comprehensive picture of elephant numbers and distribution throughout Africa against a background of claims of serious population decline in specific areas of the continent. Using data accumulated from questionnaire replies, surveys and interviews mostly from members of the AERSG - a database of elephant population estimates and distribution was assembled (Burrill and Douglas-Hamilton, 1987). Data were stored in a Geographic Information System (GIS), which is a database management system especially designed for the management of large amounts of spatially referenced environmental information. Burrough (1986) defines GIS as a *powerful set of tools for collecting, storing, retrieving, transforming and displaying spatial data from the real world for a set of particular purposes*. In many respects GIS programmes are similar to non-geographic computer programmes. They share the ability to accept, process and present data, to update, modify and combine data sets originating from different sources. ARC/INFO is the GIS software used for the AED.

Since its inception, the AED has been housed at the United Nations Environment Programme (UNEP) headquarters in Nairobi, in collaboration with UNEP's Global Environment Monitoring System (GEMS) and the Global Resource Information Database (GRID). The initial activity of the project was to plot all the data of elephant distribution on maps for the first time, and to analyse the factors most closely associated with elephant density. Of all the variables used in the analysis (vegetation, protected areas, human population, socio-economic and political factors, rainfall, tsetse fly distribution) the strongest positive correlation, which was statistically significant, was between elephant density and effective protection of a given area (Burrill and Douglas-Hamilton, 1987). The data for elephant range and estimates were updated again in 1992, both in computerised and published form (Douglas-Hamilton *et al.*, 1992).

Towards the end of 1992, the AED became the direct responsibility of the African Elephant Specialist Group (AfESG), now a separate group from the African Rhino Specialist Group (AfRSG). At an AfESG meeting in November 1992, a Data Review Taskforce, consisting of five members, was appointed to review issues related to the future structure and management of the AED and to define other data needs of the AfESG. Two Taskforce meetings were convened in 1993, during which discussions were held on the restructuring, role and potential uses of the AED (IUCN/SSC/AfESG Taskforce, 1993). In late 1993, a GIS consultant was employed to try out recommendations made by the Taskforce for data input and data quality categorisation, and to make further suggestions on the future use and management of the AED (Beardsley 1993).

Building on the consultant's report, an AED manager was employed to develop the AED further and to update it with recent data from the range states. Said and Chunge (1994) produced a preliminary report for limited circulation at the CITES meeting in November 1994, which was then revised to produce this report, which succeeds Douglas-Hamilton *et al.* (1992).

With the comprehensive GIS database in place, plans are underway for the long-term development of the AED. Future modifications and improvements to the AED will aim to enhance its value and effectiveness as a tool in the conservation and management of the African elephant and it is hoped that the AED will serve as a model for other large mammal databases, as well as benefiting with input from existing databases such as human density, land-use patterns and forest cover. With time, the database should be able to provide information for the setting of priorities at a supra-national level, by establishing significant positive and negative population trends and attributing them to given causes. The AED is only one of many single-species databases and there is a need, currently being prioritised by IUCN, to consolidate information on animal and plant species and build up a central database service for a wide range of users all over the world.

## TYPES OF DATA COLLECTED FOR THE AED

Data are collected on two basic variables: distribution or range, and numbers. There are two subspecies of the African elephant, *Loxodonta africana africana*, or the savanna elephant, and *Loxodonta africana cyclotis*, the forest elephant. Recent genetic studies indicate that forest elephants are sufficiently distinct to warrant independent conservation status (Georgiadis *et al.*, unpublished). However, no distinction is made between the two subspecies in this publication because information was neither requested nor compiled at a subspecies level.

### Elephant range

#### *Defining elephant range*

Elephant range is broadly defined by the AfESG as the entire area where the species occurs in the wild at any time.

The AfESG attempted to classify range further as: **Core range** where elephants are present throughout the year; **Seasonal range** where elephants are present seasonally; and **Erratic range** where elephants occur periodically, but not every year. A **Situation Unknown** category was also defined, to account for areas where elephants are known to occur but there is insufficient information to state which of the previous three categories applies (Working Group Discussion One, 1993).

In reality it is very difficult to define range (because of the sparsity of animals at its edge), to collect precise information about range or to monitor changes in range, especially over large areas of Africa which are covered with dense forest. Techniques of radio and satellite tracking to follow the movements of individual elephants are proving useful (Lindeque and Lindeque, 1991; Powell and Elkan, 1994; Thouless, in press) in determining precise movements but their application is limited by the expense and expertise required.

#### *Limitations of data on elephant range*

Range information for a particular country is often updated by a single representative at an AfESG meeting or by an individual answering a questionnaire. Trying to draw a precise range boundary on maps of varying quality and scale is often an arbitrary exercise and can actually degrade the database. Neat, rounded lines may be indicative of scanty

knowledge in comparison to the fragmented, more detailed pictures which emerge from countries with comprehensive information, or for which more than one person has returned a questionnaire. In some countries, national range is extrapolated from a small survey area. Range often fits, albeit too precisely, the exact boundaries of protected areas, because that is where most surveys are carried out. This means that movements in and out of protected areas, or between protected areas and surrounding dispersal areas, are largely ignored. Alternatively, range is delimited on a map 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 boundary, it is not always supplemented by its neighbouring country because of non-response or poor information. Such abrupt demarcations of range between countries are seen between, for example, Zaire and the Central African Republic, Zaire and Congo, Equatorial Guinea and Cameroon, Cameroon and the Central African Republic, Congo and Gabon, and Sudan with Kenya and Uganda.

Ideal information on range is thus difficult to obtain throughout most of the continent and therefore no attempt has been made to distinguish between different categories of range for this update, although this issue remains open for discussion and review. The Taskforce chose to retain the existing broad definition of range i.e. *the entire area in which the species occurs in the wild*, in this update of the AED.

### Elephant numbers

#### Methods to count elephants

There is no ideal method for counting elephants. Each has its advantages and disadvantages and is applicable in a different situation. It is not the intention here to describe the different methods in any detail. The reader is referred to Norton-Griffiths (1978); Barnes and Jensen (1987); Barnes (1993); Douglas-Hamilton- *et al.* (1992); Craig (1993b); and the African Wildlife Foundation (in press).

Broadly-speaking, elephants are counted using two methods: aerial and ground surveys. Each method is comprised of several different techniques. Aerial surveys are either total or sample counts, while ground surveys comprise total counts by recognition and registration of individuals, or more commonly, dung counts.

Aerial surveys are conducted from fixed-wing aircraft or helicopters and are only suitable for counting elephants

which are visible from the air and not hidden by forest or thick bush. Aerial surveys are used in many parts of east and southern Africa, and other areas where elephants occur in savanna habitats. With total counts, the aim is to count all the elephants in a defined area, while for sample counts, only the elephants in a representative proportion of the area being surveyed are counted to give an estimate of density, which is used to predict the number in the area.

Ground survey techniques are the only methods currently used for counting elephants in forests. The majority of data on elephant numbers in forested areas is based on dung counts. Piles of dung are recorded along well-defined transects and estimates of elephant density are extrapolated mathematically, taking into account the rate of defaecation and the rate of dung decay under varying conditions.

In a handful of elephant populations in Africa, total ground counts have been accomplished using recognition techniques. Elephants are identified individually by noting unique physical features. This type of count is only suitable for intensively studied populations which can be approached and monitored easily. Ground counts can also be made by sending out teams in vehicles or on foot to count elephants within a limited area of terrain.

Yet more information is collected through entirely qualitative observations, such as sighting of elephants, their dung or tracks, or through hearsay information. Data of this type are classified as guesswork. Because a substantial proportion of data on population estimates is only available in the form of guesses, the Taskforce has classified guesses into two types: those which are accompanied by some information about the accuracy of the estimate (Informed Guesses) and those which are not (Other Guesses). (See CATEGORISATION OF DATA.)

#### *Limitations of data on elephant numbers*

Data collection on elephant numbers and consequently, data quality, are limited by a number of factors. These

include the suitability of a chosen survey technique, the inherent biases of each technique, and other sources of bias, such as observer skill and variability, limited financial resources, lack of proper equipment, poorly trained staff, weather conditions, vegetative cover and incorrect application of technique. Ideally, data on elephants in any country should be collected by a wildlife management authority using qualified staff and standardised methods for collecting, recording and analysing data. In reality, elephant data are collected by a multiplicity of agencies and individuals, often without any direct linkage to one another and by using a variety of different techniques based on current opinion and available resources. The result is a collection of variable data in a few countries and no data at all from many populations. Very few countries have the means, either financially or in the form of expertise, to conduct systematic surveys on a regular basis. Furthermore, political strife plagues many range states.

Elephants are often found beyond the protected area boundaries, within which most surveys are done. In some countries, elephants inhabit a mixture of terrain and it is necessary to combine aerial and ground survey data to calculate a national estimate. Data derived from site-specific dung surveys form the basis of extrapolated estimates in vast areas of elephant range in the thick, equatorial forests of central Africa. In fact most national forest population estimates are extrapolated from dung surveys carried out in relatively small areas of forest. Seasonal movements of elephants and the occurrence of cross-border populations are additional factors which potentially lead to inaccurate national estimates. As yet there has been limited cross-border survey work to determine the uniformity of such populations. Instead they are treated as separate populations on either side of the border, which occasionally may result in a degree of double counting. Joint survey work in areas of southern and eastern Africa has been initiated in recognition of this problem.

## STRUCTURE OF THE DATABASE

An essential feature of the database is that relevant data are collated and organised, re-arranged and re-calculated, and maps and tables are produced from the re-organised data.

Primarily, survey data from the field are assembled in a manner suitable for input into the AED. This is mainly accomplished through questionnaires, interviews with relevant persons, and literature searches, and is the responsibility of the AfESG Secretariat and the AED Manager. This is followed by the organisation, input, and output of the data, which in this case takes the form of maps and tables.

While the appearance of the maps and tables in this document may superficially resemble those in previous reports (Burrill and Douglas-Hamilton 1987; Douglas-Hamilton, *et al.*, 1992), substantial changes to the AED have taken place. Data have been categorised against objective criteria, protected area boundaries have been redigitised, the identification system for survey input areas has been redesigned and revised, and additional datasets of rivers, roads and towns have been added.

### ASSEMBLY OF DATA

This publication contains updates which were made available to the AfESG during 1993, 1994 and 1995, but where no updates were available, estimates and range information from Douglas-Hamilton *et al.* (1992) have been retained provided data are not more than ten years old (IUCN/SSC/AfESG Taskforce, 1993).

Questionnaires were distributed in 1993 and 1994 to all AfESG members and other individuals with possible access to reliable information on elephant populations and distribution. At the AfESG meeting in 1994, special sessions were incorporated into the agenda for individual participants to meet with the database manager and to provide updates. Other data were assembled from published and unpublished literature, and through personal communications.

### Factors which limit data assembly

The AfESG can neither control the degree of compliance for questionnaire responses, nor can it always verify the responses. It was not possible to obtain questionnaire replies from every country and not all range states were represented at the AfESG meeting in 1994.

Available maps, on a scale of at least 1:1 ;000,000, were purchased for this update. However, the AED map collection remains incomplete because currently there is no complete map series at a suitable scale which displays protected area boundaries within the range states of the African elephant. In the absence of suitable topographic maps many respondents were unable to provide accurate elephant range boundaries. This factor will continue to be a handicap in the compilation of accurate range data since few African countries have the means to update or create topographic maps.

### INPUT OF DATA

The purpose of using GIS for the AED is mainly to organise the geometric (map) and attribute (thematic) databases of the various data components (census zone, range, protected areas, rivers, roads and places) from elephant range states and to integrate, describe and analyse their spatial associations. Map data can be input into a GIS through digitising, scanning, or through a graphical terminal. All the maps in the AED were manually digitised through the use of an interactive programme within ARC/INFO called ARCEDIT, which automatically stores the digitised lines, points or polygons, and the cartographic co-ordinates, in INFO files. INFO is a relational database management system which uses a keycode or table identifier to connect the geometric and attribute files. Data on attributes of lines, points and polygons were entered through tables which were also stored as INFO files. The attribute data in the files can be either numeric or descriptive. Numeric data can be manipulated arithmetically while descriptive data can be manipulated logically. ARC/INFO allows direct addition, subtraction division, multiplication and exponentiation of the table attributes.

All the datasets in the AED are geographically referenced in the sense that each point in every data layer is related to a physical location on the earth's surface. This allows the overlaying of different maps to make a new map. Map projection is in geographic units of degrees decimal. The previous AED was stored in Miller Oblated Stereographic (MOS) projection, which proved problematic when data were to be projected into other forms. MOS is not an equal area projection and previously, therefore, corrections had to be made to obtain reasonably accurate representations of area computations.

## Updating of maps and databases

The updating of the geometric database involved digitising, processing and presentation of maps. The precision of digitising most maps was less than 0.009 of an inch or 0.2mm. However, the validity of each map depends mainly on the accuracy of the original maps used, which cannot be improved by the process of digitisation. Several Simple Macro Languages (SMLs) and Arc Macro Languages (AMLs) were also written for map production for this update. The AED maps can be viewed on a graphical terminal or plotted from various line plotters or printers, both in colour or in black and white. Map size can vary from A4 to poster size.

The processing of the geometric data entailed cleaning up the errors, matching up the map features and linking the data to the tables. The linkage between the geometric and attribute databases is maintained through a unique keycode or identifier assigned to each map unit and table. Within the AED, the keycodes consist of six digits; the first three denote the country code and the last three denote the type of input area. This design helps the user to formulate queries related to a specific region, country or geographical area. Furthermore, when datasets from different countries are combined to form a regional or continental dataset there is no duplication of the keycode. The additional datasets on rivers, roads and towns were derived from the Digital Chart of the World (DCW) maps at a scale of 1:1,000,000. New classes were derived for the road and town datasets which were used in generating the maps for this report.

One of the major objectives of this update was to automate the process of generating information. After data input, the verified datasets were read into the INFO database and a series of programmes were run. These programmes

categorised the data, assigned each census a quality class, reclassified the data into Definite, Probable, Possible and Speculative groups and also calculated the 95% confidence limits and standard errors, based on information which accompanied the data (see CATEGORISATION OF DATA). A statistical report file was finally generated using the INFO report option. All the data files can be imported into other software programmes to generate customised reports.

Another objective of the update was to make the data accessible to a cross-section of users at both technical and decision-making levels. The data are therefore now being entered into ArcView, which is a tool to assess, display, query and analyse geographic data. ArcView links maps with traditional data analysis tools, such as spreadsheets and business graphics, to form an integrated analysis system.

## Updates since the 1992 publication

For several countries, comprehensive post-1990 updates on numbers have not been possible because of political strife or total lack of resources. For some countries, only corrections to existing estimates were received. In other countries, updates have only been received for a small portion, or sub-populations, of previously recorded populations. Even if a sub-population has been surveyed accurately and in great detail, it represents only a fraction of a much larger population, which, for the purpose of calculating a national estimate, may be, at best, an extrapolated estimate.

Post-1992 updates or corrections to existing data for elephant populations and/or range, either nationally or in individual populations, were obtained for 32 of the 37 range states. Those updated, either in terms of numbers or range, or both, include:

**Central Africa** Cameroon, Central African Republic, Chad, Equatorial Guinea, Congo, Gabon, Zaire.

**Eastern Africa** Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Tanzania, Uganda.

**Southern Africa** Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Zambia, Zimbabwe.

**West Africa** Benin, Burkina Faso, Ghana, Ivory Coast, Liberia, Mali, Nigeria, Sierra Leone, Senegal, Togo.

The remaining range states (Sudan, Swaziland, Guinea, Guinea Bissau, Niger) produced no updates. It is important to note that changes in national estimates do not necessarily reflect true population change assessed by recent updates; more often, improvement in survey techniques leads to better estimates or new estimates being produced in areas both previously surveyed and unsurveyed. New estimates for some unsurveyed areas are based on informed guesswork. For over one-third of the range states, the estimates are derived mainly from guesswork.

**The reader *is* advised not to make comparisons or trend assumptions between country, regional or continental estimates in this report and in the 1992 report, because differences between the two may not reflect real differences but rather improvements and corrections to the data and to the database.**

## **OUTPUT OF DATA**

The maps for this update are presented as two themes. The first map of each region or country shows elephant range in relation to the protected areas. The second map displays elephant range in relation to input areas, where an input area is defined as an area surveyed for elephants. Each input area is assigned an estimate. Each map feature, for example, the type of protected area, has a code, which (for the purpose of clarity) has been presented as a three-digit code.

Each country is accompanied by two tables with the exception of two: Sudan and Sierra Leone, from which no estimates were available. The first table provides information on individual survey estimates while the second summarises the individual estimates into four exclusive groups, Definite, Probable, Possible and Speculative numbers of elephants.

Accompanying each table and map for every range state is a brief written overview which relates to the elephant data for that country and is intended to supplement the information provided by the map and/or table. It is not the intention to provide the reader with exhaustive information or an historical account but simply to clarify the current situation and to highlight any factors which have contributed to it.

## **Updating and access to the AED**

The AED will continue to be updated by the AfESG at UNEP in collaboration with the UNEP/GRID. The next published update will be released in approximately three years. Individual estimates and information on range are considered valid for 10 years, unless updates are obtained (IUCN/SSC/AfESG Taskforce, 1993). Copies of “read only” data sets for integration and analysis can be acquired from UNEP/GRID, according to the normal regulations.

# CATEGORISATION OF DATA QUALITY

Because of the enormous variability in data quality of individual surveys the Taskforce reviewed and reclassified data according to specific criteria so that data quality for individual counts is rated from 1 (best) to 3 (worst), according to different types of data collection (see SURVEY TYPE & QUALITY column in the tables).

The categorisation of quality is intended to help the AED user assess the relative reliability of the data. Previously, three general categories were used: Quality 1 for aerial survey data and total ground counts, Quality 2 for dung count data and Quality 3 for informed guesswork and/or extrapolation (Douglas-Hamilton *et al.* 1992). The challenge to improve data categorisation was made to the AfESG (Douglas-Hamilton, 1993) and extensive discussions were held on the subject, both at the 1992 AfESG meeting and by the Data Review Taskforce. The Taskforce implemented the following categories for this update, though they remain open to review.

## CATEGORISATION OF SURVEY DATA

### Categories for aerial survey data

The Taskforce recommended that for **aerial sample counts**, *sampling intensity* is the best measure of quality. **The following** quality categories based on percentage sampling intensity were therefore chosen:

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

With respect to **aerial total counts**, data quality has been categorised in terms of *searching rates*, 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

### Categories for dung counts

1. CLS\* for mean elephant density less than 30% and one of the following:

- (a) Decay rate measured on site for  $\geq 50$  dung-piles
- (b) Defaecation rate measured on site
- (c) CLS for dung density estimate  $\leq 20\%$
- (d) Sampling is done for both wet and dry seasons

**OR** Any three of the above four conditions in (a)-(d).

2. CLS for elephant density  $\leq 50\%$

**OR** Any two out of the three following conditions:

- (a) Decay rate measured on site for  $\geq 30$  dung-piles
- (b) Defaecation rate measured for target population
- (c) CLS for dung density  $\leq 30\%$

3. When the conditions for 1. and 2. are not fulfilled.

\* CLS are 95% confidence limits expressed as a percentage of the mean.

### Guesses

Both Informed Guesses and Other Guesses are given a data quality category of 3.

When quality is unknown for any survey type, it is left blank.

Due to continual problems of inconsistency in data quality, the AfESG will formulate survey guidelines for distribution to relevant governmental and non-governmental organisations in the hope of improving the quality and dependability of survey data in future.

## CATEGORISATION OF NATIONAL, REGIONAL AND CONTINENTAL ESTIMATES

The national, regional and continental totals produced in this update are displayed as **Definite, Probable, Possible** and **Speculative numbers** of elephants, rather than as single figures with an attached range.

The AfESG Data Review Taskforce emphasises that the summation of elephant population estimates into national, regional and continental totals is essentially misleading because it takes no account of the variety of data types and data quality. The addition of estimates derived from surveys which range from accurate total counts to guesswork, is strictly invalid. However, the Taskforce investigated the possibility of placing individual population estimates into different groups, to better reflect the quality of estimates derived from different types of surveys. Thus, if different data types cannot legitimately be combined into a valid continental estimate, at least it becomes possible to obtain totals for a few separate categories. As a result, four exclusive groups of elephant estimates were created. They are:

1. **Definite**
2. **Probable**
3. **Possible**
4. **Speculative**

These divide the population estimates into four distinct groups of decreasing quality. Estimates from the following five categories of survey types, A,B,C,D and E, contribute to the four groups as follows:

### A. Aerial total counts (AT) and ground total counts (individual registration, (IR))

1. Definite = the population estimate
2. Probable = none
3. Possible = none
4. Speculative = none

*Example:* Kruger National Park, South Africa.

The area was surveyed by an aerial total count and 8,064 elephants were counted. Thus the population estimate is placed in the Definite group.

In this example therefore, there are “definitely” as many as 8,064 elephants present.

### B. Sample aerial counts (AS) and ground sample counts (GC) with 95% confidence limits

1. Definite = the lower 95% confidence limit of the population estimate (there are *at least* this number of elephants) or the number actually seen, whichever is greater
2. Probable = the difference\* 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 a negative\*\*
3. Possible = the difference\* between the upper confidence limit and the estimate.
4. Speculative = none

- \* Rounded to the nearest whole number if necessary  
\*\* If the lower confidence limit of the estimate is a minus figure, the definite estimate will be zero, or the actual number of elephants seen.

*Example:* Ruaha National Park, Tanzania.

The area was surveyed by an aerial sample count and an estimate of  $7\,091 \pm 2,042$  ( $\pm$  95% confidence limits) elephants was given. The lower 95% confidence limit of the population estimate is placed in the Definite group. In this example this equals 5,049 (7,091 - 2,042). The difference between the lower 95% confidence limit (5,049) and the estimate itself is placed in the Probable group (7,091 - 5,049 = 2,042) while the difference between the upper 95% confidence limit and the estimate is placed in the Possible group (9,133 - 7,091 = 2,042).

Thus, in Ruaha, it can be concluded that there are “definitely” 5,049 elephants, “probably” 2,042 more than this, and “possibly” an additional 2,042 (i.e. “possibly” as many as  $5,049 + 2,042 + 2,042$ ).

For an aerial sample count the Probable estimate will always equal the Possible estimate provided that the confidence limits are symmetrical about the mean. However, if the lower confidence limit of the estimate is less than zero, the Possible estimate will be greater than the Probable (e.g. Nkhotakota Game Reserve, Malawi).

### C. Dung counts (DC) with 95% confidence limits

1. Definite = None\*
2. Probable = the population estimate
3. Possible = the difference between the upper confidence limit and the estimate
4. Speculative = Nil

\* It is assumed that there are no “definite” elephants because no elephants are observed directly and while aerial surveys will almost always be undercounts, the same does not apply to dung counts, where a change in parameters such as forest area, decay rate, or the mathematical model used, may change the estimate either upwards or downwards.

*Example:* Lobeke Forest Reserve, Cameroon.

The area was surveyed by dung counts and an estimate of  $3,719 \pm 2,125$  elephants was given. The population estimate (3,719) is the Probable figure while the difference between the upper confidence limit of the estimate ( $3,719 + 2,125 = 5,844$ ) and the estimate itself ( $5,844 - 3,719 = 2,125$ ) is the Possible figure.

Thus, in Lobeke, it can be concluded that there are “probably” 3,719 elephants and “possibly” another 2,125 more.

### D. Informed guesses (IG)

An informed Guess is one where either the person giving has a good knowledge of the area, or else has given an accurate description of the process by which the guess is derived. This includes aerial sample surveys or dung counts where no range or confidence limits are given or details of methods are not documented. GIS extrapolations are also considered as Informed Guesses.

1. Definite = none
2. Probable = none
3. Possible = the population estimate or the lower estimate if a range is given
4. Speculative = the difference between upper and lower estimates if given

*Example:* Gash Setit, Eritrea

The estimate of 70 to 100 elephants is based on an aerial reconnaissance survey. A few elephants were actually seen. Because the estimate was “informed” but not based on a systematic survey, it is categorised as an Informed Guess. In this case the lower estimate, 70, is placed in the Possible group while the difference between the upper (100) estimate and the lower is classified as Speculative i.e. 30.

Thus, in Gash Setit, there are “possibly” just 70 elephants and “speculatively” another 30.

### E. Other guesses (OG)

Other Guesses include estimates for which there is no indication of how accurate they might be e.g. the estimate came from a casual visitor to an area or simply from hearsay. Data are also classified as Other Guesses where there are grounds for supposing that they might be very inaccurate or unreliable because of a breakdown in central government since the estimate was provided, even if the estimate was based on an actual survey. This is the case for estimates from Angola and Liberia. Extrapolations with limited ground-truthing or no statement of the model’s assumptions are also included as Other Guesses.

1. Definite = None
2. Probable = None
3. Possible = None
4. Speculative = the estimate, or if given, the mean of the upper and lower limit.

*Example:* Guinea

The estimate for Guinea is 1000, but there is no information about the accuracy of the estimate. It is therefore classified as an Other Guess. Therefore, “speculatively”, there are about 1000 elephants in Guinea.

## READING THE TABLES

### NATIONAL TABLES

The first table presented for each country provides information on individual survey estimates of elephant numbers. The following parameters are displayed:

**CODE** = the three-digit code which identifies the area in the AED.

The codes in the update denote the following:

101 - 199	National Parks
210 - 299	Game Reserves, Safari Areas, Game Management Areas, National Reserves, Natural Reserves
301 - 399	Forest, Forest Reserves, Forest Lands
401 - 499	Conservation Areas, Wildlife Sanctuaries, Wildlife Reserves, Hunting Areas
501 - 599	Unprotected Areas
601 - 699	Ecosystems, Special Study Areas
701 - 750	Biosphere Reserves
751 - 799	Wetlands
801 - 899	Ranches, Communal Lands
901 - 900	Others

**ZONE** = the name of the area surveyed.

**SURVEY DATE** = the year of survey, if known or applicable.

**AREA** = the size of the area in km<sup>2</sup>. Where the area was not given by a respondent, a figure was inserted using the area calculated from the GIS. The projection used for area calculation was Lambert Azimuthal Equal area projection, which is best suited for area calculations in Africa (Beardsley, 1993).

**NUMBER OF ELEPHANTS** = the individual **ESTIMATE** from a given survey with 95% **CONFIDENCE LIMITS** (or range limits) where applicable.

**SOURCE** = the report, questionnaire reply or personal communication from which the estimate came. Each source is referenced.

**SURVEY TYPE & QUALITY** = The type of survey carried out and its assigned quality, 1,2 or 3, and blank if unknown (see **CATEGORISATION OF DATA QUALITY**). The abbreviations for each survey type are explained above each table.

**DATA CATEGORY** = The category, A,B,C,D or E, into which the elephant estimate falls, which is dependent on the survey type and additional criteria described above (see **CATEGORISATION OF NATIONAL, REGIONAL AND CONTINENTAL ESTIMATES**). The summation of the estimates in each category is used to create the second table.

The second table summarises the information contained in the first by placing the overall **NUMBERS OF ELEPHANTS** for a country into four groups, **DEFINITE, PROBABLE, POSSIBLE** and **SPECULATIVE**, based on the five categories, **DATA CATEGORY A-E**, described in the section above, **CATEGORISATION OF NATIONAL, REGIONAL AND CONTINENTAL ESTIMATES**.

It is important to note that the totals presented for each country are minimum estimates, based on the estimates for the areas that have been censused in that country. Areas of elephant range that have not been censused are not included in these totals. If all of the elephant range is listed, then the totals are national estimates. However, if, for example, estimates are given of forest elephants in particular sites which account for only a small proportion of the elephant range in the forest zone (e.g. Cameroon), the total cannot be considered a national estimate.

### NATIONAL, REGIONAL AND CONTINENTAL SUMMARY TABLES

For each of the four regions, a summary table is presented displaying total national estimates and overall regional estimates as Definite, Probable, Possible and Speculative numbers of elephants. The regional summaries are totalled to produce the continental summary of estimates, also as Definite, Probable, Possible and Speculative numbers of

elephants. For national, regional and continental summaries, the Definite (w), Probable (x), Possible (y) and Speculative (z) totals are exclusive. Thus, for a country, a region or the whole continent, there are, simply speaking, “definitely” (w) number of elephants, “probably” (w + x) number of elephants, “possibly” (w + x + y) number of elephants and “speculatively” (w + x + y + z) number of elephants.

Note that the confidence interval of the overall total of several sample counts from different areas is obtained by pooling of the variances from the individual estimates (Norton-Griffiths, 1978). At all levels of addition of these estimates i.e. national, regional and continental levels, the variances are pooled before addition of the estimates to

the four groups, Definite, Probable, Possible and Speculative. This is why the regional group totals are not always the sum of the national group subtotals, and likewise, the continental totals of Definite, Probable, Possible and Speculative numbers of elephants are not always the simple sum of the regional group subtotals.

No attempt has been made to analyse or interpret past or future trends of elephant populations at the local, national, regional or continental level, as there are few places with comparable estimates collected over a long enough time. It is expected that as overall data quality improves with time it will be possible to combine more of the estimates legitimately, and the division of total population estimates into categories will fall away.



# **CONTINENTAL OVERVIEW**



## SUMMARY OF ELEPHANT ESTIMATES

REGION	COUNTRY	NUMUER OF ELEPHANTS				COUNTRY AREA (km <sup>2</sup> )	RANGE AREA (kin <sup>2</sup> )	% OF TOTAL RANGE
		DIFINITE	PROBABLE	POSSIBLE	SPECULATIVE			
Central Africa	Cameroon	1,100	6,689	8,824	600	469,370	235,264	50.12
	Central African Republic	1,750	0	2,640	4,894	624,278	314,418	50.37
	Chad	0	0	1,040	2,100	1,277,301	205,523	16.09
	Congo	0	0	32,563	0	344,011	246,673	71.70
	Equatorial Guinea	0	0	407	0	25,183	14,593	57.95
	Gabon	0	61,794	20,218	0	266,521	263,902	99.02
	Zaire	4,470	13,174	65,974	0	2,343,242	1,479,904	63.16
	<b>Total</b>	<b>7,320</b>	<b>81,657</b>	<b>128,648</b>	<b>7,594</b>	<b>5,349,906</b>	<b>2,760,277</b>	<b>51.59</b>
Eastern Africa	Eritrea	0	0	70	30	122,352	591	0.48
	Ethiopia	847	0	1,560	0	1,133,575	102,984	9.08
	Kenya	13,834	5,273	6,447	924	594,704	135,005	22.70
	Rwanda	39	0	32	10	25,376	1,263	4.98
	Somalia	0	0	130	120	637,726	10,186	1.60
	Sudan	-	-	-	-	2,509,212	385,143	15.35
	Tanzania	73,459	12,419	12,301	0	947,948	425,384	44.87
	Uganda	1,318	0	530	0	242,841	13,493	5.56
	<b>Total</b>	<b>90,482</b>	<b>16,707</b>	<b>19,999</b>	<b>1,084</b>	<b>6,213,734</b>	<b>1,074,049</b>	<b>17.29</b>

REGION	COUNTRY	NUMUER OF ELEPHANTS				COUNTRY AREA (km <sup>2</sup> )	RANGE AREA (kin <sup>2</sup> )	% OF TOTAL RANGE
		DIFINITE	PROBABLE	POSSIBLE	SPECULATIVE			
Southern Africa	Angola	0	0	0	8,170	1,255,004	680,326	54.21
	Botswana	62,998	8,588	8,588	0	580,865	81,671	14.06
	Malawi	1,111	540	436	250	118,775	8,388	7.06
	Mozambique	825	185	485	13,405	789,855	468,113	59.27
	Namibia	5,843	3,058	3,098	0	828,183	145,344	17.55
	South Africa	9,990	20	0	0	1,224,437	22,695	1.85
	Swaziland	20	0	0	0	17,360	281	1.62
	Zambia	19,701	6,574	6,729	0	755,834	211,944	28.04
	Zimbabwe	56,297	11,674	13,884	0	392,729	106,476	27.11
	<b>Total</b>	<b>170,837</b>	<b>16,402</b>	<b>18,983</b>	<b>21,825</b>	<b>5,963,042</b>	<b>1,725,238</b>	<b>28.93</b>

REGION	COUNTRY	NUMBER OF ELEPHANTS				COUNTRY AREA (km <sup>2</sup> )	RANGE AREA (kin <sup>2</sup> )	% OF TOTAL RANGE
		DIFINITE	PROBABLE	POSSIBLE	SPECULATIVE			
West Africa	Benin	0	0	1,400	150	116,279	21,152	18.19
	Burkina Faso	1,469	583	583	0	276,372	21,320	7.71
	Ghana	245	427	1,416	443	240,311	31,250	13.00
	Guinea	0	0	0	1,000	246,163	9,316	3.78
	Guinea Bissau	0	0	0	35	34,184	331	0.97
	Ivory Coast	551	250	810	585	232,970	36,688	15.75
	Liberia	0	0	0	1,783	96,509	22,053	22.85
	Mali	0	611	151	45	1,257,166	34,021	2.71
	Niger	0	0	0	800	1,190,316	2,387	0.20
	Nigeria	0	0	1,065	550	915,252	34,391	3.76
	Senegal	0	0	20	20	197,928	8,447	4.27
	Sierra Leone				72,790	2,921	4.01	
	Togo	0	0	85	143	57,407	5,911	10.30
	<b>Total</b>	<b>2,760</b>	<b>1,376</b>	<b>5,035</b>	<b>5,554</b>	<b>4,933,647</b>	<b>230,198</b>	<b>4.67</b>

	NUMBER OF ELEPHANTS				COUNTRY AREA (km <sup>2</sup> )	RANGE AREA (kin <sup>2</sup> )	% OF TOTAL RANGE
	DIFINITE	PROBABLE	POSSIBLE	SPECULATIVE			
Continental Total	286,234	101,297	155,944	36,057	30,043,980	5,789,752	19.27

# ELEPHANT RANGE IN AFRICA



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



# PROTECTED AREAS AND ELEPHANT RANGE IN AFRICA



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*





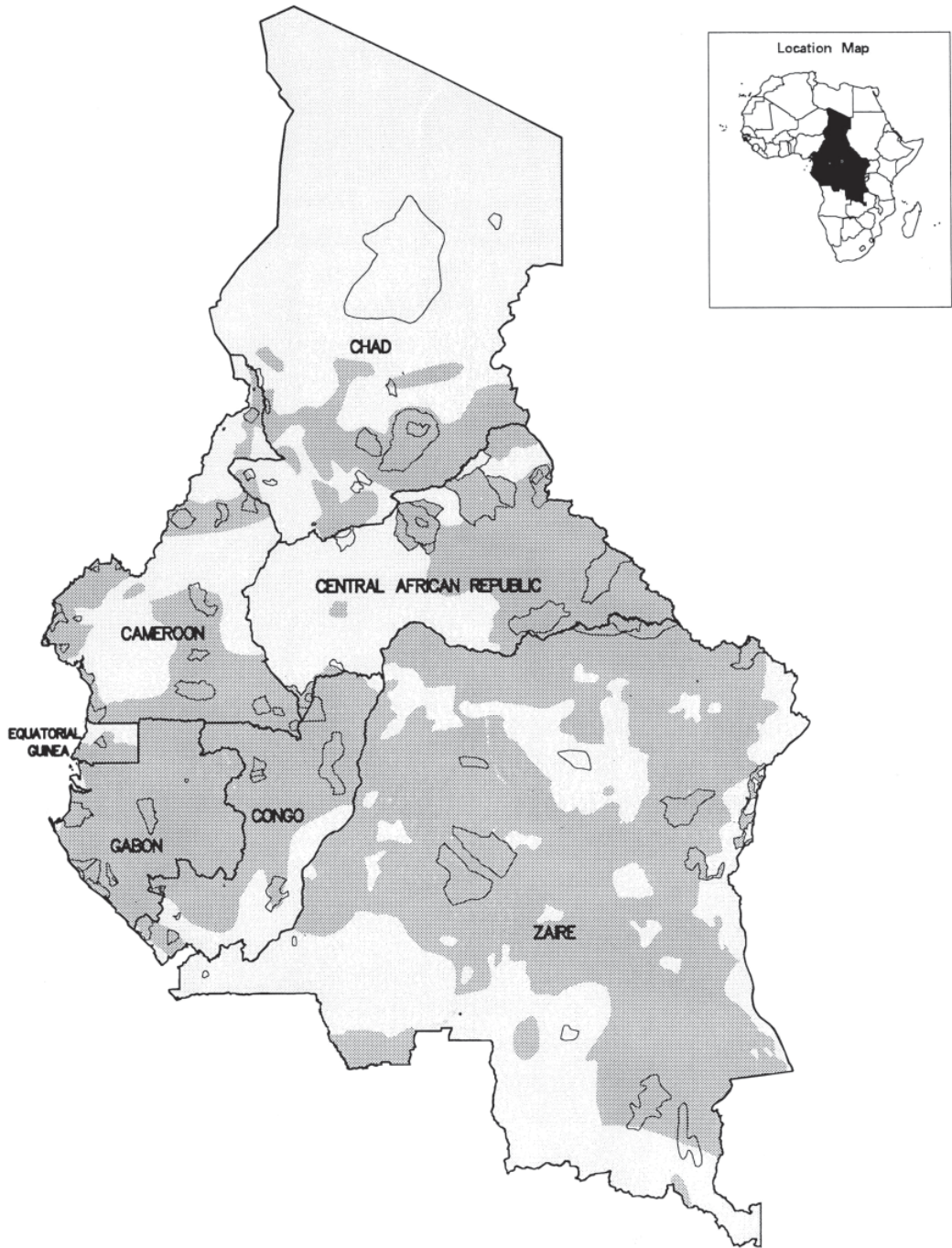
# **CENTRAL AFRICA**



**SUMMARY OF ELEPHANT TOTALS FOR CENTRAL AFRICA**

REGION	COUNTRY	NUMUER OF ELEPHANTS				COUNTRY AREA (km <sup>2</sup> )	RANGE AREA (kin <sup>2</sup> )	% OF TOTAL RANGE
		DIFINITE	PROBABLE	POSSIBLE	SPECULATIVE			
Central Africa	Cameroon	1,100	6,689	8,824	600	469,370	235,264	50.12
	Central African Republic	1,750	0	2,640	4,894	624,278	314,418	50.37
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	Zaire	4,470	13,174	65,974	0	2,343,242	1,479,904	63.16
	<b>Total</b>	<b>7,320</b>	<b>81,657</b>	<b>128,648</b>	<b>7,594</b>	<b>5,349,906</b>	<b>2,760,277</b>	<b>51.59</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN CENTRAL AFRICA



LEGEND

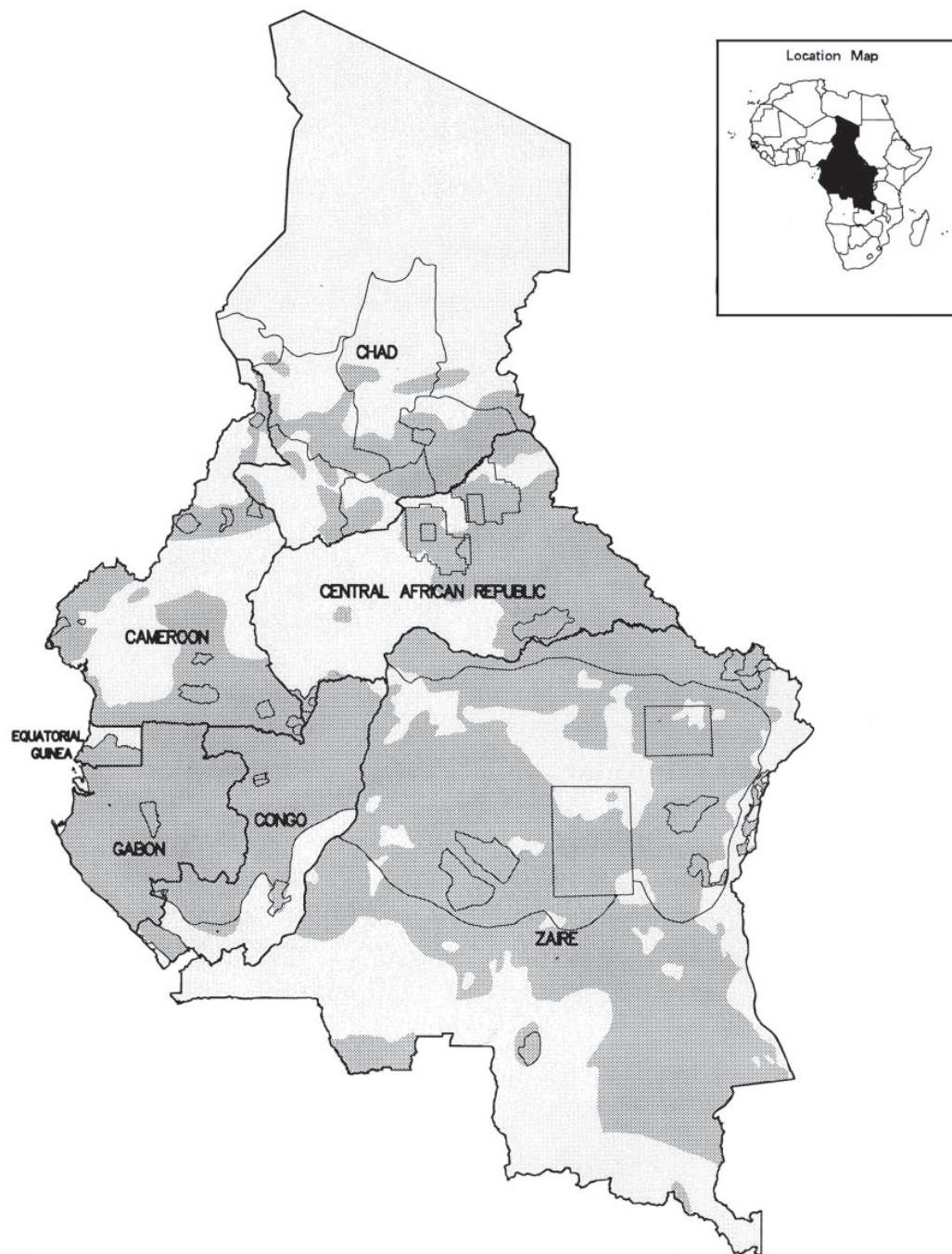
 Elephant Range



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN CENTRAL AFRICA



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*





## Cameroon

There are three distinct areas of elephant range in Cameroon, comprising the northern savanna ranges in the sahelian and sudanian regions, and the southern forest elephant range.

The northernmost population, in the sahelian region, is concentrated in and around Waza NP but there is increasing dispersal outside the Park, mainly in the wet season (Tchamba, 1993a; Tchamba, 1995), which accounts for most of the elephant distribution in the north. The 1991/92 aerial survey in Waza NP was carried out in the dry season when the population congregates in the Logone floodplain. Recent radio and satellite tracking of two elephants has suggested the existence of at least two, and possibly three, sub-populations in Waza (Tchamba *et al.*, in prep.). During the wet season some elephants move to the far north, while others migrate south where they cause extensive crop damage (Tchamba, 1995). There is also a resident population in Waza NP. It is speculated that a relict population of elephants from Lake Chad has also moved into northern Cameroon following recent civil disturbances in Chad (Tchamba, 1995).

There have been no updates for the middle region since 1991. The estimates for the three protected areas are based

on extrapolations from an educated guess of 0.3 elephants per km<sup>2</sup> (Tchamba, 1993a). Tchamba *et al.* (1991), estimated that a further 360 elephants live outside the protected areas of the sudanian domain.

The forest elephant densities are relatively high in the south-east, with estimates commonly more than 2 elephants per km<sup>2</sup> from recent dung counts (Stromayer and Ekobo, 1992; Ekobo, 1995). Monitoring is continuing and being extended in the south-east, while in Korup National Park in the south-west, data from both dung transect counts and surveys with satellite collared elephants are being analysed (Powell and Elkan, 1994); the estimates presented should be treated as preliminary (Powell, pers.comm., 1995). A 1991 estimate for Dja of 5,260 elephants was based on a density of one elephant per km<sup>2</sup> (Tchamba *et al.*, 1991) but it may be closer to 0.3 per km<sup>2</sup>, which reduces the population estimate to about 1,500 (Gartlan, pers. comm., 1995; Tchamba, pers. comm., 1995). Michelmore *et al.* (1994) extrapolated an estimate of 11,836 for a total forest range of 135,578km<sup>2</sup> and attribute forest population decline since the mid 1970s largely to habitat loss, poaching and other forms of human disturbance. The southern forest elephant range may extend into the Central African Republic, Congo and Gabon.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown

## CENTRAL AFRICA

### CAMEROON

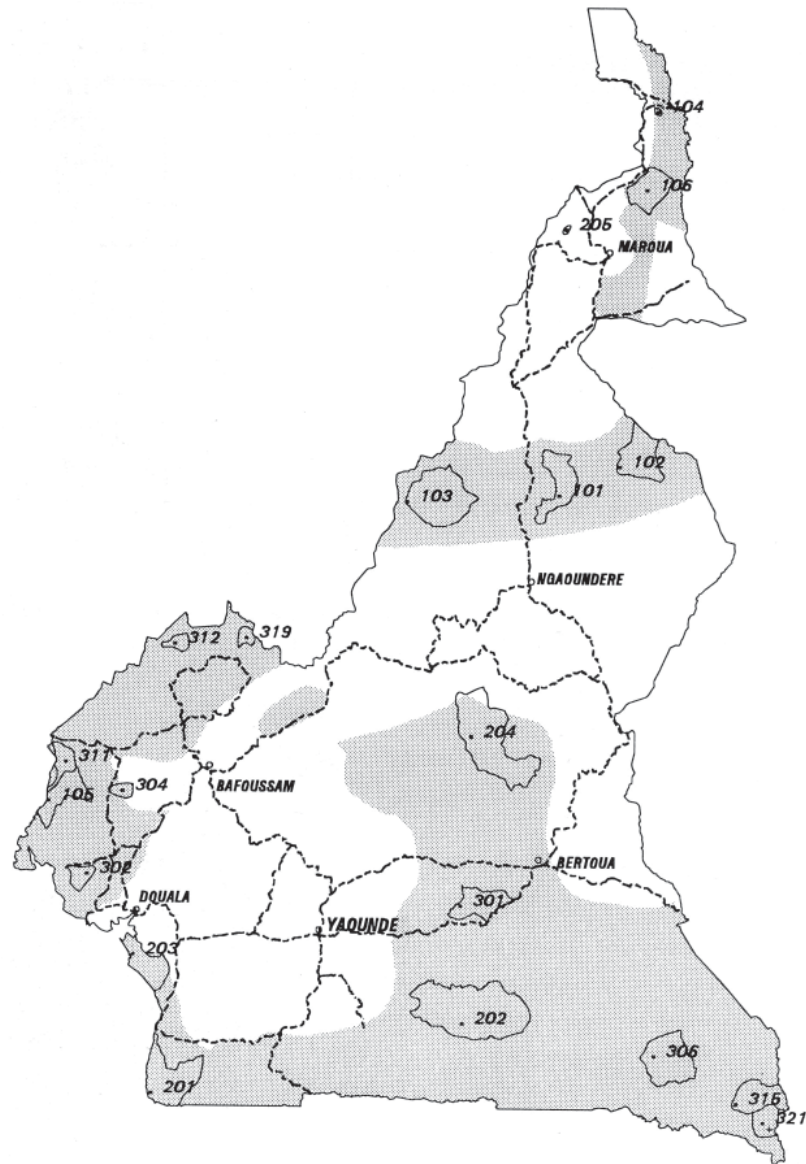
CODE	ZONE	SURVEY DATE	AREA (km2)	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATE CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
	<b>Savanna</b>							
101	Benoue National Park		1,781	540	-	Tchamba et al., 1991	1G3	D
102	Bouba-Ndjida National Park		1,940	660	-	Tchamba et al., 1991	1G3	D
103	Faro National Park		3,410	60	-	Tchamba, 1993a	1G3	D
106	Waza National Park	1991	1,700	1,100	0	Tchamba, 1993a; Tchamba, Quest. Reply, 1993b	AT	A
601	sudanian zone outside input areas 101, 102 and 103			360		Tshamba et Si., 1991	1G3	D
	<b>Forest</b>							
105	Korup National Park	1993	1,250	423	±271	Powell, Quest. Reply, 1993	DC2	C
202	Dja Reserve		6,194	1,500	+500	Tchamba, pers. comm., 1995	1G3	D
301	Abong-Mbang Forest Reserve		1,540	100		Ekobo, Quest. Reply, 1994a	OG3	E
304	Banyang-Mbo Forest Reserve	1993	426	368	±236	Powell, Quest. Reply, 1993	DC2	C
306	Boumba-Bek Forest Reserve	1991	1,322	1,404	±82	Ekobo, pers. comm., 1994b	DC1	C
315	Lobeke Forest Reserve	1993	1,985	3,719	±2,125	Ekobo, 1995	DC2	C
321	Mongokele Forest Reserve	1991	830	773	±53	Ekobo, pers. comm., 1994b	DC2	C
	Remaining forest area			3,547*		Michelmores et Si., 1994	Es	D

\* Derived from total GIS extrapolation of 11,836 minus individual forest estimates

## SUMMARY OF TOTALS FOR CAMEROON

	DATA CATEGORY	NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	1,100	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	6,689	2,157	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	6,667	500
E	Other Guesses and Other Extrapolations	0	0	0	100
	<b>TOTAL</b>	<b>1,100</b>	<b>6,689</b>	<b>8,824</b>	<b>600</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN CAMEROON



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARK

- 101 Benoue NP
- 102 Bouba Njidah NP
- 103 Faro NP
- 104 Kalamaloue NP
- 105 Korup NP
- 106 Waza NP

### NATIONAL RESERVES

- 201 Campo R
- 202 Dja R
- 203 Douala-Edea R
- 204 Mbam et Djerem R
- 205 Mozogo Gokoro R

### FOREST RESERVES

- 301 Abong-Mbang FR
- 302 Babules FR
- 304 Banyang-Mbo FR
- 306 Boumba-Bek FR
- 311 Ejaham FR
- 312 Fungom FR

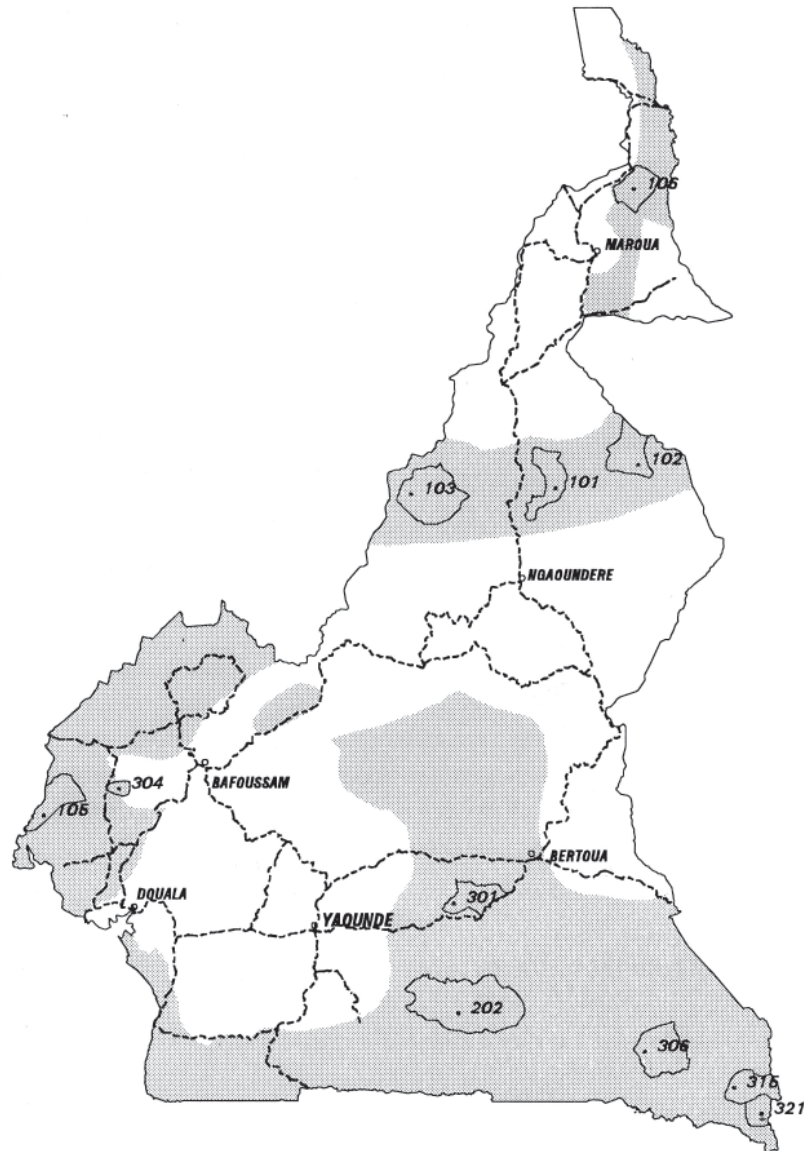
- 315 L. Lobo FR
- 319 Mbambe FoR
- 321 Ongokele FR



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN CAMEROON



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
101	Benoue NP	540	301	Abong-Mbang FR	100
102	Bouba-Ndjida NP	660	304	Bayang-Mbo FR	368
103	Faro NP	60	306	Boumba-Bek FR	1404
105	Korup NP	425	315	Lobeke FR	3719
106	Waza NP	1100	321	Mongokele FR	773
107	Dja Reserve	1500		Sudanian zone outside census zone 101,102 and 103*	360

\* Input zone not indicated on the map



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



## Central African Republic

Dung transect counts were conducted in 1989 in two areas located in the south-western forests and one Site in the south-eastern forests of the Central African Republic by Wildlife Conservation International (now Wildlife Conservation Society/New York Zoological Society) (Fay, 1991; Fay and Agnagna, 1991 a). The extrapolated forest population from these survey areas totalling 16,500 km<sup>2</sup> of forest, was 6,240. Elephant dung was not found along any transect in the site located on the east side of the south-western forests, though in the area located in the extreme south-west of the country, elephant density was relatively high at 2.1 elephants per km<sup>2</sup>. Since the 1989 study, the latter site has officially become a Reserve, Dzangha-Sangha, where there is an ongoing individual registration survey of elephants in a forest clearing. Nearly 2000 elephants have been identified at the Dzanga clearing since early 1991 (Turkalo and Fay, 1995). The southern forest elephant range is thought to extend into the Nouabale-Ndoki NP in northern Congo, as well as westwards into Cameroon. There also may be shared populations between the Central African Republic and Zaire, and Sudan to the east.

Michelmore *et al.*, (1994) provided a GIS extrapolation of only 1,654 elephants for 40,350 km<sup>2</sup>, which is considerably lower than Fay's (1991) estimate of 6,240. Barnes *et al.* (1995a) believe this difference is probably because the Michelmore *et al* (1994) model was based on a small sample area extrapolated to a large area of central Africa and it did not predict the higher elephant densities found by Fay and Agnagna in the south-east and extreme south-west.

The aerial survey estimates provided in the table for the northern savanna areas were conducted in 1985 (Douglas-Hamilton *et al*, 1985). Because the estimates are ten years old and originate from a time when poaching was rife, they have been downgraded from Data Category B (aerial sample survey) to B, and are placed as "Speculative" in the second table.

Poaching continues to be a problem in eastern Central African Republic, from where the ivory is apparently moved across the border into Sudan (Flack, pers. Comm., 1995).

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### CENTRAL AFRICA

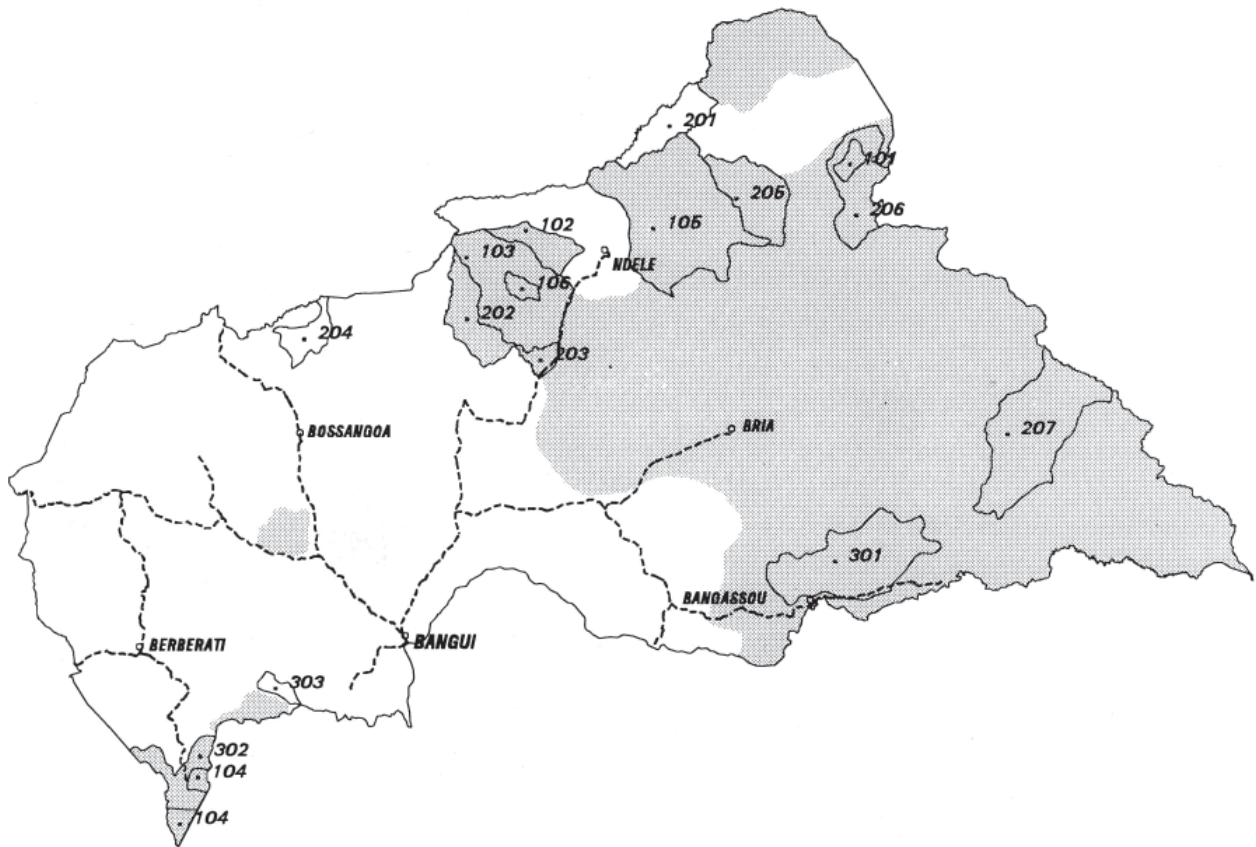
#### CENTRAL AFRICAN REPUBLIC

CODE	ZONE	SURVEY DATE	AREA (km2)	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATE CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
301	Bangassou Forest	1989	5,500	2,640	-	Fay & Agnagna, 1991a Fsy, 1991	DC	D
302	Dzanga-Sangha Reserve	1993	3,292	1,750	0	Turkalo, Quest. Reply, 1993; Turkalo & Fay, 1995	IRI	A
601	Bamingui - Bangoran Complex	1985	32,000	1,607	± 1,896	Douglas-Hamilton <i>et al.</i> , 1985	AS3	E
602	Manovo Gounda - St Floris Complex	1985	32,400	2,701	± 1,837	Douglas-Hamilton <i>et al.</i> , 1985	AS3	E
603	Manovo Intensive	1985	4,800	444	±319	Douglas-Hamilton <i>et al.</i> , 1985	AS2	E
604	Rhino Sector	1985	2,700	51	±48	Douglas-Hamilton <i>et al.</i> , 1985	AS2	E
605	Vassako - Bolo	1985	2,500	91	±120	Douglas-Hamilton <i>et al.</i> , 1985	AS2	E


#### SUMMARY OF TOTALS FOR CENTRAL AFRICAN REPUBLIC

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	1,750	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	2,640	0
E	Other Guesses and Other Extrapolations	0	0	0	4,894
<b>TOTAL</b>		<b>1,750</b>	<b>0</b>	<b>2,640</b>	<b>4,894</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN CENTRAL AFRICAN REPUBLIC



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARK

- 101 Andre Felix NP
- 102 Avakaba Presidential NP
- 103 Bamingui-Bangoran NP
- 104 Dzanga Ndoki NP
- 105 Manovo Gounda - Saint Floris NP
- 106 Vassako-Bolo SNR

### GAME RESERVES

- 201 Aouk-Aoukale OR
- 202 Gribingui-Bamingui GR
- 203 Koukourou-Bamingui GR
- 204 Nana Barya GR
- 205 Ouandja-Vakaga GR
- 206 Yata-Ngaya GR
- 207 Zemongo GR

### FOREST RESERVES

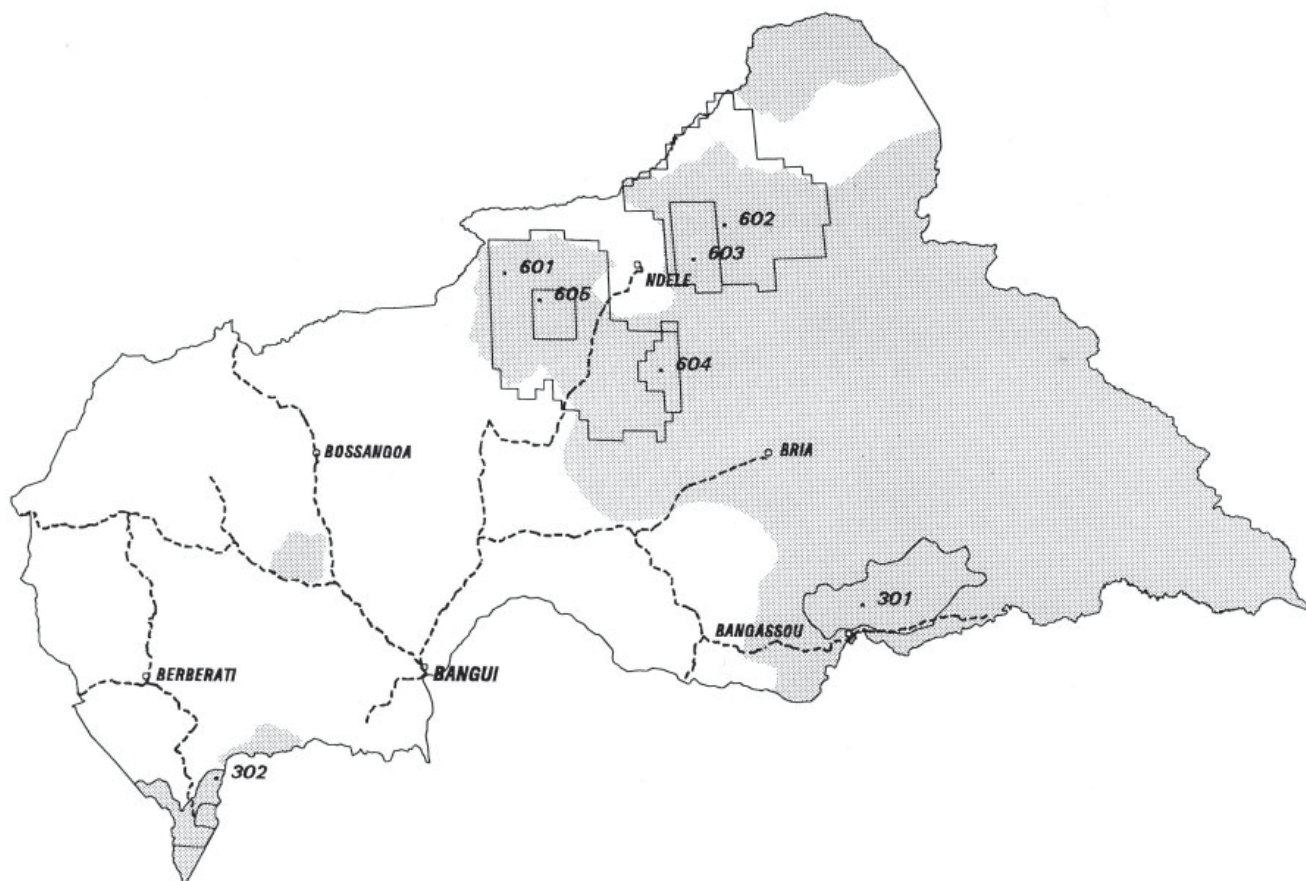
- 301 Bangassou FR
- 302 Dzanga Sangha FR
- 303 Ngoto FR



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# INPUT AREAS AND ELEPHANT RANGE IN CENTRAL AFRICAN REPUBLIC



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
301	Bangassou FR	2640	603	Manovo Intensive	444
302	Dzanga-Sangha FR	1750	604	Rhino Sector	51
601	Bamingui-Bengoran Complex	1607	605	Vassoko-Bolo	91
602	Manovo Gounda - St Floris Complex	2701			



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



## Chad

Apart from some changes to the range map provided by Daboulaye (pers. comm., 1995), there has been no recent quantitative information on the elephants in Chad due to the past civil war. The combined effects of war, drought and poaching reduced the overall elephant population but

there is an indication that it is now increasing (Daboulaye, pers.comm., 1995).

The government is in the process of planning aerial surveys in the south-east with the assistance of the EU (Daboulaye, pers. comm., 1995).

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### CENTRAL AFRICA

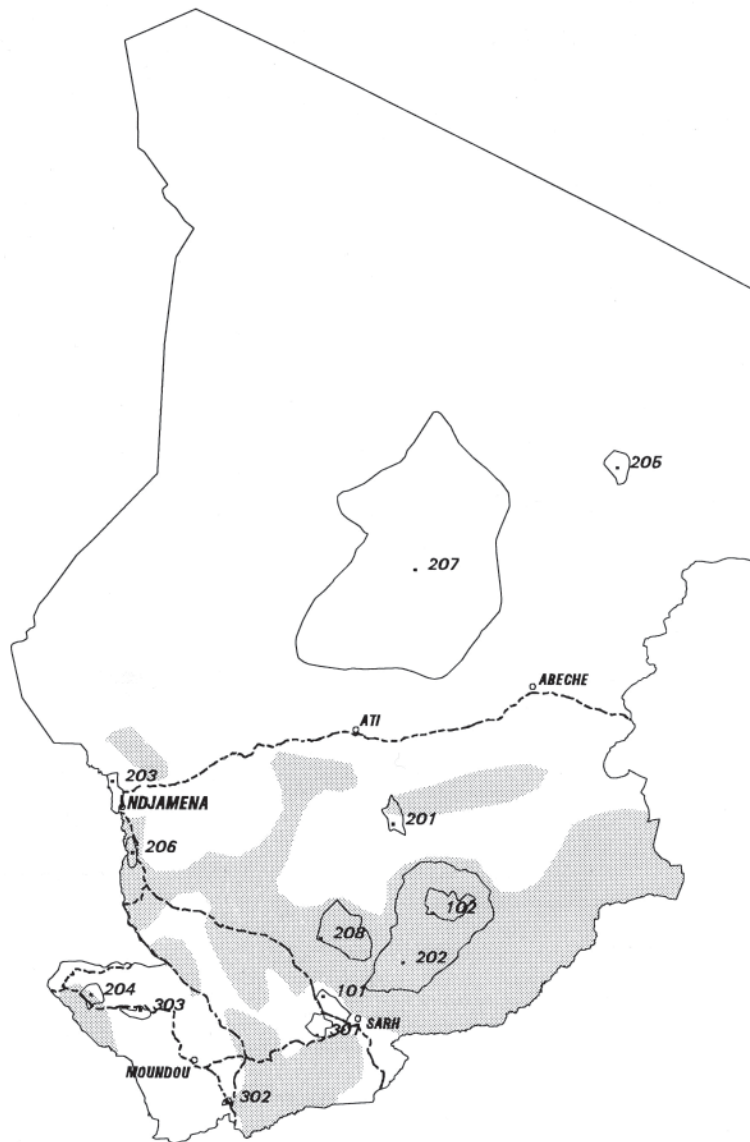
#### CHAD

CODE	ZONE	SURVEY DATE	AREA (km2)	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATE CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
102	Zakouma National Park	1991	3,156	1,040	-	DPNRF, 1991	AS3	D
601	Baths Guera Region		149,992	500	-	Daboulaye & Thomassey, 1990	OG3	E
602	Chari Baguimi Region		96,278	300	-	Daboulaye pers. comm., 1995	OG3	E
603	Chari west Region		45,315	800	-	Daboulaye pers. comm., 1995	OG3	E
604	Lac Tchad		23,733	100	-	Daboulaye & Thomassey, 1990	OG3	E
605	Salamat Region		64,570	400	-	Daboulaye pers. conan., 1995	OG3	E

### SUMMARY OF TOTALS FOR CHAD

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POS8IBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	1,040	0
E	Other Guesses and Other Extrapolations	0	0	0	2,100
<b>TOTAL</b>		<b>0</b>	<b>0</b>	<b>1,640</b>	<b>2,100</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN CHAD



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

- |                  |                               |                      |
|------------------|-------------------------------|----------------------|
| NATIONAL PARKS   | 202 Bahr Salamat GR           | 206 Siniaka-Minim GR |
| 101 Manda NP     | 203 Bas Chari GR              |                      |
| 102 Zakouma NP   | 204 Binder Lere GR            | FOREST RESERVES      |
|                  | 205 Fada Archei GR            | 301 Djoli Kera FR    |
| GAME RESERVES    | 206 Mandelia GR               | 302 Unk FR           |
| 201 Aboutefan GR | 207 Ouadi Rime-Ouadi Achim GR | 303 Yamba Berets FR  |



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# INPUT AREAS AND ELEPHANT RANGE IN CHAD



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## Location Map



## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
102	Zakouma NP	1040	603	Chari West Region	800
601	Batha Guera Region	500	604	Lac Tchad	100
602	Chari Baguirmi Region	300	605	Salamat Region	400



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*





## Congo

Nearly two-thirds of the Congo is forested. All the estimates provided in the table by N'Sosso (1994, 1995) are extrapolated from density estimates derived from dung transect Counts carried out at three sites in northern Congo in 1989 (Fay and Agnagna, 1991a, 1991b). Estimated elephant densities ranged from 0.31 to 0.88 elephants per km<sup>2</sup> over the three areas. Agnagna *et al* (1991) made a reconnaissance of the southern Congo forests and found that the forest elephant population was fragmented into four sub-populations. The elephant population is believed to be lower in southern Congo due to high human density and intense forest exploitation (Fay and Agnagna, 1991

a; Barnes *et al.*, 1993). Michelmore *et al.*, (1994) extrapolated a forest elephant estimate of 30,884 for 196,689 km<sup>2</sup> of forest, which is probably an overestimate because the eastern forest swamps may harbour fewer elephants than assumed (Barnes *et al.*, 1995a). Revisions to the elephant range map were made by Fay (1993). Cross-border forest elephant populations may occur between Congo, the Central African Republic, Cameroon and Gabon.

Elephants are thought to have largely disappeared from the savanna areas due to poaching (Barnes, 1987).

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SIJRVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

## CENTRAL AFRICA

### CONGO

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
	<b>Savanna</b>							
201	Mt Fouari Reserve		156	6	-	N'Sosso, 1994	1G3	D
202	Nyanga North Reserve		230	9	.	N'Sosso, 1994	1G3	D
203	Lefini Reserve		6,300	252	-	N'Sosso, 1994	1G3	D
205	Lekoli-Pandaka Game Reserve		900	810	-	N'Sosso, 1994	1G3	D
401	Mboko Hunting Reserve		682	614	-	N'Sosso, 1994	1G3	D
402	Mt Mavoubou Hunting Reserve		420	17	-	N'Sosso, 1994	1G3	D
403	Nyanga South Hunting Reserve		77	3	-	N'Sosso, 1994	1G3	D
	<b>Forest</b>							
101	Nouabale-Ndoki National Park		3,866	3,479	-	N'Sosso, 1994	1G3	D
102	Odzala National Park		1,266	1,139	.	N'Sosso, 1994	1G3	D
204	Conkouati Game Reserve		3,000	1,290	-	N'Sosso, 1994	1G3	D
701	Dominika Biosphere Reserve		1,360	51	-	N'Sosso, 1994	1G3	D
399	Forest Elephant Range		246.680	30,852	-	N'Sosso, 1995	1G3	D

## SUMMARY OF TOTALS FOR CONGO

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	32,563	0
F	Other Guesses and Other Extrapolations	0	0	0	0
<b>TOTAL</b>		<b>0</b>	<b>0</b>	<b>32,563</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN CONGO



## LEGEND

■ Elephant Range

• Input Zone

---- Roads

○ Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

101 Nouabale Ndoki NP  
102 Odzala NP

### GAME RESERVES

201 Mount Fouari R  
202 Nyanga North R  
203 Lefini R

204 Conkouati GR

205 Lekoli-Pandaka GR  
206 Tsoulou GR

### HUNTING RESERVES

401 Mboko HR  
402 Mount Mavoumbou HR  
403 Nyanga South HR

### BIOSPHERE RESERVE

701 Dimonika BR

### WETLAND

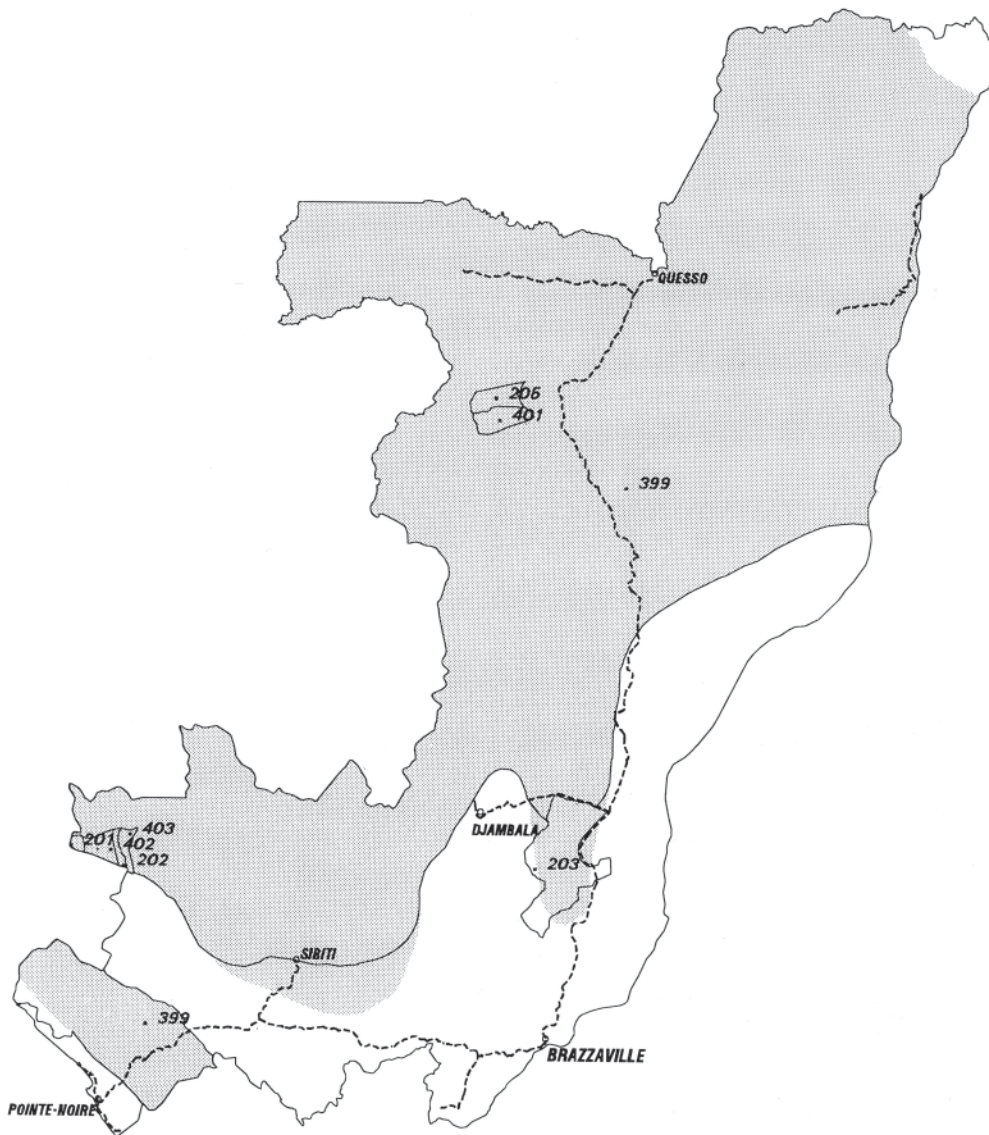
751 Lac Tele-Likouala aux Herbes (Ramsar)



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collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN CONGO



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
201	Mt Fouari R	6	399	Forest Elephant Range	30852
202	Nyanga North R	9	401	Mboko HR	614
203	Lefini RC	252	402	Mt Mavoumbou HR	17
205	Lekoli-Pandaka GR	810	403	Nyanga South HR	3



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collaboration with UNEP/GRID*



## Equatorial Guinea

Alers and Blom (1988) carried out a brief reconnaissance survey on elephants and apes in mainland Equatorial Guinea and reported very few elephants in the northern half of the country (Barnes *et al.*, 1993). Elephants are found in the southern half of the country in three main areas, one in the south-western mountains and two in the south-east (Barnes *et al.*, 1993). The forest elephant range may extend into Gabon. A recent ECOFAC report on the faunal biodiversity in the Monte Alen National Park

confirms the presence of elephants in the Park (Lasse Alcala, 1994). However, details of elephant status in the whole country are not available and the range map is based on guesswork with its border being demarcated by a river

The national estimate of 407 is an extrapolation from Michelmore *et al.*'s (1994) model, for 25,713 km<sup>2</sup> of forest range.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### CENTRAL AFRICA

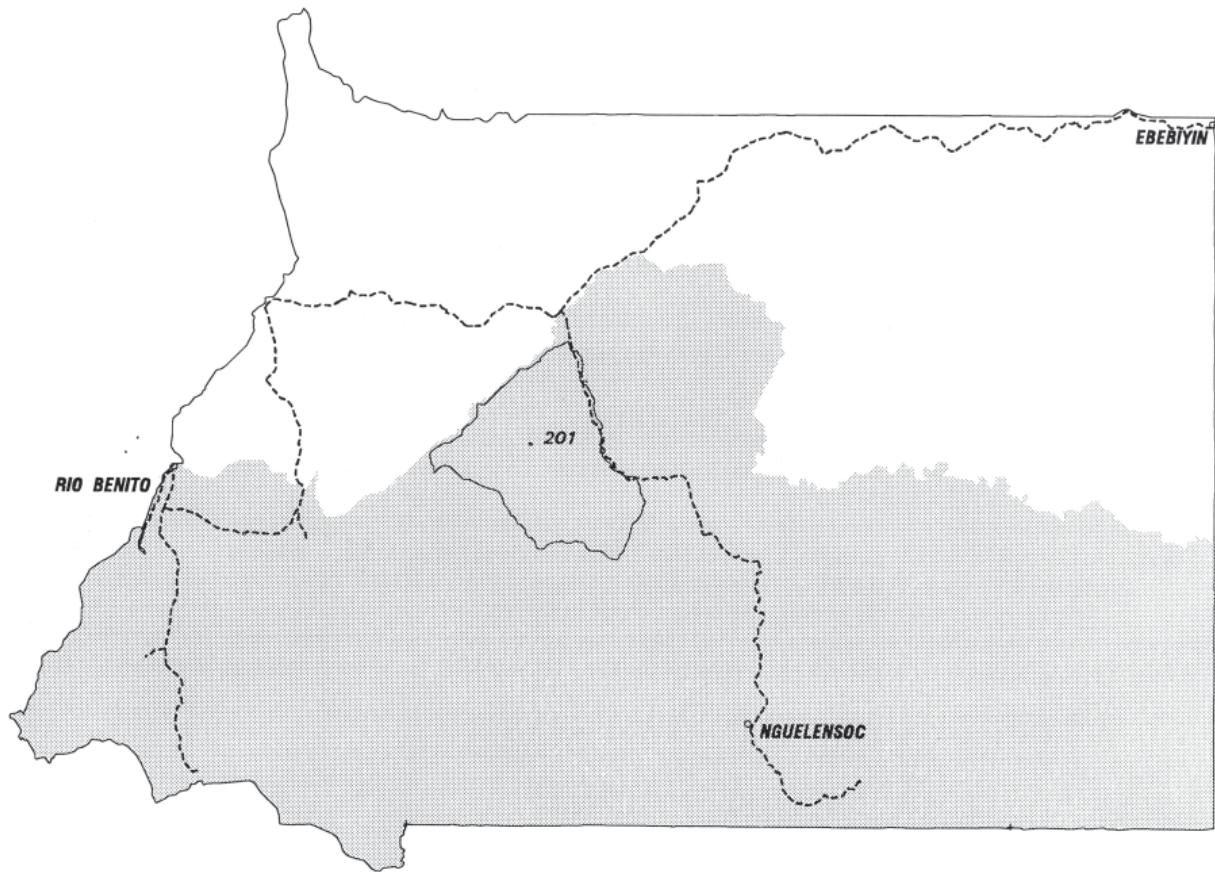
#### EQUATORIAL GUINEA

CODE	ZONE	SURVEY DATA	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE TYPE &	SURVEY CATEGORY	DATA QUALITY
				ESTIMATE	95% CONFIDENCE LIMITS			
399	Forest Elephant Range	1989	25,713	407	–	Michelmore et al. . 1994	Ex	D

#### SUMMARY OF TOTALS FOR EQUATORIAL GUINEA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	407	0
E	Other Guesses and Other Extrapolations	0	0	0	0
<b>TOTAL</b>		<b>0</b>	<b>0</b>	<b>407</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN EQUATORIAL GUINEA



**LEGEND**

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

**KEY TO PROTECTED AREAS**

**RESERVE**

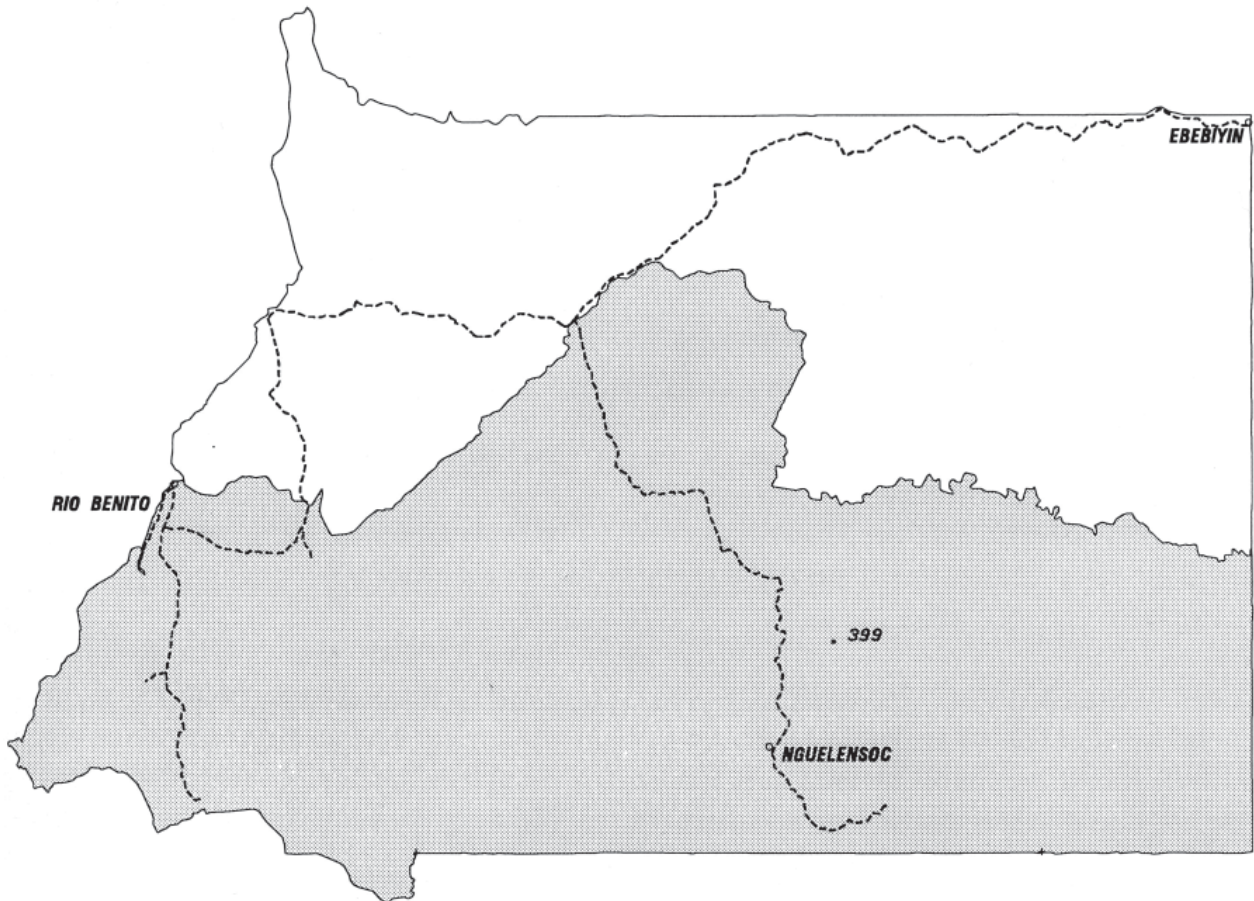
201 Mt Alen Partial Reserve




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# INPUT AREAS AND ELEPHANT RANGE IN EQUATORIAL GUINEA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE
399	Forest Elephant Range	407



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



## Gabon

Over three-quarters of Gabon is forested and it remains an important area for forest elephants, with relatively large, undisturbed tracts of land, especially in the north-east. The extensive elephant range was confirmed by R. Barnes and S. Lahm (Barnes, pers.comm., 1994). Cross-border movements may occur from Gabon into Cameroon, Congo and Equatorial Guinea.

A stratified sample survey of elephant dung was conducted in the forests of Gabon between 1985 and 1988 by Barnes *et al.* (1991, 1995b). It returned an estimate of 61,800 forest elephants. This differed from the earlier preliminary figure in Douglas-Hamilton *et al.* (1992) because of the use of improved estimates of defaecation and decay rates (Tchamba, 1991; Barnes and Barnes, 1992). Michelmore *et al.* (1994) provide an extrapolated figure of 54,848 forest elephants, which may be an underestimate because it is based on a vegetation map of the country showing the

forests as covering a smaller area than other maps (Barnes *et al.*, 1995a).

Forest elephants were observed opportunistically over a seven-year period, from 1984 to 1991, in the lowland rain forest of Lopè Reserve, during an ongoing study of gorillas and chimpanzees (White *et al.*, 1993). Mean mammal densities were estimated in five sites in the Lopè Reserve and it was found that forest elephants dominated the biomass at all sites (White, 1994). The estimate for Lopè, however, is included in, and not additive to, the overall forest estimate.

Lahm (1994) conducted a survey of crop-raiding by elephants and other animals throughout Gabon. All the provinces (nine) in Gabon reported elephant crop-raiding, though the overall severity of elephant-related damage in the study locations was secondary to that of the cane-rat.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown CENTRAL AFRICA

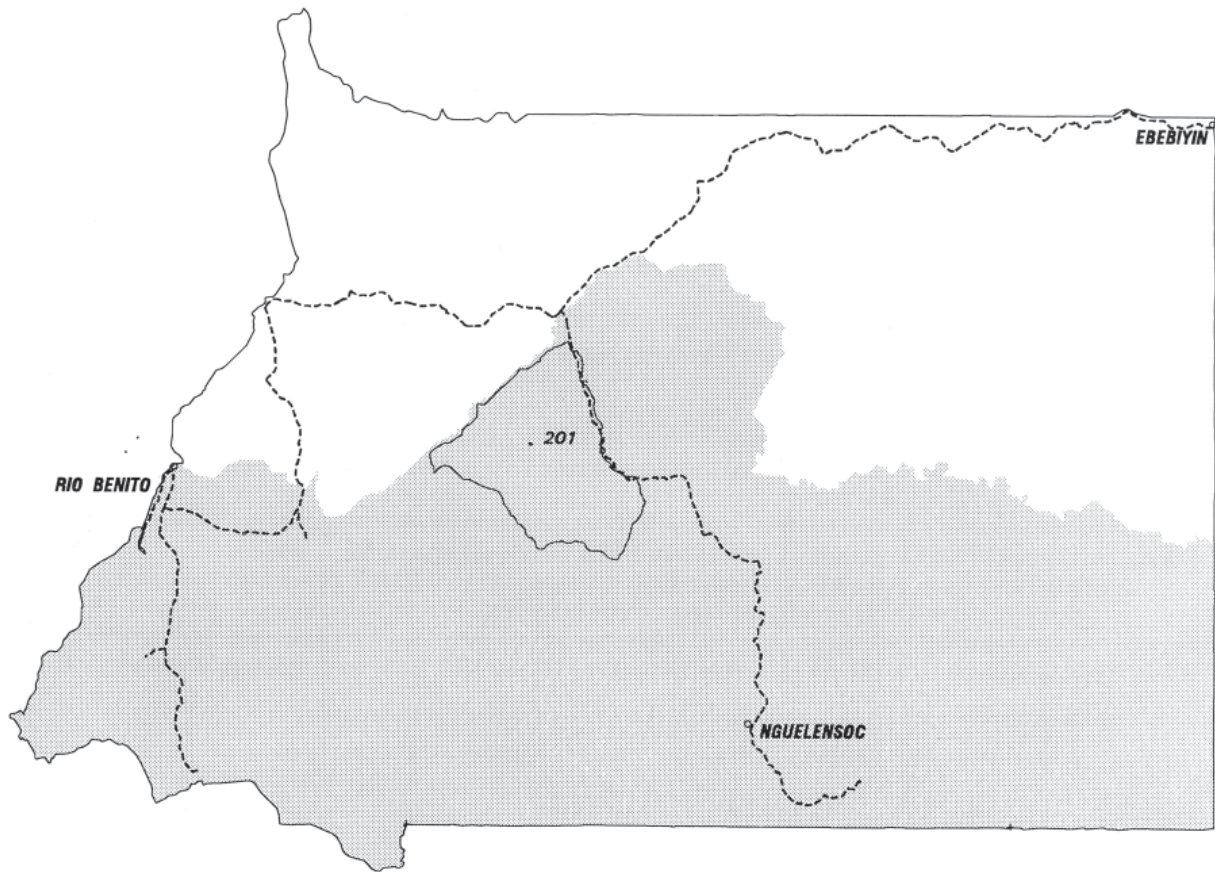
### GABON

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
101	LopÈ Okanda National Reserve (this population is included in the Forest elephant estimate)	1989-91	5,000	5,500	–	White, 1994; White, pers. comm., 1995	DC	D
399	Forest elephant range	1985-88	222,627	61,794	±20,218	Barnes et al., 1995	DC2	C

### SUMMARY OF TOTALS FOR GABON

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	61,794	20,218	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	5,500	0
E	Other Guesses and Other Extrapolations	0	0	0	0
<b>TOTAL</b>		<b>0</b>	<b>61,794</b>	<b>20,218</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN GABON



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL RESERVES

- 101 Lope-Okanda NR
- 102 Moukalaba NR
- 103 Ouango NR
- 104 Petit-Loango NR
- 105 Wonga Wongue NR

### HUNTING RESERVES

- 401 Iguela HR
- 402 Moukalaba HR
- 403 Ngove-Ndogo HR
- 404 Sette Cama HR

### BIOSPHERE RESERVE

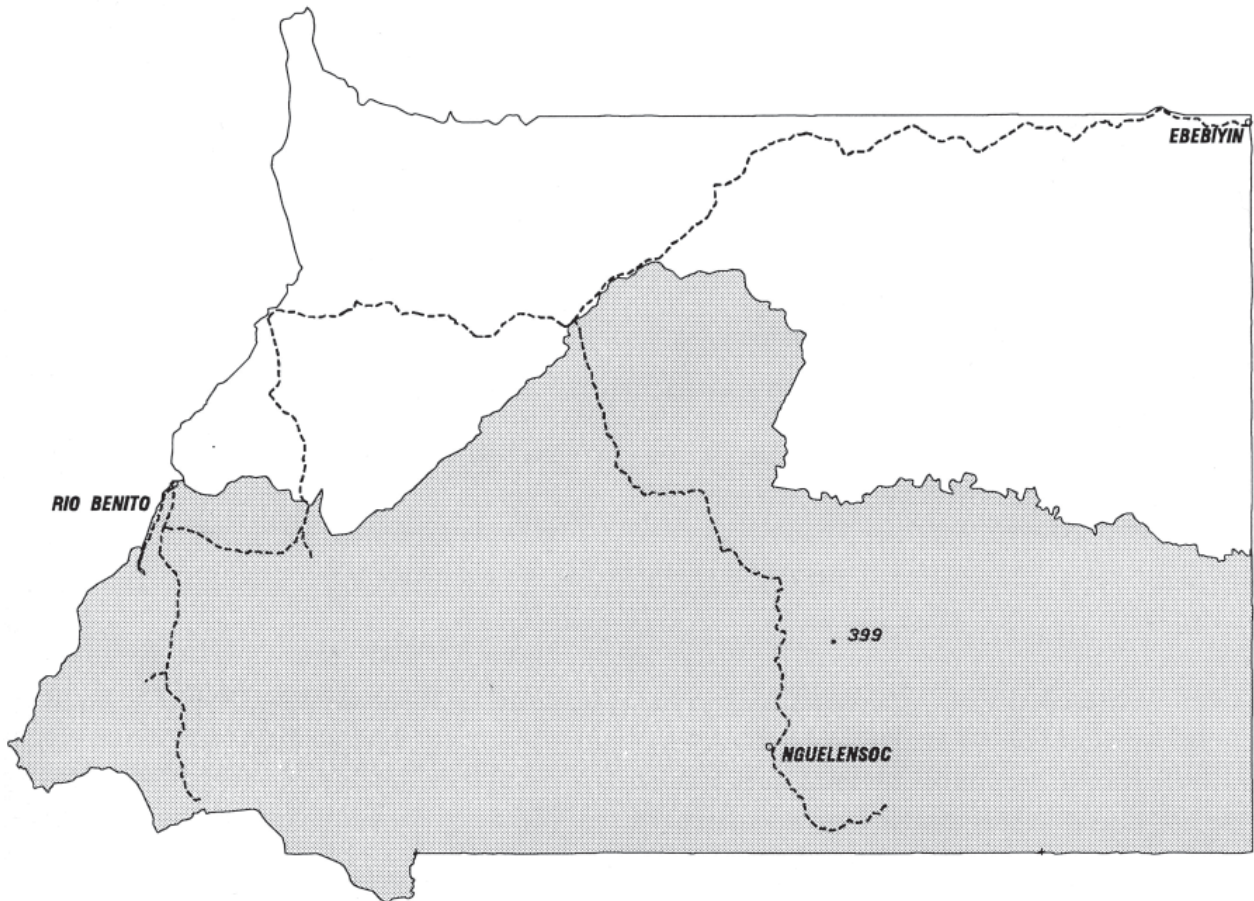
- 701 Ipassa BR



*African Elephant Database of IUCN/SSC/AESG in  
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# INPUT AREAS AND ELEPHANT RANGE IN GABON



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE
101	Lope Okanda NR	5500
399	Forest Elephant	61794

NOTE: The Lope Okanda elephant population estimate is included in the Forest Elephant estimates.



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*





## Zaire

Zaire's forests cover approximately one million square kilometres and probably harbour some of the continent's largest elephant populations. However, the political situation in recent years has limited survey work and much of the country's estimates are several years old. Alers *et al.* (1992) estimated the total forest elephant population at 64,000, mainly based on a crude extrapolation from reconnaissance surveys in four large areas of forest during 1989. The authors pointed out that it was a rough figure based on various assumptions which should be viewed with extreme caution. Since then, a survey has been carried out in Maiko NP (Hart and Sikubwabo, 1994) and a survey is ongoing in Ituri (Hart, pers.comm., 1995). A survey of elephant densities was completed in Kahuzi-Biega NP in 1994 but analysis has not yet been completed, while survey work is currently ongoing in the Kasese region west of the Park (Morland, pers.comm., 1995). Heavy poaching is thought to have occurred in Virunga NP (Wathaut, pers. comm., 1995) since Aveling's (1990) aerial survey. Butynski and Sarmiento (1995) reported that there are at least 30 elephants on Mount Tshiabermu, which is an extension of Virunga NP. The area linking it to the Park, formerly used as a corridor by the elephants, is now densely populated by people.

Michelmore *et al.* (1994) gave an extrapolated forest population estimate of 71,705 but stated that this

calculation did not allow for the fact that large areas were no longer inhabited by elephants (Alers *et al.*, 1992; Barnes *et al.*, 1995a).

The savanna elephant population in Garamba NP in north-eastern Zaire was severely reduced by poaching from the late 1970s up to 1984, from over 20,000 to less than 8000 elephants (Smith *et al.*, 1995b). Since then the population has been recovering and currently is estimated at over 10,000 (Smith *et al.*, 1995a). Garamba NP has been surveyed regularly by sample aerial census for over a decade. The elephant density in the southern area of the Park is very high with over 20 elephants per km<sup>2</sup> in some places (Smith *et al.*, 1995b). As a result of armed Sudanese refugees fleeing into Garamba NP and its environs since 1991, there has been an increase in poaching of elephants for ivory (Smith and Smith, 1994). Recent poaching activity peaked in 1993 but decreased again in 1994 after organised Park anti-poaching operations assisted by the local military unit (Smith *et al.*, 1995a).

Zaire is bordered by several countries (Central African Republic, Sudan, Uganda, Rwanda, Zambia, Angola and Congo) with which it possibly shares elephant populations.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AS Aerial Sample Survey
- AT Aerial Total Count
- AC Aerial Count Unspecified
- DC Dropping Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

## CENTRAL AFRICA

### ZAIRE

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
	<b>Savanna</b>							
101 401	Garamba National Park and Surrounding Reserves (Azande, Gangala na Bodio and Mondo Miss)	1995	15,125	11,175	±7,174	Smith et al., 1995a	AS2	B
108	Virunga National Park	1990	7,506	469	0	Aveling, 1990	AT2	A
601	Bushimae	1987	5,266	120	–	Won wa Musiti, Quest Reply, 1991	1G3	D
	<b>Forest</b>							
102	Kahuzi Biega National Park	1988	6,000	9,000	–	Alers et al., 1992	1G3	D
104	Maiko National Park	1992	10,800	6,000	±1000	Hart & Sikubwabo, 1994	DC2	C
105	Salonga South National Park	1989	17,000	3,680	–	Alers et al., 1992	1G3	D
106	Salonga North National Park	1989	19,000	2,650	–	Alers et al., 1992	1G3	D
602	Lomami	1989	32,000	8,000	–	Alers et al., 1992	1G3	D
603	Ituri	1989	30,000	6,750	–	Alers et al., 1992	1G3	D
399	Rest of Forest	1989	1,061,000	27,620	–	Alers et al., 1992	1G3	D

## SUMMARY OF TOTALS FOR ZAIRE

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	469	0	0	0
B	Aerial or Ground Sample Counts	4,001	7,174	7,174	0
C	Dung Counts	0	6,000	1,000	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	57,800	0
E	Other Guesses and Other Extrapolations	0	0	0	0
<b>TOTAL</b>		<b>4,470</b>	<b>13,174</b>	<b>65,974</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN ZARIE



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Garamba NP
- 102 Kahuzi Biega NP
- 103 Kundelungu NP
- 104 Maiko NP
- 105 Salonga South NP
- 106 Salonga North NP

- 107 Upembe NP
  - 108 Virunga NP
  - 109 Volcana NP
- GAME & NATURAL RESERVES**
- 201 Bombo Lumene GR
  - Gwane GR

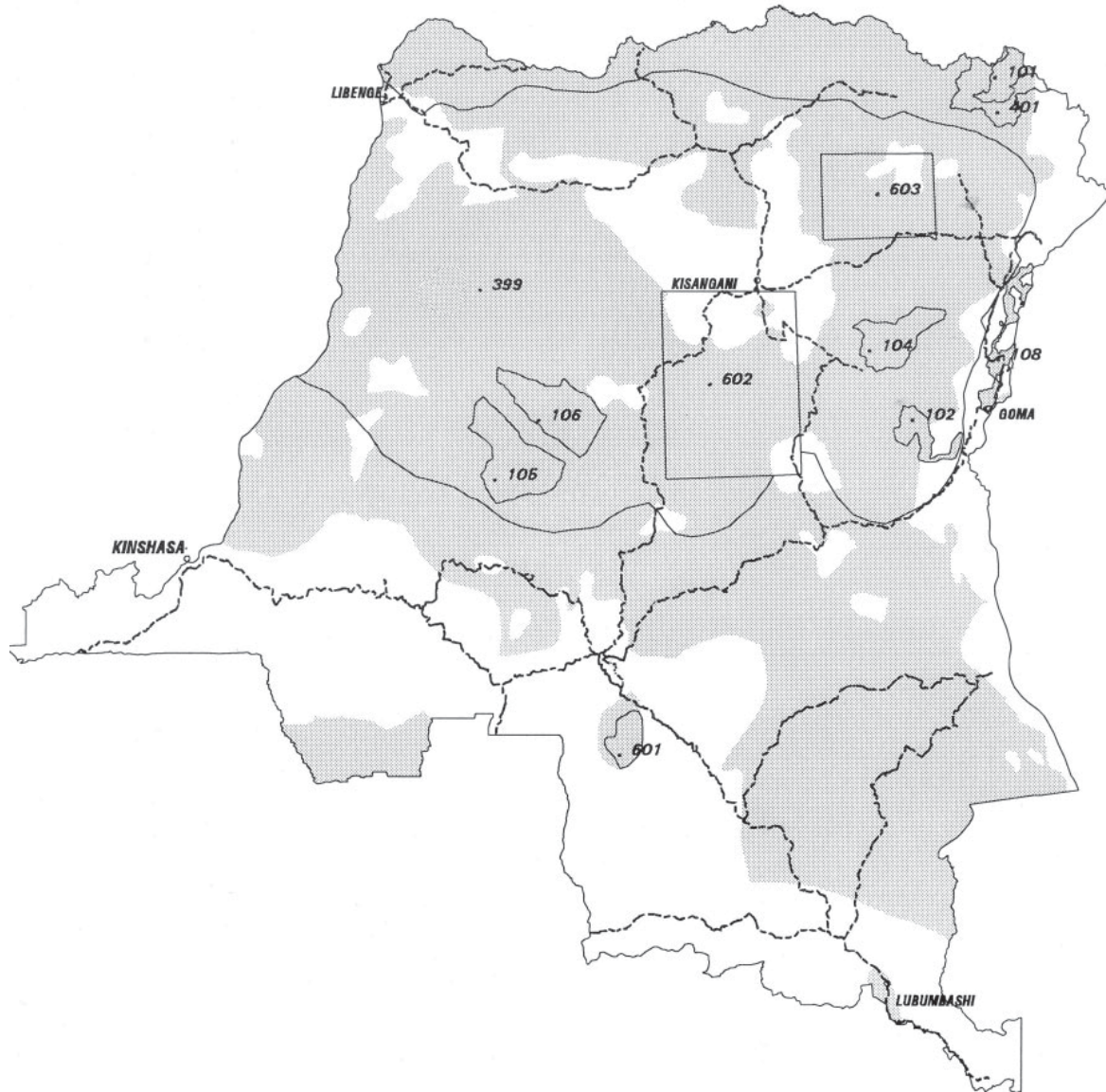
- 203 Lomako-Yekokora GR
  - 204 Shaba GR
  - 205 Bomu NR
- BIOSPHERE RESERVE**
- 701 Luki BR
  - 702 Yangambi BR



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# INPUT AREAS AND ELEPHANT RANGE IN ZAIRE



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	ESTIMATE	ESIMATE
101	Garamba NP &	11175	105	Salonga South NP	3680
401	Surrounding Reserves		106	Salonga North NP2650	
108	Virunga NP	469	602	Lomami	8000
601	Bushimae	120	603	Ituri	6730
102	Kahuzi Biega NP 9000	399	Rest of Forest		27620
104	Maiko NP	6000			



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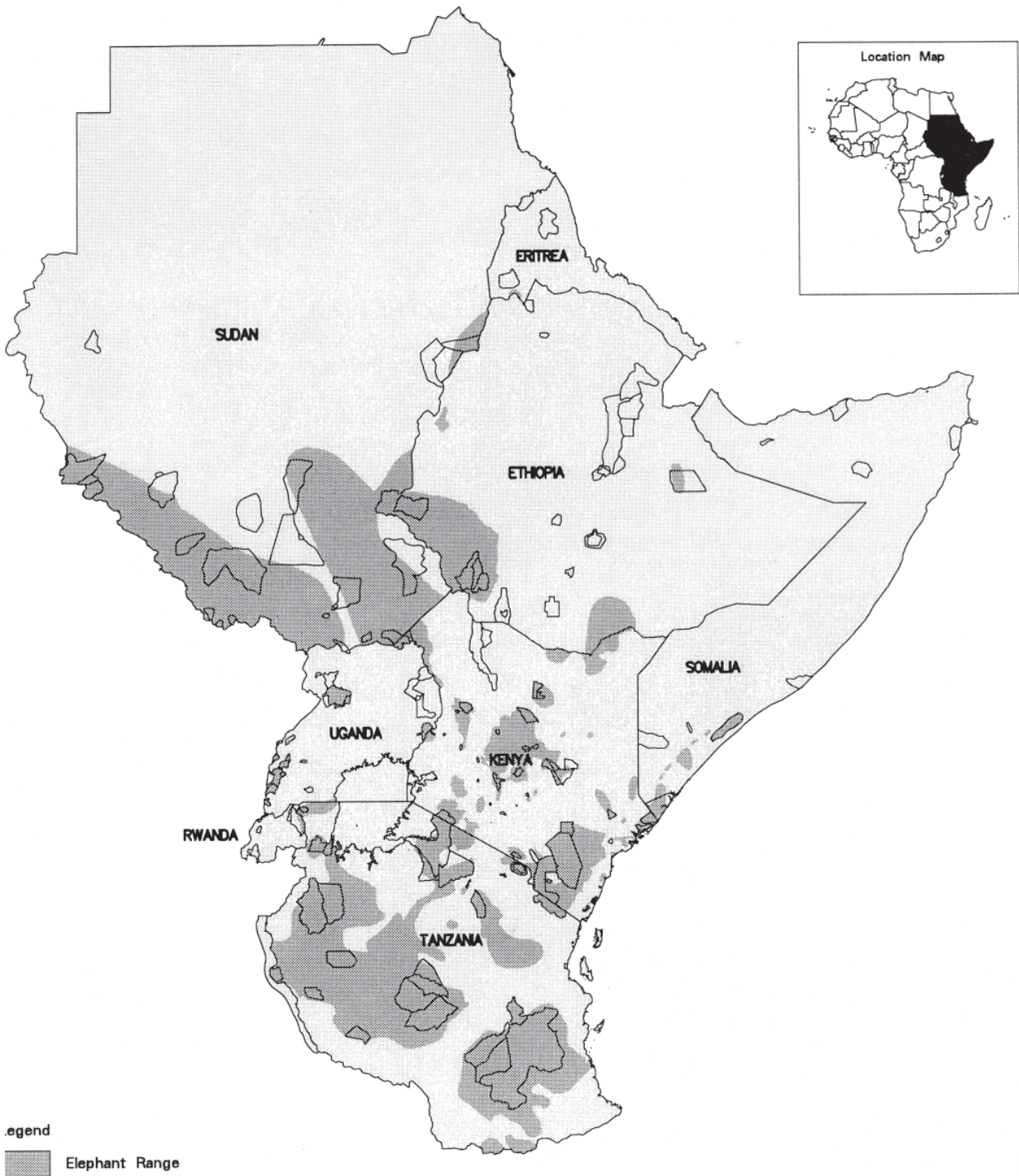
# **EASTERN AFRICA**



**SUMMARY OF ELEPHANT TOTALS FOR EASTERN AFRICA**

REGION	COUNTRY	NUMBER OF ELEPHANTS				COUNTRY AREA (km <sup>2</sup> )	RANGE AREA (km <sup>2</sup> )	% OF TOTAL RANGE
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE			
Eastern Africa	Eritrea	0	0	70	30	122,352	591	0.48
	Ethiopia	847	0	1,560	0	1,133,575	102,984	9.08
	Kenya	13,834	5,273	6,447	924	594,704	135,005	22.70
	Rwanda	39	0	32	10	25,376	1,263	4.98
	Somalia	0	0	130	120	637,726	10,186	1.60
	Sudan	-	-	-	-	2,509,212	385,143	15.35
	Tanzania	73,459	12,419	12,301	0	947,948	425,384	44.87
	Uganda	1,318	0	530	0	242,841	13,493	5.56
	<b>Total</b>	<b>90,482</b>	<b>16,707</b>	<b>19,999</b>	<b>1,084</b>	<b>6,213,734</b>	<b>1,074,049</b>	<b>17.29</b>

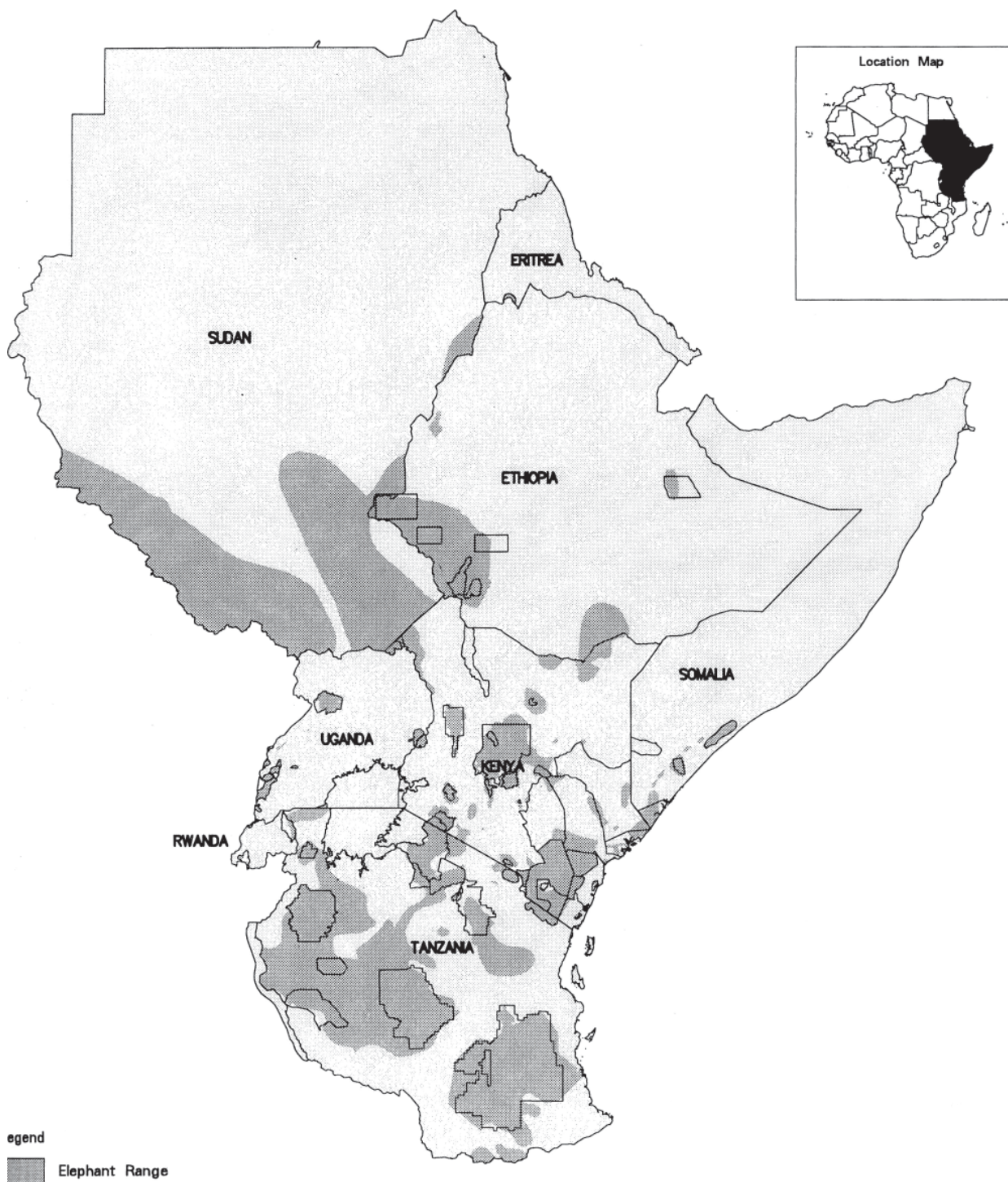
# PROTECTED AREAS AND ELEPHANT RANGE IN EASTERN AFRICA



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# INPUT AREAS AND ELEPHANT RANGE IN EASTERN AFRICA



egend

■ Elephant Range



AESG

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UNEP

## Eritrea

The newly independent country of Eritrea contains one of the continent's most northern elephant populations, south only to Mali's elephants. The estimate of 70 to 100 individuals in the Gash-Setit area is based on an aerial reconnaissance survey made in October 1993, during

which six elephants were definitely sighted (Hagos, 1993). The population is thought to spend parts of each year on the Ethiopian side of the border. The two governments have put forward a proposal to study the population in detail.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AS Aerial Sample Survey
- AT Aerial Total Count
- AC Aerial Count Unspecified
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

## EASTERN AFRICA

### ERITREA

CODE	ZONE	SURVEY AREA	DATE (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
901	Gash-setit Area	1993	709	70	+30*	Hagos, 1993	1G3	D

\* Range for Informed Guess

## SUMMARY OF TOTALS FOR ERITREA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	A Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	70	30
E	Other Guesses and Other Extrapolations	0	0	0	0
<b>TOTAL</b>		<b>0</b>	<b>0</b>	<b>70</b>	<b>30</b>

# PROTECTED ANREAS AND ELEPHANT RAMGE IN ERITREA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

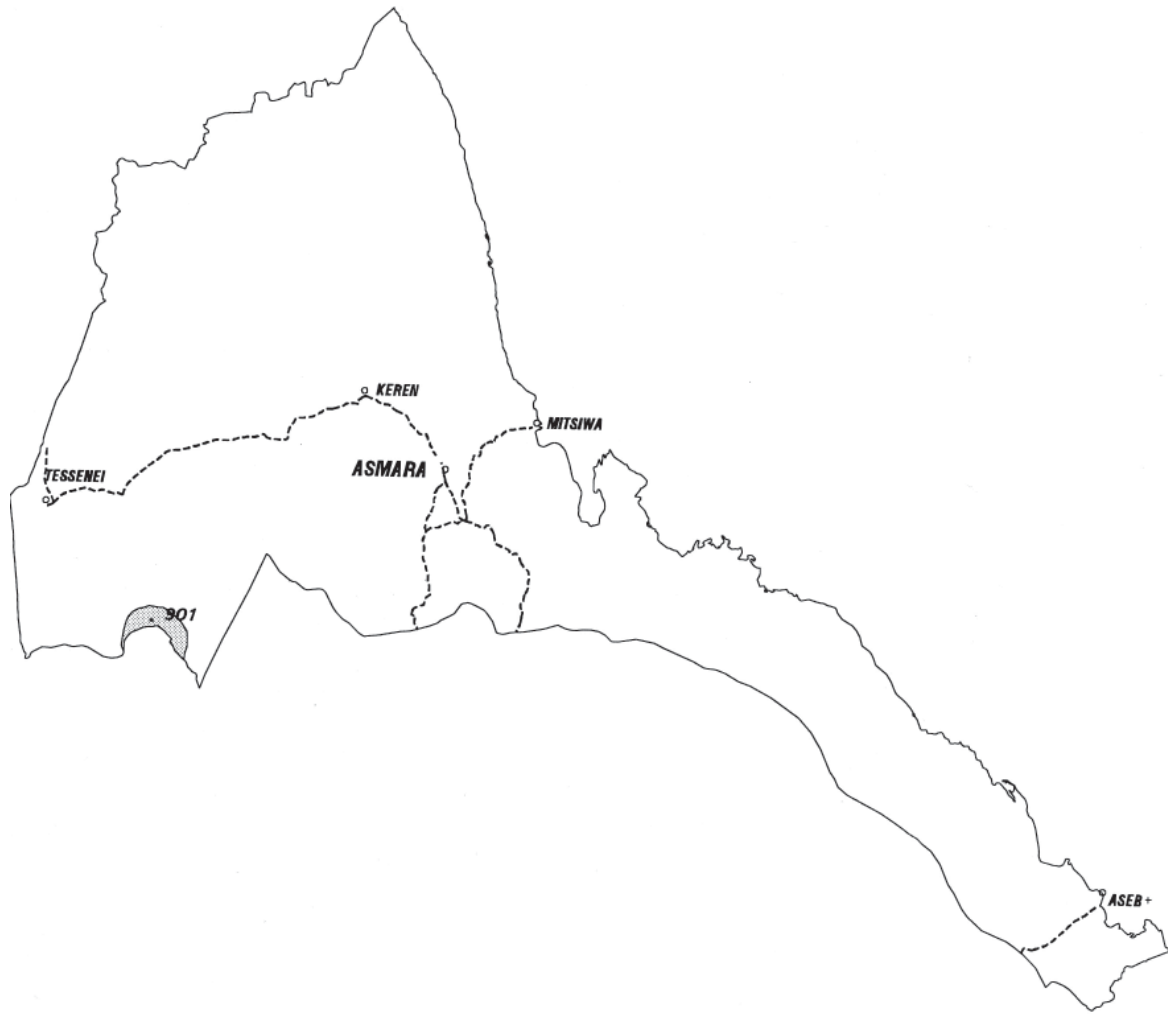
- WILDLIFE RESERVES  
 201 Gash Setit WR  
 202 Nakfa WR  
 203 Yob WR



*African Elephant Database of IUCN/SSC/AESG in  
 collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN ERITREA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE
901	Gash Setit Area	70



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



## Ethiopia

Most of Ethiopia's elephants live in the southwestern corner of the country. Mago and Omo NP's were surveyed by aerial total counts in 1994, giving an estimate of 657 elephants. The remaining estimates for Ethiopia are based on sample aerial surveys conducted in 1990 as part of a WWF project (Allen-Rowlandson, 1990). However, elephants occurred at low densities and were not seen within the survey strips so the population estimates provided are informed guesses, from observations made outside the strips. The estimate listed as Definite in the country summary increases to 847 because a total of 190 elephants were actually seen outside the streamers of the aircraft during Allen-Rowlandson's (1990) surveys.

EU-sponsored surveys of elephants were carried out in early 1990's using field teams to interview local people

and to conduct ground censuses, as well as aerial surveys (Manspeizer, 1994). The collection of data was often hampered by practical problems and the data are mainly descriptive. Elephants and/or their signs were sighted in Babile Elephant Sanctuary, Gambella NP, Mago NP (with an elephant estimate of 710 based on dung counts and 281 seen in the aerial survey), Gino NP (376 elephants counted during an aerial census) and the Southwest Forest (14 elephants seen).

The Gash Setit population of southern Eritrea is thought to move seasonally across the border into Ethiopia, while cross-border movement may also occur between western Ethiopia and Sudan.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AS Aerial Sample Survey
- AT Aerial Total Count
- AC Aerial Count Unspecified
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### EASTERN AFRICA

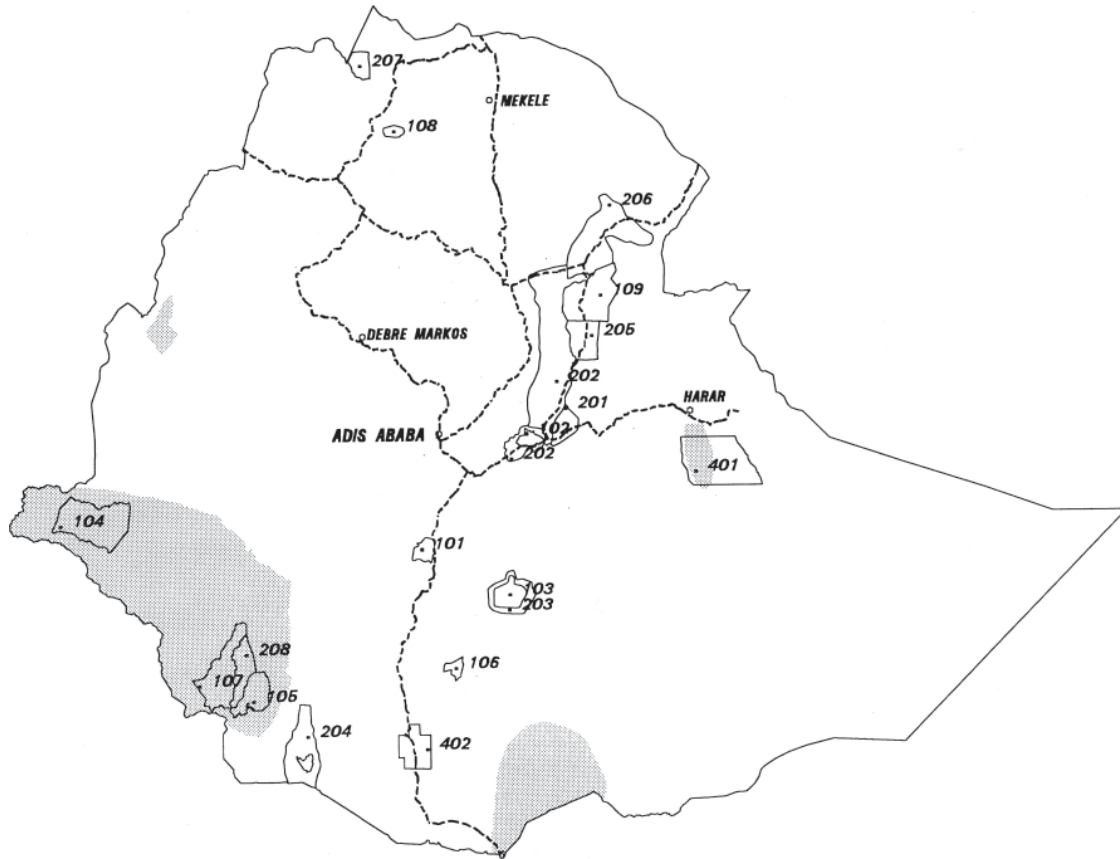
#### ETHIOPIA

CODE ZONE		SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
407	Metehel - Dabus River	1990		300	-	Allen-Rowlandson, 1990	1G3	D
408	Babile Elephant Sanctuary - Webe Shahelle River	1990		100	-	Allen-Rowlandson, 1990	1G3	D
601	Akobo - Mizan Teferi Area	1990	3,500	1,000	-	Allen-Rowlandson, 1990	1G3	D
602	Ameya-Bonga Area	1990	6,700	200	-	Allen-Rowlandson, 1990	1G3	D
603	Borana Atea	1990		50	-	Allen-Rowlandson, 1990	1G3	D
604	Gambella National Park	1990	4,800	100	-	Allen-Rowlandson, 1990	1G3	D
605	Mago and Omo National Park	1994	6.031	657	0	Lamprey, 1994	AT	A

### SUMMARY OF TOTALS FOR ETHIOPIA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	847	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	1,560	0
E	Other Guesses and Other Extrapolations	0	0	0	0
<b>TOTAL</b>		<b>847</b>	<b>0</b>	<b>1,560</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN ETHIOPIA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Abijatta-Shalla Lakes NP
- 102 Awash NP
- 103 Bale Mountains NP
- 104 Gambella NP
- 106 Mago NP
- 106 Nechisar NP
- 107 Omo NP
- 108 Simen Mountains NP
- 109 Yangudi Rass NP

### WILDLIFE RESERVES

- 201 Alledeghi WR
- 202 Awash West WR
- 203 Bale WR
- 204 Chew Bahr WR
- 206 Gewane WR
- 206 Mille-Sardo WR
- 207 Shire WR
- 208 Tama WR

### WILDLIFE SANCTUARY

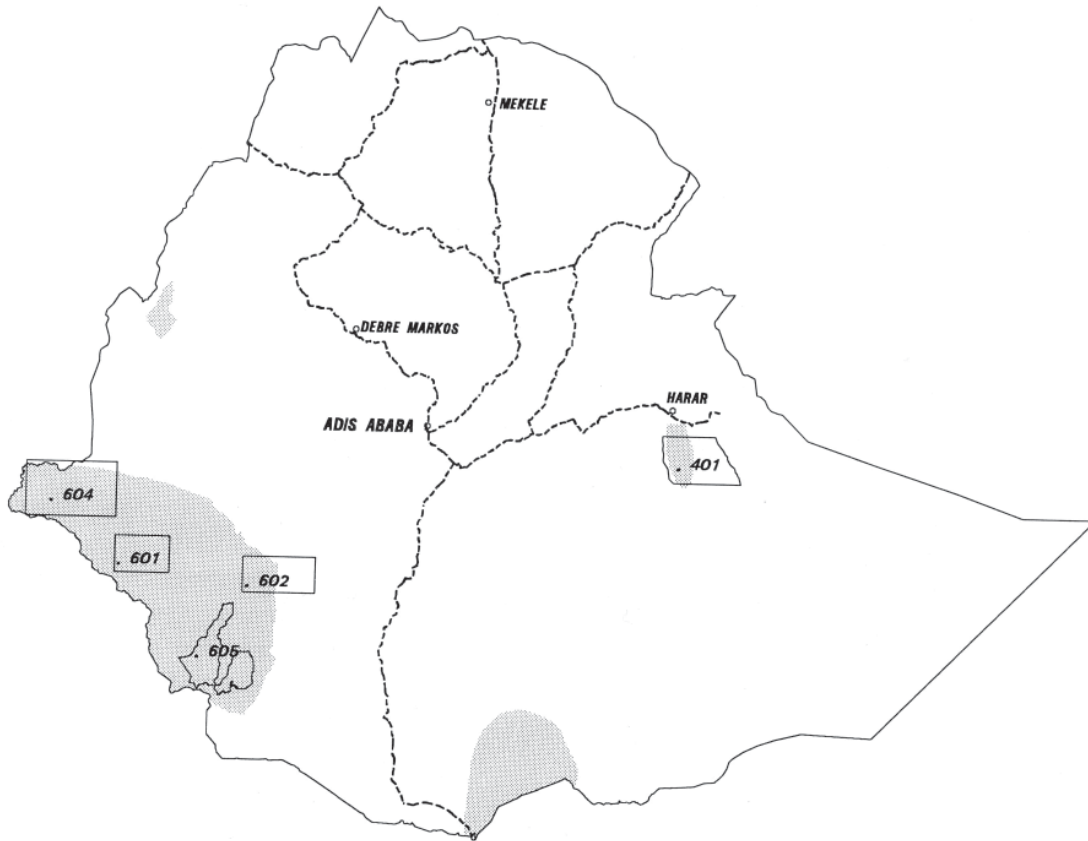
- 401 Babile Elephant WS
- 402 Yabello WS



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collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN ETHIOPIA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS	ESTIMATE	CODE	CENSUS	ESTIMATE
401	Babile Elephant Sanctuary	100	604	Gambella NP	100
601	Akobo - Mizan Teferi Area	1000	605	Mago and Omo NP	657
602	Ameya-Bonga Area	200	901	Metehel - Dabus River*	300
603	Borana Area*	50			



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*





## Kenya

Elephants in Kenya were heavily poached for ivory from the mid-1970s to the end of the 1980s but there are still several large, viable populations which are now relatively stable (Poole *et al.*, 1992). Kenya's elephant populations have benefitted from protection by one of the best-financed and run wildlife departments on the continent (Dublin *et al.*, 1995).

The mapping of elephant range and calculation of elephant population estimates for Kenya are particularly difficult because of the variety and extent of census techniques employed (total and sample aerial counts, dung counts, individual registration) and the proximity of varied habitat types, for example forest and savanna, requiring the integration of different census techniques. There are also two government departments and several individuals and non-governmental organisations involved in censusing elephants in Kenya. The estimates provided in the table are mainly based on surveys carried out by the Kenya Wildlife Service and the Department of Resource Surveys and Remote Sensing. Recent surveys have been conducted by Kenya Wildlife Service personnel in Mount Elgon NP and the Mau Forest Complex (dung counts), in Tsavo NP (total aerial count), and in the Shimba Hills NR (dung count and total aerial count); analysis is ongoing.

A large proportion of Kenya's elephant range lies outside protected areas and elephants frequently migrate between both protected and non-protected areas and between different types of habitat. For example, the Samburu/Laikipia savanna elephant population contains elephants

which seasonally move out of nearby forests, though both habitats have been surveyed independently, using aerial and dung counts, respectively. Expanding human population and increased cultivation in marginal, non-protected areas of elephant range have escalated conflicts between humans and elephants competing for land and access to water (Thouless, 1994; Kiiru, 1995; KWS unpublished survey reports [see References]). To appease a conflict situation at the Mwea NR and surrounding area, Kenya's first elephant family translocation programme was initiated by the KWS in October 1995. Elephants are being relocated from Mwea NR to Tsavo East NP in the current operation.

Kenya's Amboseli elephant population is the most well-researched wild population in Africa, with continuous monitoring dating back to the 1970's. Several scientific articles and books have been written about the elephants (cf. Moss, 1988). Other populations which have been carefully researched and/or censused on a long-term basis include those of the Masai Mara NR (Dublin and Douglas-Hamilton, 1987; Dublin *et al.*, 1990) and Tsavo NP (Douglas-Hamilton *et al.*, 1994) and, more recently, Laikipia/Samburu Districts (Thouless, 1991; Thouless, in press).

Cross-border elephant movements occur mainly across the Kenya-Tanzania border, in the Serengeti-Mara, Tsavo-Mkomazi and Amboseli-Kilimanjaro ecosystems. There may also be a cross-border population shared with Somalia near Kenya's north-east coastline, and possibly, movement between northern Kenya and Ethiopia.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IG Informed Guess
- IR Total Count (Individual Registration)
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### EASTERN AFRICA

#### KENYA

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
102	Amboseli National Park	1995	365	870	–	Moss, 1995	IRI	A
213	Marsabit National Reserve	1993	142	267	0	Litoroh <i>et al.</i> , 1994	AT2	A
107	Mt Elgon National Park and Forest	1991	125	52	+68*	Reuling <i>et al.</i> , 1992a	DC3	D
108	Mt Kenya National Park and Forest Reserve	1991	1,367	4,245	±1,740	Reuling <i>et al.</i> , 1992a	DC2	C
214	Mwea National Reserve	1995	42	48	0	Njumbi <i>et al.</i> , 1995 Sakwa <i>et al.</i> , 1995	AT IRI	AA
220	Shimba Hills National Reserve	1992	217	300	+250*	Reuling <i>et al.</i> , 1992b	DC3	D
302	Arabuko Sokoke Forest	1991	372	78	+12*	Gesicho, 1991	DC3	D
304	Loroki Forest	1992	596	307	+265*	Mwangi <i>et al.</i> , 1992	DC3	D
601	Aderdare National Park and Forest Aderdare National Park**	1990 1994	2,000 767	2,500 1,036	- -	Reuling <i>et al.</i> , 1992a Mulama (in press)	1G3 DC3	D D
602	Meru National Park and Bisandi Imenti Forest Outside the Park	1992 1994	1,348 100	264 92 100	0 +279* -	Litoroh, 1992 Njumbi & Litoroh, 1994 Njumbi, pets comm. 1995	AT DC3 1G3	A D D
603	Masai Mara Game Reserve Outside Reserve	1994	3,508	1,098387	00	Dublin & Watkin, 1994	AT	A
604	Mau Forest Complex	1992	1.065	250	+50*	Reuling <i>et al.</i> , 1992c	DC3	D
605	Nasalot National Reserve and South Turkana National Reserve and Kerio Valley	1992	5.050	580	0	Mbugua, 1992	AT	A

607	Tsavo National Park	1994	20,574	6,270	0	Douglas-Hamilton <i>et al.</i> , 1994	AT2	A
901	Taita Area	1994	5,886	287	0	Douglas-Hamilton <i>et al.</i> , 1894	AT2	A
801	Galana Ranch	1994	6,382	46	0	Douglas-Hamilton <i>et al.</i> , 1994	AT2	A
992	Rombo	1994	1,185	446	0	Douglas-Hamilton <i>et al.</i> , 1994	AT2	A
802	Remainder	1994	2,334	26	0	Douglas-Hamilton <i>et al.</i> , 1994	AT2	A
903	Garissa District	1988	43,623	176	+340	Grunblatt <i>et al.</i> , 1995	AS2	IS
904	Kilifi District	1993	12,475	34	±46	Grunblatt <i>et al.</i> , 1995	AS2	B
905	Kitui District	1993	1,602	830	±826	Grunblatt <i>et al.</i> , 1995	AS2	B
906	Lamu District	1993	5,964	264	+508	Grunblatt <i>et al.</i> , 1995	AS2	B
907	Samburu and Laikipia	1992	7,483	2,969	0	Thouless, 1992	AT2	A
	Mathews Range***	1992	750	650	-	Reuling <i>et al.</i> , 1992d	DC3	D
	Marmanet Forest Complex***	1992	317	50	+50*	Litoroh <i>et al.</i> , 1992	DC3	D

\* Range for Informed Guest

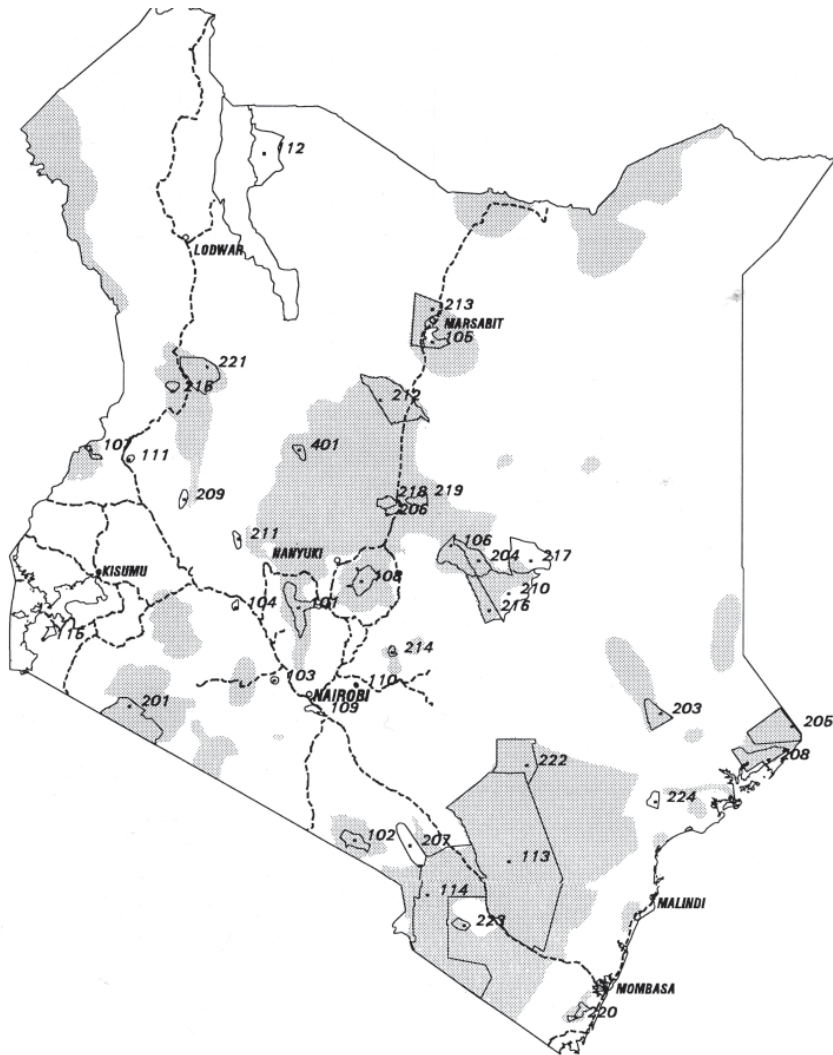
\*\* Part of Aberdare elephant population

\*\*\* Part of the Samburu and Laikipia elephant population

## SUMMARY OF TOTALS FOR KENYA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	13,558	0	0	0
B	Aerial or Ground Sample Counts	276	1,028	1,028	0
C	Dung Counts	0	4,245	1,740	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	3,679	924
E	Other Guesses and Other Extrapolations	0	0	0	0
<b>TOTAL</b>		<b>13,834</b>	<b>5,273</b>	<b>6,447</b>	<b>924</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN KENYA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Aberdare NP
- 102 Amboseli NP
- 103 Hells Gate NP
- 104 Lake Nakuru NP
- 105 Marsabit NP
- 106 Meru NP
- 107 Mount Elgon NP
- 108 Mount Kenya NP
- 109 Nairobi NP
- 110 Ol Doinyo Sabuk NP
- 111 Saiswa Swamp NP

### GAME RESERVE

- 201 Masai Mara GR

### NATIONAL RESERVES

- 112 Sibiloi NP
- 113 Tsavo East NP
- 114 Tsavo West NP
- 116 Ruma NP
- 203 Atawaie NR
- 204 Bisandi NR
- 205 Boni NR
- 208 Buffalo Springs NR

### NATIONAL RESERVES (continued)

- 207 Chyulu Hills NR
- 208 Dodori NR
- 209 Kerio Valley NR
- 210 Kora NR
- 211 Lake Bogoria NR
- 212 Losai NR
- 213 Marsabit NR
- 214 Mwea NR
- 215 Nasolot NR
- 216 North Kitui NR
- 217 Raholo NR
- 218 Samburu NR
- 219 Shaba NR
- 220 Shimba Hills NR

### NATIONAL RESERVES (continued)

- 221 South Turkana NR
- 222 South Kitui NR
- 223 Taita Hills NR
- 224 Tans River Primate NR

### NATIONAL SANCTUARY

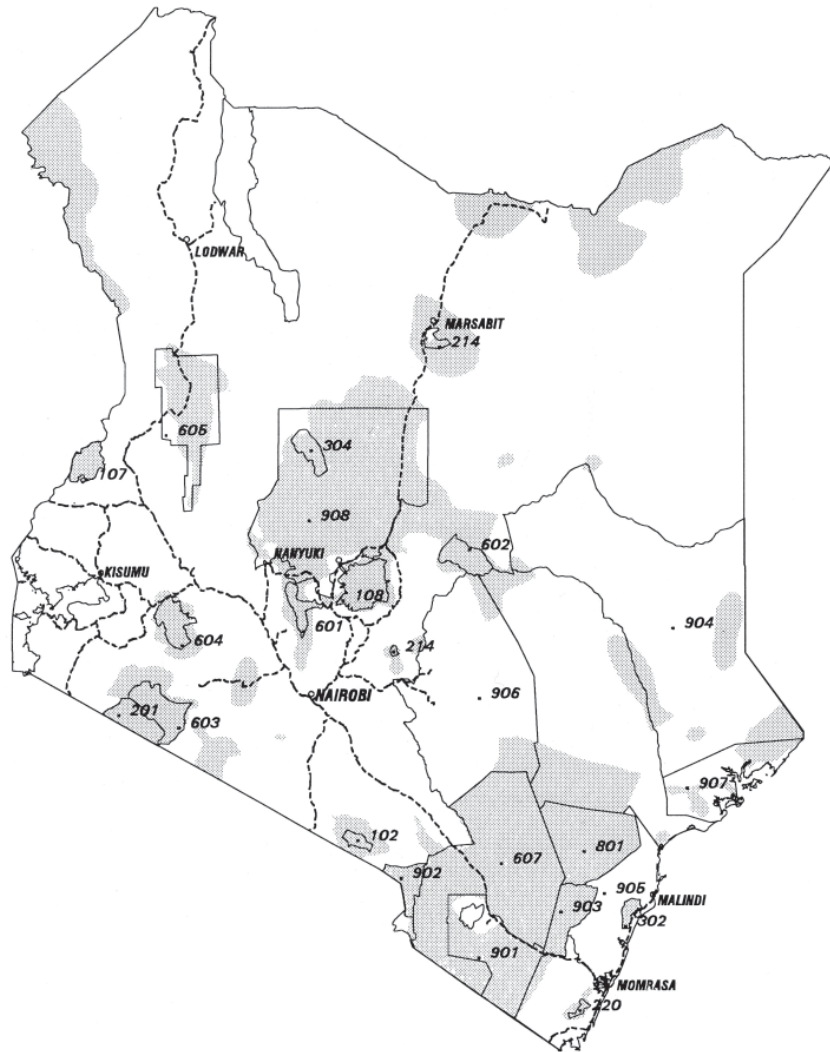
- 401 Maralal NS



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collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN KENYA



## LEGEND

-  Elephant Range
-  Input Zone
-  Roads
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
102	Amboseli NP	870	601	Aberdare NP and Forest	2500	902	Rombo	446
214	Marsabit NR	267	602	Meru NP & Bisanadi NR	264	903	Remainder	26
107	Mt Elgon NP and Forest	52	201	Masai Mara GR	1098	904	Garissa District	176
108	Mt Kenya NP and Forest	4245	603	Outside Reserve	387	905	Kilifi District	34
214	Mwea NR	48	604	Mau Forest Complex	250	906	Kitui District	830
220	Shimba Hills NR	300	605	Nasolot NR and S Turkana NR & Kerio Valley	580	907	Lamu District	264
302	Arabuko Sokoke F	78	607	Tsavo NP	6270	908	Sanburu and Laikipia	2969
304	Loroki F	307	901	Taita Aes	287			
			801	Galana Ranch	46			



African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID



## Rwanda

The recent civil war has led to a refugee crisis in Rwanda but it is difficult to say whether the small, remaining elephant populations will be affected.

In 1973 there were approximately 140 elephants in Rwanda, in two isolated populations surrounded by human settlements. Due to increasing human-elephant conflict, the government decided to exterminate the adults in one operation and translocate the juveniles to Akagera NP in northeastern Rwanda (Haigh *et al.*, 1979). A total of 26 animals were successfully released to form the nucleus of a new population. The most recent aerial census of Akagera NP was conducted in late February and early March, 1994, primarily to count buffalo, topi and zebra (Fourniret, 1994). For two days, the eastern section of the Park was searched specifically for elephants using an aerial total block count and 39 were seen (Kalpers, pers.

comm., 1995). A large proportion of the northern sector of Akagera NP, a portion of the Park where elephants have not inhabited in the past, has been occupied by refugees and their cattle since the war (d'Huart, pers. comm., 1995).

Dung counts in 1988/89 gave an estimate of seven elephants in Volcans NP (Plumptre and Harris, 1995), but this probably represents a minimum number since the elephant range is thought to extend into Uganda and Zaire (ORPTN, 1991; Kalpers, pers. comm., 1995).

The Wildlife Conservation Society/New York Zoological Society was working in Nyungwe Forest Reserve before the war, and saw no evidence to suggest any more than one elephant in the Park, although several elephants may still be there. Elephant signs were seen as recently as May 1995 (Fimbel, pers. comm., 1995).

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AS Aerial Sample Survey
- AT Aerial Total Count
- AC Aerial Count Unspecified
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### EASTERN AFRICA

#### RWANDA

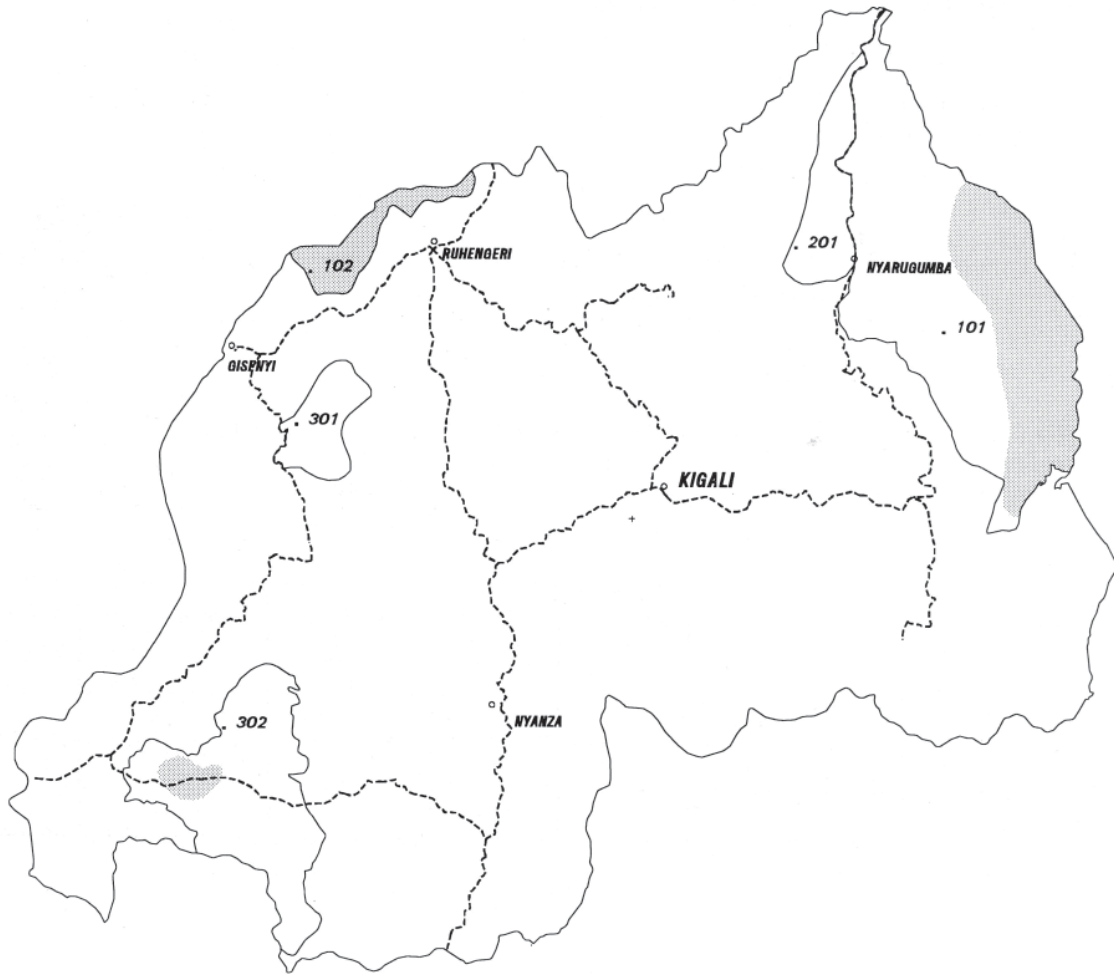
CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
101	Akagera National Park	1994	2,800	39	0	Fourniret, 1994	AT	A
102	Volcans National Park	1988/89	228	20	+10*	ORTPN, 1991	1G3	D
302	Nyungwe Forest Reserve		1,088	12	-	ORTPN, 1991	1G3	D

\* Range for Informed Guess

### SUMMARY OF TOTALS FOR RWANDA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	39	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	D	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	32	10
E	Other Guesses and Other Extrapolations	0	0	0	0
	<b>TOTAL</b>	<b>39</b>	<b>0</b>	<b>32</b>	<b>10</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN RWANDA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

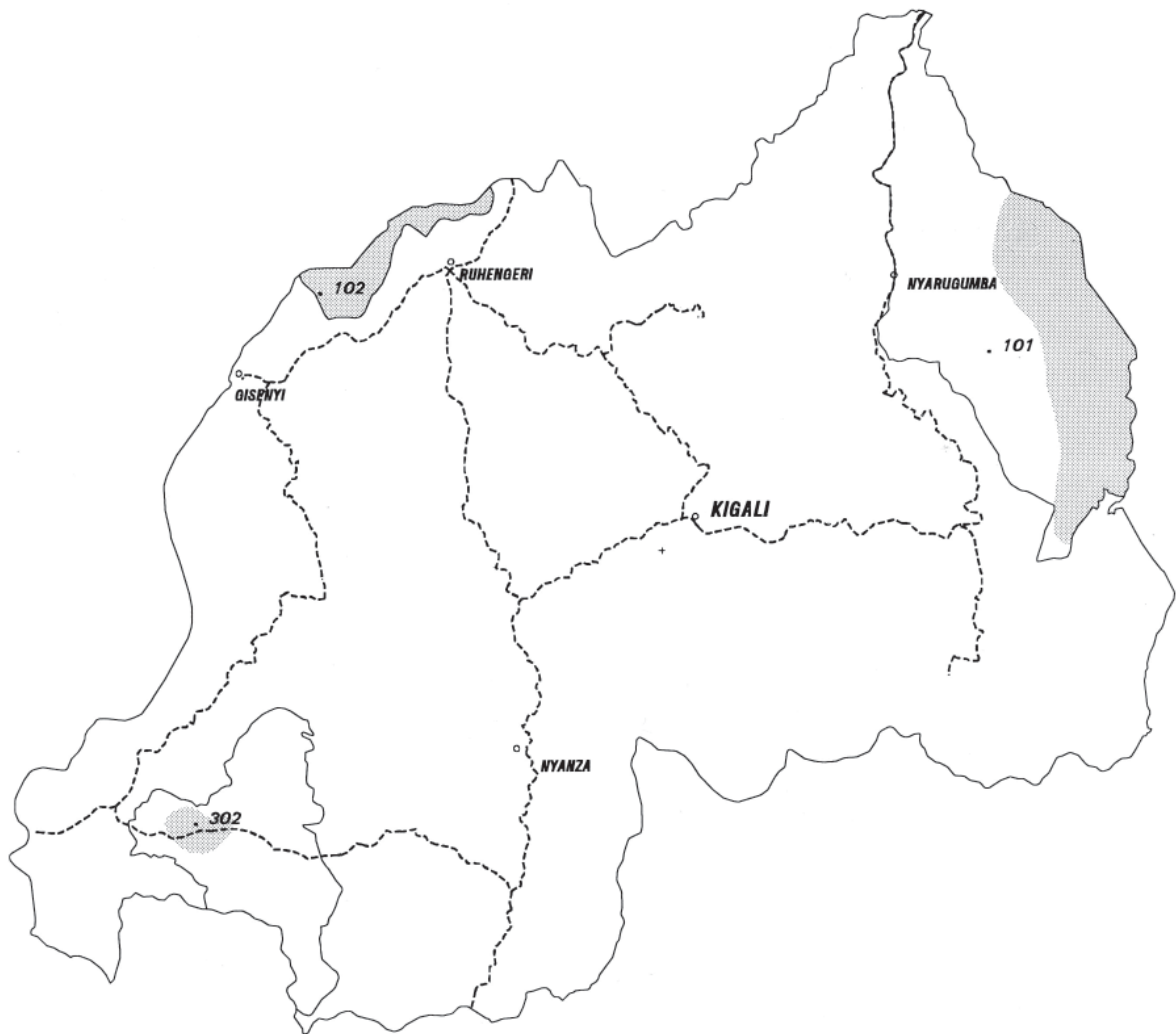
NATIONAL PARKS		GAME RESERVES	FOREST RESERVES	
101	Akagera NP	201	Mutara GR	
102	Volcans NP	302	Nyungwe PR	
			301	Giswati FR



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collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN RWANDA



-  Elephant Range
-  Roads
-  Input Zone
-  Towns

**KEY TO POPULATION ESTIMATES**

CODE	CENSUS ZONENAME	ESTIMATE
101	Akagera NP	39
102	Volcans NP	20
302	Nyungwe FR	12



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



## Somalia

Aerial surveys in 1989 (Watson, 1991) and reconnaissance flights during the years 1987 to 1995 (Bauer, 1995), produced some information on elephants in Somalia which is mainly qualitative. Due to the political situation over the last few years, populations have decreased considerably and Watson's estimates of 2,000 and 500 elephants in the Bush Bush NP and Lag Dhere Ecosystem respectively, are no longer considered viable. A combination of ongoing reconnaissance flights, patrols by 15 former game rangers and an escort system, operating under a programme implemented by ECO<sup>2</sup>TERRA in 1991, indicate that there are no elephants left in the Lag Dhere ecosystem, and probably only between 150 and 250 elephants in Somalia overall (Bauer, 1995). These remaining elephants are confined to swampy areas south of Mogadishu (Far Wamo

WR and Swamp NP), as well as Bush Bush NP. They appear to be highly mobile, moving within and between the three main areas of their range in small groups (Bauer, 1995).

In 1994, a staff member of a Somali NGO (Somali Community Service) visited the area between the Bush Bush NP and Kenya and saw several elephants. He speculates that some elephants migrate between Somalia and Kenya along that area of the border (Bashir, pers. comm., 1995).

Updates to the range map were made by Bauer (1995). Several areas within Somalia (mostly not shown) were proposed for protected status in the early 1980s but were never gazetted.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AS Aerial Sample Survey
- AT Aerial Total Count
- AC Aerial Count Unspecified
- DC Dropping Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

## EASTERN AFRICA

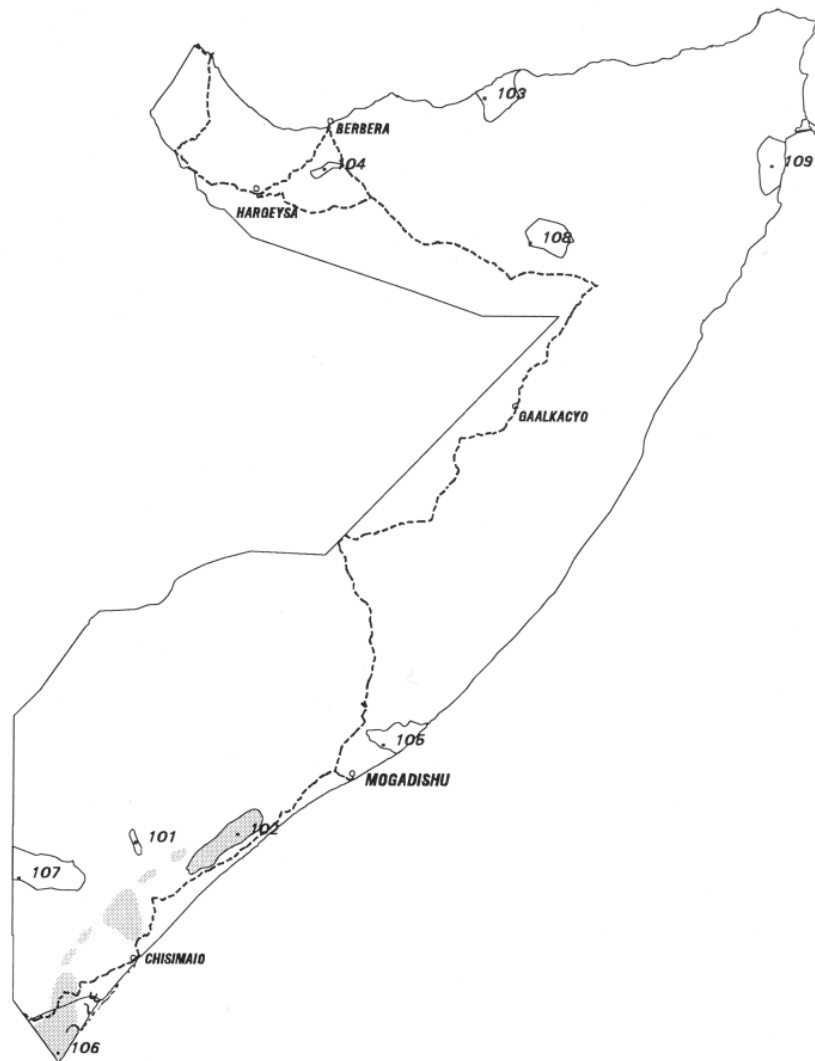
### SOMALIA

CODE	ZONE	SURVEY DATE	AREA (km2)	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE &	DATA CATEGORY QUALITY
				ESTIMATE	95% CONFIDENCE LIMITS			
106	Bush Bush National Park	1991-1995	4,267	70	-	Bauer, Quest. Reply, 1995	1G3	D
102	Swamp National Park	1991-1995	1,050	30	-	Bauer, Quest. Reply, 1995	1G3	D
405	Far Wamo Wildlife Reserve	1991-1995	850	30	-	Bauer, Quest. Reply, 1995	1G3	D
601	Lag Dhere Ecosystem	1991-1995	5,348	0	-	Bauer, Quest. Reply, 1995	1G3	D
	Other Areas	1991-1995		120	-	Bauer, Oust. Reply, 1995	OGS	E

## SUMMARY OF TOTALS FOR SOMALIA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GISExtrapolations	0	0	130	0
E	Other Guesses and Other Extrapolations	0	0	0	120
	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>130</b>	<b>120</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN SOMALIA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

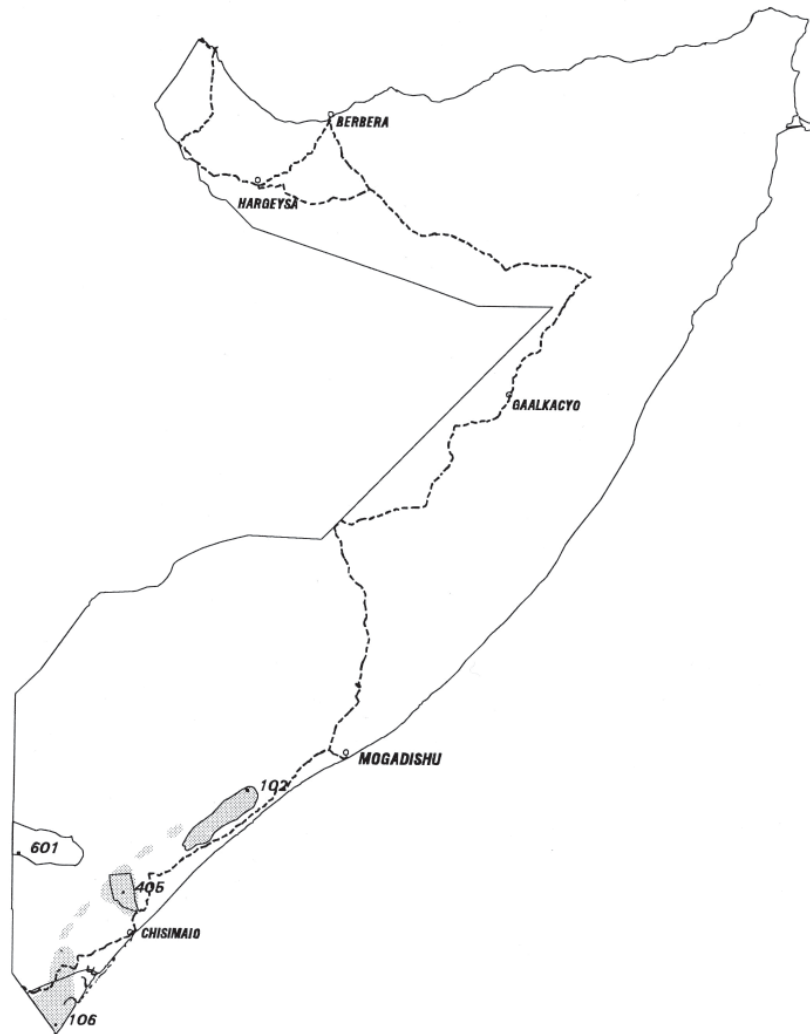
- |                        |                  |
|------------------------|------------------|
| 101 Angole-Farbiddu NP | 107 Lag Dhere NP |
| 102 Swamp NP           | 108 Las Anod NP  |
| 103 Daalo Forest NP    | 109 Ras Guba NP  |
| 104 Gaan Libaax NP     |                  |
| 105 Jowhar Warshek NP  |                  |
| 106 Bush Bush NP       |                  |



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# INPUT AEAS AND ELEPHANT RANGE IN SOMALIA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE
106	Bush Bush NP	70
102	Swamp NP	30
405	Far Wamo WR	30
601	Lag Dhere Ecosystem	120
	Other Areas*	

\*Input area not indicated on the map



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*





## Sudan

No recent information has been received due to the civil war. Range information was supplied by Minga (1990) and may be very different now. Hashim (pers.comm., 1995) recently observed tracks of about 12 elephants in Dinder NP He postulates that the elephants cross into the Park from Ethiopia during the rainy season.


Dulling (1992), reporting on the African elephant and the

wildlife situation in Sudan in general, said that illegal killing of elephants on a massive scale, along with civil war, drought and extensive human population movements, had reduced the population from an estimated 133,000 in 1976 to a maximum of 40,000 by 1992. However, continuing civil war across the country's elephant range has probably reduced this population further.

# PROTECTED AREAS AND ELEPHANT RANGE IN SUDAN



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Boma NP
- 102 Dinder NP
- 103 Nimule NP
- 104 Radom NP
- 105 Southern NP

### GAME RESERVES

- 201 Ashana GR
- 202 Badingilo GR
- 203 Bangangai GR

### NATIONAL PARKS (continued)

- 204 Bire Kpatuos GR
- 205 Boro GR
- 206 Chelkaou GR
- 207 Juba GR
- 208 Kidepo GR
- 209 Mbarizungu GR
- 210 Mashra GR
- 211 Mongalla GR
- 212 Numatina GR
- 213 Rahad GR
- 214 Shambe GR

### FOREST RESERVE

- 215 Bud Daofur
- 216 Zeraf GR
- 301 Jebel Manna FR

### OTHERS

- 951 Dinder HR
- 952 Imatong Mts
- 953 Shambe Ext



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# INPUT AREAS AND ELEPHANT RANGE IN SUDAN



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

No recent censuses have been carried out in Sudan



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## Tanzania

Despite population declines in the late 1970's and 1980's due to poaching (Barnes and Kapela, 1991; Prins *et al.*, 1994), Tanzania still supports the largest elephant population on the continent. Most information for Tanzania is based on sample aerial counts carried out by the Tanzania Wildlife Conservation Monitoring (TWCM) unit (see references).

There are still relatively large, areas of range outside protected areas, especially in the west, for which there are no recent population estimates. The area west of Ruaha/Rungwa was censused in the late 1970s. These

areas probably harbour considerable numbers of elephants in distinct populations.

Northern Tanzania shares elephant populations with Kenya, in the Serengeti-Mara, Tsavo-Mkomazi and Amboseli-Kilimanjaro ecosystems. The population in the Serengeti was greatly reduced by poaching during the mid 1980s, reaching a low of 467 in 1986. By 1994 it had increased to 1,357, thought to be due in part from immigration of elephants from Kenya's Masai Mara population (TWCM, 1994). There may be some additional cross-border movement from southern Tanzania into Mozambique.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### EASTERN AFRICA

#### TANZANIA

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
104	Kilimanjaro National Park	1990	418	220	±88	TWCM, 1992a	DC2	C
105	Lake Manyara National Park	1990	246	149	0	TWCM, 1992a	AT	A
109	Rubonda Island National Park	1990	400	14		TWCM, 1992a	1G3	D
202	Burigi Game Reserve	1990	6,102	71	±92	TWCM, 1992a	AS2	H
210	Mkomazi Game Reserve	1994	3,509	300		Douglas-Hamilton et al., 1994	AT	A
216	Ugalla River Game Reserve	1991	6,984	1,620	±749	TWCM, 1992b	AS2	B
601	Katavi-Rukwa Area	1991	12,641	5,360	±4,065	TWCM, 1992c	AS2	B
602	Moyowosi/Kigosi Area	1994	21,869	1,583	±1,382	Farm, pens. comm., 1995b	AS2	B
603	<b>Ruaha-Rungwa Ecosystem</b>	1993	41,927	18,864	±3,578	TWCM, 1993	AS2	B
	Ruaha National Park	1993	10,401	7,091	±2,042	TWCM, 1993	AS2	B
	Rungwa-Kisigo Game Reserve	1993	14,160	7,986	±2,091	TWCM, 1993	AS2	B
	Muhesi Game Reserve	1993	4,539	1,596	±584	TWCM, 1993	AS2	B
	Itigi South	1993	6,249	435	±727	TWCM, 1993	AS2	B
	Eastern Border	1993	1,699	696	±1,301	TWCM, 1993	AS2	B
	Southeast Border	1993	901	442	±462	TWCM, 1993	AS2	B
	Western Border	1993	1,328	618	±1,219	TWCM, 1993	AS2	B
	Utengule Area	1993	2,020	0	0	TWCM, 1993	AS2	B

604	<b>Selous Ecosystem</b>	1994	91,981	52,151	±10,661	TWCM, 1995b	AS2	B
	Mikumi National Park	1994	3,125	700	±309	TWCM, 1995b	AS2	B
	Selous Game Reserve	1994	43,626	31,735	±9,183	TWCM, 1995b	AS2	B
	Kilombero Game Conservation Area	1994	6,928	1,903	±.514	TWCM, 1995b	AS2	B
	Outside Area	1994	38,212	17,836	±6,101	TWCM, 1995b	AS2	B
605	<b>Serengeti Ecosystem</b>	1994	21,413					
	Serengeti National Park	1994		1,357	0	TWCM, 1994	AT	A
	Ngorongoro Crater	1992		29	0	Farm, pers. comm.,1995a	AT	A
	Maswa Game Reserve	1992		27	0	Farm. pers. comm.,1995a	AT	A
	Makao-Kakesio	1992		90	0	Farm, pers. comm.,1995a	AT	A
	Endulen	1992		169		Farm, pers. comm.,1995a	AT	A
606	Tarangire Ecosystem	1994	12,826	3,888	±.1,832	TWCM, 1995	AS2	B

## SUMMARY OF TOTALS FOR TANZANIA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	2,121	0	0	0
B	Aerial or Ground Sample Counts	71,338	12,199	12,199	0
C	Dung Counts	0	220	88	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	14	0
E	Other Guesses and Other Extrapolations	0	0	0	0
	<b>TOTAL</b>	<b>73,459</b>	<b>12,419</b>	<b>12,301</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN TANANIA



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Arusha NP
- 102 Gombe NP
- 103 Katavi NP
- 104 Kilimanjaro NP
- 105 Lake Manyara NP
- 106 Mahale Mts NP
- 107 Mikumu NP
- 108 Ruaha NP
- 109 Rubondo Island NP
- 110 Serengeti NP
- 111 Tarangire NP

### GAME RESERVES

- 201 Biharamulo GR
- 202 Burigi GR
- 203 Grumeti GR
- 204 Ibanda GR
- 205 Ikorongo GR
- 206 Kigosi GR
- 207 Kilimanjaro GR
- 208 Kisigo GR
- 209 Maswa GR
- 210 Mkomazi GR

- 211 Moyowosi GR
- 212 Muhesi GR
- 213 Rumanyika GR
- 214 Rungwa GR
- 215 Sadani GR
- 216 Selous GR
- 217 Ugalla River GR
- 218 Uwanda GR

### CONSERVATION AREAS

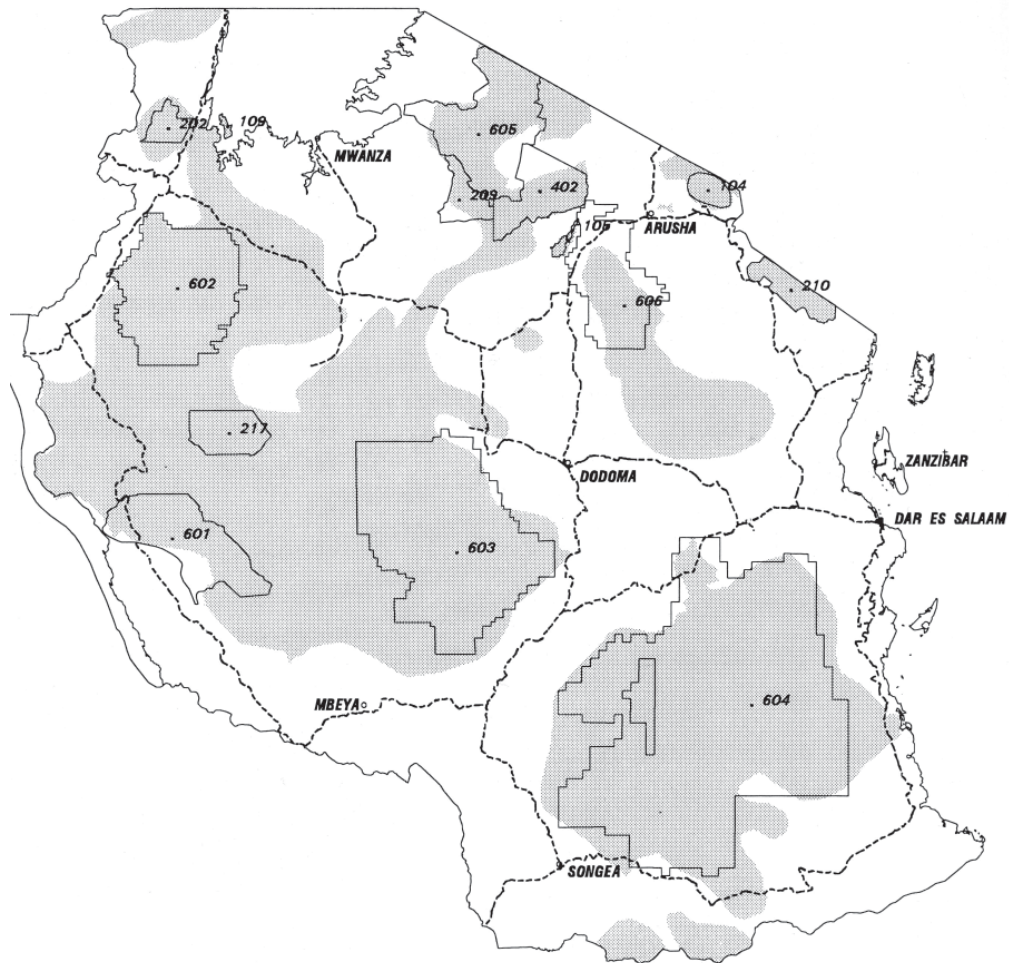
- 401 Kilombero CA
- 402 Ngorongoro CA




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# INPUT AREAS AND ELEPHANT RANGE IN TANZANIA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
104	Kilimanjaro NP	220	601	Katavi-Rukwa Area	5360
105	Lake Manyara NP	149	602	Moyowosi/Kigosi Area	1583
109	Rubonda Island NP	14	603	Ruaha – Rungwa Ecosystem	18864
202	Burigi GR	71	604	Selous Ecosystem	52151
210	Mkomazi GR	300	605	Serengeti Ecosystem	1672
217	Ugalla River GR	1620	606	Tarangire Ecosystem	3888



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## Uganda

Following the major losses experienced in the 1970's (Douglas-Hamilton, 1987), Uganda's remaining elephants are mostly found in protected areas. Very few of these are forested areas, notably Kibale and Bwindi NPs. The three largest populations are in Murchison, Queen Elizabeth and Kidepo NP's, where total aerial counts were carried out in 1992. The remaining numbers are minimum 1994 estimates given by staff working at the Uganda Institute of Ecology (Edroma, 1994). The government plans to conduct aerial surveys in all the game reserves in the country in 1995.

Recent research in Queen Elizabeth NP has concentrated on group size and range of elephants, using radio-collars to follow specific individuals (Abe, 1992).

There is evidence for immigration of elephants into Uganda from Sudan (into Murchison Falls NP), Kenya (Mount Elgon NP) and Zaire (from Virunga NP into Queen Elizabeth NP) (Edroma, 1994). Cross-border movements may also occur between Volcans NP in Rwanda and Mgahinga Gorilla NP in Uganda.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AS Aerial Sample Survey
- AT Aerial Total Count
- AC Aerial Count Unspecified
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

## EAST AFRICA

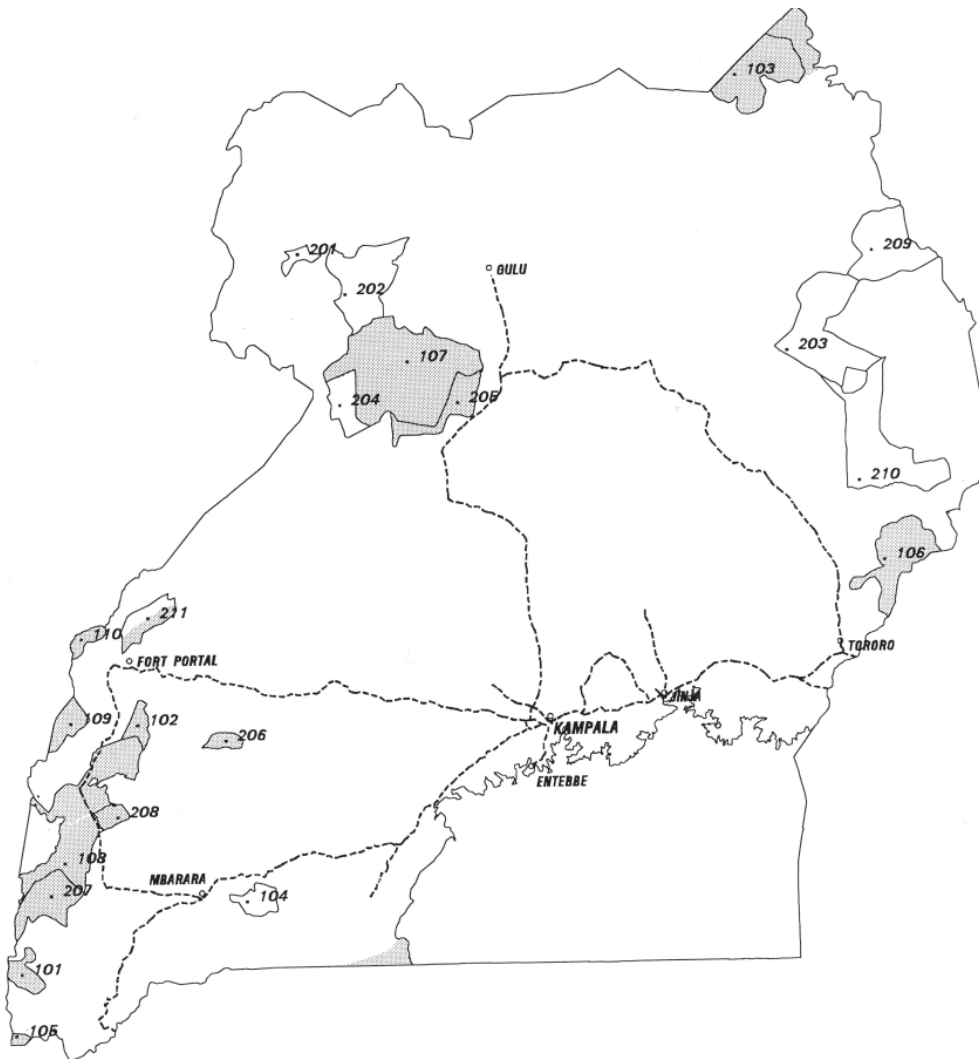
### UGANDA

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
101	Bwindi Impenetrable National Park		347	30	–	Edroma, 1994	1G3	D
103	Kidepo National Park	1992	1,483	215	0	Olivier, 1992	AT2	A
105	Mgahinga Gorilla National Park		44	15	–	Edroma, 1994	1G3	D
106	Mt Elgon National Park		1,117	20	–	Edroma, 1994	1G3	D
107	Murchison National Park and Buffer Reserve	1992	3,346	601	0	Olivier, 1992	AT2	A
108	Queen Elizabeth National Park and Environs	1992	3,366	502	0	Olivier, 1992	AT2	A
109	Rwenzori Mountains National Park		1,054	25	–	Edroma, 1994	1G3	D
110	Semuliki National Park		250	60	–	Edroma, 1994	1G3	D
102	Kibale National Park & Katonga	909	150	–	Edroma, 1994	1G3	D	
206	Game Reserve							
901	Sango Bay		506	30	–	Edroma, 1994	1G3	D
	Other Protected Areas			200	–	Edroma, 1994	1G3	D

## SUMMARY OF TOTALS FOR UGANDA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	1,318	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	530	0
D	Other Guesses and Other Extrapolations	0	0	0	0
<b>TOTAL</b>		<b>1,318</b>	<b>0</b>	<b>530</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN UGANDA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Bwindi Impenetrable NP
- 102 Kibale NP
- 103 Kidepo Valley NP
- 104 Lake Mburo NP
- 105 Mgahinga Gorilla NP
- 105 Mt Elgon NP
- 107 Murchison Falls NP

- 108 Queen Elizabeth NP
- 109 Rwenzori Mts NP
- 110 Semuliki NP

### GAME RESERVES

- 201 Ajai GR
- 202 Aswa-Lolim GR
- 203 Bokora Corridor GR

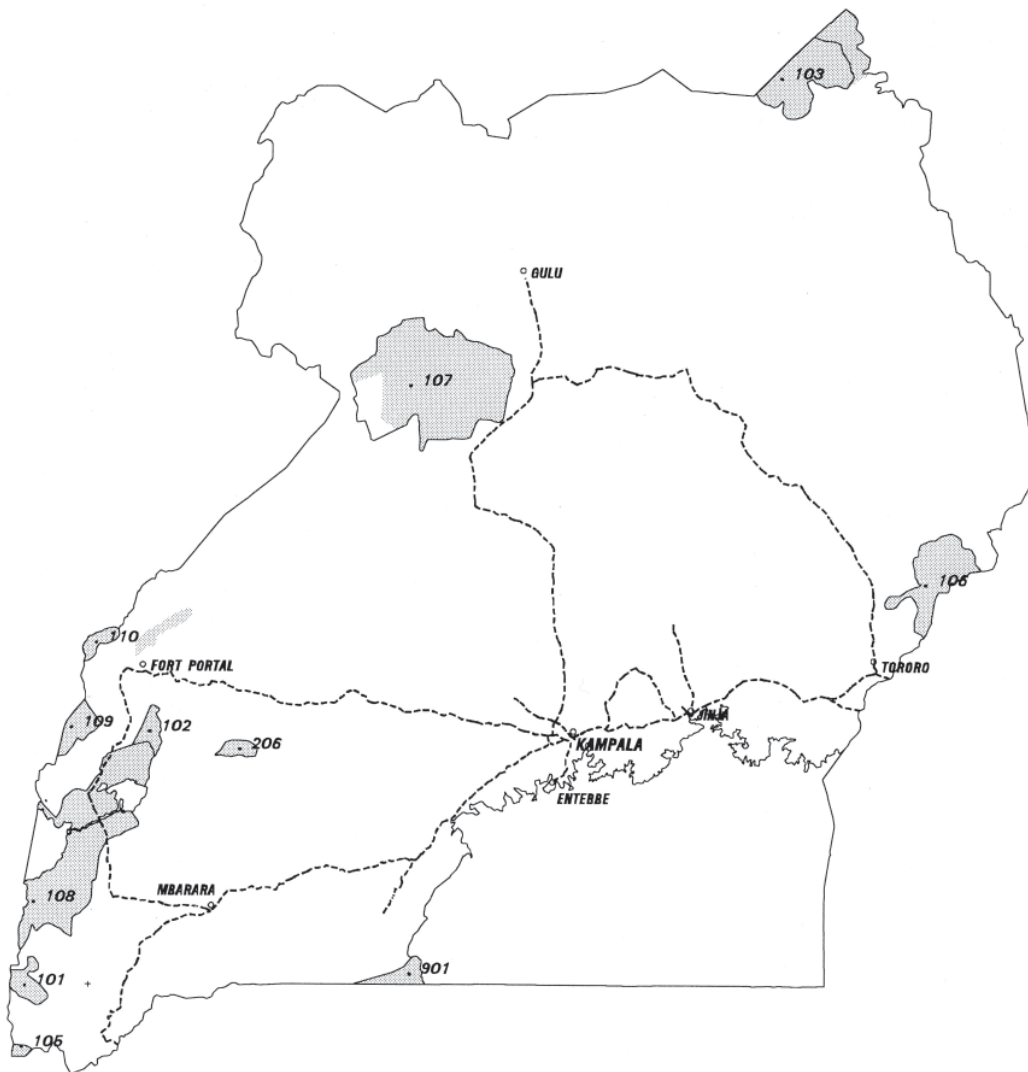
- 204 Bugungu OR
- 205 Karuma OR
- 205 Katonga OR
- 207 Kigezi OR
- 208 Kyambura OR
- 209 Matheniko OR
- 210 Pian-Upe OR
- 211 Toro OR



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# INPUT AREAS AND ELEPHANT RANGE IN UGANDA



## LEGEND

-  Elephant Range
-  Input Zone
-  Roads
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
101	Bwindi Impenetrable NP	30	109	Ruwenzori NP	25
103	Kidepo valley NP	215	110	Semuliki NP	60
105	Mgahinga Gorilla NP	15	102	Kibale NP end	150
106	Mt Elgon NP	20	206	Katonga GR	
107	Murchison Falls NP & Buffer Reserve	601	901	Sango Bay	30
108	Queen Elizabeth NP	502		Others	200



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collaboration with UNEP/GRID*





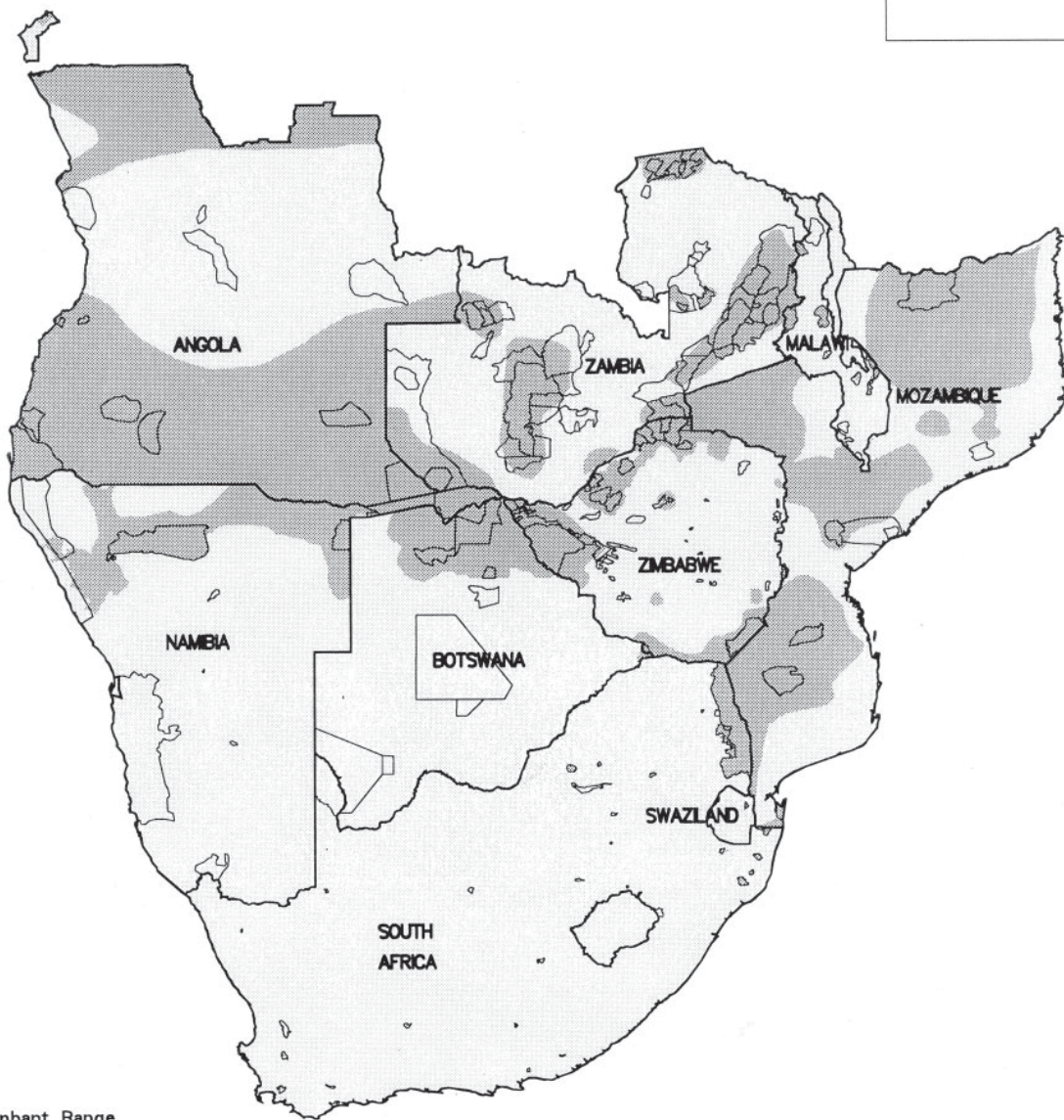
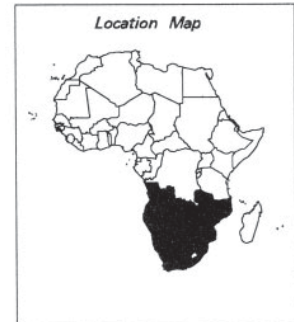
# **SOUTHERN AFRICA**

## SUMMARY OF ELEPHANT TOTALS FOR SOUTHERN AFRICA

REGION	COUNTRY	NUMBER OF ELEPHANTS				COUNTRY AREA (km <sup>2</sup> )	RANGE AREA (km <sup>2</sup> )	% OF TOTAL RANGE
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE			
Southern Africa	Angola	0	0	0	8,170	1,255,004	680,326	54.21
	Botswana	62,998	8,588	8,588	0	580,865	81,671	14.06
	Malawi	1,111	540	436	250	118,775	8,388	7.06
	Mozambique	825	185	485	13,405	789,855	468,113	59.27
	Namibia	5,843	3,058	3,098	0	828,183	145,344	17.55
	South Africa	9,990	20	0	0	1,224,437	22,695	1.85
	Swaziland	20	0	0	0	17,360	281	1.62
	Zambia	19,701	6,574	6,729	0	755,834	211,944	28.04
	Zimbabwe	56,297	11,674	13,884	0	392,729	106,476	27.11
	<b>Total</b>	<b>170,837</b>	<b>16,402</b>	<b>18,983</b>	<b>21,825</b>	<b>5,963,042</b>	<b>1,725,238</b>	<b>28.93</b>



# PROTECTED AREAS AND ELEPHANT RANGE IN SOUTHERN AFRICA



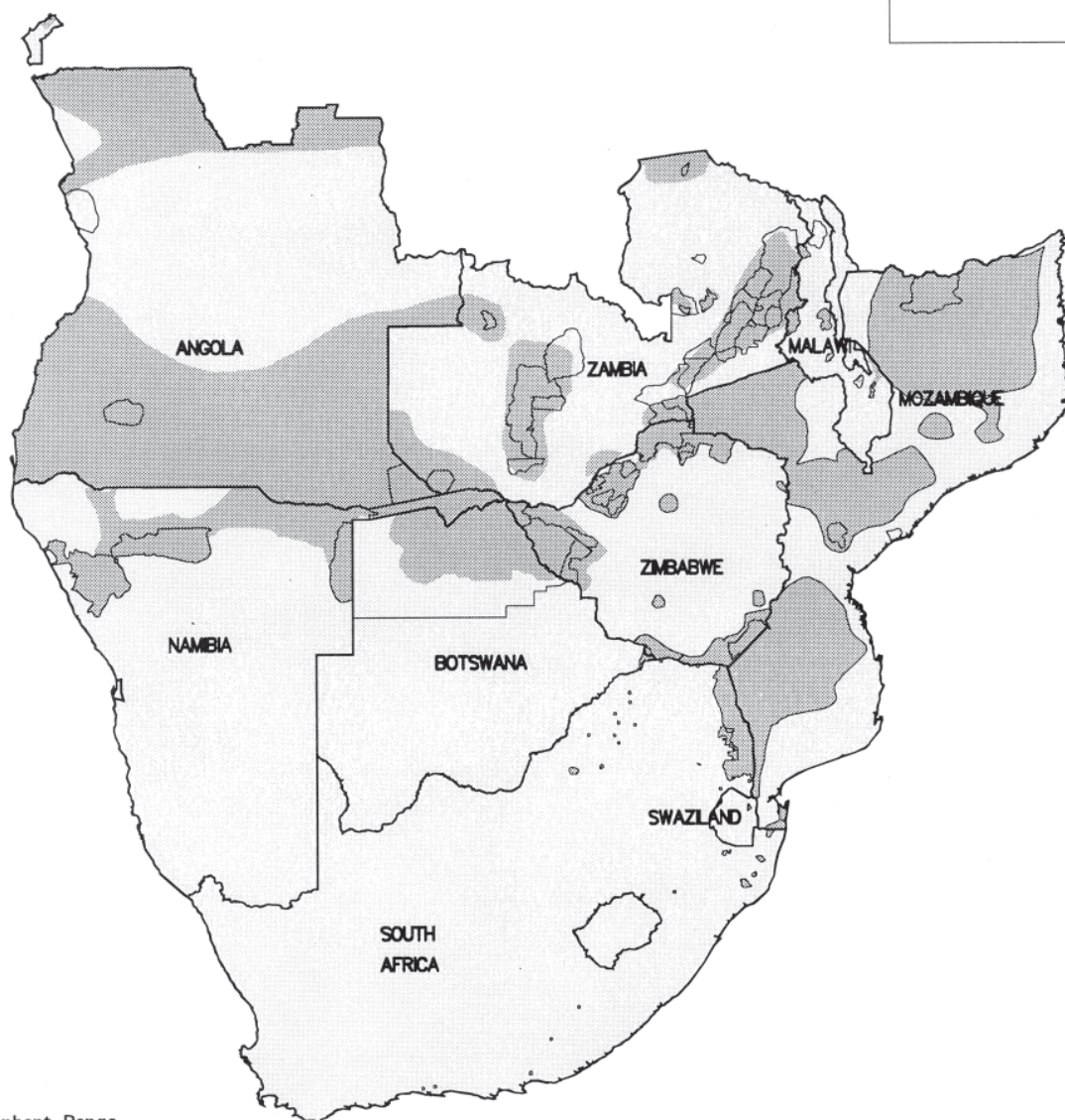
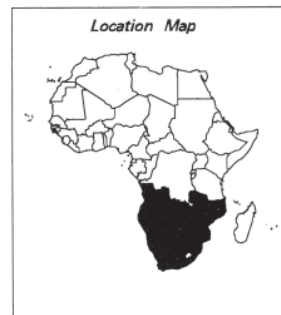
EGEND  
■ Elephant Range



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# INPUT AREAS AND ELEPHANT RANGE IN SOUTHERN AFRICA



LEGEND  
■ Elephant Range



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



## Angola

The civil war disrupted ongoing survey work and no updates have been received since the limited aerial surveys carried out by Hall-Martin and Pienaar (1992) in the south-east and the qualitative surveys of Anstey (1993), which were conducted in 1992. The ongoing ELESMAF programme may help to ascertain whether there are cross-

border movements between Angola, Namibia, Botswana Zimbabwe and Zambia.

The estimates in the tables have been downgraded to Data Category E due to the breakdown of political order since they were made.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### SOUTHERN AFRICA

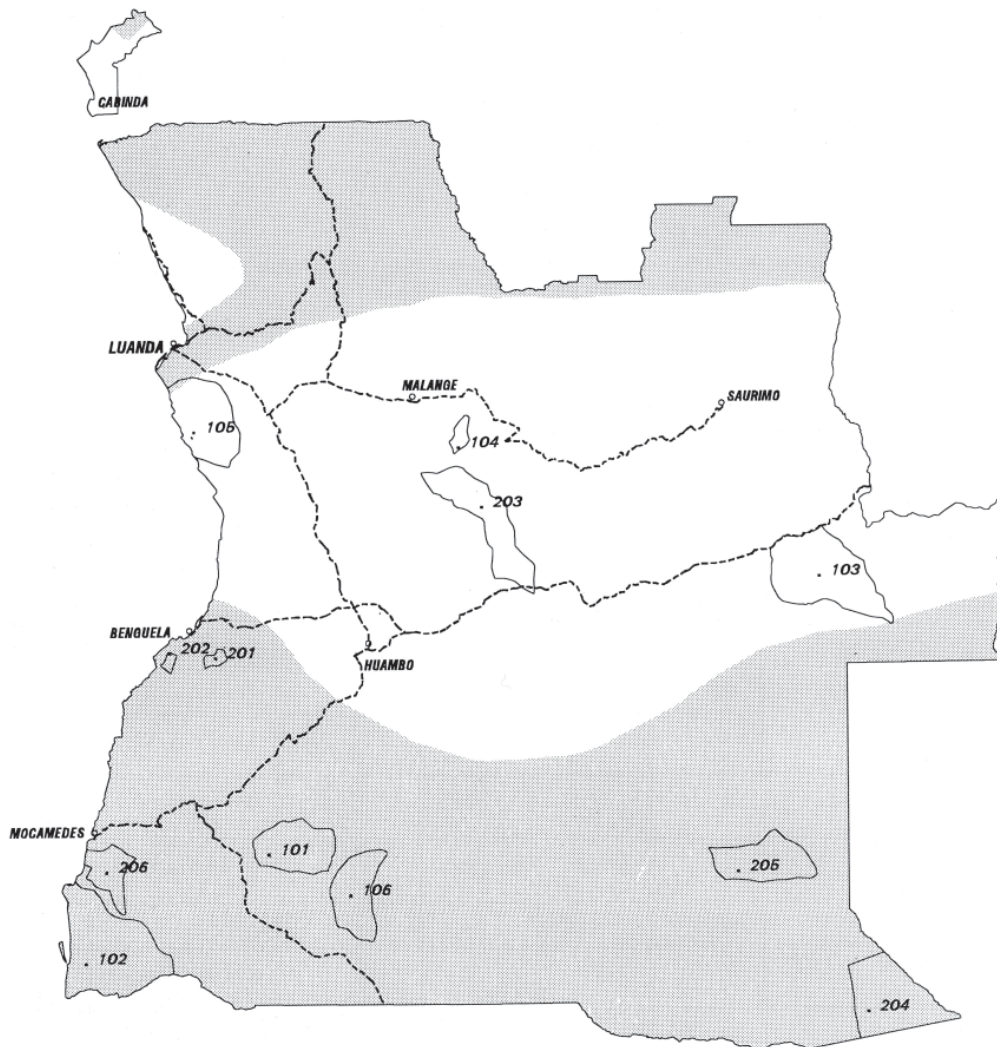
#### ANGOLA

CODE	ZONE	SURVEY DATE	AREA (km2)	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
101	Bikuar National Park	1992		60	–	Ansley, 1993	IG3	E
105	Kisama National Park	1992	9,500	100	–	Ansley, 1993	IG3	E
204	Luiana National Reserve	1989	9,504	3,390	–	Hall-Martin & Pienaar, 1992	AS3	E
951	Biongue	1989	10,890	1,020	–	Hall-Martin & Pienaar, 1992	AS3	E
952	Bongola Area	1992		60	-	Ansley, 1993	IG3	E
953	Cuando	1989		1,550	–	Hall-Martin & Pienaar, 1992	ASS	E
954	Villa Nova	1989	47,306	1,990	–	Hall-Martin & Pienaar, 1992	ASS	E

### SUMMARY OF TOTALS FOR ANGOLA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	0	0
E	Other Guesses and Other Extrapolations	0	0	0	8,170
	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8,170</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN ANGOLA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Bikuar NP
- 102 Iona NP
- 103 Kameia NP
- 104 Kangandala NP
- 105 Kisama NP
- 106 Mupa NP

### NATURAL RESERVES

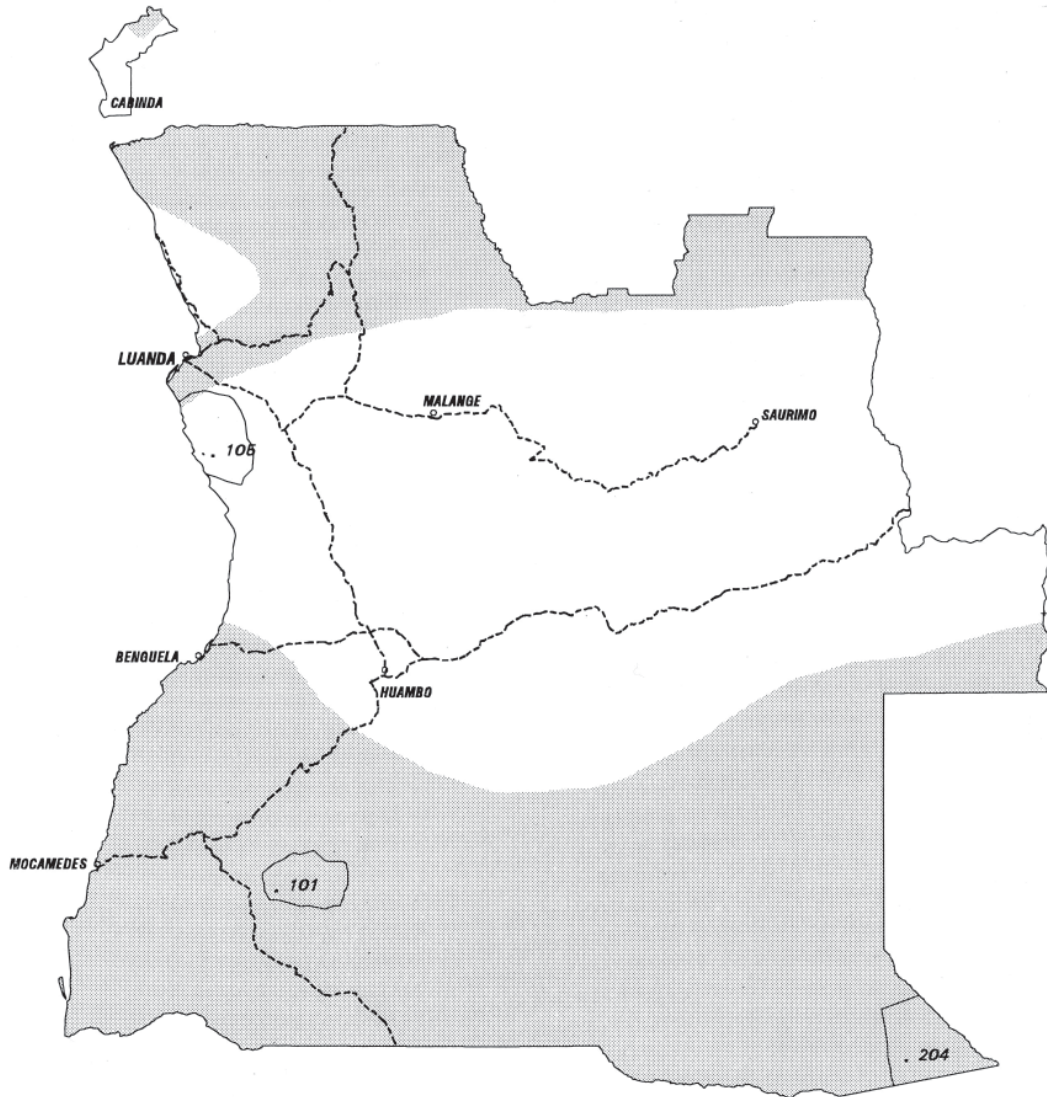
- 201 Bufalo NR
- 202 Chimalavera NR
- 203 Luando NR
- 204 Luiana NR
- 205 Mavinga NR
- 206 Mocamedes NR



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# INPUT AREAS AND ELEPHANT RANGE IN ANGOLA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
101	Bikuar NP	60	951	Biongue*	1020
105	Kisama NP	100	952	Bongola Areas*	60
204	Luiana NR	3390	953	Cuando*	1550
			954	Villa Nova*	1990



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## Botswana

Botswana's main elephant population is found in the north where elephant range extends into Zimbabwe and Namibia, and possibly into Zambia and Angola as well. A second, smaller population, shared with Zimbabwe, occurs in the extreme east of the country in Tuli at the Shashe/Limpopo confluence.

The cross-border populations are being surveyed by the ELESMAF programme of aerial counts, independently from the Department of Wildlife and National Parks which carries out regular systematic aerial sample surveys within Botswana.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### SOUTHERN AFRICA

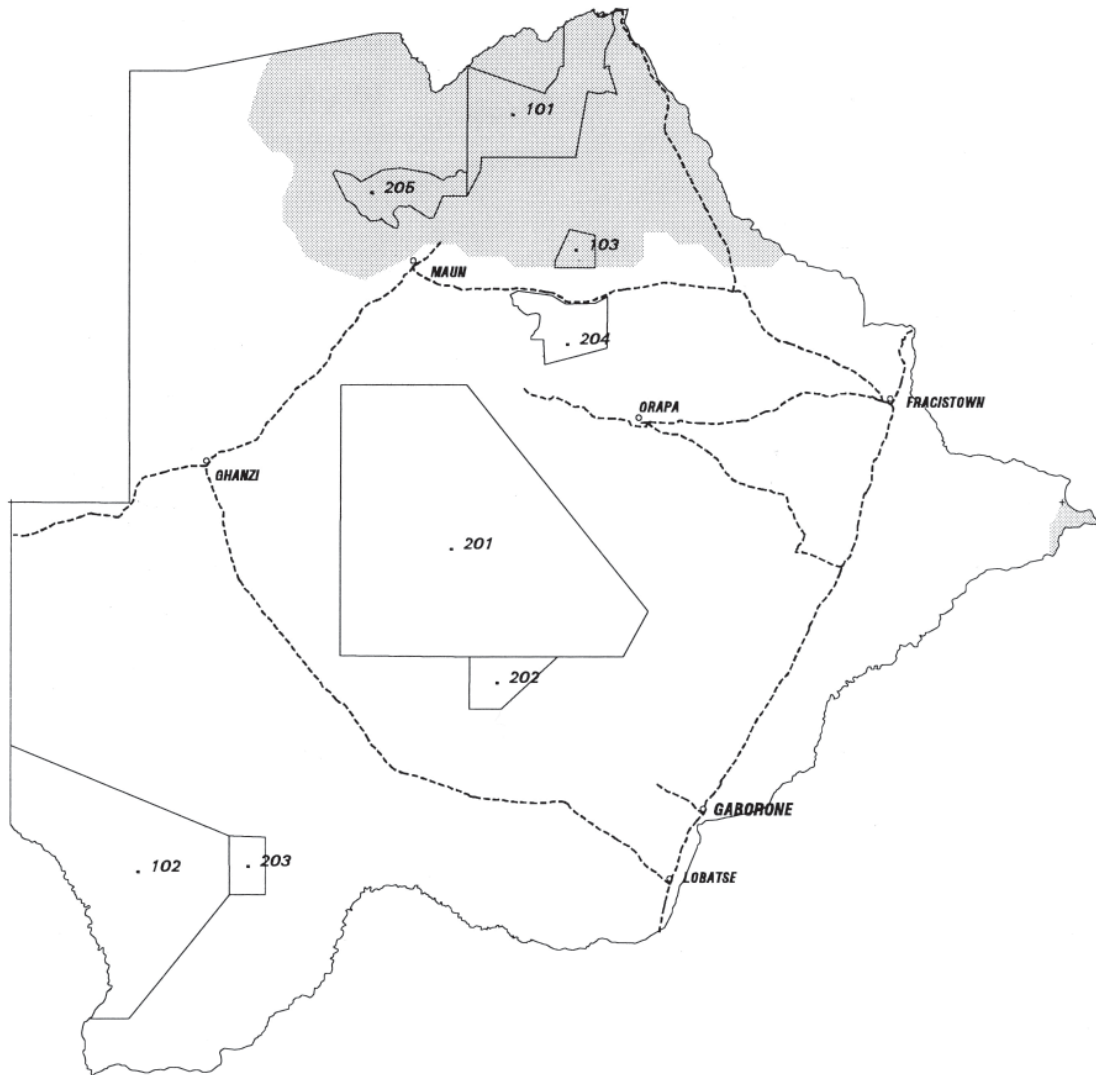
#### BOTSWANA

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
901	Northern Botswana	9/93,3/94, 9/94	159,013	70,755	±8,576	ULG, 1993, 1994a,b	AS1	B
902	Tuli Game Reserve	3/94,9/94	927	831	±456	ULG, 1994a,b	AS1	B
903	Rest of Botswana	3/94,9/94	419,019	0	–	ULG, 1994a,b	AS2	B

#### SUMMARY OF TOTALS FOR BOTSWANA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	62,998	8,588	8,588	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	0	0
E	Other Guesses and Other Extrapolations	0	0	0	0
	<b>TOTAL</b>	<b>62,998</b>	<b>8,588</b>	<b>8,588</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN BOTSWANA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

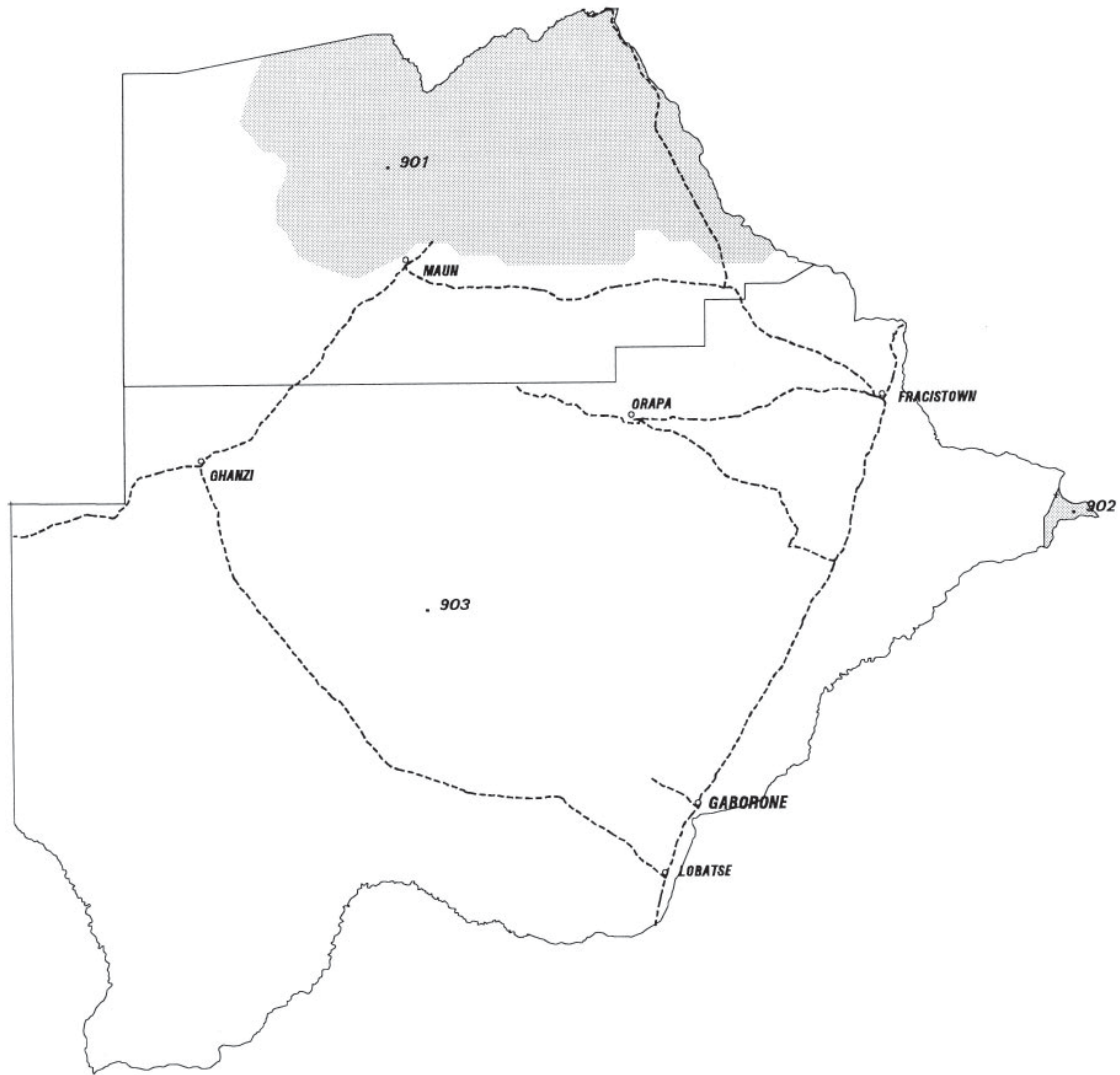
NATIONAL PARKS		GAME RESERVES	
101	Chobe NP	201	Central Kalahari GR
102	Gemsbok NP	202	Kutse GR
103	Nxai Pan NP	203	Mabuasehube GR
		204	Makgadikgadi Pans GR
		205	Moremi WR



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collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN BOTSWANA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE
901	Northern Botswana	70755
902	Tuli Game Reserve	B3 1
903	Rest of Botswana	0



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



## Malawi

Malawi's elephant populations are almost entirely confined to small protected areas. Most areas were re-surveyed in 1992 by aerial counts. The status of the elephant populations in Liwonde and Kasungu has been described by Mkanda (1993a), who also reported that the Majete population, which was estimated at 300 in 1992 (Douglas-Hamilton *et al.*, 1992), had probably been extirpated (Mkanda, 1993b). The latter situation has

recently been confirmed through ground surveys, field reports and a sample aerial survey of Majete Wildlife Reserve and the surrounding communal lands in October 1994. During the survey, 52 elephant carcasses were found. It is likely that the entire population was killed locally, mainly as a result of an influx of armed refugees from Mozambique into the area (Sherry, 1995).

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

## SOUTHERN AFRICA

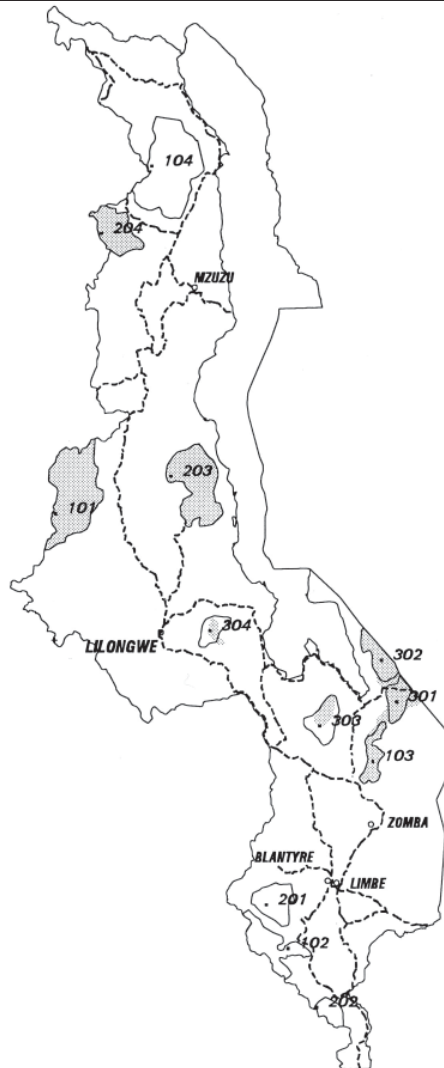
### MALAWI

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE &	DATA CATEGORY QUALITY
				ESTIMATE	95% CONFIDENCE LIMITS			
101	Kasungu National Park	1992	2,316	672	72	Mkanda, Quest. Reply, 1993b	AS2	B
103	Liwonde National Park	1992	548	365	0	Mkanda, Quest. Reply, 1993b	AT	A
104	Nyika National Park	1992	375	1772	±68	Mkanda, Quest. Reply, 1993b	DC	C
203	Nkhotakota Game Reserve	1992	1,802	71	±206	Mkanda, Quest. Reply, 1993b	AS2	B
204	Vwaza Marsh Game Reserve	1992	986	371	±296	Mkanda, Quest. Reply, 1993b	AS1	B
303 304	Phirilongwe Forest Thuma Forest	17989	1,000	250	–	Munthali, in Douglas-Hamilton <i>et al.</i> , 1 992	OG3	E



## SUMMARY OF TOTALS FOR MALAWI

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	365	0	0	0
B	Aerial Or Ground Sample Counts	746	368	368	0
C	Dung Counts	0	172	68	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	0	0
E	Other Guesses and Other Extrapolations	0	0	0	250
<b>TOTAL</b>		<b>1,111</b>	<b>540</b>	<b>436</b>	<b>250</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN MALAWI



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

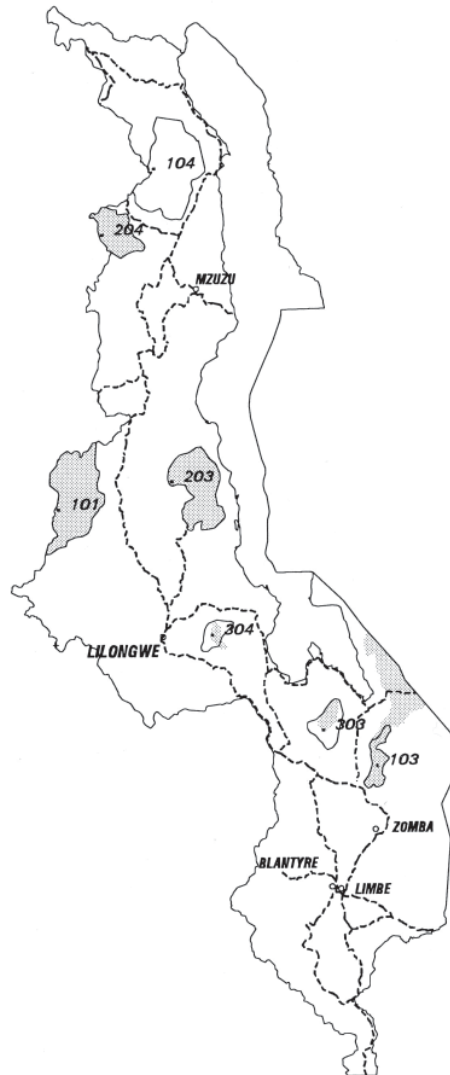
NATIONAL PARKS		GAME RESERVES		FOREST RESERVES	
101	Kasungu NP	201	Majete GR	301	Mangochi FR
102	Lengwe NP	202	Mwabvi GR	302	Namizimu FR
103	Liwonde NP	203	Nkhotakota GR	303	Phirilongwe FR
104	Nyika NP	204	Vwaza GR	304	Thuma FR



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN MALAWI



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE
101	Kasungu NP	672
103	Liwonde NP	365
104	Nyika NP	172
203	Nkhotakota GR	71
204	Vwaza Marsh GR	371
303	Phirilongwe FR and	250
304	Thuma FR	



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## Mozambique

Some assessment of the country's elephant populations has been possible in the initial recovery period since the settlement of the civil war. Systematic aerial surveys are currently being planned for later in 1995 (Anstey, pers. comm., 1995).

Chambal's (1993) estimates and range information are informed guesses based on data collected from 1985 to 1992 using questionnaires, interviews and aerial surveys. More recently, Cumming *et al.* (1994) carried out a sample aerial census in Gorongosa NP and estimated the population at 108, but this did not include the Marromeu swamp where at least 150 elephants may exist (Anstey,

pers. comm., 1995). According to Anstey (pers. comm., 1995) recent ground observations, which included crop-raiding reports, provided evidence for the existence of 50 to 150 elephants in Maputo Reserve, over 100 in Tete Province and over 700 in the Niassa Reserve area of Niassa/Cabo Delgado Province which borders on Tanzania. In 1994 Price Waterhouse carried out a brief reconnaissance survey for two days in the Gaza/Inhambane Provinces and although no elephants were recorded, some cross-border movement between Zimbabwe and South Africa may occur. Manica Province was not surveyed but about 100 elephants may exist in the lower zones of the Chimanimani mountain range.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 4 (worst), and left blank where unknown.

## SOUTHERN AFRICA

### MOZAMBIQUE

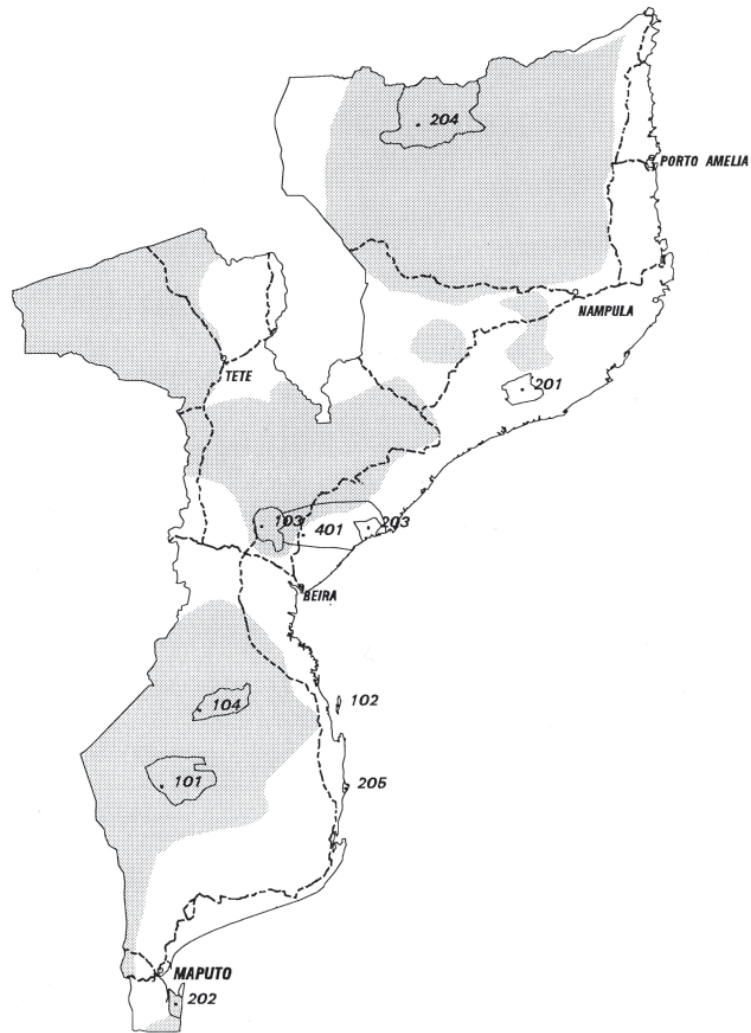
CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ESTIMATE	ELEPHANTS 95% CONFIDENCE LIMITS	SOURCE	SURVEY TYPE &	DATA CATEGORY QUALITY
103	Gorongosa National Park	1994	2,075	108	±185	Cumming <i>et al.</i> , 1994	AS3	B
202	Maputo Game Reserve			50	±100*	Analey pers. comm., 1995	1G3	D
203	Marromeu Game Reserve			150		Analey pers. comm., 1995	1G3	D
204	Niassa (Ruvuma) Game Reserve Area			717	-	Ansley pers. comm., 1995	GC	B
601	Central Zone	1992	341,339	8,175	-	Chambal, 1993	AS	E
602	Northern Zone	1992	167,335	3,825	-	Chambal, 1993	AS	E
603	Southern Zone	1992	280,173	3,000	-	Chambal, 1993	AS	E
	Chimanimami Mountain Range			100	-	Analey pers. comm., 1995	1G3	D

\* Range for Informed Guess


## SUMMARY OF TOTALS FOR MOZAMBIQUE

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	825	185	185	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	300	100
E	Other Guesses and Other Extrapolations	0	0	0	13,305
	<b>TOTAL</b>	<b>825</b>	<b>185</b>	<b>485</b>	<b>13,405</b>

# PROTECTED AREAS AND ELEPHANT RANGE MOZAMBIQUE



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Banhine NP
- 102 Bazaruto NP
- 103 Gorongosa NP
- 104 Zinhave NP

### GAME RESERVES

- 201 Gile GR
- 202 Maputo GR
- 203 Marromeu GR
- 204 Niassa (Rovuma) GR
- 205 Pomene GR

### WILDLIFE UTILIZATION UNIT

- 401 Zambezi WUU



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# INPUT AREAS AND ELEPHANT RANGE IN MOZAMBIQUE



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
Gorongosa NP	108	601	Central Zone	8175
Maputo GR	50	602	Northern Zone	3825
Marromeu GR	150	603	Southern Zone	3000
Niassa (Ruvuma) GR	717		Chimanimani Mountain*	100

\* Input zone not indicated on the Map



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



## Namibia

The elephants in Namibia are amongst the most nomadic of any elephants on the continent (Lindeque, 1995). Elephants in Namibia occupy a variety of habitats from desert (Kaokoveld area) to forest, but the populations all tend to be migratory. Etosha NP, Khadum GR and the Caprivi region are protected areas which harbour large populations but the elephants' range extends much further. Cross-border movements occur between northern

Botswana, Angola, Zimbabwe and Zambia and the populations are being surveyed under the ELESMA programme.

Elephant range is also expanding southwards through the establishment of translocated elephant populations on private land (Lindeque, 1995).

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

AC Aerial Count Unspecified

AS Aerial Sample Survey

AT Aerial Total Count

DC Dung Count

Ex Extrapolation from GIS

GC Ground Count

IR Total Count (Individual Registration)

IG Informed Guess

OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### SOUTHERN AFRICA

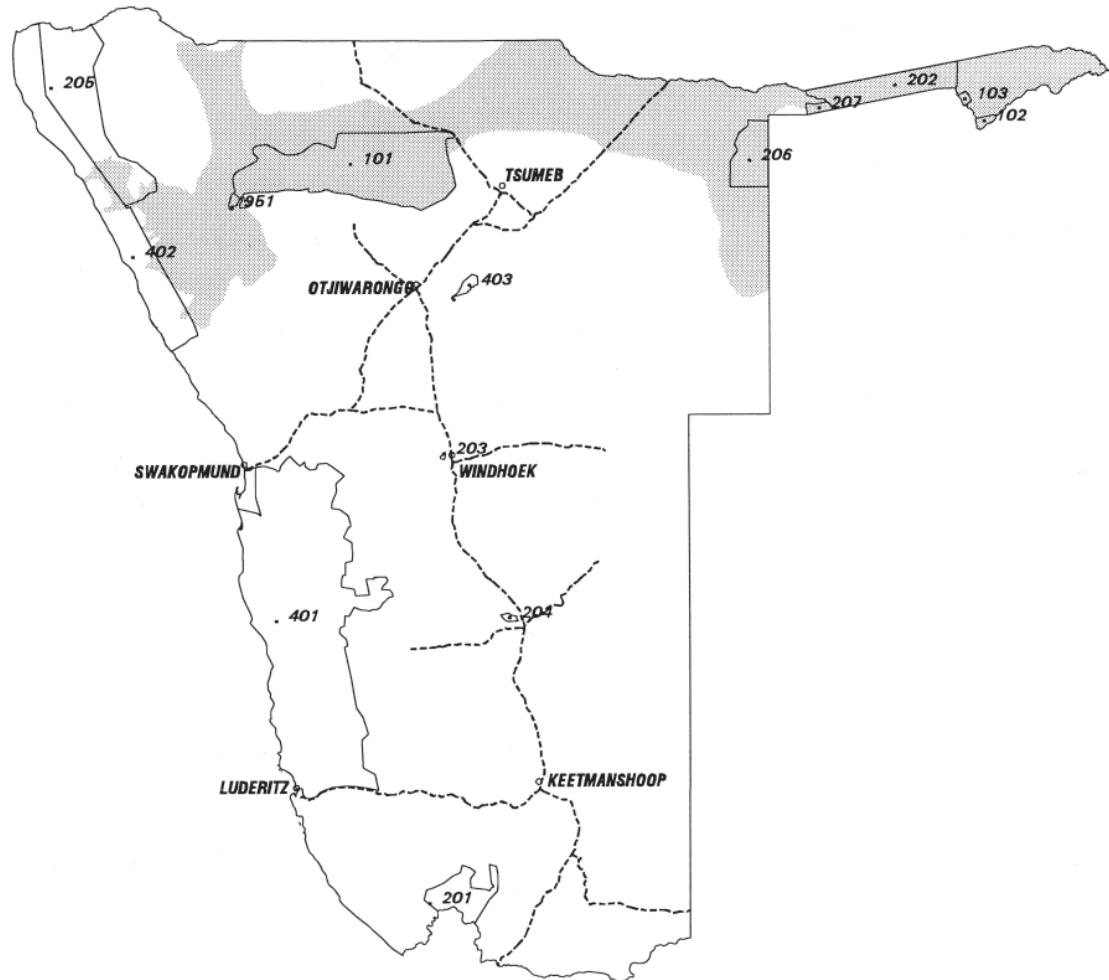
#### NAMIBIA

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	98% CONFIDENCE LIMITS			
101	Etosha National Park	17990	217,346	1,750	±250	Lindeque & Lindeque, 1990	ASI	B
601	Caprivi Region	1993	7,027	5,785	±3,046	Rodwell, 1993	ASI	N
602	Kaokoveld Area	1992	21,282	366	-	Loutit & Douglas-Hamilton, 1992	AT3	A
603	Khaudom Area	1990	12,492	1,000	±100	Lindeque & Lindeque, 1990	ASI	B


#### SUMMARY OF TOTALS FOR NAMIBIA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	366	0	0	0
B	Aerial or Ground Sample Counts	5,477	3,058	3,058	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	40	0
E	Other Guesses and Other Extrapolations	0	0	0	0
	<b>TOTAL</b>	<b>5,843</b>	<b>3,058</b>	<b>3,098</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN NAMIBIA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Etosha NP
- 102 Mamilii NP
- 103 Mudumu NP

### GAME PARKS

- 201 Ai-Ais Hot Springs GP
- 202 Caprivi GP

- 203 Daan Viljoen GP
- 204 Hardap GP
- 205 Kaokoland GP (Proposed)
- 206 Khaudom GP
- 207 Mahango GP

### PARKS

- 401 Namib Naukluft Park

- 402 Skeleton Coast Park
- 403 Waterberg Plateau Park

### CONCESSION AREA

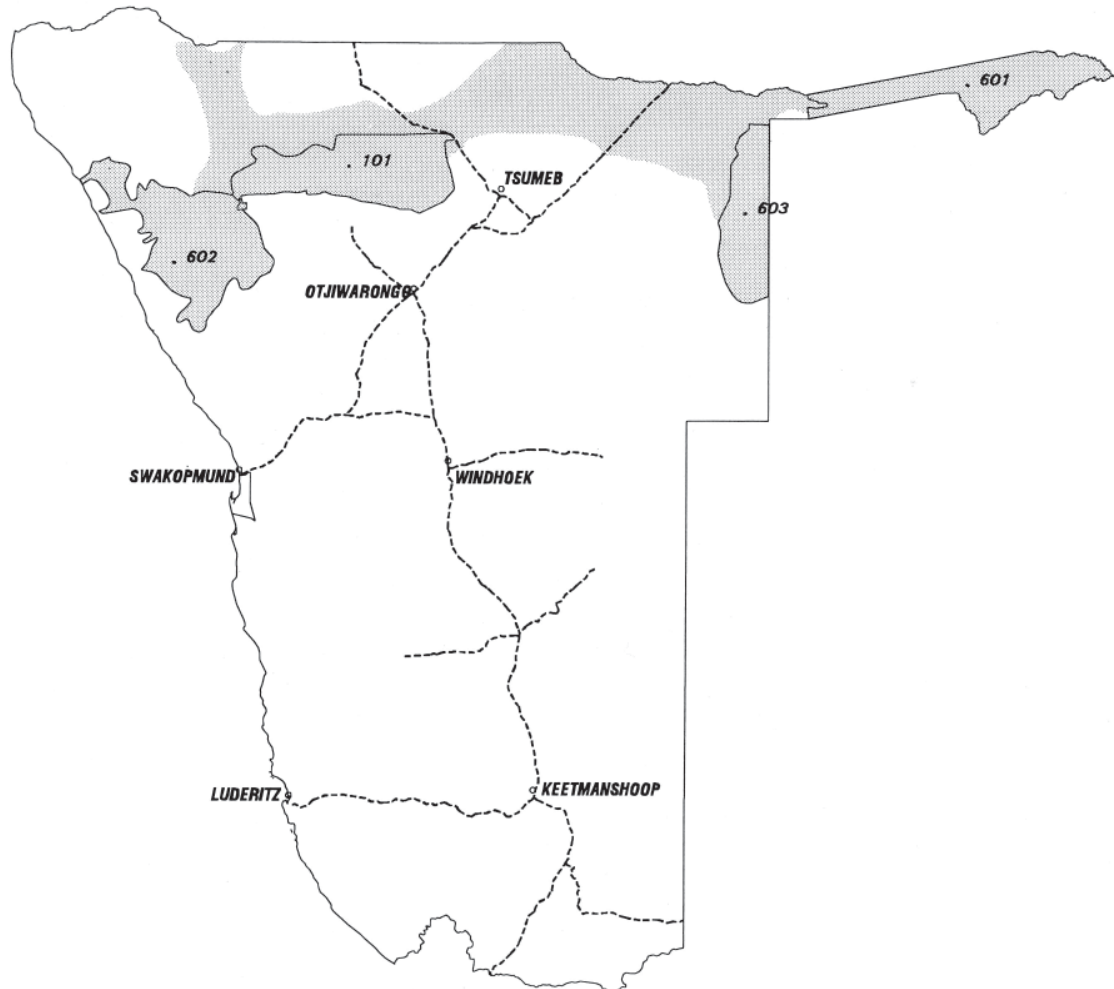
- 951 Hobatere Concession Area



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# INPUT AREAS AND ELEPHANT RANGE IN NAMIBIA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE
101	Etosha NP	1750
601	Caprivi Region	5785
602	Kaokoveld Area	366
603	Khaudom Area	1000



*African Elephant Database of IUCN/SSC/AESG in  
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## South Africa

South Africa's elephant population recovered *from a* low of 120 animals in 1920 to over 10,000 in 1992 (Hall-Martin, 1992). About 80% of South Africa's elephant population today is found in the Kruger NP, where an aerial total count using helicopters is carried out annually. The September 1995 total count of 8,064 represents a 3.3% increase on the 1994 count of 7,806 elephants (Whyte and Wood, 1994). It is expected that the numbers of elephants in the reserves adjacent to Kruger NP (Sabie Sand Wildtuin, Klaserie, Timbavati and Manyeleti), which make up the Kruger NP complex, will fluctuate in future because the fences adjacent to the Park's western boundary have been removed (Garai, 1994).

Translocations of elephants from Kruger to private ranches have led to the existence of small populations in

areas of former range. Not all of these are displayed on the map. Most of these populations are small enough to be counted individually. Family units as well as orphaned calves are now being translocated. In May 1994, 144 elephants in family groups were moved from Kruger NP to eight private game ranches in the country, and to Atherstone, a government-owned reserve (IFAW, 1995).

Remnants of wild populations are found in Addo and Knysna. Addo's elephants are also censused annually using helicopters for aerial total counts. Knysna's tiny population consists of three females (Walker, pers. comm., 1995), only one of which is from the remnant population, the other two having been translocated from Kruger NP. They represent the most southerly distribution of the African elephant.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed 1 (best) to 3 (worst), and left blank where unknown.

### SOUTHERN AFRICA

#### SOUTH AFRICA

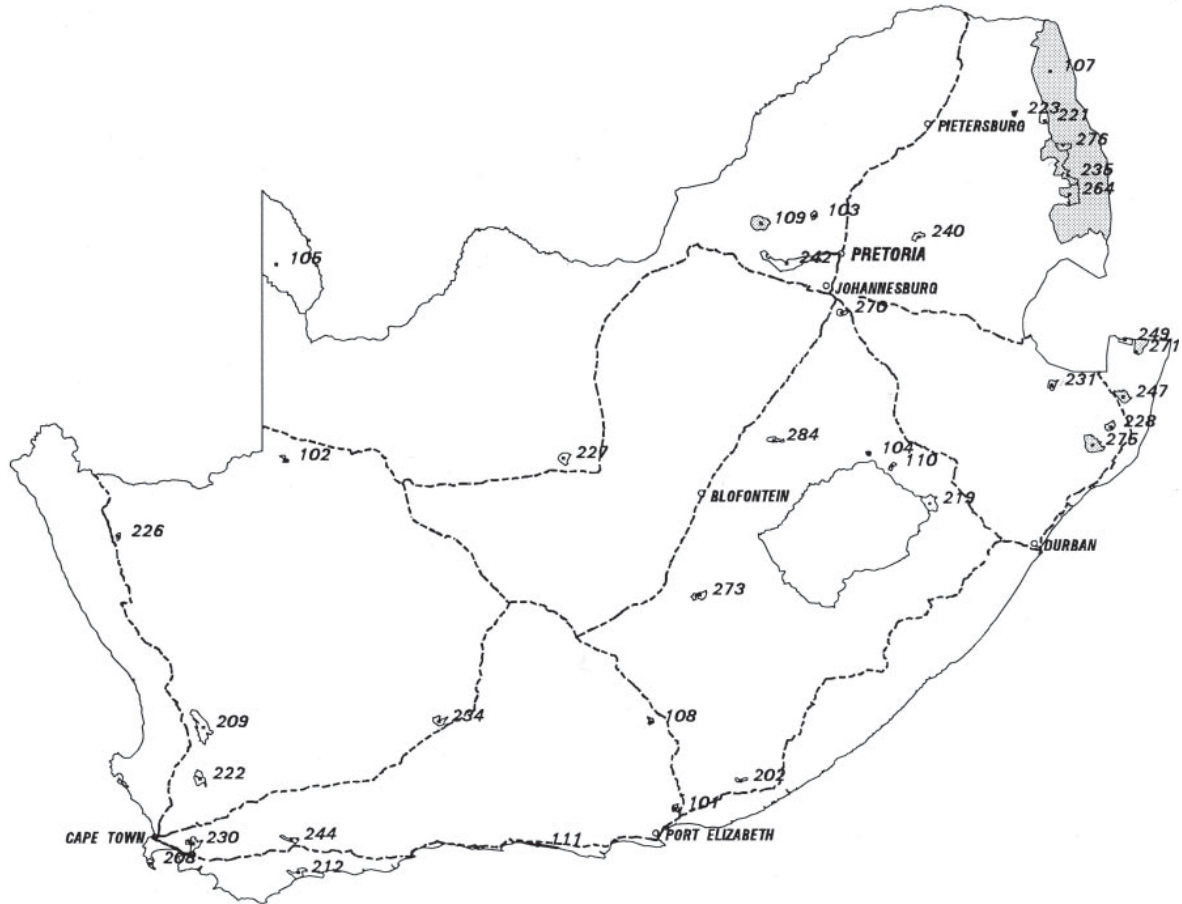
CODE	ZONE	SURVEY AREA	DATE (km2)	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
	<b>Transvaal</b>							
107	Kruger National Park	1995	19,485	8,064	0	Whyte & Wood, 1995	ATI	A
112	Songimvelo National Park	1994	490	18	-	Garai, 1994	IRI	A
235	Klaserie Game Reserve	1994	628	207	0	Whyte & Wood, 1994	ATI	A
264	Sable Sands Game Reserve	1993	572	51	0	Whyte Quest. Reply, 1993	ATI	A
272	Timbavati Game Reserve	1994	784	187	0	Whyte & Wood, 1994	ATI	A
276	Umbabat Game Reserve.	1994		117	0	Whyte & Wood, 1994	ATI	A
288	Tshukudu Game Lodge	1994	45	2	-	Garai, 1994	IRI	A
289	Thornybush Game Lodge	1995	80	18	-	Garai, pers. comm., 1995a	IRI	A
290	Mabula Game Lodge	1994	65	6	-	Garai, 1994	IRI	A
291	Mthethomusha Game Reserve	1994	72	17	-	Garai, 1994	IRI	A
292	Venetia Limpopo Nature Reserve	1995	300	45		Garai, pers. comm., 1995a	IRI	A
293	Mokolo River Nature Reserve	1994	45	6	-	Garai, 1994	IRI	A
294	Ndzalama Game Reserve	1994	79	8	-	Garai, 1994	IRI	A
295	Andover Game Reserve	1994	71	11	-	Garai, 1994	IRI	A
801	Letaba Game Ranch	1994	60	26	-	Garai, 1994	IRI	A
802	Kapama Game Farm	1994	120	18	-	Garai, 1994	IRI	A
803	Touchstone Game Ranch	1994	75	10	-	Garai, 1994	IRI	A
804	Mtibi Game Ranch	1994	25	6	-	Garai, 1994	IRI	A
805	Paradise Game Ranch	1994	30	6	-	Garai, 1994	IRI	A
901	Thaba Tholo	1994	250	17	-	Garai, 1994	IRI	A
802	Vosdal	1994	64	3	-	Garai, 1994	IRI	A
903	Rhinoland Safaris	1994	70	5	-	Garai, 1994	IRI	A

904	Kwalata	1994	90	22	-	Garai, 1994	IRI	A
905	Pro Game	1994		8	-	Garai, 1994	IR1	A
906	Greater Kududland Safaris	1995	120	6	-	Garai, pers. comm., 1995a	IRI	A
907	Lowhills	1994	30	8	-	Garai, 1994	IRI	A
908	Riverside	1995	40	6	-	Garai, pers. comm., 1995a	IR1	A
909	Elandsdrift	1995		2	-	Garai, pers. comm., 1995a	IRI	A
	<b>Natal</b>							
110	Natal Lion Park	1994		9	-	Garai, 1994	IRI	A
228	Hluhluwe Umfolozi Game Reserve	1995	1,000	160	+10*	Garai, pers. comm., 1995b	IRI	A
231	Itala Game Reserve	1994	300	49	-	Garai, 1994	IR1	A
247	Mkuze Game Reserve	1994	400	12	-	Garai, 1994	IR1	A
271	Tembe Elephant Park	1995	300	90	+10*	Garai, pers. comm., 1995b	AT/IR	A
296	Pumulanga	1994	27	3	-	Garai, 1994	IR1	A
297	Phinda Resource Reserve	1994	138	56	-	Garai, 1994	IRI	A
298	Mahlatini Game Reserve	1994	15	5	-	Garai, 1994	IRI	A
701	Thukela Biosphere	1994	240	9	-	Garai, 1994	IR1	A
806	Sutton Game Ranch	1994	20	4	-	Garai, 1994	IR1	A
910	Pamula Game Lodge	1994	21	5	-	Garai, 1994	IRI	A
911	Mkuze Falls Safaris	1994	22	3	-	Garai, 1994	IRI	A
912	Zulu Nyala Safaris	1994	7	4	-	Garai, 1994	IRI	A
	<b>Eastern Cape</b>							
101	Addo Elephant Park	1995	117	212	0	Knight & Hall-Martin, 1995	AT1	A
113	Knysna Elephant Park	1995		2	-	Garai, pers. comm., 1995a	IR1	A
200	Dubble Drift Game Reserve	1994		4	-	Garai, 1994	IR1	A
299	Shamwari Game Reserve	1994	60	22	-	Garai, 1994	IRI	A
913	Knysna State Forest	1994	300	3	-	Garai, 1994	IR1	A
	<b>North Western Province</b>							
103	Borakalalo National Park	1994	120	2	-	Garai, 1994	IRI	A
109	Pilanesberg National Park	1994	580	75	-	Garai, 1994	AT	A
300	Madikwe Game Reserve	1995	650	250	-	Garai, pers. comm., 1995b	AT/IR	A
914	Welgevonden	1995	255	51	-	Garai, pers. comm., 1995a	IRI	A
915	Atherstone	1994	230	22	-	Garai, 1994	IRI	A
917	Makalali Resource Reserve	1994	80	13	-	Garai, 1994	IRI	A
918	Phalaborwa Mining Co.	1994	41	14	-	Garai, 1994	IR1	A
919	Game Services	1994	20	6	-	Garai, 1994	IR1	A
920	Kaia Ingwe	1994	45	5	-	Garai, 1994	IRI	A

## SUMMARY OF TOTALS FOR SOUTH AFRICA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	9,990	20	0	0
B	Aerial or Ground Sample Counts		0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	0	0
E	Other Guesses and Other Extrapolations	0	0	0	0
<b>TOTAL</b>		<b>9,990</b>	<b>20</b>	<b>0</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN SOUTH AFRICA



## LEGEND

- Elephant Range
- \* Input Zone
- Roads
- o Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Addo Elephant NP
- 102 Augrabies Falls NP
- 103 Borakalalo NP
- 104 Golden Gate Highlands NP
- 105 Kalahari Gemsbok NP
- 106 Karro NP\*
- 107 Kruger NP
- 108 Mountain Zebra NP
- 109 Pilansberg NP
- 110 Riyal Natal NP
- 111 Tsisikama FoR and Coastal NP

### RESERVES

- 202 Andres Vosloo R
- 208 Cape of Good Hope NR
- 209 Cedeberg
- 212 De Hoop
- 219 Giant Castle NR
- 221 Groot Letaba
- 222 Groot Winterhoen
- 223 Hans Merensky NR
- 226 Hester Malan NR

- 227 Hetbad
- 228 Hluhluwe GR
- 230 Hottentotsholland
- 231 Itala GR
- 234 Karro NR
- 235 Klasserie NR
- 240 Loskop Dam NR
- 242 Magalisberg
- 244 Marloth
- 247 Mkuza GR

- 249 Ndumu GR
- 264 Sabie Sand PGR
- 270 Suikerbosrand NR
- 271 Tembe Elephant
- 272 Timbavati NR
- 273 Tussen Die Riviere NR
- 275 Umfolozi GR
- 276 Umbabat
- 284 Willem Pretor's GR



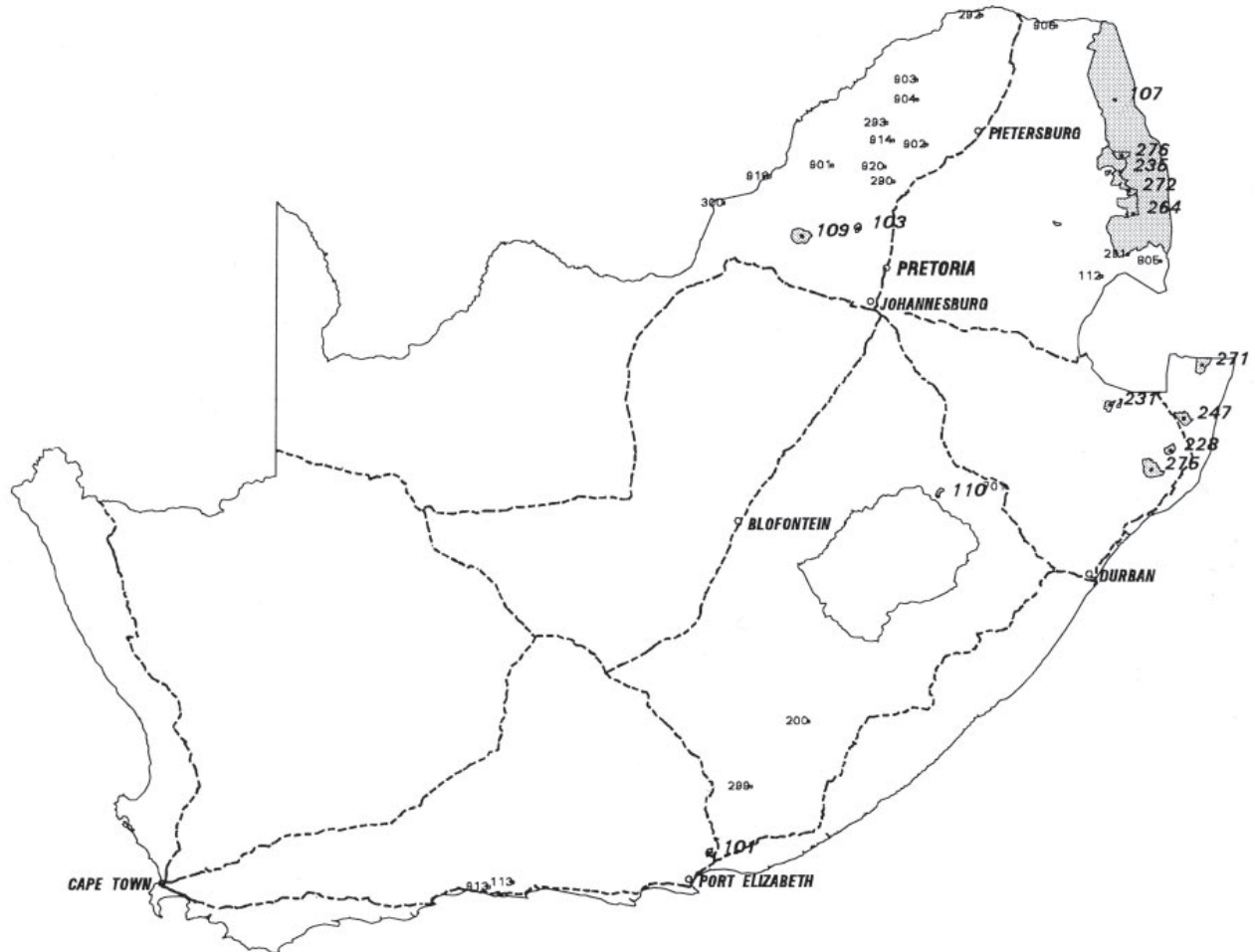
\* Protected Area not indicated on the map



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# INPUT AREAS AND ELEPHANT RANGE IN SOUTH AFRICA



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns



## KEY TO POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	ZONENAME	ESTIMATE	CODE	ZONENAME	ESTIMATE	CODE	ZONENAME	ESTIMATE
107	Kruger NP	8064	802	Kapman GF*	18	231	Itala GR	46	913	KnysnaSF	3
112	Songimvelo NP	18	803	Touchstone GR*	10	247	Mkuza GR	12	109	Pilansberg NP	76
236	Kiasire GR	207	806	Paradise GR	6	271	Tembe Elephant P	90	300	Madikwe GR	250
264	Sabie Sands GR	51	901	Thaba Tholo	6	296	Pumulanga GR*	3	914	Welgevonden	51
272	Timbavati GR	187	902	Vosdal	17	297	Phinda RR*	56	915	Atherstone*	22
276	Umbabat NR	117	903	Rhinoland S	3	298	Mhalatini GR*	5	917	Makalali RR	13
288	Tshukudu GL*	2	904	Kwalata	5	701	Thuklea B	9	918	Phalaborwa M. Co.*	14
289	Thornybush GL*	18	905	Pro Gama*	22	806	Sutton GR*	4	919	Game Services*	6
290	Mabula GL	6	906	Greater Kuduland S	8	910	Pamula GL*	5	920	Kala Ingwe	5
291	Mthethomusha GR	17	907	Lowhills*	6	911	mkuze Falls S*	3	103	Borakalalo	2
292	Venetia Limpopo NR	45	908	Riverside F*	8	912	Zulu Nyala S*	4			
293	Mokolo River NR*	6	909	Elandsdrift*	2	101	Addo Elephant P	212			
294	Ndzalama GR*	8	110	Natal Lion P	8	113	Knysna Elephant P	2			
295	Andover GR*	11	228	Hluluwe Umfolozi GR	160	200	Dubbie Drift GR	4			
601	LetabaGR*	26				299	Shawira GR	22			

\* Input area not indicated on the map



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collaboration with UNEP/GRID



## Swaziland

All of Swaziland's few elephants were translocated from South Africa.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- JR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

## SOUTHERN AFRICA

### SWAZILAND

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
201	Hlane Game Reserve	1999	127	9	0	Hall-Martin in Douglas-Hamilton <i>et al.</i> , 1992	IR1	A
202	Malolotja Nature Reserve	1993	154	2	0	Anderson, Quest. Reply 1993	IR1	A
203	Mkhaya Nature Reserve	1989		9	0	Hall-Martin in Douglas-Hamilton <i>et al.</i> , 1992	IR1	A

## SUMMARY OF TOTALS FOR SWAZILAND

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	20	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GISExtrapolations	0	0	0	0
E	Other Guesses and Other Extrapolations	0	0	0	0
	<b>TOTAL</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN SWAZILAND



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

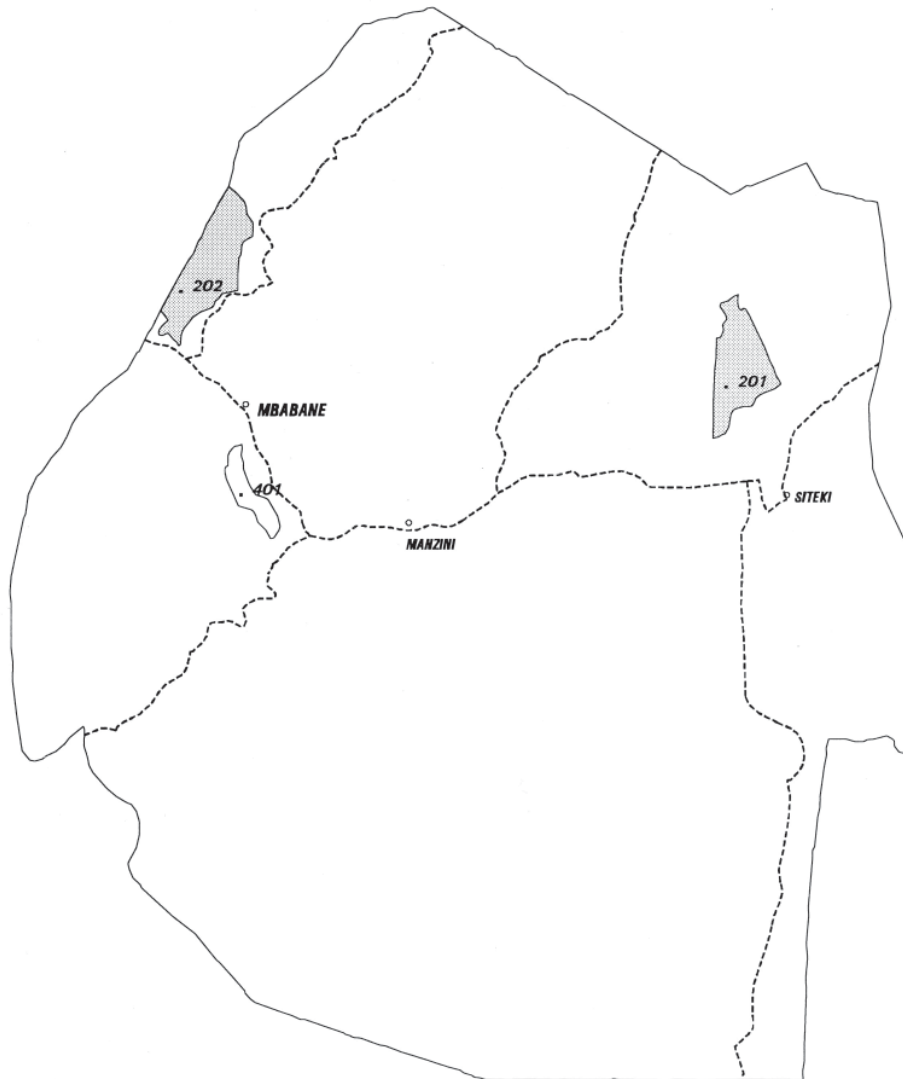
- |                     |                      |                           |
|---------------------|----------------------|---------------------------|
| <b>GAME RESERVE</b> | <b>NAURE RESERVE</b> | <b>WILDLIFE SANCTUARY</b> |
| 201 Hlane GR        | 202 Malolotja NR     | 401 Mlilwane WS           |



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN SWAZILAND



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE
210	Hlane GR	9
202	Malolotja NR	2
203	Mkhaya NR*	9

\* Input zone not indicated on the Map



African Elephant Database of IUCN/SSG/AESG in  
collaboration with UNEP/GRID





## Zambia

Illegal hunting for ivory in the mid 1970's to the late 1980s severely reduced Zambia's elephant population (Douglas-Hamilton, 1987) and elephants today are found mainly in Zambia's extensive protected area system. Aerial sample surveys were carried out in 1991, providing most of the newer estimates. More recent aerial sample surveys have been conducted in South Luangwa NP and Lupande GMA in 1993 (Jachmann, 1995) and 1994 (Jachmann and

Kalyocha, 1994). Some areas formerly designated as range (Douglas-Hamilton *et al.*, 1992) have been reduced or eliminated (Tembo, 1993).

Cross-border movements of elephants possibly occur between Zambia and Botswana, Angola and Zimbabwe to the south, Mozambique to the east and Zaire in the north.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

## SOUTHERN AFRICA

### ZAMBIA

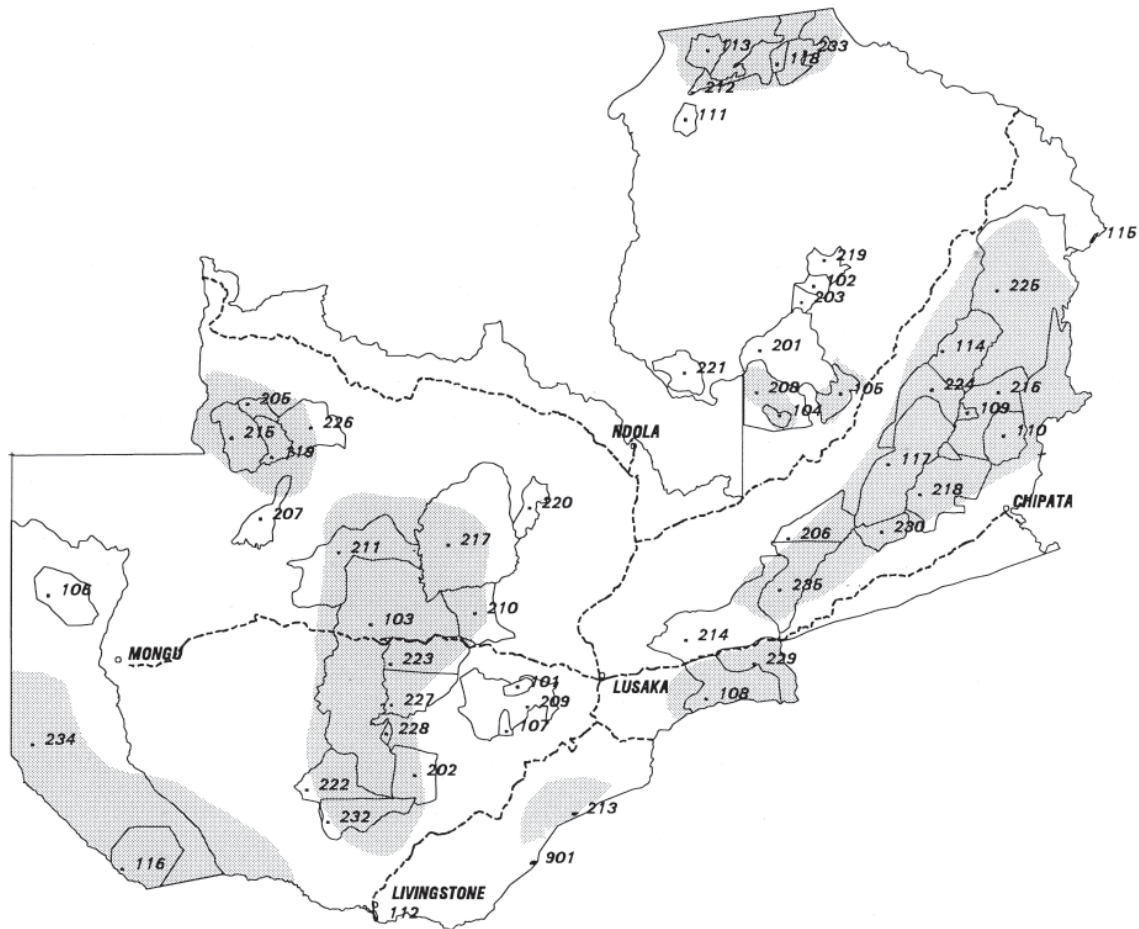
CODE	ZONE	SURVEY AREA	DATE (km2)	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				EST1MATE	95% CONFIDENCE LIMITS			
102	Isangano National Park	1993	840	3	-	Tembo, Quest. Reply, 1993	GC1	A
103	Kafue National Park	1901	22,400	5,927	±3,008	Tembo, Quest. Reply, 1993	AS2	B
104	Kasanka National Park	1991	390	50	-	Tembo, Quest. Reply, 1993	KG3	D
105	Lavushi Manda National Park	1991	1,500	15	-	Tembo, Quest. Reply, 1993	IG3	D
108	Lower Zambezi National Park	1991	4,092	328	±242	Chanda & Tembo, 1993	AS2	B
109	Luambe National Park	1994	320	54	±90	Jachmann & Kalyocha, 1994	AS2	B
110	Lukusuzi National Park	1994	1,920	110	±194	Jachmann & Kalyocha, 1994	AS2	B
112	Mosi-Oa-Tunya National Park	1991	66	19	0	Tembo, Quest. Reply, 1993	AT	A
114	North Luangwa National Park	1993	4,636	2,100	±366	Jachmann, Quest. Reply, 1994	AS2	B
116	Sioma-Ngwezi National Park	1991	5,276	1,187	±962	Tembo, 1995	AS2	B
117	South Luangwa National Park	1994	9,050	7,197	±2,402	Jachmann & Kalyocha, 1994	AS2	B
118	Sumbu National Park	1991	2,020	88	±128	Tembo, Quest. Reply, 1993	AS2	B
119	West Lunga National Park	1991	1,684	322	±584	Tembo, Quest. Reply, 1993	AS2	B
204	Chiawa Game Management Area	1991	2,344	31	±36	Chanda & Tembo, 1993	AS1	B
209	Chisomo Game Management Area	1994	3,450	469	± 1,006	Jachmann & Kalyocha., 1994	ASS	B
208	Kafinda Game Management Area	1991	3,860	50	-	Tembo, Quest. Reply, 1993	IG3	D
213	Katokota Game Management Area	1991		19	0	Tembo, Quest. Reply, 1993	AT	A
214	Luano Game Management Area	1981	8,950	40	-	Tembo, Quest. Reply, 1993	IG3	D
216	Lumimba Game Management Area	1994	2,700	299	±328	Jachmann & Kalyocha, 1994	AS3	B

217	Lunga Luswishi Game Management Area	1991	13,340	125	±226	Tembo, Quest. Reply, 1993	AS2	B
218	Lupande Game Management Area	1993	4,840	666	±116	Jachmann, 1995	AS2	B
223	Mumbwa Game Management Area	1991	3,370	2,538	±3,948	Tembo, Quest. Reply, 1993	AS2	B
224	Munyamadzi Game Management Area	1994	2,500	459	±340	Jachmann & Kalyocha, 1994	AS3	B.
225	Musalangu Game Management Area	1991	17,350	624	±546	Tembo, Quest. Reply, 1993	AS2	B
230	Sandwe Game Management Area	1994	1,500	131	± 190	Jachmann & Kalyocha, 1994	AS2	B
231	Sekula Game Management Area	1991		7	0	Tembo, Quest. Reply, 1993	AT	A
232	Sichifulo/Mulobezi Game Management Area	1901	7,383	1,673	±2,116	Tembo, Quest. Reply, 1993	AS2	B
235	West Petauke Game Management Area	1994	3,842	1,850	±3,386	Jachmann & Kalyocha, 1994	AS3	B
291	Chete Island	1991	32	49	0	Tembo, Quest. Reply, 1993	AT	A

## ASUMMARY OF TOTALS FOR ZAMBIA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	97	0	0	0
B	Aerial or Ground Sample Counts	19,604	6,574	6,574	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	155	0
E	Other Guesses and Other Extrapolations	0	0	0	0
	<b>TOTAL</b>	<b>19,701</b>	<b>6,574</b>	<b>6,729</b>	<b>0</b>

# INPUT AREAS AND ELEPHANT RANGE IN ZAMBIA



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY TO PROTECTED AREAS

<b>NATIONAL PARKS</b>	112	Mosi-Oa-Tunya NP	203	Chambeshi GMA	227	Namwala GMA	227	Namwala GMA	
101	Blue Lagoon NP	113	Mweru Wantipe NP	204	Chiawa GMA*	216	Lumimba GMA	228	Nkala GMA
102	Isangano NP	114	North Luangwa NP	205	Chibwika-Ntambu GMA	217	Lunga-Luswishi GMA	229	Rufunsa GMA
103	Kafue NP	115	Nyika NP	206	Chisomo GMA	218	Lupande GMA	230	Sandwe GMA
104	Kansaka NP	116	Sioma Ngwezi NP	207	Chizera GMA	219	Luwingu GMA	231	Sekula GMA*
105	Lavushi Mandu NP	117	South Luangwa NP	208	Kafinda GMA	220	Machiya-Funulwe GMA	231	Sichifulo Mulobezi GMA
106	Liuwa Plain NP	118	Sumbu NP	209	Kafue Flats GMA	221	Mansa GMA	233	Tondwa GMA
107	Lochinvar NP	119	West Lunga NP	210	Kaluanyembe GMA	222	Mulobezi GMA	234	West Zambezi GMA
108	Lower Zambezi NP			211	Kansonso-Busanga GMA	223	Mumbwa GMA	235	West Petauke GMA
109	Luambe NP	<b>GAME MANAGEMENT AREA</b>		212	Kaputa GMA	224	Munyamadzi GMA		
110	Lukusuzi NP	201	Bangwelu GMA	213	Katokota GMA	225	Musalngu GMA	<b>OTHERS</b>	
111	Lusenga NP	202	Bilili Sprongs GMA	214	Luano GMA	226	Musela-Matebo GMA	901	Chete Island

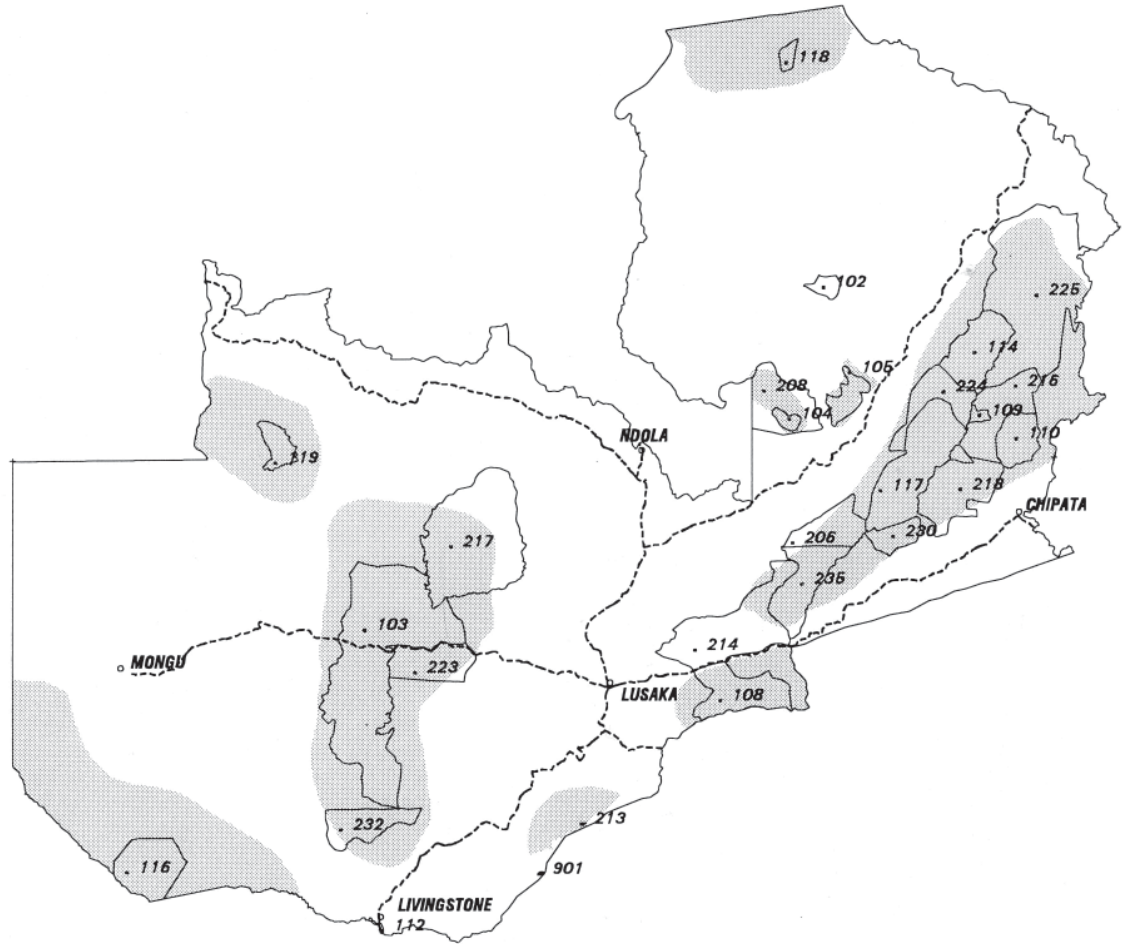
\* Protected area not indicated on the Map



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# INPUT AREAS AND ELEPHANT RANGE IN ZAMBIA



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
102	Isangano NP	3	117	South Luangwa NP	7197	218	Lupande GMA	666
103	Kafue NP	5927	118	Sumbu NP	88	223	Mumbwa GMA	2538
104	Kasanka NP	50	119	West Lunga NP	322	224	Myamadazi GMA	499
105	Lavushi Mandu NP	15	204	Chiawa GMA*	31	225	Musalangu GMA	624
108	Lower Zambezi NP	328	206	Chisomo GMA	469	230	Sandwe GMA	131
109	Luambe NP	54	208	Kafinda GMA	50	231	Sakula GMA*	7
110	Lukusuzi NP	110	213	Katokota GMA	19	232	Sichifulo Mulobezi GMA	1673
112	Mosi-Oa-Tunya NP	19	214	Luano GMA	40	235	West Petauke GMA	1850
114	North Luangwa NP	2100	216	Limimba GMA	299	901	Chete Island	49
116	Sioma-Ngwezi NP	1187	217	Lunga Luswishi GMA	125			

\* Input zone not indicated on the Map



African Elephant Database of IUCN/SSG/AESG in  
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## Zimbabwe

Data collected by the Department of National Parks and Wild Life Management in 1993 and 1994 are largely based on aerial sample surveys, which have been conducted on a fairly regular basis for many years.

Zimbabwe has pioneered the technique of elephant family translocations, triggered off by the severe drought conditions prevailing in south-east Zimbabwe in 1992. In 1993 more than 600 elephants in family groups were translocated from Gona-re-zhou NP to the Save Valley Conservancy in south-eastern Zimbabwe while 200 were successfully transported over 1300km away to the

Madikwe GR in South Africa, under the direction of Clem Coetsee (Coetsee, 1995); the technique has aroused considerable public interest. Translocations of crop-raiding elephants have also been carried out.

Zimbabwe is participating in the regional ELESMAF programme to study cross-border populations between Zimbabwe, Botswana, Namibia, Zambia and Angola. There is also possible movement between Zimbabwe and Zambia, Zimbabwe and Mozambique and Zimbabwe and South Africa.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### SOUTHERN AFRICA

#### ZIMBABWE

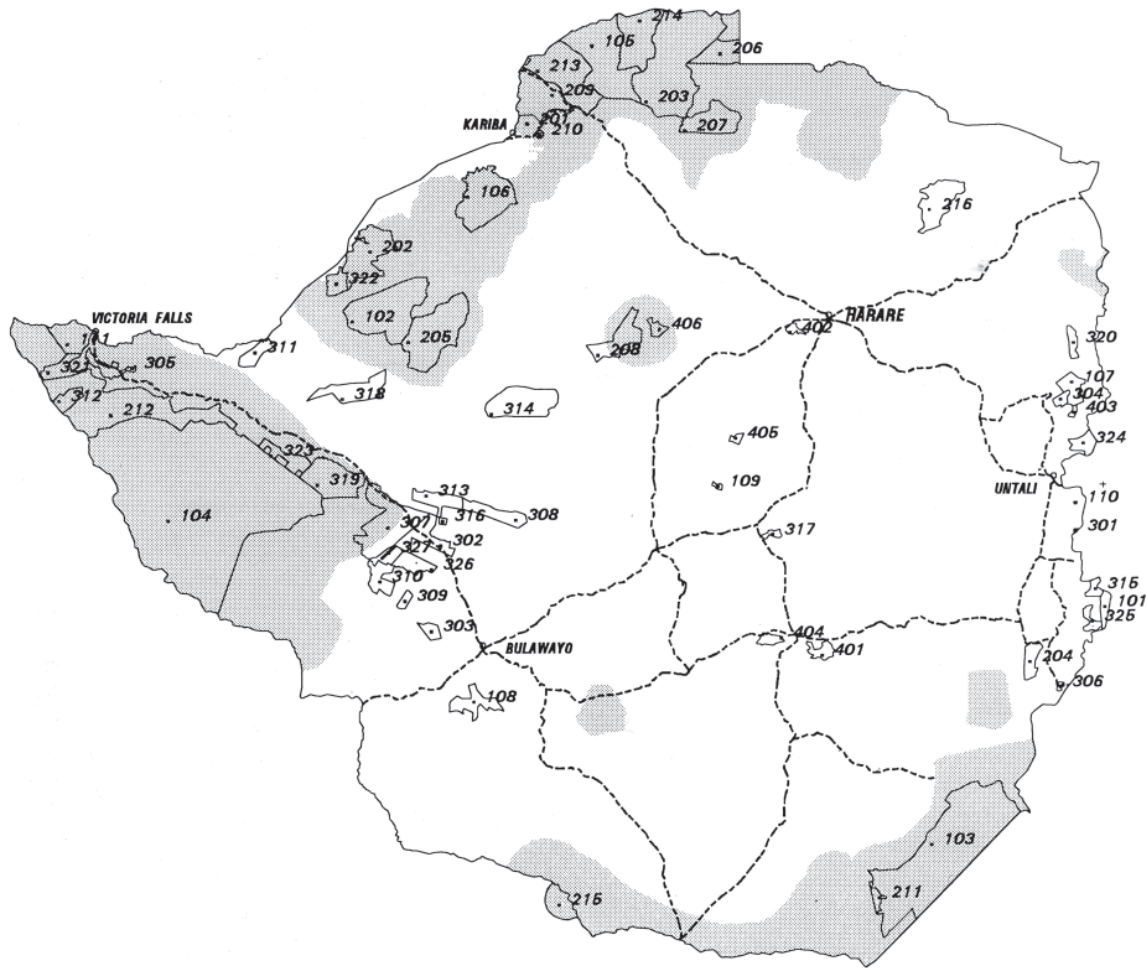
CODE	ZONE	SURVEY AREA	DATE (km2)	NUMBER OF ELEPHANTS		SOURCE QUALITY	SURVEY TYPE &	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
	<b>Matabeleland</b>							
104	Hwange National Park	1994	15.219	31,576	± 10,728	Davies & Craig (in prep); Craig, 1994	AS2	B
212	Matetsi Safari Complex	1994	4,399	4,451	± 1,918	Davies & Craig (in prep); Craig, 1994	AS2	B
391	Forest Area	1994	2,344	706	± 594	Davies & Craig (in prep); Craig, 1994	AS2	B
851	Communal Lands	1994	3.110	689	±1,680	Davies & Craig (in prep); Craig, 1994	AS2	B
	<b>Sebungwe</b>							
102	Chizarira National Park	1993	2,161	2,508	± 1,017	Craig, pers. comm., 1995	AS2	B
106	Matusadona National Park	1993	1.343	1,893	± 914	Cumming <i>et al.</i> , (in prep)	- AS2	B
202	Chete Safari Area	1993	1,237	1,113	± 692	Cumming <i>et al.</i> , (in prep)	AS2	B
205	Chirisa Safari Area	1993	1.498	1,738	± 1,102	Cumming <i>et al.</i> , (in prep)	AS2	B
322	Sijarira Forest	1993	259	70	±194	Cumming <i>et al.</i> , (in prep)	AS2	B
852	Communal Lands	1993	8,292	3,151	±1,220	Cumming <i>et al.</i> , (in prep)	AS2	B
	<b>Zambezi valley</b>							
401	Parks Areas	1993	10.880	14,361	± 2,322	Bowler, 1995	AS2	B
853	Communal Lands	1993	7.786	1,090	± 933	Cumming <i>et al.</i> , (in prep)	AS2	B

Other Zones								
103	Gona re Zhou National Park	1995	5,189	4,625	±1,729	Douglas-Hamilton, 1995	AS2	B
951	Zone 14	1993	925	100	-	DNPWLM (in prep.)	IG3	D
952	Zone 15	1993	100	50	-	DNPWLM (in prep.)	IG3	D
953	Zone 16	1993	72	50	-	DNPWLM (in prep.)	IG3	D
208	Hartley Safari Area	1993	642	100	-	DNPWLM (in prep.)	IG3	D
954	Zone 19	1993	132	600	-	DNPWLM (in prep.)	IG3	D
955	Zone 19	1993	107	100	-	DNPWLM (in prep.)	IG3	D
215	Tuli Safari Area	1993	429	60	-	DNPWLM (in prep.)	IG3	D
956	Zone 21	1993	450	400	-	DNPWLM (in prep.)	IG3	D
957	Zone 22	1993	1,051	50	-	DNPWLM (in prep.)	IG3	D
958	Zone 23	1993		300	-	DNPWLM (in prep.)	IG3	D
959	Zone 24	1993		400	-	DNPWLM (in prep.)	IG3	D

## SUMMARY OF TOTALS FOR ZIMBABWE

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POS8IBLE	8PECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	56,297	11,674	11,674	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	2,210	0
E	Other Guesses and Other Extrapolations	0	0	0	0
<b>TOTAL</b>		<b>56,297</b>	<b>11,674</b>	<b>13,884</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN ZIMBABWE



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

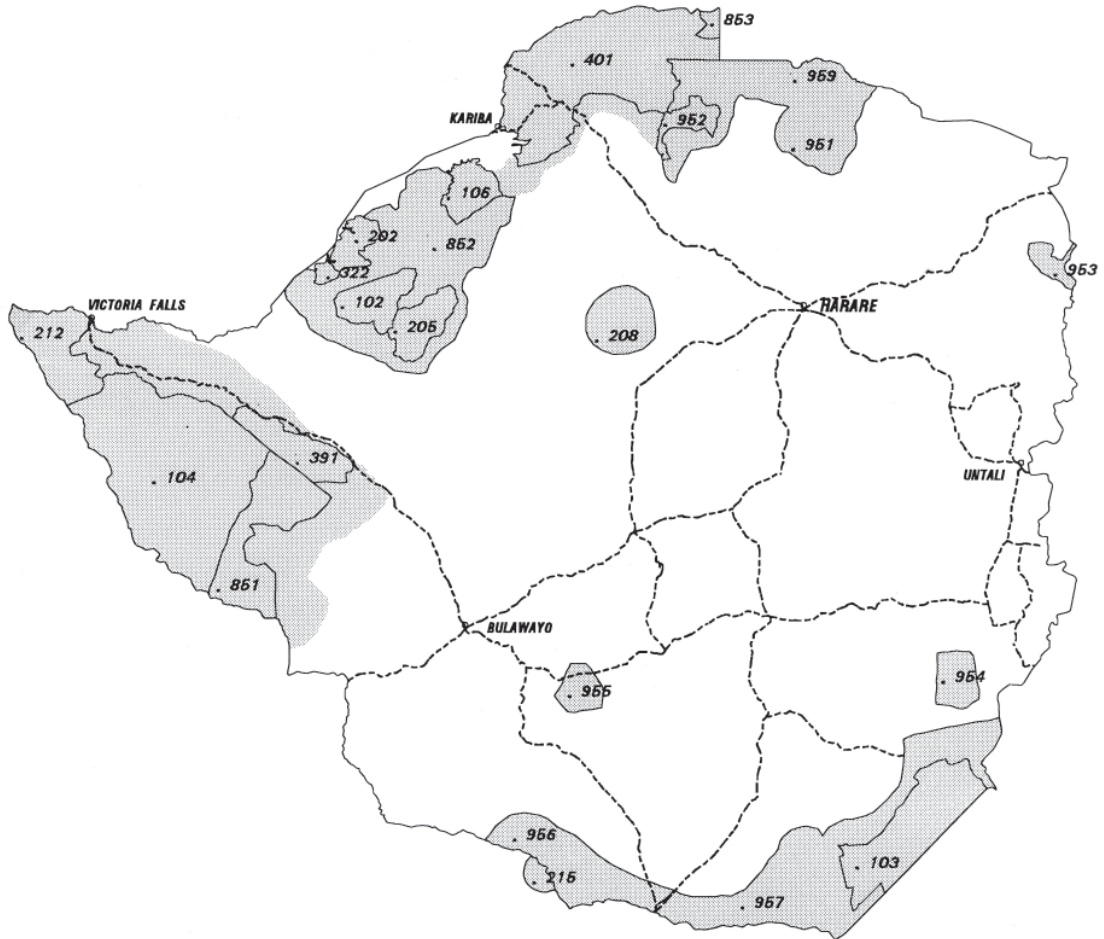
<b>NATIONAL PARK</b>	<b>SAFARI AREA</b>	215 Tuli SA	312 Kazuma Pan FA	327 Umzibani
101 Chimanimani NP	201 Charara SA	216 Umfurudzi SA	313 Lake Akice F	
102 Chizarira NP	202 Chete SA		314 Mafungabusi FA	<b>RECREATIONAL PARKS</b>
103 Gona re zhou NP	203 Chewore SA	<b>FOREST LAND</b>	315 Martin F	401 Kyle RP
104 Hwange NP	204 Chipinga SA	301 Bantli F	316 Molo F	402 Lake Robertson RP
105 Mana Poole NP	205 Chirisa SA	302 Bambezi FA	317 Mtao F	403 Mtarazi Falls RP
106 Mutusadona NP	206 Dande SA	303 Chesha FA	318 Mzolo FA	404 Mushandike RP
107 Rhodes Inyanga NP	207 Doma SA	304 Erin F	319 Ngamo F	405 Ngezi RP
108 Rhodes Matopos NP	208 Hartley SA	305 Fuller F	320 Nyangui FA	406 Umfuli RP
109 Sebakwe NP	209 Hurungwe SA	306 Gununyana F	321 Panda Masule FA	
110 Vumba NP	210 Kariba SA	307 Gwasi FA	322 Sijaira F	
111 Zambezi NP	211 Malapati SA	308 Gwampa FA	323 Sikumi F	
	212 Matetsi SA	309 Inseze FA Ext.	324 Stapelford F	
	213 Nyakasanga SA	310 Inseze FA	325 Tark F	
	214 Sapi SA	311 Kavira FA	326 Umguza F	



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# PROTECTED AREAS AND ELEPHANT RANGE IN ZIMBABWE



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
104	Hwange NP	31578	322	Sijarira Forest	70	952	Zone 15	50
212	Matetsi Safari Complex	4451	852	Communal Lands	3151	953	Zone 16	50
391	Forest Area	706	401	Parks Areas	14361	954	Zone 18	600
851	Communal Lands	689	853	Communal Lands	1090	955	Zone 19	100
102	Chizarira NP	2508	103	Gona re Zhou NP	4625	956	Zone 21	400
106	Matusadona NP	1893	208	Hartley SA	100	957	Zone 22	50
202	Cheta SA	1113	215	Tuli SA	60	958	Zone 23*	300
205	Chrisa SA	1738	951	Zone 14	100	959	Zone 24	400

\* Input zone not indicated on the Map



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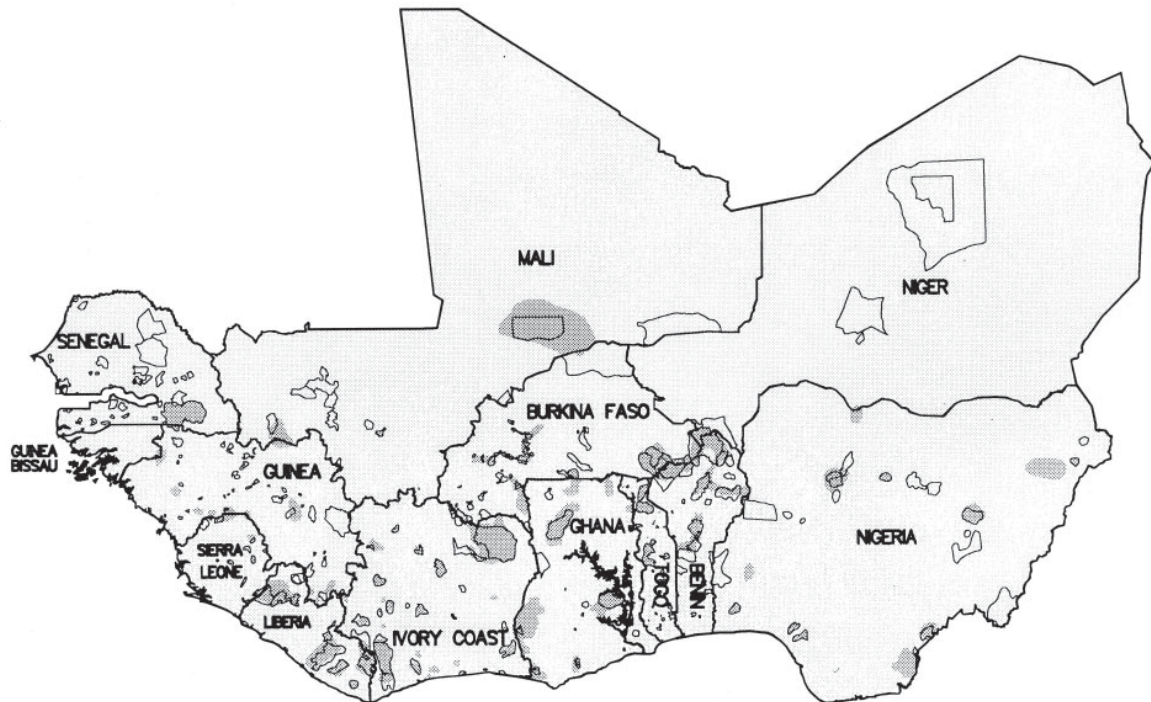
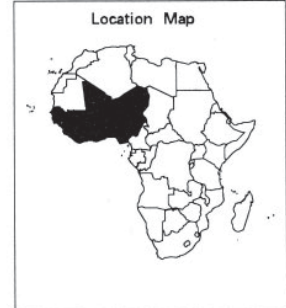
# **WEST AFRICA**



## SUMMARY OF ELEPHANT TOTALS FOR WEST AFRICA

REGION	COUNTRY	NUMBER OF ELEPHANTS				COUNTRY AREA (km2)	RANGE AREA (km2)	%OF RANGE TOTAL
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE			
West Africa	Benin	0	0	1,400	150	116,279	21,152	18.19
	Burkina Faso	1,469	583	583	0	276,372	21,320	7.71
	Ghana	672	427	1,416	443	240,311	31,250	13.00
	Guinea	0	0	0	1,000	246,163	9,316	3.78
	Guinea Bissau	0	0	0	35	34,184	331	0.97
	ivory Coast	551	250	810	585	232,970	36,688	15.75
	Liberia	0	0	0	1,783	96,509	22,053	22.85
	Mali	0	611	151	45	1,257,166	34,021	2.71
	Niger	0	0	0	800	1,190,316	2,387	0.20
	Nigeria	0	0	1,065	550	915,252	34,391	3.76
	Senegal	0	0	20	20	197,928	8,447	4.27
	Sierra Leone					72,790	2,921	4.01
	Togo	0	0	85	143	57,407	5,911	10.30
	<b>Total</b>	<b>2,760</b>	<b>1,376</b>	<b>5,035</b>	<b>5,554</b>	<b>4,933,647</b>	<b>230,188</b>	<b>4.67</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN WEST AFRICA



## LEGEND

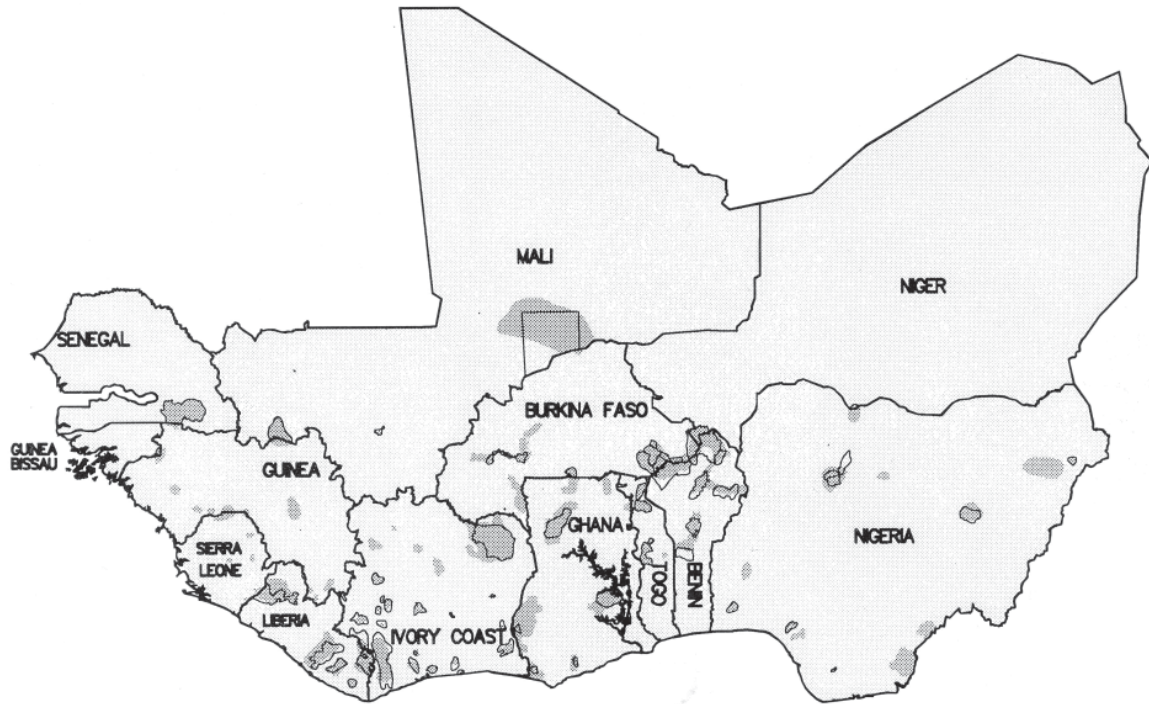
 Elephant Range



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN WEST AFRICA



## LEGEND

 Elephant Range



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*





## Benin

There has been no recent data collection on elephants in Benin, which inhabit both savanna and forest terrain. Sournia (1994) described an elephant population

numbering about 150 which frequents the village of Alfakoara in northern Benin, sharing a watering point with local human populations.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from I (best) to 3 (worst), and left blank where unknown.

### WEST AFRICA

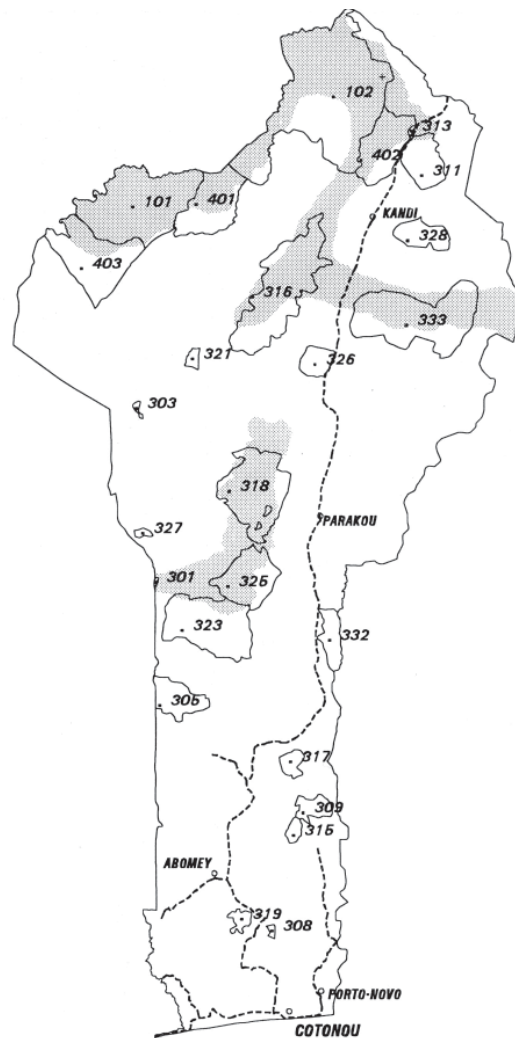
#### BENIN

CODE	ZONE	SURVEY AREA	DATE (km2)	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
102	W National Park		5,600	350	-	Agbahungba, Quest. Reply, 1991	IG3	D
316	Alibori Superieur Forest		2,557	60	-	Agbahungba, Quest. Reply, 1991	OG3	E
318	Oueme Superieur Forest		1,883	30	-	Agbahungba, Quest. Reply, 1991	OG3	E
323	Monts Kouffe Forest		1,908	20	-	Agbahungba, Quest. Reply, 1991 Tebabi, Quest. Reply, 1991	OG3	E
333	Trois Rivières Forest		2,639	40	-	Agbahungba, Quest. Reply, 1991 Tcbabi, Quest. Reply, 1991	OG3	E
402	Zone Cynegetique do Djona		1,146	130	-	Agbahungba, Quest. Reply, 1991	IG3	D
601	Pendjari National Park Zone Cynegetique de la Pendjari Zone Cynegetique de l'Atakora		6,037	900	-	Agbahungba, Quest. Reply, 1991	IG3	D

## SUMMARY OF TOTALS FOR BENIN

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PRORABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	1,400	0
B	Other Guesses and Other Extrapolations	0	0	0	150
<b>TOTAL</b>		<b>0</b>	<b>0</b>	<b>1,400</b>	<b>150</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN BENIN



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

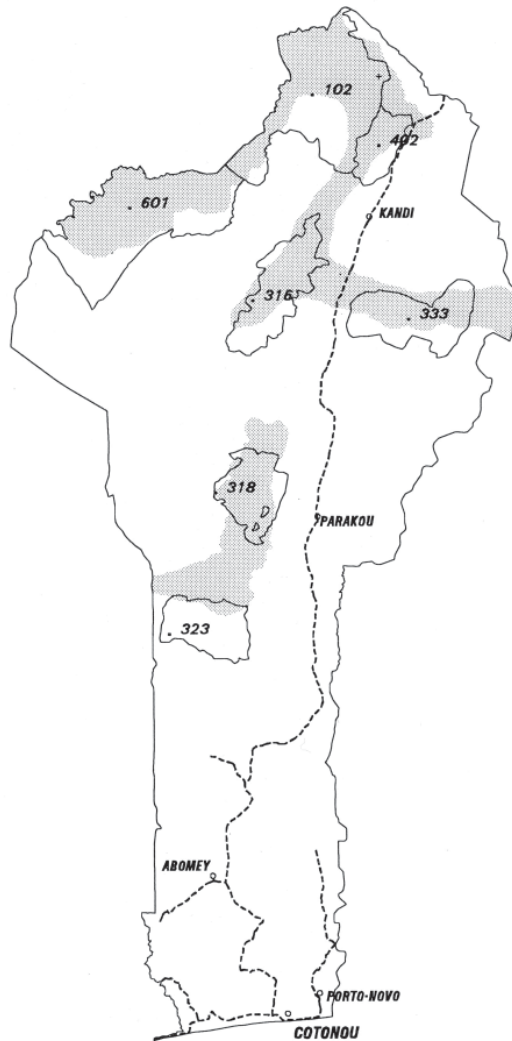
NATIONAL PARKS	308 Djigbe FR	319 Lama FR	333 Trois Rivières FR
101 Penjari NP	309 Dogo FR	321 Mekrou Fr	
102 W NP	311 Goungoun FR	323 Monts Kouffé FR	ZONE CYNEGETIQUE
FOREST	313 Ketou FR	326 Ouénou Benou FR	402 Zone Cynegetique de Djona
301 Bassila FR	316 Alibori Supérieur FR	327 Penessoulou FR	403 Zone Cynegetique de la Pendjari
303 Birni FR	317 Ouème Boukou FR	328 Sota FR	
305 Agoua FR	318 Ouème Supérieur FR	332 Toul-Kilibo FR	



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# INPUT AREAS AND ELEPHANT RANGE IN BENIN



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
102	W NP	350	333	Trois Rivières FR	40
316	Alibori Supérieur FR	60	402	Zone Cynégetique de Djona	150
318	Ouémé Supérieur FR	30	601	Pendjari NP	900
323	Monts Kouffé FR	20		Zone Cynégetique de la Pendjari	
				Zone Cynégetique de l'Atskora	



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## Burkina Faso

Burkina Faso contains more elephants than any other West African range state, though the populations are still modest in comparison to Central, Eastern and Southern regions.

A full national inventory of elephants and other mammals was carried out in 1992 by aerial sample surveys (Lacroix, 1992).

The most studied population is that of Nazinga GR, where Jachmann (1991 a) evaluated four survey methods for

estimating elephant densities in 1988 and 1989. Detailed studies on elephant impacts, population structure and villagers' perceptions of elephants were also conducted in 1990 (Damiba and Ables, 1992, 1994). From the 1990 line transect survey, an estimate of 234+ 379 was made (Damiba and Ables, 1994).

Migrations of elephants are thought to occur from Nazinga into northern Ghana and Togo in the wet season (Jachmann, 1992) and from Mali into northern Burkina Faso.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown,

### WEST AFRICA

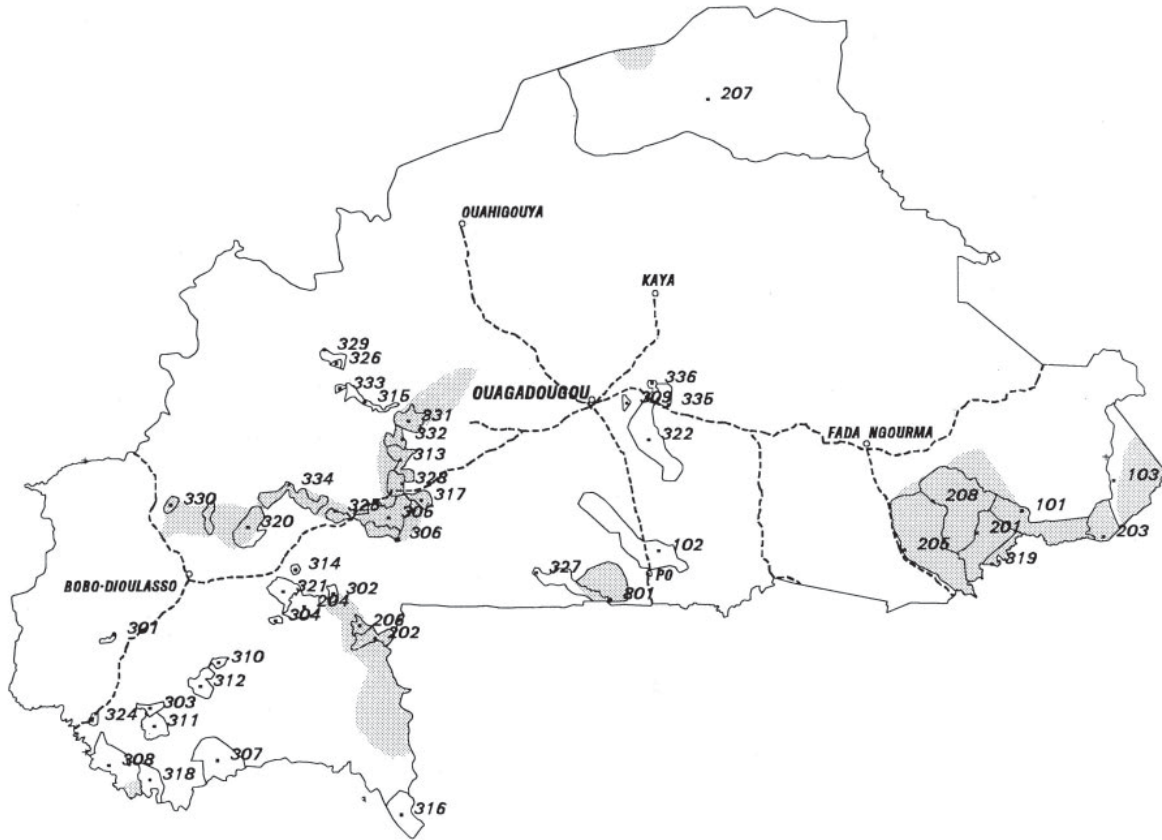
#### BURKINA FASO

CODE	ZONE	SURVEY AREA	DATE (km2)	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE &	DATA CATEGORY QUALITY
				ESTIMATE	95% CONFIDENCE LIMITS			
101	Arli National Park	1992	1,143	70	±68	La roix, 1992 Lamarque, Quest. Reply, 1993 Sebogo, Quest. Reply, 1993	AS2	B
103	W Nartional Park	1992	2,368	33	±28	Lacroix, 1992 Lamarque, Quest. Reply, 1993 Sebogo, Quest. Reply, 1993	AS2	B
205	Reserve partielle de Pama	1992	2,494	201	±194	Lacroix, 1992 Lamarque, Quest. Reply, 1993 Sebogo, Quest. Reply, 1993	AS2	B
208	Reserve totale du Singou	1992	2,062	770	±284	Lacroix, 1992 Lamarque, Quest. Reply, 1993 Sebogo, Quest. Reply, 1993	AS2	B
801	Nazinga Game Ranch	1993	757	405	±323	Sebogo, pers. comm., 1994	AS2	B
401	Zone de chasse d'Ougarou	1992	1,181	298	±179	Lacroix, 1992 Lamarque, Quest. Reply, 1993	AS2	B
601	Deux Bale and Dibon Forest Reserve	1992	838	185	±266	Sebogo, pers. conan., 1984	AS2	B
602	Maro, Tui and Pa Forest Reserve	1992	1,053	90	±98	Lacroix, 1992 Lamarque, Quest. Reply, 1993	AS2	B

## SUMMARY OF TOTALS FOR BURKINA FASO

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0		0	0
B	Aerial or Ground Sample Counts	1,469	583	583	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial nr Dung Surveys and GIS Extrapolations	0	0	0	0
E	Other Guesses and Other Extrapolations	0	0	0	0
<b>TOTAL</b>		<b>1,469</b>	<b>583</b>	<b>583</b>	<b>0</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN BURKINA FASO



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY TO PROTECTED AREAS

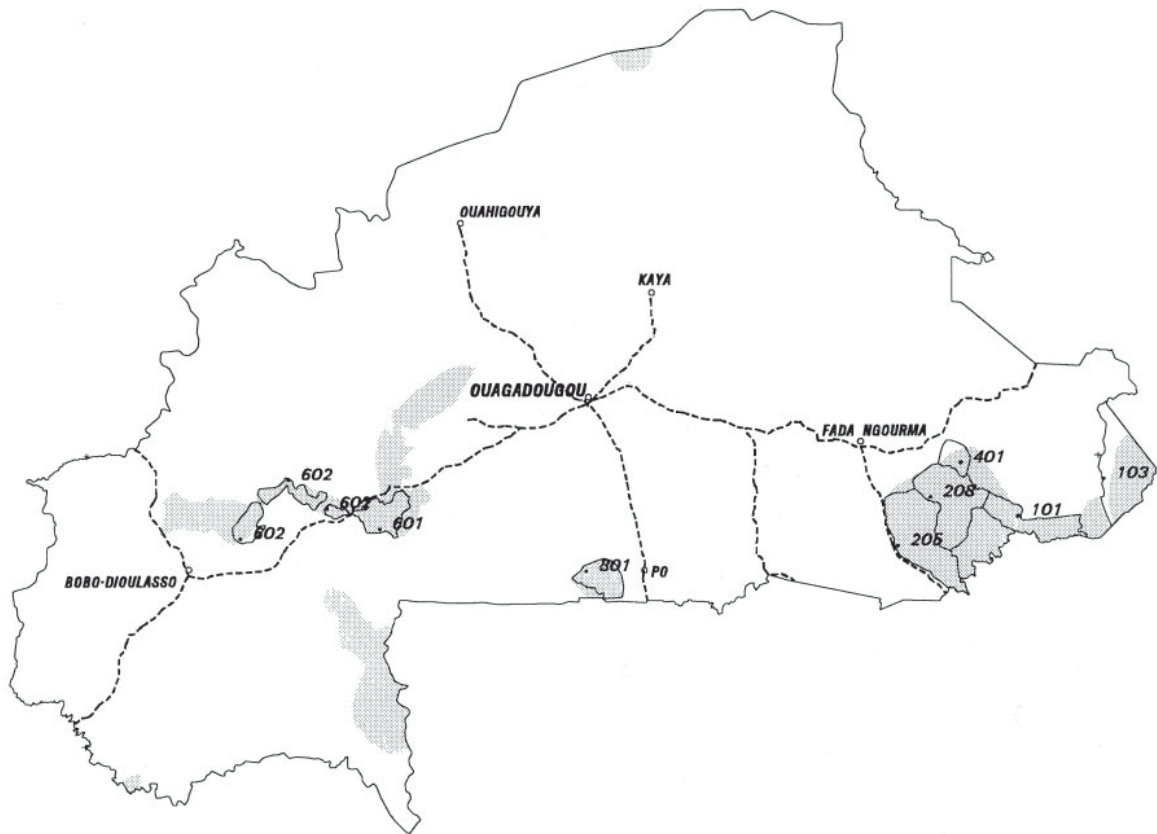
<b>NATIONAL PARKS</b>	205 Bontioli RT	307 Dida FR	318 Logoniegue FR	329 Sourou Mouhoun FR
101 Arie NP	207 Sahek RP	308 Diefoula FR	319 Madoari FR	330 Tere FR
102 Tambi Kabore NP	208 Singou RP	309 Gonse FR	320 Maro FR	331 Tiogo FR
103 W NP		310 Gouandougou FR	321 Mou FR	332 Tisse FR
	<b>FOREST RESERVES</b>	311 Kafande FR	322 Nakambe FR	333 Toruba FR
<b>NATIONAL RESERVES</b>	301 Berégadougou FR	312 Kangouko FR	324 Niangoloko Yendere FR	334 Tui FR
201 Arie RP	302 Bougouriba FR	313 Kallo FR	325 Pa FR	335 Wayen FR
202 Bontioli RP	303 Boulon FR	314 Kapo FR	326 Say FR	336 Ziga FR
203 Kourtiagou RP	304 Dan FR	315 Kari FR	327 Sissili FR	
204 Nabere RP	305 Deux Bale FR	316 Koulibi FR	328 Sorobouli FR	<b>GAME RANCH</b>
205 Pama RP	306 Dibon FR	317 Laba FR		801 Nazinga GR



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# INPUT AREAS AND ELEPHANT RANGE IN BURKINA FASO



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
101	Arlu NP	70	401	d'Ougarou ZC	298
103	W NP	33	601	Deux Bale FR and Dibon FR	185
205	Pama RP	201	602	Maro FR, Tui FR and Pa FR	90
298	Singou RP	770			
801	Nazinga Game Ranch	405			



African Elephant Database of IUCN/SSC/AESG in  
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## Ghana

Ghana's small elephant populations are found in both savanna and forest habitats. Sample aerial surveys were carried out in Mole and Digya NP's in 1993 and 1994 respectively, but probably underestimated the elephant populations due to the techniques used (Sam Moses, 1994c). In Digya NP, 83 elephants were actually seen and are therefore recorded in the Definite group in the table. Dudley *et al.* (1992) provided an estimate of 100-150 elephants in the southern forests of Kakum NP and Assin-Attandanso WR based on dung surveys and visual

sightings. Elephant crop-raiding in the same area was investigated in 1992 and 1993 by Barnes *et al.* (1995c), where the remaining elephants occupy an isolated block of forest which is surrounded by agricultural land.

Possible cross-border elephant movements occur between northern Ghana and Burkina Faso (Nazinga), north-east Ghana and Togo (Fosse-aux-Lions) and along the western border with Ivory Coast.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### WEST AFRICA

#### GHANA

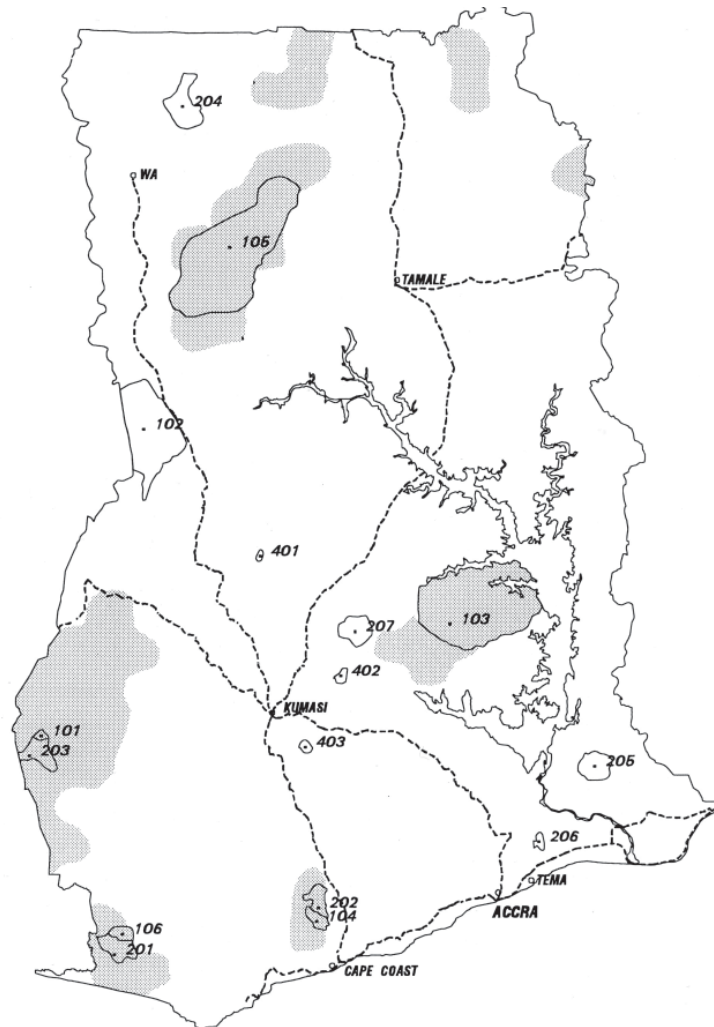
CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
103	Digya National Park	1994	3,478	200	-	Sam Moses, 1994a	IG3	D
105	Mole National Park	1993	4,840	589	±427	Grainger, pers. comm., 1994	AS	B
601	Kakum National Park and Assin-Attandanso Game Production Reserve	1990	347	100	-	Dudley, et al., 1992	IG	D
602	Bia Area		306	100	-	Sam Moses, pers. comm., 1995	IG3	D
603	Goaso Area			500	+300*	Sam Moses, pers. comm., 1995	IG3	D
604	Nini-Suhien National Park and Ankasa Game Production Reserve		509	60	+90*	Sam Moses, pers. comm., 1995	IG3	D
605	Chichibon Corridor	1994		12	+3*	Sam Moses & Wilson, 1994	IG3	D
606	Northeastern Ghana			100	+50*	Sam Moses, 1994b	IG3	D

\* Range for Informed Guess

### SUMMARY OF TOTALS FOR GHANA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	83	0	0	0
B	Aerial or Ground Sample Counts	162	427	427	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	989	0
E	Other Guesses and Other Extrapolations	0	0	0	443
	<b>TOTAL</b>	<b>245</b>	<b>427</b>	<b>1,416</b>	<b>443</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN GHANA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Bia NP
- 102 Bui NP
- 103 Digya NP
- 104 Kakum NP
- 106 Mole NP
- 106 Nini-Suhien NP

### GAME PRODUCTION RESERVES

- 201 Ankasa GPR
- 202 Assin-Attandanso GPR
- 203 Bia GPR
- 204 Gbele GPR
- 204 Kalakpa GPR
- 206 Shai Hills GRR
- 206 Kogyae SNR

### WILDLIFE SANCTUARIES

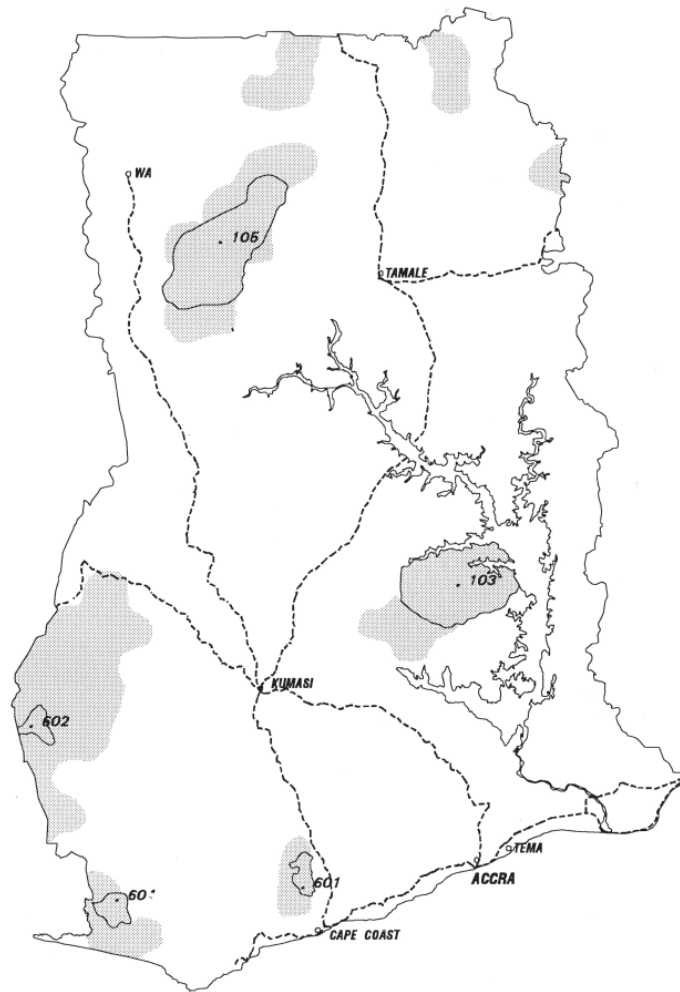
- 401 Boabang-Fiema WS
- 402 Bomfobiri WS



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collaboration with UNEP/GRID*



# INPUT AREAS AND ELEPHANT RANGE IN GHANA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
103	Digya NP	200	603	Goaso Area*	500
105	Male NP	589	604	Nini-Suhien NP and Ankasa GPR	60
601	Kakum NP & Asain- Attandanso GPR	100	605	Chichibon Corridor*	12
602	Bia Area	100	606	Northeastern Ghana*	100

\* Input zone not indicated on the map



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



## **Guinea**

There has been no recent information from Guinea. Roth and Douglas-Hamilton (1991) reported that forest elephants might still be found in scattered populations.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### WEST AFRICA

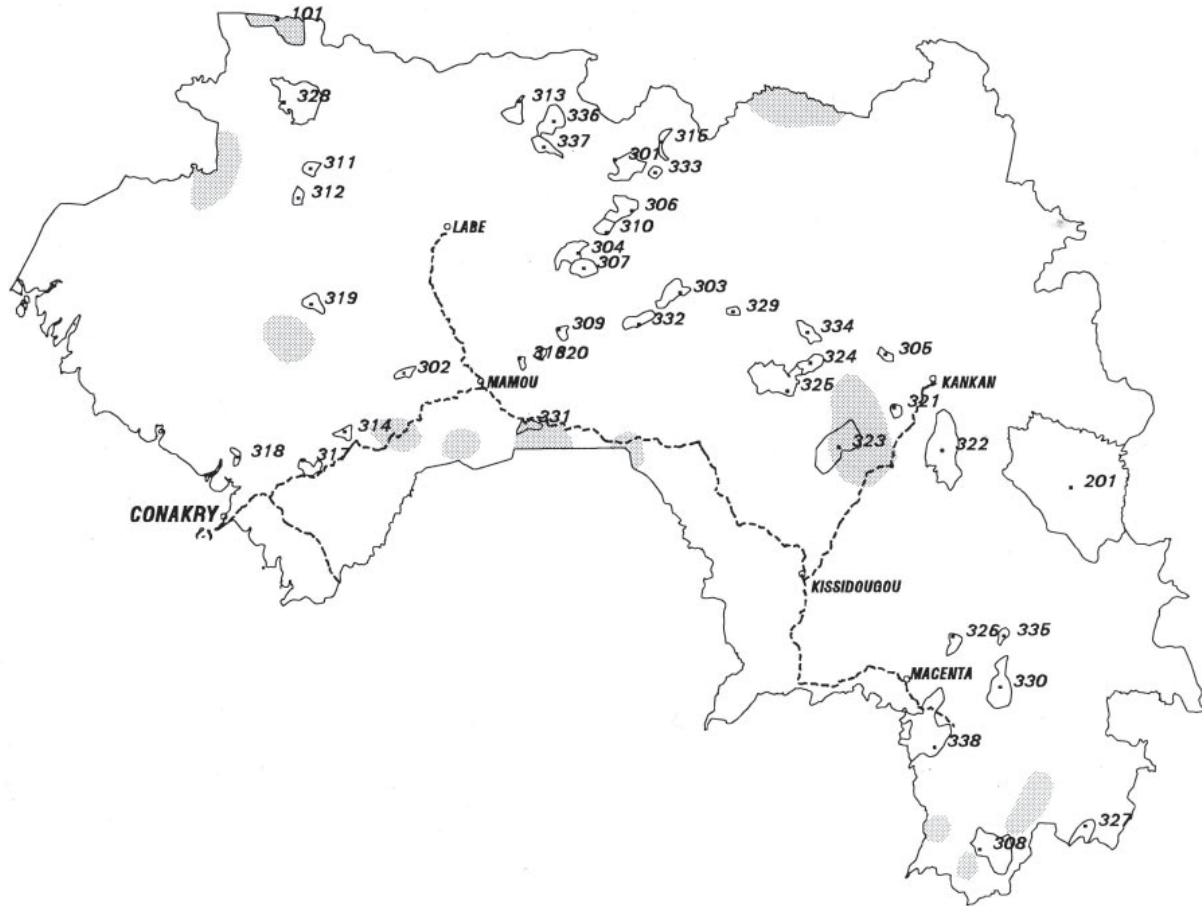
#### GUINEA

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
		1991	9,316	000	-	Macky, Quest. Reply, 199	OG3	E

### SUMMARY OF TOTALS FOR GUINEA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B.	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung surveys and GIS Extrapolations	0	0	0	0
E	Other Guesses and Other Extrapolations	0	0	0	1,000
	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,000</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN GUINEA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

<b>NATIONAL PARK</b>					
101	Badiar NP	306	Boula FR	318	Kabital FR
		307	Dar-es-Salam FR	319	Kankande FR
<b>NATURAL RESERVE</b>					
201	Kankan NR	308	Dieke FR	320	Kegneko FR
		309	Diogoure FR	321	Koumbankourou FR
		310	Dokoro FR	322	Kourani Oulete Dieni
<b>FOREST</b>					
301	Bakoun FR	311	Fello Digue FR	323	Kouya FR
302	Balandougou FR	312	Fello Sounga FR	324	l'Amama FR
303	Balayan et Sourouma FR	313	Gambie FR	325	Mafou FR
304	Bani FR	314	Gangan FR	326	Milo FR
305	Baro FR	315	Gombo FR	327	Monts Nimba FR
		316	Gouba FR	328	Ndama FR
		317	Grandes Chutes FR	329	Nono FR
				330	Plc de Fon FR
				331	Pinselli FR
				332	Sinseri Oursa FR
				333	Sobori FR FR
				334	Tamba FR
				335	Tibe FR
				336	Woundou FR
				337	Woundou-Sud FR
				338	Ziama FR



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# INPUT AREAS AND ELEPHANT RANGE IN GUINEA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY POPULATION ESTIMATES

The total country Elephant population is estimated to be approximately 1000 elephants.



*African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID*



## Guinea Bissau

There has been no recent information about elephants from Guinea Bissau. An inventory of all the fauna in Guinea Bissau was made in 1989 (Limoges, 1989). During this exercise, no elephants were seen but some tracks and dung were noted in the south-east area adjacent to Guinea. The signs were apparently remaining from

the previous wet season. A dung count based on a small number of transects gave an estimate of only five elephants, and the report recommended the creation of a protected area to ensure the survival of the African elephant in Guinea Bissau.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### WEST AFRICA

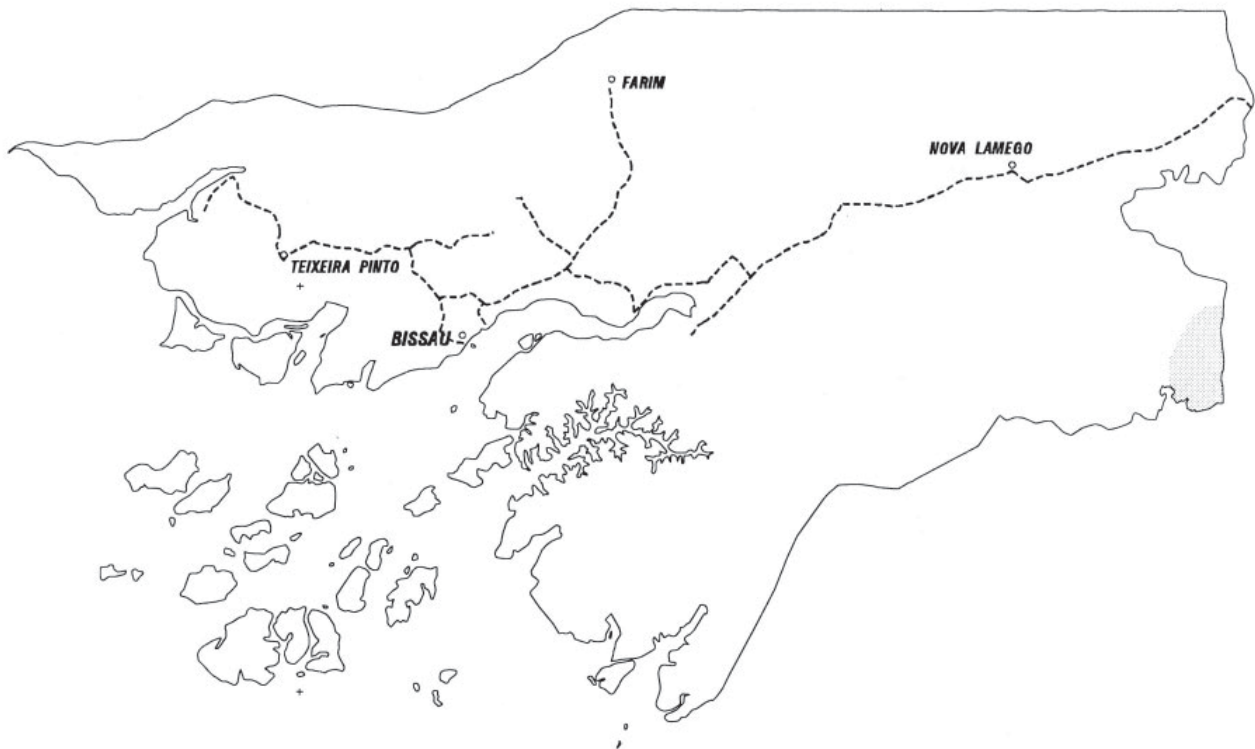
#### GUINEA BISSAU

CODE	ZONE	SURVEY DATE	AREA (km2)	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
951	Binasse Area		331	35	-	Sournia. in Douglas-Hamilton <i>et al.</i> , 1992	OG3	E

#### SUMMARY OF TOTALS FOR GUINEA BISSAU

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POS8IBLE	SPECULAT1VE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	0	0
E	Other Guesses and Other Extrapolations	0	0	0	35
<b>TOTAL</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>35</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN GUINEA BISSAU



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

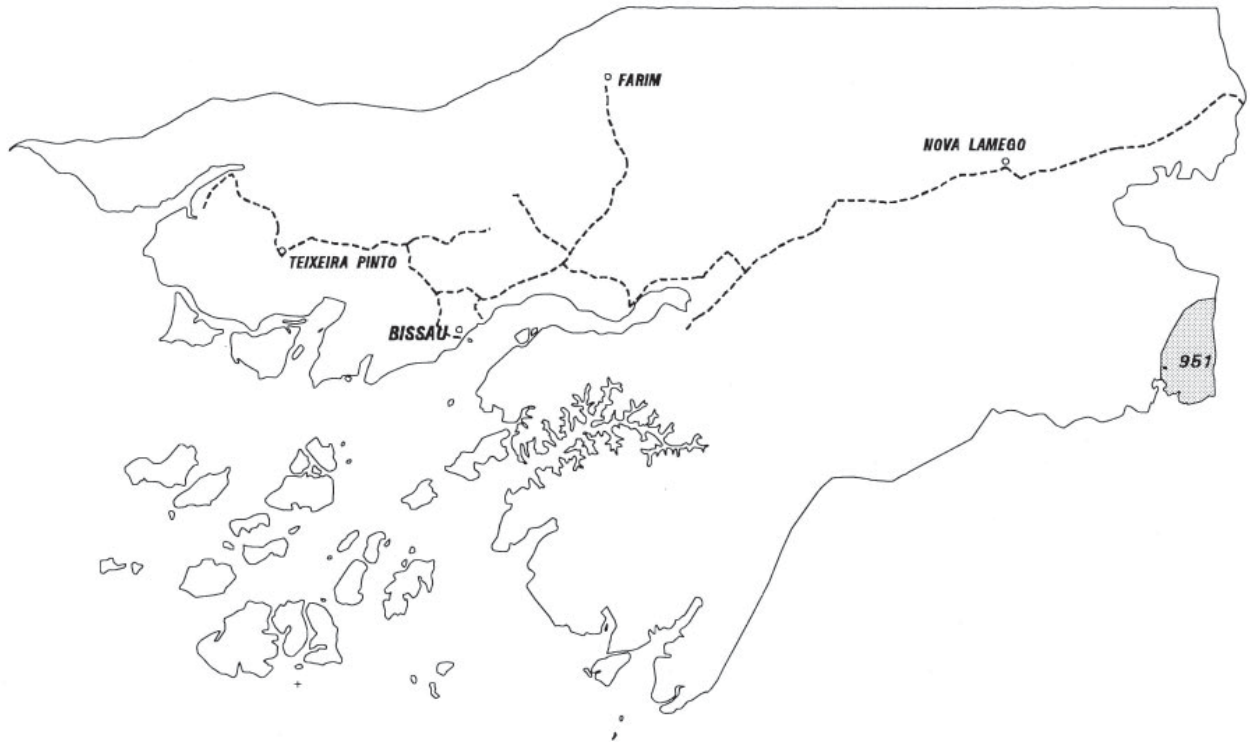
Note: There are no protected areas in Guinea Bissau






African Elephant Database of IUCN/SSC/AESG in  
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# INPUT AREAS AND ELEPHANT RANGE IN GUINEA BISSAU



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE
951	Binasse Area	35



African Elephant Database of IUCN/SSC/AESG in  
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## Ivory Coast

No inventories of the scattered elephant populations in Ivory Coast have been made recently. Detailed studies from Tai NP are already about 10 years old (Merz, 1986). Merz and Hoppe-Dominik (1991) summarised the 1988 and 1989 census results of forest elephants which totaled

1,520, as recorded from survey work and enquiries. Most of the remaining elephants live in forests but it is speculated that many have been poached. There may be cross-border movements of elephants between Ivory Coast, Ghana, Burkina Faso and Liberia.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IG Informed Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### WEST AFRICA

#### IVORY COAST

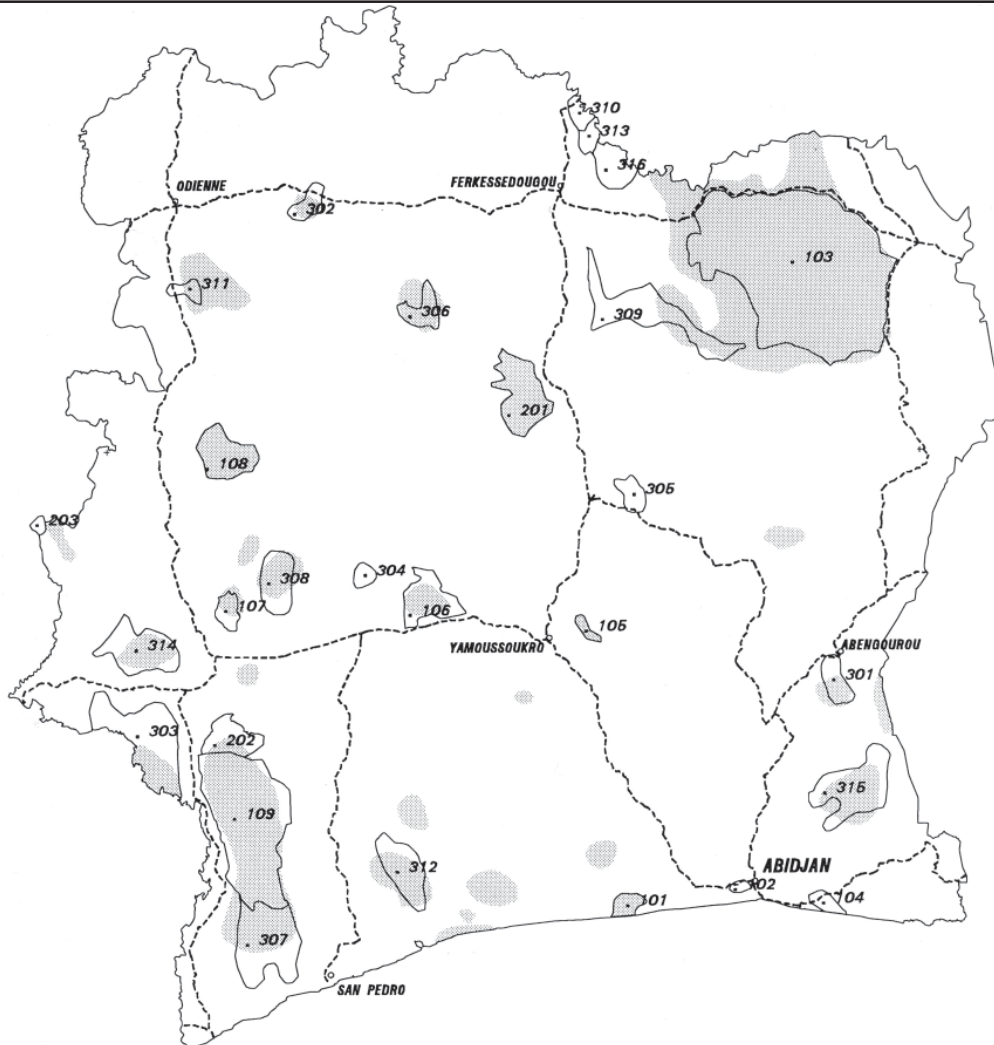
CODE	ZONE	SURVEY AREA	DATE (km <sub>2</sub> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
101	Azagny National Park	1997	231	60	-	Laugnie, in Douglas-Hamilton <i>et al.</i> , 1992	AS3	D
104	Abo Koamekro National Park	1994	151	6	-	Kouame, Quest. Reply, 1994	GC1	A
106	Marahoue National Park	1991	1,038	50	-	Alers, in Douglas-Hamilton <i>et al.</i> , 1992	IG3	D
107	Mont Peko National Park	1988-89	340	20	-	Merz & Hoppe-Dominik, 1991	OG3	U
108	Sangbe National Park	1988-89	950	30	-	Merz & Hoppe-Dominik, 1991	OG3	E
501	Bossematie Forest Reserve and Area	1993	220	45	-	Waitkuwait, Quest. Reply, 1994 Laugnie, Quest. Reply, 1994	GC	A
303	Goin-Cavally and Goin-Debe Forest Reserve	1988-89	1,890	70	-	Merz & Hoppe—Dominik, 1991	OG3	E
308	Haul Sassandra Forest Reserve	1988-89	1,187	30	-	Merz & Hoppe-Dominik, 1991	OG3	E
312	Niegre Forest Reserve	1988-89	1,056	50	-	Merz & Hoppe-Dominik, 1991	OG3	E
314	Scio Forest Reserve	1988-89	1,338	30	-	Merz & Hoppe—Dominik, 1991	OG3	E
315	Songan, Tamin, Mabi and Yaya Forest Reserve	1988-89		150	-	Merz & Hoppe—Dominik, 1991	OG3	E
901	Keregbo Forest	1988-89	213	30	-	Merz & Hoppe-Dominik	OG3	E
602	Duekoue Forest	1988-89	536	15	-	Merz & Hoppe-Dominik, 1991	OG3	E
903	Tiapleu Forest	1988-89	380	10	-	Merz & Hoppe—Dominik, 1991	OG3	E
904	Bolo Forest	1988-89	88	5	-	Merz & Hoppe-Dominik, 1991	OG3	E
905	Davo Forest	1988-89	126	20	-	Merz & Hoppe-Dominik, 1991	OG3	E
906	Okromodou Forest	1988-89	945	50	-	Merz & Hoppe-Dominik, 1991	OG3	E

907	Go-Bodienou Forest	1988-89	600	20	-	Merz & Hoppe—Dominik, 1991	OG3	E
908	Djambamakrou Forest	1988-89	389	30	-	Merz & Hoppe—Dominik, 1991	OG3	E
909	Tene Forest	1988-89	4	5	-	Merz & Hoppe—Dominik, 1991	OG3	E
103	Comoe National Park	1989	19,337	730	±250	Laugnie, in Douglas-Hamilton <i>et al</i> , 1992	AS	B
602	Fresco Forest Area	1991	2,229	130	-	Alers, in Douglas-Hamilton <i>et al</i> , 1992	IG3	D
603	Tai National Park and Ecosystem	1991	8,119	300	-	Alers, in Douglas-Hamilton <i>et al</i> , 1992	IG3	D

## SUMMARY OF TOTALS FOR IVORY COAST

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	51	0	0	0
8	Aerial or Ground Sample Counts	500	250	250	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	560	0
E	Other Guesses and Other Extrapolations	0	0	0	585
	<b>TOTAL</b>	<b>551</b>	<b>250</b>	<b>810</b>	<b>585</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN IVORY COAST



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARK

- 101 Azagny NP
- 102 Banco NP
- 103 Comoe NP
- 104 Iles des Ehotiles NP
- 105 Abo Kouamekro NP
- 106 Marahoue NP
- 107 Mont Peko NP
- 108 Mont Sangbe NP
- 109 Tai NP

### GAME RESERVES

- 201 Haut Bandama GR
- 202 N'zo GR
- 203 Mont Nimba NR

### FOREST RESERVES

- 301 Beki-Bossematie FR
- 302 Boundiali-Pale FR
- 303 Goin-Cavally FR
- 304 De FR
- 305 Fetekro-Leka-Mafa FR

- 306 Foubou FR
- 307 Haut Oodo/Grah/Hana FR
- 308 Haut Sassandra FR
- 309 Kinkene/Nyellepuo-Nzi FR
- 310 Leraba FR
- 311 Mont Gbande FR
- 312 Niegre FR
- 313 Nougbo FR
- 314 Scio FR
- 315 Songan-Tamin-Mabi-Yaya FR
- 316 Warigue FR

Location Map



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# INPUT AREAS AND ELEPHANT RANGE IN IVORY COAST

## LEGEND

 Elephant Range	 Roads
 Input Zone	 Towns



## KEY POPULATION ESTIMATES

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
101	Azagny NP	60	901	Keregbo F	30
105	Abo Kouamekro NP	6	902	Duekoue F	15
106	Marahoue NP	50	903	Tiapleu F	10
107	Mont Peko NP	20	904	Bolo F	5
108	Sangbe NP	30	905	Davo F	20
301	Beki-Boseematie FoR	45	906	Okromodou F	50
303	Goin-Cavally & Goin-Debe FR	70	907	Go-Bodienou F	20
308	Haut Sassandra FR	50	908	Djambamakrou F	30
312	Niegre FR	50	909	Tene F	5
314	Scio FR	30	103	Comoe NP	750
315	Songan-Tamin-Mabi-Yaya FR	150	602	Fresco Forest Area	150
			603	Tel NP & Ecosystem	300



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## **Liberia**

The ongoing civil war has probably put Liberia's elephant populations in jeopardy. The 1990 survey work carried out by Anstey and Dunn (1991) has not been updated.

The estimates have been devalued in the tables to Data Category E because of a breakdown of political order since they were made.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count(Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### WEST AFRICA

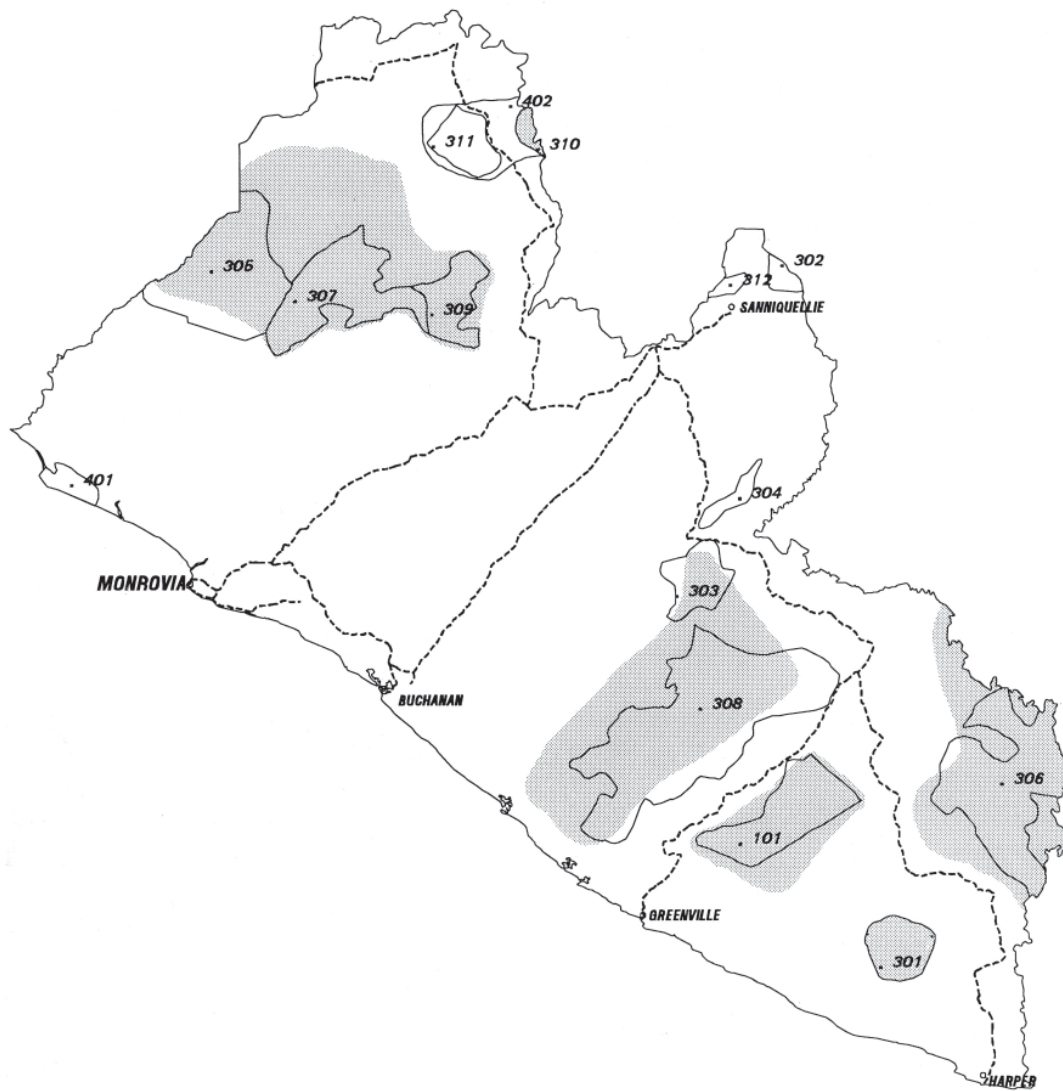
#### LIBERIA

CODE	ZONE	SURVEY DATE	AREA (km2)	NUMBER OF ELEPHANTS		SOURCE	SVRVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
101	Sapo National Park	19S9/90	1,391	430	-	Anstey & Dunn, 1991	DC3	E
301	Barrobo Forest Area	1989/90	640	99	-	Anstey & Dunn, 1991	OG3	E
306	Grebo National Forest Area	1989/90	2,596	231	-	Anstey & Dunn, 1991	OG3	E
308	Krahn-Bassa National Forest Area	1989/90	4,435	495		Anstey & Dunn, 1991	OG3	E
310	North-East Forest Area	1989/90	130	33	-	Anstey & Dunn, 1991	OG3	E
399	North Gola, Kpelle/Belle, Lorma National Forest Area	1989/90	4,532	495		Anstey & Dunn, 1991	OG3	E

### SUMMARY OF TOTALS FOR LIBERIA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	0	0
E	Other Guesses and Other Extrapolations	0	0	0	1,783
	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,783</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN LIBERIA



## LEGEND



## KEY TO PROTECTED AREAS

### NATIONAL PARK

101 Sapo NP

### NATIONAL FORESTS

301	Barrobo NF	305	Gals NF
302	East Nimba NF	306	Grebo NF
303	Gbi NF	307	Kpelle/Bello NF
304	Gio NF	308	Krahn Bassa NF
		309	Lorma NF
		310	North East NF
		311	North Loma NF
		312	West Nimba NF

### CONSERVATION AREAS

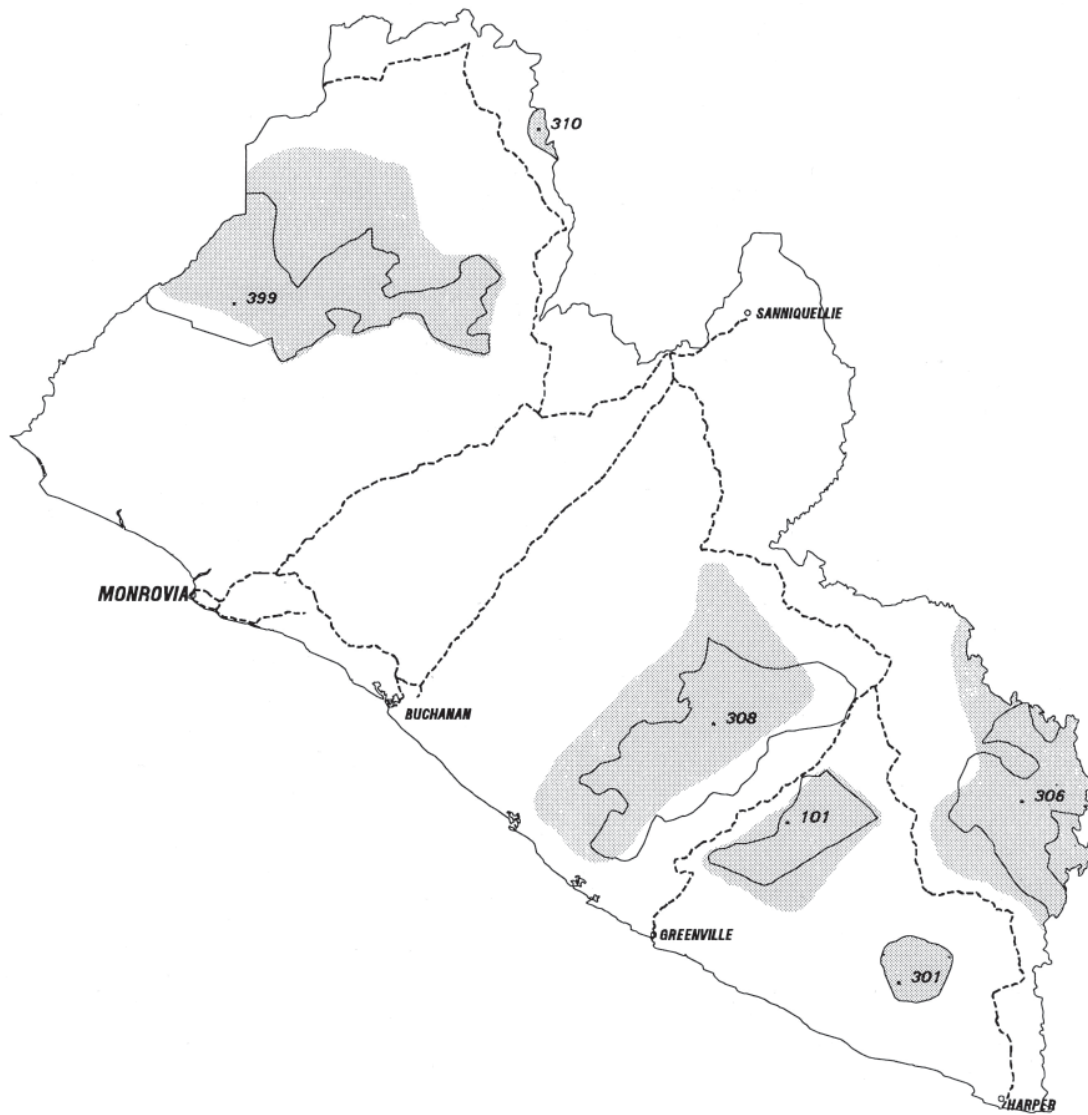
401	Cape Mount CA (Proposed)
402	Loma CA (Proposed)



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# INPUT AREAS AND ELEPHANT RANGE IN LIBERIA



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY TO PROTECTED AREAS

CODE	CENSUS ZONENAME	ESTIMATE	CODE	CENSUS ZONENAME	ESTIMATE
101	Sapo NP	430	310	North-East FA	33
301	Barrobo FA	99	399	North Gola, Kpelle/Belle and Lorma National FA	495
306	Grebo National FA	231			
308	Krahn-Bassa National FA	495			



African Elephant Database of IUCN/SSC/AESG in  
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## Mali

Jachmann (1991b) provides both dry and wet season estimates for the Gourma elephant population, which inhabits near-desert conditions and represents the northernmost population of the African elephant. Changing land-use patterns may be threatening this

migratory population, which for years has co-existed with pastoral people (Pringle and Diakite, 1992).

It is possible that the elephants from Mali move into northern Burkina Faso.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### WEST AFRICA

#### MALI

CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SVRVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
601	Gourma Area	1990/1991	27,000	611	±151	Jachmann, 1991b	DCI	C
303	Soussan Forest Reserve		241	15	-	Bourama Quest. Reply, 1989	OG3	E
901	Mali - Guinea Border		3,628	30	-	Sournia, in Douglas-Hamilton, <i>et al.</i> , 1992	OG3	E

### SUMMARY OF TOTALS FOR MALI

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	611	151	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0		0	0
E	Other Guesses and Other Extrapolations	0		0	45
	<b>TOTAL</b>	<b>00</b>	<b>611</b>	<b>151</b>	<b>45</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN MALI



## LEGEND

- Elephant Range
- Input Zone
- Roads
- Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Bafing NP
- 102 Boucle du Baoule NP

### GAME RESERVES

- 201 Ansongo-Menaka GR
- 202 Badinko OR
- 203 Bay OR
- 204 Elephant GR
- 205 Fina GR
- 206 Kenia-Baoule OR

### FOREST RESERVES

- 301 Faya FR
- 302 Sorondian FR
- 303 Soussan FR



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# INPUT AREAS AND ELEPHANT RANGE IN MALI



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

CODE	CENSUS ZONENAME	ESTIMATE
303	Soussan FR	15
601	Gourma Area	611
901	Mali - Guinea Border	30



African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID



## **NIGER**

There has been no recent survey information from Niger, but Saadou (1993) believes there is evidence that the two elephant populations are increasing.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

## WEST AFRICA

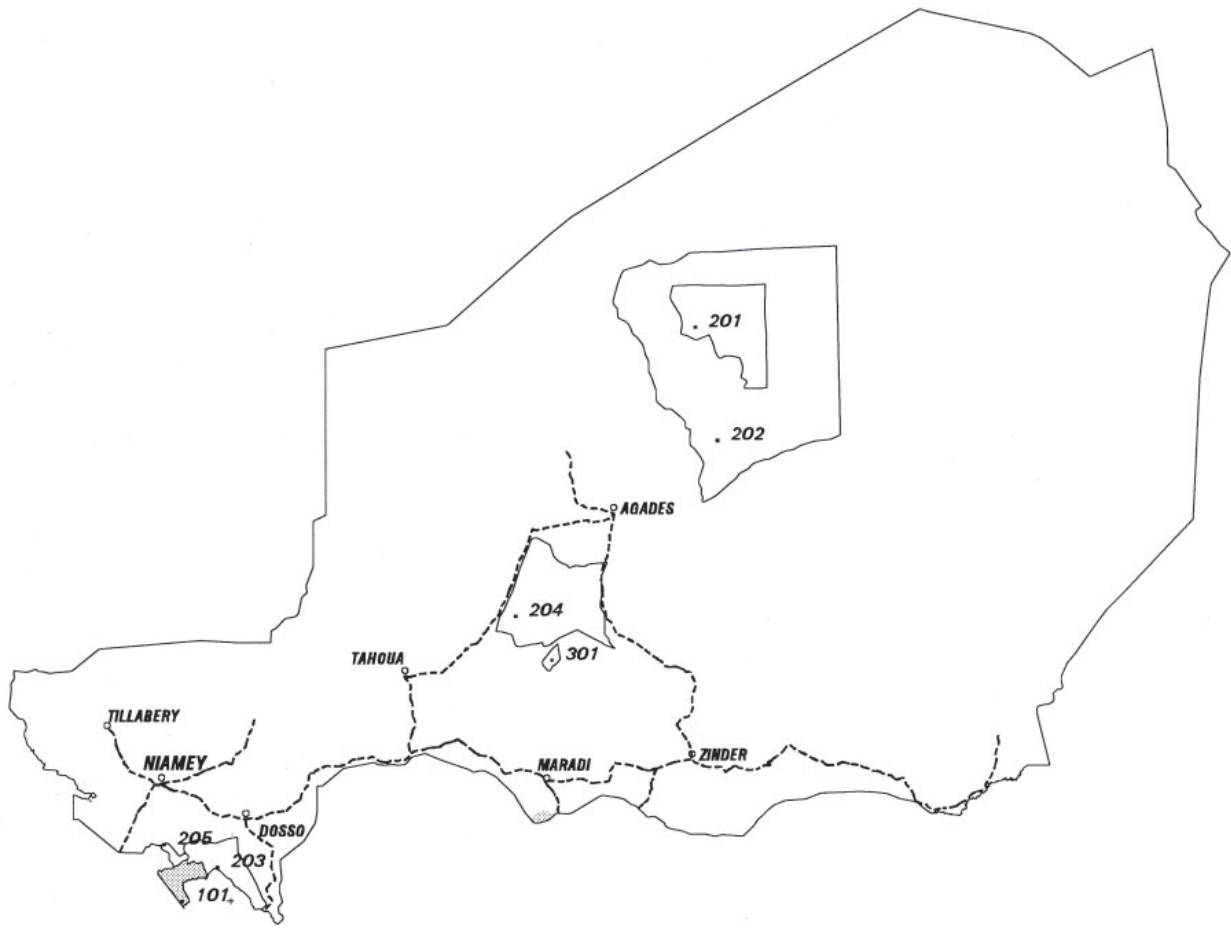
### NIGER

	ZONE	SURVEY DATE	AREA (km2)	NUMBER OF ELEPHANTS		SOURCE	SVRVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
101	W National Park		2,478	700	-	Saadou, Quest. Reply, 1993	OG3	E
302	Baban Rati Forest		352	100	-	Saadou, Quest. Reply, 1993	OG3	E

## SUMMARY OF TOTALS FOR NIGER

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	0	0
E	Other Guesses and Other Extrapolations	0	0	0	800
	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>800</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN NIGER



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

**NATIONAL PARK**  
101 W NP

**GAME RESERVES**  
201 Addax SNR  
202 Air and Tenere NNR  
203 Dosso R  
204 Tadres GR  
205 Tamou GR

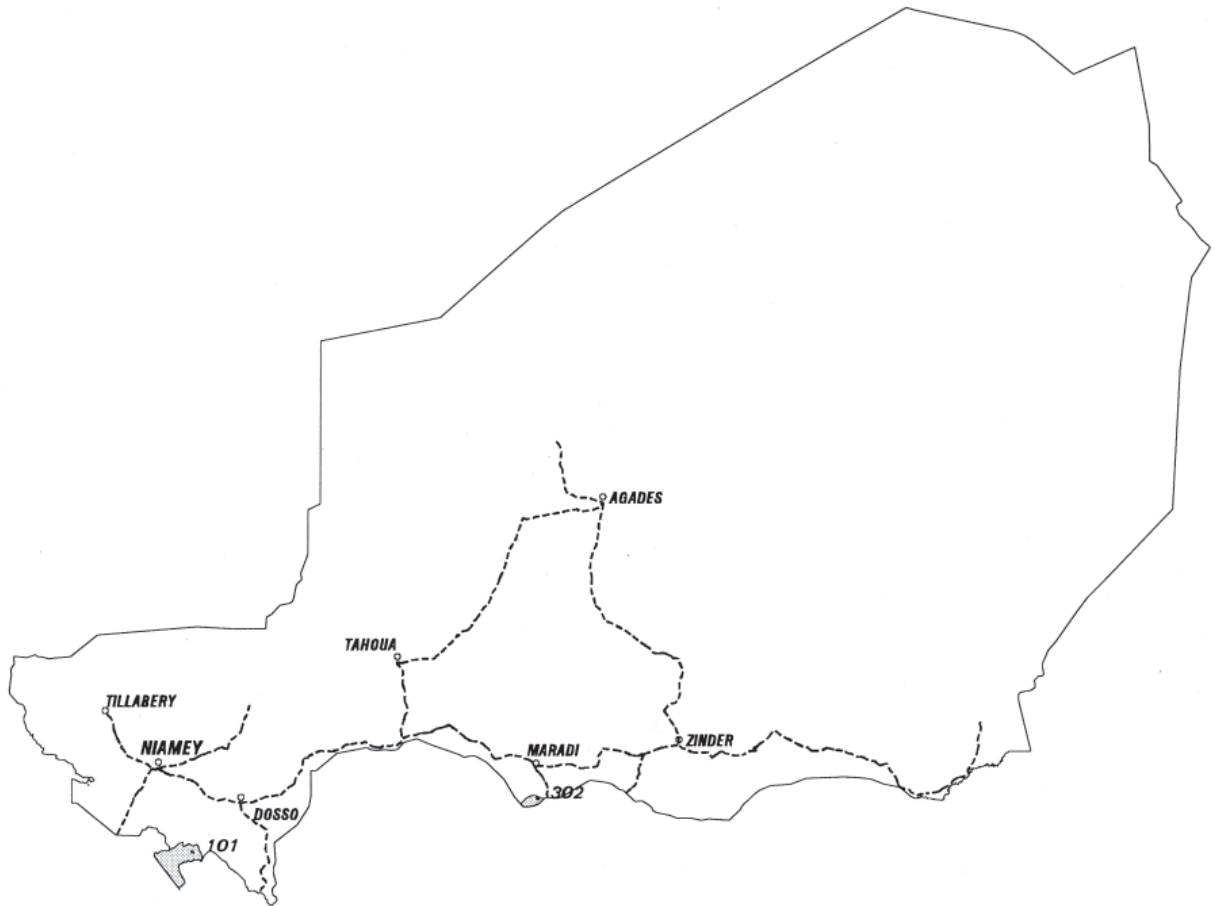
**FOREST RESERVE**  
301 Gadabeji PR



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# INPUT AREAS AND ELEPHANT RANGE IN NIGER



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY TO PROTECTED AREAS

CODE	CENSUS ZONENAME	ESTIMATE
101	W NP	700
302	Baban Rati Forest	100



African Elephant Database of IUCN/SSC/AESG in  
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## Nigeria

Guesswork information and direct observation have provided most of Nigeria's elephant estimates. Nigeria's elephants live in small, relict populations which are probably undergoing rapid change in response to human pressures. Many of the protected areas are of uncertain or changing status. Of all the populations, only that of Yankari in northern Nigeria has good prospects for survival (Dougherty, 1994). In the southern forests, logging, extensive commercial plantations and farming

within forest reserves threaten the remaining biodiversity (Oates, 1995).

Cross-border movements of elephants occur between Nigeria and Cameroon, probably in both northern savanna (cf. Waza in Cameroon) and southern forest populations. It is possible that the elephants of the Lake Chad area in Nigeria have entirely disappeared (Bita, pers. comm., 1995).

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SITRVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### WEST AFRICA

#### NIGERIA

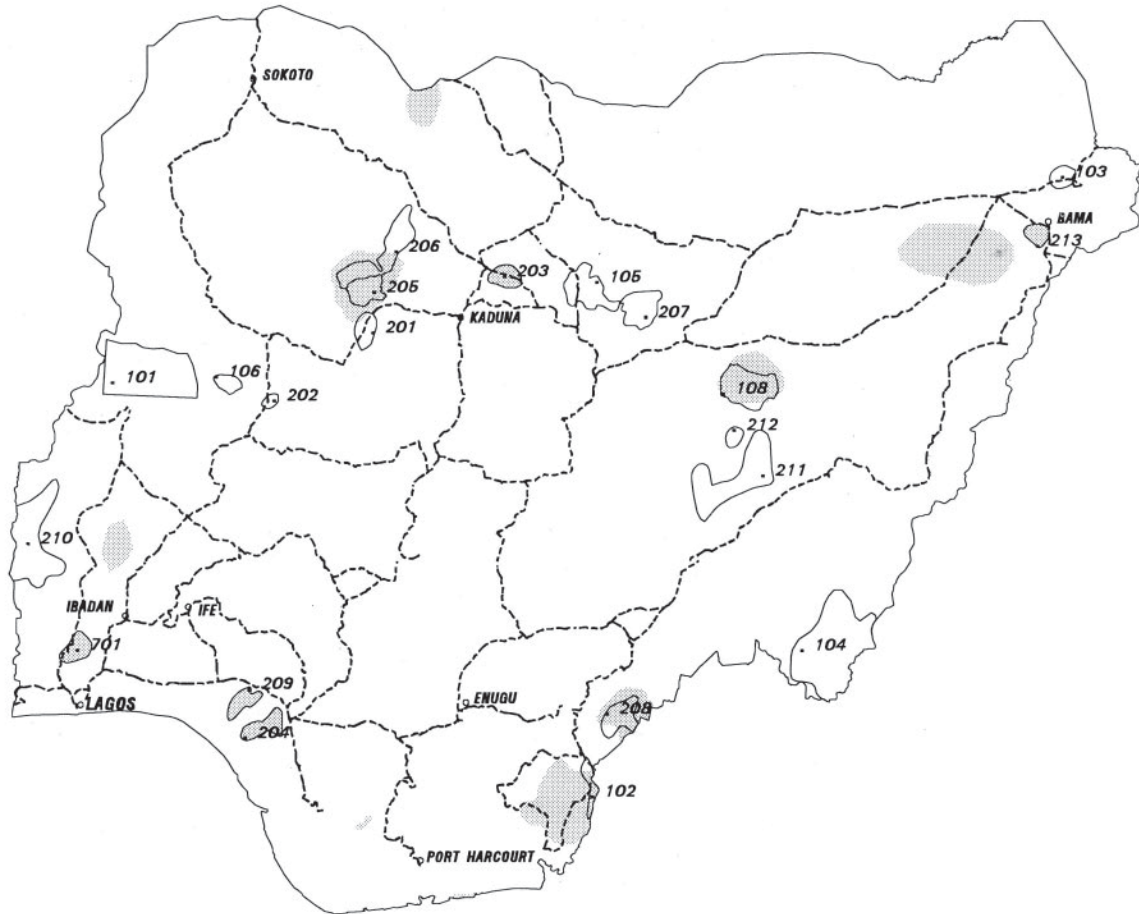
CODE	ZONE	SURVEY DATE	AREA (km2)	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
108	Yankari National Park	1993	2,244	600	±50*	Hurst, Quest. Reply, 1994	IG3	D
205 206	Kamuka Game Reserve Kwaiambana Game Reserve	1993	1,120 2,610	80	+40*	Hurst. Quest. Reply, 1994; Anstey & Dunn, Quest.Reply. 1994	IG3	D
953	Lake Chad		3,308	300	-	NRCC, 1991	OG3	E
213	Sambisa Game Reserve	1993	518	300	+100*	Hurst, Quest. Reply, 1994 Anstey & Dunn, Quest. Reply, 1994	IG3	D
209	Okomu Game Reserve		245	40	-	NCF, 1991	OG3	E
701	Omo Biosphere Reserve	1993	870	30	-	Coad, 1993	DC	D
951	Andoni Island	1993	118	30	+20*	Thouless, 1993	IG3	D
952	Taylor Creek		143	25		Powell, pers. comm. in Thouless, 1993	IG3	D

\*Range for Informed Guess

### SUMMARY OF TOTALS FOR NIGERIA

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	6	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	1,065	0
E	Other Guesses and Other Extrapolations	0	0	0	550
	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>1,065</b>	<b>550</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN NIGERIA



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Lake Kainji NP
- 102 Cross River NP
- 103 Chingurmi-Duguma NP
- 104 Gashaka Gumpti NP
- 105 Falgore NP
- 106 Old Oyo NP
- 107 Upper Ogun NP\*
- 108 Yankari NP

### GAME RESERVES

- 201 Aiwawa GR
- 202 Dagida GR
- 203 Falgore GR
- 204 Giligili GR
- 206 Kamuku GR
- 206 Kwiambana GR
- 207 Lame-Bura GR
- 208 Obudu GR

- 209 Okomu GR
- 210 Okpara GR
- 211 Pai River GR
- 212 Pandam GR
- 213 Sambisa GR

### BIOSPHERE RESERVE

- 701 Omo BR



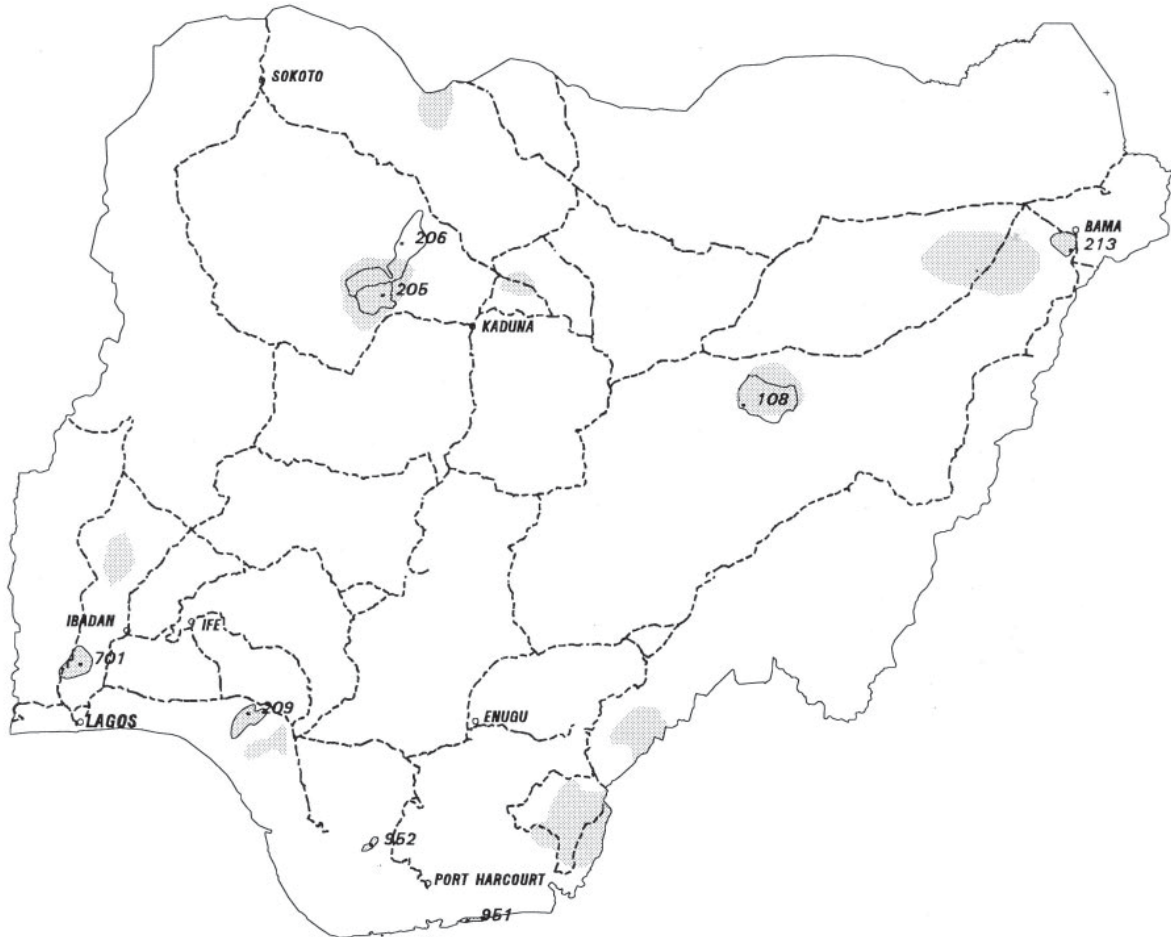
\* Protected area not indicated on the map



African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID



# INOUT AREAS AND ELEPHANT RANGE IN NIGERIA



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

CODE	CENSUS ZONENAME	ESTIMATE
108	Yankari NP	600
205	Kamuku GR and	80
206	Kwiambana GR	
953	Lake Chad GR*	300
213	Sambisa GR	300
209	Okomu GR	40
701	Omo BR	30
951	Andoni Island	30
952	Taylor Creek	25

\* Input area not indicated on the map



African Elephant Database of IUCN/SSC/AESG in  
collaboration with UNEP/GRID



## Senegal

Senegal's small elephant population lives in Niokola Koba NP but has not been surveyed systematically. The

government is trying to find funds to conduct surveys and to rehabilitate the Park.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

AC Aerial Count Unspecified

AS Aerial Sample Survey

AT Aerial Total Count

DC Dung Count

Ex Extrapolation from GIS

GC Ground Count

IR Total Count (Individual Registration)

IG Informed Guess

OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

## WEST AFRICA

### SENEGAL

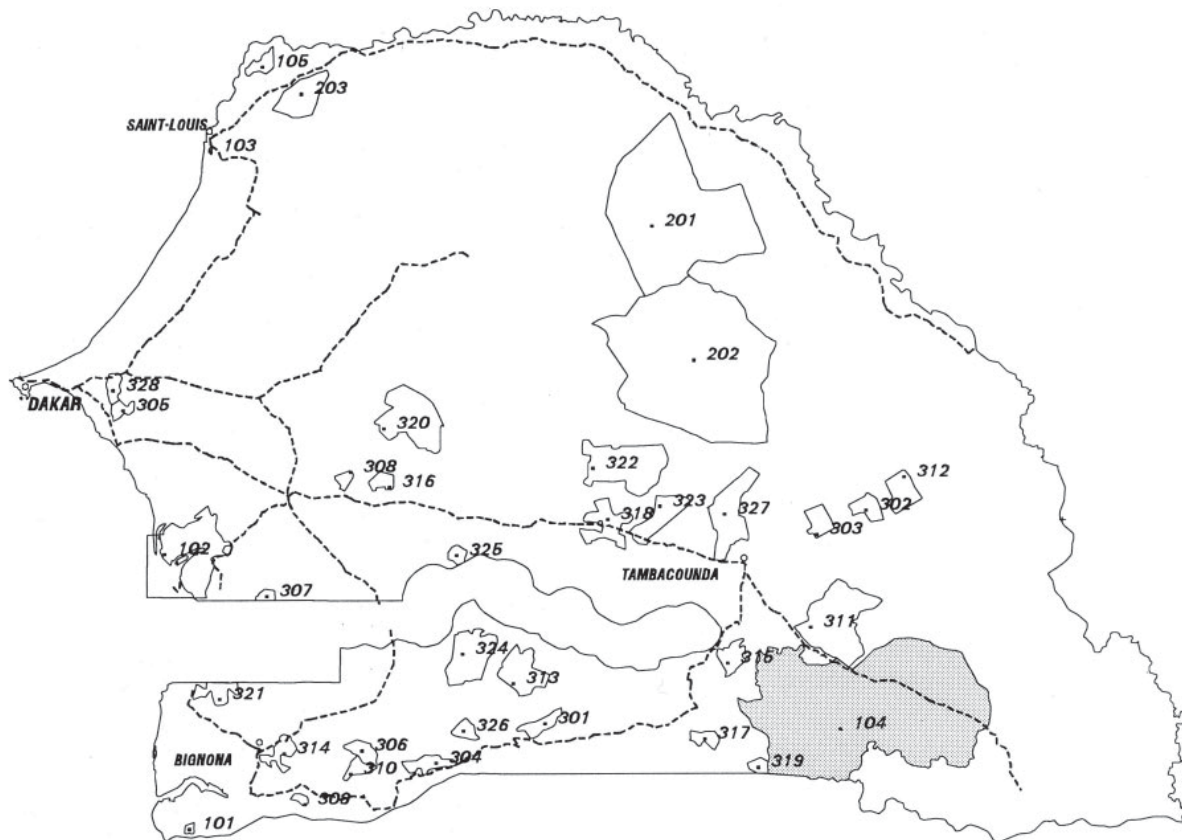
CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE TYPE	SURVEY CATEGORY	DATA QUALITY
				ESTIMATE	95% CONFIENCE LIMITS			
104	Niokola Koba National Park		8,447	20	+20*	Benoit & Sylla, 1992	IG3	D

\* Range for Informed Guess

## SUMMARY OF TOTALS FOR SENEGAL

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POBSIBLE	SPECULATIVE
<b>A</b>	Aerial or Ground Total Counts	0	0	0	0
<b>E</b>	Aerial or Ground Sample Counts	0	0	0	
<b>C</b>	Dung Counts	0		0	0
<b>D</b>	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	20	20
<b>E</b>	Other Guesses and Other Extrapolations	0	0	0	0
	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>20</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN SENEGAL



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Basse-Casamance NP
- 102 Delta du Saloum NP
- 103 Langue de Barbarie NP
- 104 Niokolo Koba NP
- 105 Oiseaux du Djoudj NP

### GAME RESERVE

- 201 Ferlo-Nord GR
- 202 Ferlo-Sud GR
- 203 Ndiael GR

### FOREST RESERVE

- 301 Bakor FR
- 302 Bala-Est FR
- 303 Bala-Ouest Fr
- 304 Balamadou FR
- 305 Bandia FR
- 306 Bari FR
- 307 Baria FR
- 308 Birkelane FR
- 309 Bissine FR

- 310 Boudie FR
- 311 Diambour FR
- 312 Goudiri FR
- 313 Guimara FR
- 314 Kalounayes FR
- 315 Kantora FR
- 316 Kassas FR
- 317 Kayanga FR
- 318 Malem Niani
- 319 Mampaye FR

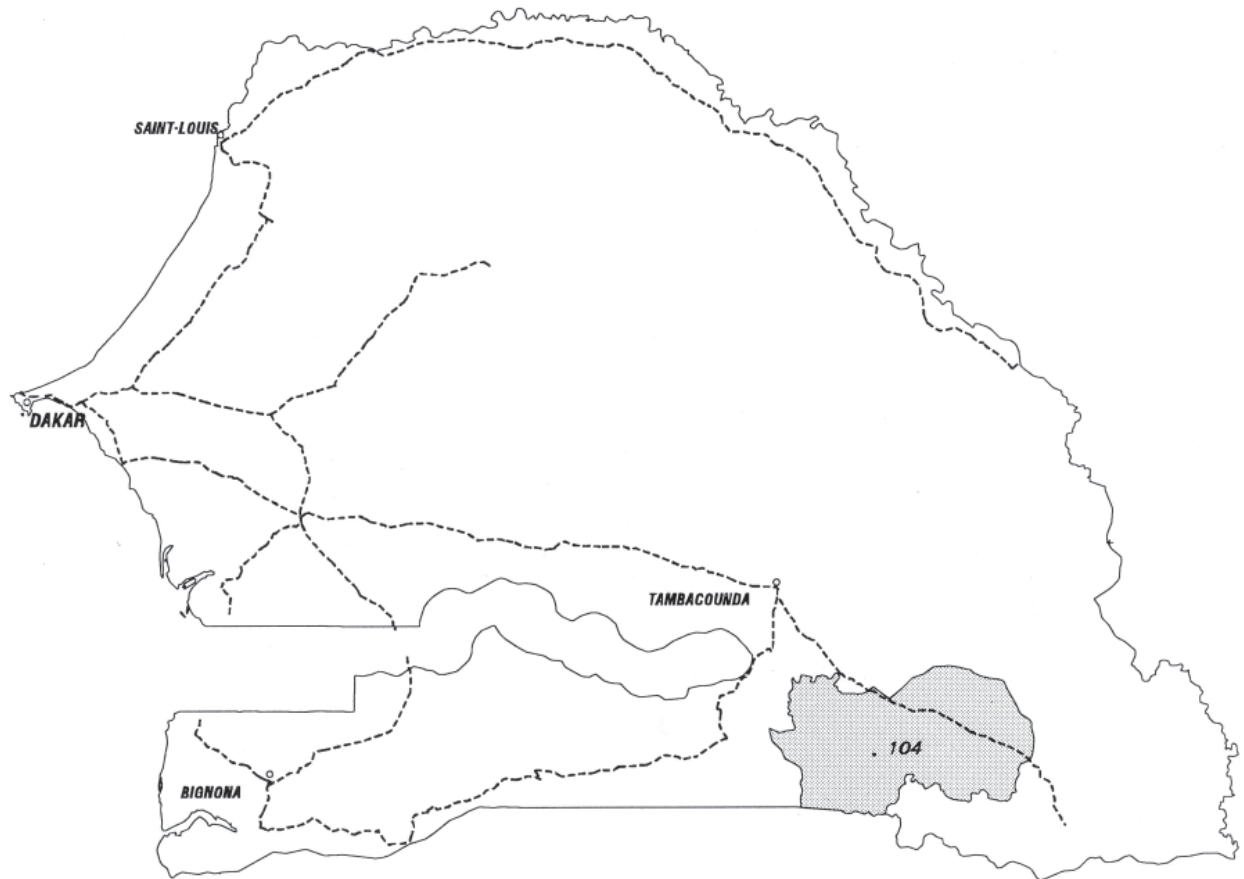
- 320 Mbegue FR
- 321 Narange FR
- 322 Panal FR
- 323 Paniates FR
- 324 Pata FR
- 325 Pate FR
- 326 Sadiata FR
- 327 Tambacounda-Nord FR
- 328 Thies FR



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# INPUT AREAS AND ELEPHANT RANGE IN SENEGAL



## LEGEND

- Elephant Range
- Roads
- Input Zone
- Towns

## KEY TO PROTECTED AREAS

CODE	CENSUS ZONENAME	ESTIMATE
104	Niokola Koba NP	20



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collaboration with UNEP/GRID



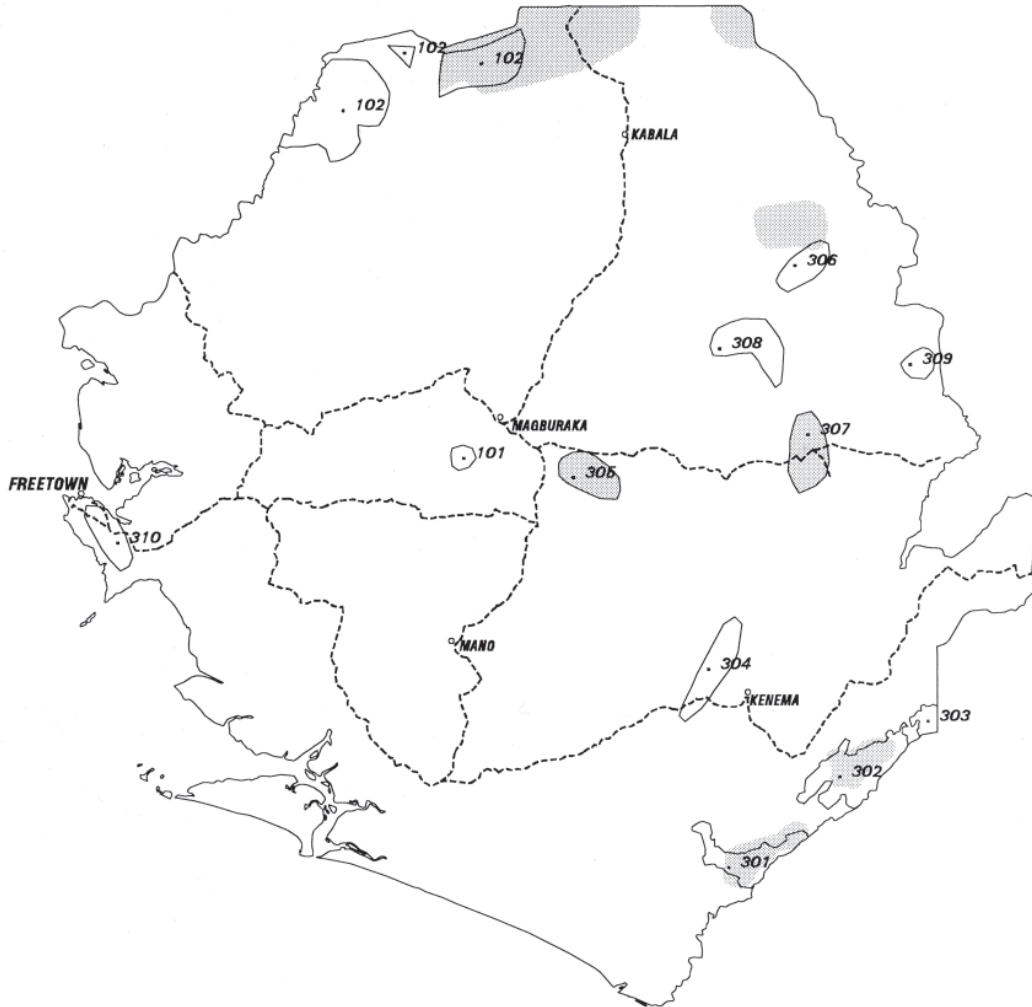


## Sierra Leone

There has been no recent survey information from Sierra Leone, but updates to the range map were provided by

Davies (1993) and Wood (1993), though not on the basis of further survey work.

# PROTECTED AREAS AND ELEPHANT RANGE IN SIERRA LEONE



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARKS

- 101 Mamunta-Mayoso Swamp NP
- 102 Outamba Kilimi NP (proposed)

### FOREST RESERVES

- 301 Gola East and West FR

- 302 Gola North FR
- 303 Gola North FR Ext
- 304 Kambui Hills FR
- 305 Kangari Hills FR
- 306 Loma F

- 307 Nimini FR
- 305 Tama FR
- 309 Tingi FR
- 310 Western Area FR



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# INPUT AREAS AND ELEPHANT RANGE IN SIERRA LEONE



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

No recent censuses have been carried out in Sierra Leone



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## Togo

Apart from the aerial total count by Hall-Martin and Ackerman in Fosse-aux-Lions (Douglas-Hamilton *et al.*, 1992), the estimates and range are based on qualitative surveys by Chardonnet (1988). Tanghanwaye (1993) reported that elephants may have moved out of Fosse-aux-Lions into Ghana following encroachment by local communities. He reports other movements of

elephants from Togo to Ghana, Benin and Burkina Faso. A postscript to an article on the Fosse-aux-Lions elephants (Stalmans and Anderson, 1992) reported that the number of elephants in the reserve had dropped to 25, due to poaching and increased settlement pressure. For this reason, the estimate for Fosse-aux-Lions has been downgraded to Data Category E.

## RECENT ELEPHANT ESTIMATES (1992-1995)

**SURVEY TYPE** is keyed as follows:

- AC Aerial Count Unspecified
- AS Aerial Sample Survey
- AT Aerial Total Count
- DC Dung Count
- Ex Extrapolation from GIS
- GC Ground Count
- IR Total Count (Individual Registration)
- IG Informed Guess
- OG Other Guess

**DATA QUALITY** is keyed from 1 (best) to 3 (worst), and left blank where unknown.

### WEST AFRICA

#### TOGO

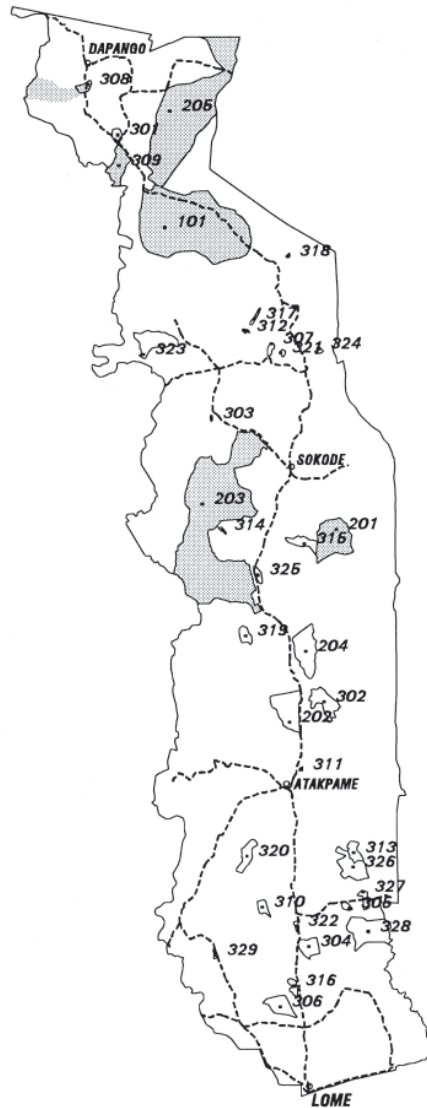
CODE	ZONE	SURVEY DATE	AREA (km <sup>2</sup> )	NUMBER OF ELEPHANTS		SOURCE	SURVEY TYPE & QUALITY	DATA CATEGORY
				ESTIMATE	95% CONFIDENCE LIMITS			
101	Keran National Park	1987	1,645	25	-	Chardonnet, 1988	IG3	D
203	Fazao/Malfacassa Game Reserve	1987	2,169	45	-	Chardonnet, 1988	IG3	D
205	Oti Game Reserve	1987	1,407	10	+10*	Chardonnet, 1988	IG3	D
309	Fosse-aux-Lions Forest Reserve	1991	128		0	Hall-Martin & Ackerman, AT in Douglas-Hamilton <i>et al.</i> , 1992	E	
309	Galangachi Forest Reserve	1987	130	5	+5*	Chardonnet, 1988	IG3	D

\* Range for Informed Guess

### SUMMARY OF TOTALS FOR TOGO

DATA CATEGORY		NUMBER OF ELEPHANTS			
		DEFINITE	PROBABLE	POSSIBLE	SPECULATIVE
A	Aerial or Ground Total Counts	0	0	0	0
B	Aerial or Ground Sample Counts	0	0	0	0
C	Dung Counts	0	0	0	0
D	Informed Guesses, undocumented Aerial or Dung Surveys and GIS Extrapolations	0	0	85	15
E	Other Guesses and Other Extrapolations	0	0	0	128
	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>85</b>	<b>143</b>

# PROTECTED AREAS AND ELEPHANT RANGE IN TOGO



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

### NATIONAL PARK

101 Keran NP

### GAME RESERVES

201 d'Abdoulaye GR  
 202 d'Akaba GR  
 203 Fazao Malfakassa GR  
 204 Kpessi GR  
 205 l'Oti GR

### FOREST RESERVES

301 Barkoissi PR  
 302 Bas-Ogou FR  
 303 Bassar FR  
 304 d'Amakpave FR  
 305 d'Asrama FR  
 306 d'Eto FR  
 307 Diamde FR  
 308 Posse aux Lions FR  
 309 Galangachi FR  
 310 Haho Baloe FR

311 Have-Nerd FR  
 312 Kara FR  
 313 l'Amou Mono FR  
 314 l'Ania FR  
 315 l'Aou Mono Fr  
 316 Lili FR  
 317 Manda FR  
 318 Mont Amalo FR  
 319 Mont Balam FR  
 320 Mont Haito FR

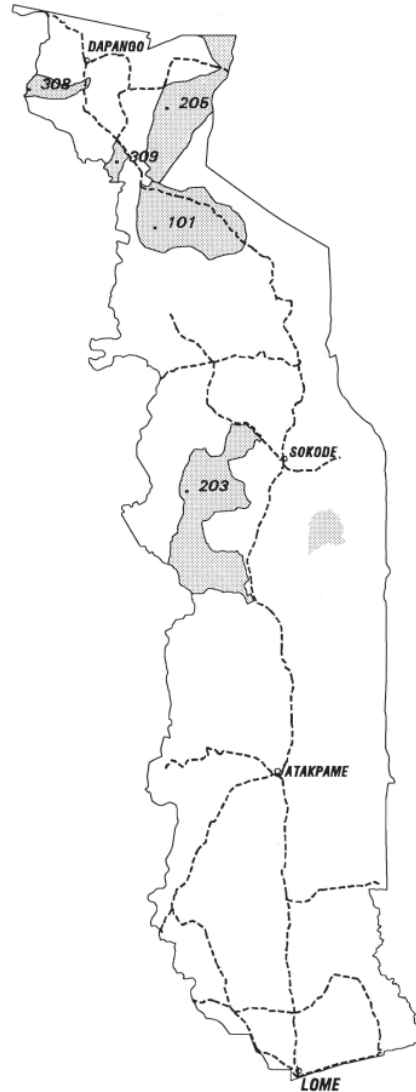
321 Mont Kindja FR  
 322 Notse FR  
 323 Sadjji FR  
 324 Sirka FR  
 325 Sotouboua FR  
 326 Tchila Monota FR  
 327 Tetatou FR  
 328 Togodo FR  
 329 Woutu FR



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# INPUT AREAS AND ELEPHANT RANGE IN TOGO



## LEGEND

-  Elephant Range
-  Roads
-  Input Zone
-  Towns

## KEY TO PROTECTED AREAS

CODE	CENSUS ZONENAME	ESTIMATE
101	Keran NP	25
203	Fazao Malfacassa GR	45
205	Oti GR	20
308	Fosse aux Lions FR	128
309	Galangachi FR	10

Location Map



African Elephant Database of IUCN/SSC/AESG in  
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## AFRICAN ELEPHANT BIBLIOGRAPHY

A project is currently underway to computerise a bibliography of African elephant literature, both published and unpublished, which was originally a collection of Iain Douglas-Hamilton's. It has been extended and updated and when complete, will be available as an on-line facility at UNEP.

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The SSC's mission is to conserve biological diversity by developing and executing programmes to save, restore and wisely manage species and their habitats. A volunteer network comprised of nearly 7,000 scientists, field researchers, government officials and conservation leaders from 179 countries, the SSC membership is an unmatched source of information about biological diversity and its conservation. As such, SSC members provide technical and scientific counsel for conservation projects throughout the world and serve as resources to governments, international conventions and conservation organisations.

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