



**SPATIAL DISTRIBUTION AND CONSERVATION OF FOREST ELEPHANTS
(*LOXODONTA AFRICANA CYCLOTIS*) IN SOUTHWESTERN NIGERIA**

DETAILED FINAL REPORT

BY

AMUSA Tajudeen Okekunle, PhD.
Department of Forest Resources Management
University of Ilorin, Nigeria



SUBMITTED TO

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www.ruffordsmallgrants.org

6th Floor, 248 Tottenham Court Road London W1T 7QZ

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EXECUTIVE SUMMARY

The project was set to contribute up-to-date and accurate information on elephant population in southwestern Nigeria with a view to assisting people in management to make strategic decisions for effective conservation of the animal. The specific objectives of the project were to: (i) identify key elephant habitats within the project area; (ii) determine the population status and distribution of elephants in the project area; (iii) stimulate environmental sensitivity and awareness to elephant conservation; (iv) improve the practical capacity of forest guards and park rangers on systematic elephant survey and; (v) prepare a comprehensive survey document and recommendations for conservation and management of the forest elephants in the area.

The project forged a very strong tie with the Nigeria Conservation Foundation (NCF) and the National Park Service (NPS). Sensitization and planning meetings were also carried out with community stakeholders in the support zone area of Okomu National Park and enclaves within the forest reserves in the area. Series of conservation education outreach towards elephant conservation were carried out in several communities within the project area. Intensive field survey to determine population size and spatial distribution of the forest elephants for both the wet and dry seasons were conducted in Okomu National Park and Omo Forest Reserve.

The project identified key elephant habitats within the project area to include Okomu National Park, Omo and Ison (now Osse River Park) Forest Reserves. OFR support about 28 elephants, while ONP hold up around 33. A mean density of 0.06 elephants per square km was obtained for OFR during the dry season, while 0.14 elephants per square km was found for the rainy season. In ONP, mean density was 0.08 elephants per square km during the dry season, while it was 0.15 elephants per square km for the rainy season. Elephants were more randomly distributed during the rainy season than the dry season in the two locations. However, within the two sites, the animals seem to be restricted to certain areas of the forest complex. A number of identified threats, apart from the landscape features may explain why elephants are confined to narrow bands within the study sites.

Our estimate of elephants' population size and status in the project area is the latest information on the distribution and status of elephants in southwestern Nigeria. The project activities have also helped in stimulating environmental sensitivity and awareness among local communities towards elephant conservation in the area. In addition, the project helped in increasing the practical capacity of forest guards and park rangers on systematic elephant survey.

We believe wildlife managers and conservationists should focus attention and resources on elephant conservation in key elephant habitats within southwestern Nigeria. There is need for continuous sensitization, support and empowerment of local people through community initiatives outside protected areas in the landscape to ensure they participate in the conservation and protection of elephants and other natural resources. There is need to carry out a ground survey and re-demarcate the core elephant habitats within Omo Forest Reserve. There is also need to set up Rangers squad, and provide equipment and vehicle for patrol as part of critical activities for the protection of large mammals such as elephants in the project area.

1.0 INTRODUCTION

1.1 Background

The forest elephant (*Loxodonta cyclotis* Syn. *Loxodonta africana cyclotis*) is an ecological flagship species with great conservation attention. However, the species population in Nigeria has been declining due to illegal hunting and habitat destruction. The rate of elephant decline in the country cannot be established owing to the insufficiency of available data. The lack of knowledge of the population size and status of forest elephants is a major obstacle in determining appropriate conservation needs and measures in the areas where they occur (Ikemeh, 2009). Forest elephant still exists in reserves and other protected areas within the rainforest ecological zone of Nigeria. Ensuring the continued survival of these remaining elephant populations will require up-to-date and accurate information. Increased environmental sensitivity and awareness among local communities will also help to conserve key elephant habitats and populations.

1.2 Objectives

The broad objective of the project- *Spatial distribution and conservation of forest elephants (Loxodonta africana cyclotis) in Southwestern Nigeria* was to contribute up-to-date and accurate information on elephant population in the project area so as to assist people in management to make strategic decisions for effective conservation of the animal. The specific objectives of the project were to:

- (i) identify key elephant habitats within the project area;
- (ii) determine the population status and distribution of elephants in the project area;
- (iii) stimulate environmental sensitivity and awareness to elephant conservation;
- (iv) improve the practical capacity of forest guards and park rangers on systematic elephant survey and;
- (v) prepare a comprehensive survey document and recommendations for conservation and management of the forest elephants in the area.

1.3 Justification

There is clearly a need for defined management objectives for both protected and non-protected areas of elephant range; and these cannot be drawn up without accurate information on elephant distribution and numbers. A better understanding and knowledge on elephant abundance and distribution will make it possible to develop a coherent strategy for their conservation and management. This project will help contribute up-to-date information on elephants in Southwestern Nigeria as part of a strong desire of obtaining accurate population of elephant in the country. This will go a long way in assisting people in management to make strategic decisions for effective conservation. The study will highlight key elephant habitats within the landscape, thereby reducing habitat fragmentation for elephant population in the project area. Besides, elephants are umbrella species that can be used to ensure the conservation of other endangered plants and animals in an area. They are not only a flagship species, but also a keystone species across the world. Thus, the project was set to foster effective wildlife management in the project area.

2.0 MATERIALS AND METHODS

2.1 The Project Area

The project focused on forest elephants within the rainforest ecological zone of Southwestern Nigeria. This zone covers about 2% of the total land area of the country (White and Oates, 1999). It is one of the most densely populated areas in Africa with high levels of human activities even before the western colonial times. The area is of considerable biological interest because it occupies a geographically intermediate position between the Upper Guinea forests which extend from Sierra Leone to the Ghana-Togo border and the Lower Guinea forests (or Central African forests) that reach into eastern Nigeria. It covers about 69,113 km² within much of Edo, Ondo, Ogun, Osun and Ekiti States including northern Lagos and Delta as well as south-eastern Oyo State (Toham *et al.*, 2006). However, a number of studies (Sayer *et al.*, 1992; FORMECU, 1998; Toham *et al.*, 2006) have documented shifts in the ecological boundaries of the zone as a result of human pressure. The only native lowland rainforest zone of south-western Nigeria is found in protected areas, particularly the forest reserves in eastern Ogun, western Ondo and southern Osun States. Our work covers the Okomu National Park, Omo Forest Reserve, Shasha Forest Reserve and Oluwa Forest Reserve. Survey was also extended to Ifon and Akure-Ofosu Forest Reserves where recent reports indicated the likely presence of forest elephants.

2.2 Field Activities

The project commenced by forging a very strong tie with the Nigeria Conservation Foundation (NCF) and the National Park Service (NPS). This was with a view to building relevant relationships with stakeholders to inform a comprehensive conservation management plan for elephants in the project area. The NCF is a non-governmental organization dedicated to the promotion of nature conservation and the maintenance of ecological processes in Nigeria. It was established in 1980, and to date has remained the foremost environmental NGO in the country. NCF has in the past years worked with relevant governments in southwestern Nigeria to jointly seek new legal and policy designation for the protection of the forest elephants and other critically endangered species. On its part, the Nigeria National Park Service is legally empowered to discharge responsibilities relating to carrying out conservation activities towards protecting biodiversity as a whole in Nigeria. However, at present, the only national park within the project area, Okomu National Park, lacks a management plan, and only carries out its activities based on annual work design.

The project team had fruitful engagement with Dr. Joseph Onoja- Head of Technical Programme at the NCF and Messrs. C. Omonu and E. Olabode, both of NCF. A number of correspondences and meetings were also held with other management authorities and field officers in the project area, particularly those from the NPS. Some of the important personalities include: Dr. O.A. Okeyoyin- a Director and Deputy Conservator-General of the National Park Service; Mr. S. Yohanna- a research officer at the NPS headquarters, Mr. A.R. Muraina- Head of Department, Park Protection and Conservation, Okomu National Park and Messrs. Williams, Folusho and Christopher, all of Okomu National Park. We received meaningful inputs from these various individuals. The different communities that are pertinent to the projects were also identified with protocols for engaging them thoroughly discussed and analyzed. The relationship building with stakeholders provided a forum that helped created a very strong synergy for positive and long-lasting impacts of our project outputs. Both the NCF and the NPS contributed logistics and personnel who were involved in the various activities relating to the project.

Sensitization and planning meetings were also carried out with community stakeholders in the support zone area of the Park and enclaves within the forest reserves. The exercise was premised on the fact that the local communities have the highest stakes in the success and sustainability of the project. In

addition, the local communities as custodians of the environment have the knowledge and capacity to contribute to successful conservation of wildlife species. This approach helped to incorporate the views, perceptions, religious beliefs, interests, priorities and realities of the communities in project planning and design. Receptions were generally warm in all the communities, except a few. Most of the community leaders and village council specifically promised their commitment towards ensuring the success of the project. We administered questionnaire to different members of the communities so as to gather socio-economic data relating to the project.

We conducted series of conservation education outreach to stimulate environmental sensitivity and awareness towards elephant conservation in several communities within the project area. Some of the socio-economic data relating to the project which were obtained from administered questionnaire were processed for relevant analysis. Preliminary results revealed the need to step up sensitivity and awareness on elephant conservation in communities within the project area, particularly in the Omo Forest Reserve axis. The experience people have of forest elephants tend to influence their perceptions of, and attitudes towards them. There is an emerging relationship in people's attitudes towards elephant conservation and land use for farming, especially in core elephant habitats.

We also completed field survey on determining population size and spatial distribution of the forest elephants for both the wet and dry seasons. We used two methods of survey: The Line Transect Survey Method (Barnes and Jensen, 1987) and the Short-cut or Reconnaissance ("recce") Method (Barnes, 1988). There were two important aspects to the data collection: One was the finding and recording of dung piles along transect lines; and the other was the regular checking of a number of dung piles to measure decay rate. As each pile of dung along the transect was found, its state of decay was categorized according to the MIKE 'S System' for dung-pile classification (Hedges and Lawson, 2006). The data collection protocol also involved recording habitat-related data such as land cover, land use information and threats. Direct observations of elephants were aided with the mounting of trail cameras.

A total of thirty-eight and forty 3km line transects were used to sample elephants dung in ONP and OFR respectively, covering both rainy and dry season. In ONP, the survey area was stratified on the basis of low (Compartment 1), medium (Compartment 2) and high (Compartment 3) dung-pile densities following the evaluation of the Park rangers. On the other hand, stratification for dung-pile survey in OFR was based on the elephants' use of habitat and extent of human disturbance in the forest reserve. Thus, data were collected from areas designated as elephant sanctuary, farmland and settlement camps. The line transects were randomly placed within the sampling strata. The distance along the transects and perpendicular distance were recorded for each elephant dung pile observed following the method outlined by Barnes & Jensen (1987) for censusing elephant populations. In addition, elephants' footprints diameter, dominant vegetation and land features were also recorded.

The elephant densities were calculated following the formula described by McClanahan (1986) and Barnes & Jensen (1987):

$$E = (Y * r) / D$$

Where: E = Elephant density; Y = Dung pile density; r = Daily rate of dung pile decay and;
D = Defecation rate or number of dung piles produced per elephant per day

The daily rate of dung pile decay for the two sites was measured during the study. Mean dung pile decay period was estimated as 63 days. Only five dung piles remained intact in the course of the survey. The percentage for the daily decay rate of elephant dung was estimated at 0.009. The defecation rate was assumed to be 17 defecations per day (Wing and Buss, 1970). Estimate of elephant numbers was extrapolated from the footprints diameter data.

3.0 FINDINGS AND ACHIEVEMENTS

3.1 Key elephant habitats in southwestern Nigeria

Figure 1 shows the key and non-key elephant habitats within the project locale. Forest elephants were found in Okomu National Park, Omo and Ifon (now Osse River Park) Forest Reserves. Presence of elephants in the Shasha Forest Reserve was not confirmed by our survey, but they are reported to be present by local hunters. There was also no evidence of elephants in Akure-Ofosu and Oluwa Forest Reserves where they are believed to be locally extirpated.

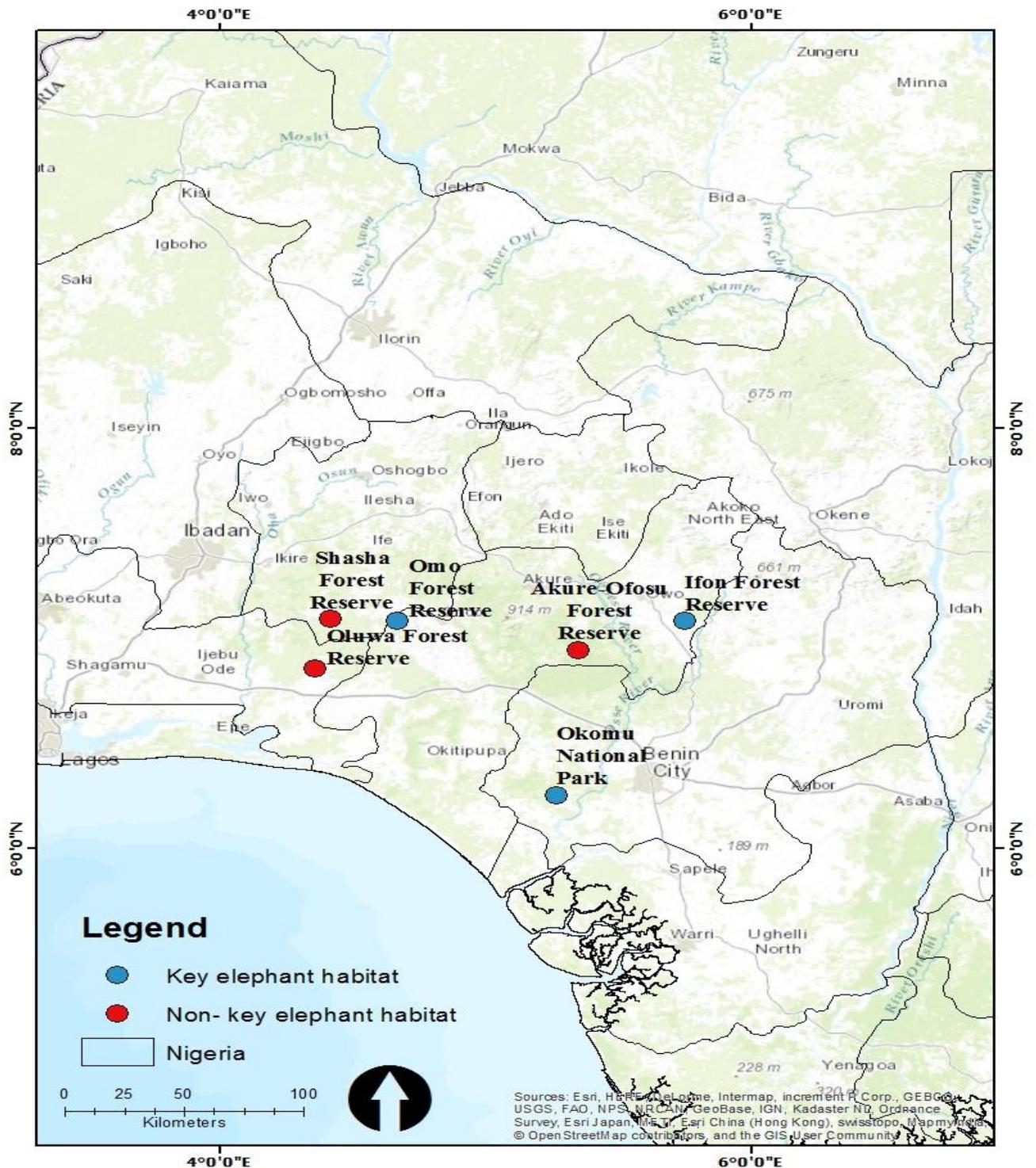


Figure 1: Map of southwestern Nigeria showing key and non-key elephant habitats in the region

3.2 Population status and distribution of elephants in southwestern Nigeria

Tables 1-5 show the population status of elephants in ONP and OFR for both rainy and dry season. OFR support about 28 elephants, while ONP hold up around 33. A total of 24 adults and nine young ones were estimated for ONP, while 22 adults and six young ones were calculated for OFR. A mean density of 0.06 elephants per square km was obtained for OFR during the dry season, while 0.14 elephants per square km was found for the rainy season. In ONP, mean density was 0.08 elephants per square km during the dry season, while it was 0.15 elephants per square km for the rainy season. Elephant densities were higher in compartment 3 of the ONP (0.20 elephants per square km) and elephant sanctuary of the OFR (0.16 per square km) during the rainy season. The distributions of elephants for rainy and dry season in the two locations are shown in Figures 2 and 3. Elephants were more randomly distributed during the rainy season than the dry season in the two locations. However, within the two sites, the animals seem to be restricted to certain areas of the forest complex.

Table 1: Rainy season dung-pile survey of elephants in Okomu National Park

Transect location	No. of transects	Transect length (km)	Sampled area	Number of dung	Dung density/km ²	Elephant density/km ²
Compartment 1	6	18	0.04	12	300	0.16
Compartment 2	4	12	0.03	5	166	0.09
Compartment 3	9	27	0.06	23	383	0.20
Total	19	57	0.13	40		
Mean	---	---	---	---	283	0.15

Table 2: Dry season dung-pile survey of elephants in Okomu National Park

Transect location	No. of transects	Transect length (km)	Sampled area	Number of dung	Dung density/km ²	Elephant density/km ²
Compartment 1	6	18	0.04	7	175	0.09
Compartment 2	4	12	0.03	6	200	0.11
Compartment 3	9	27	0.06	3	50	0.03
Total	19	57	0.13	16		
Mean	---	---	---	---	141.67	0.08

Table 3: Rainy season dung-pile survey of elephants in Omo Forest Reserve

Transect location	No. of transects	Transect length (km)	Sampled area	Number of dung	Dung density/km ²	Elephant density/km ²
Elephant sanctuary	13	39	0.08	24	300	0.16
Farmland	4	12	0.03	8	266	0.14
Settlement camp	3	9	0.02	5	250	0.13
Total	20	60	0.13	37		
Mean	---	---	---	---	272	0.14

Table 4: Dry season dung-pile survey of elephants in Omo Forest Reserve

Transect location	No. of transects	Transect length (km)	Sampled area	Number of dung	Dung density/km ²	Elephant density/km ²
Elephant sanctuary	13	39	0.08	11	138	0.07
Farmland	4	12	0.03	4	133	0.07
Settlement camp	3	9	0.02	2	100	0.05
Total	20	60	0.13	17		
Mean	---	---	---	---	123.67	0.06

Table 5: Estimated elephant populations in Okomu National Park (ONP) and Omo Forest Reserve (OFR)

Site	No. of Adults	Percentage	No. of young	Percentage	Total count	Percentage
ONP	24	72.73	9	27.27	33	100.00
OFR	22	78.57	6	21.43	28	100.00

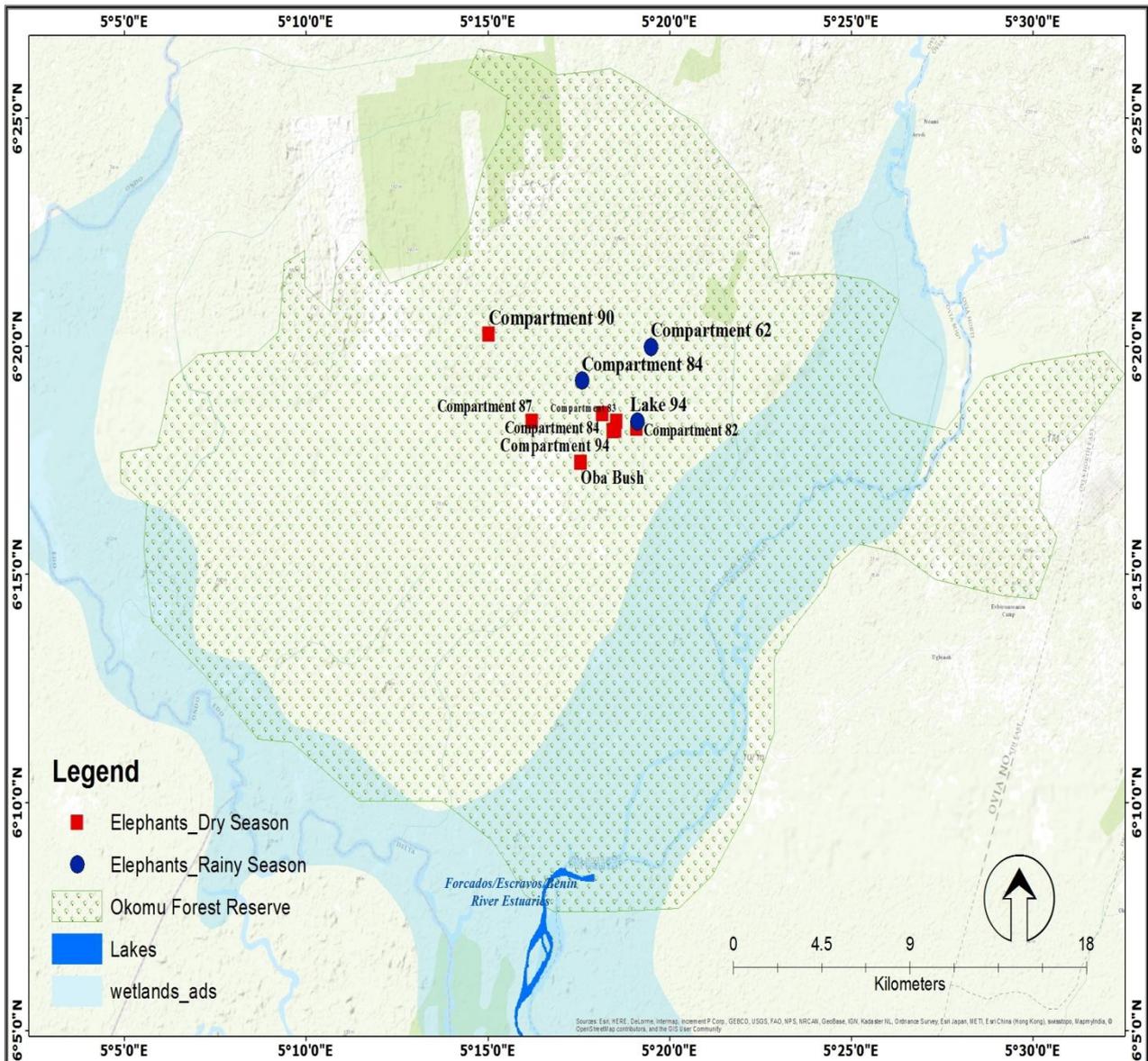


Figure 2: Map of Okomu National Park showing the distribution of elephants for dry and rainy season

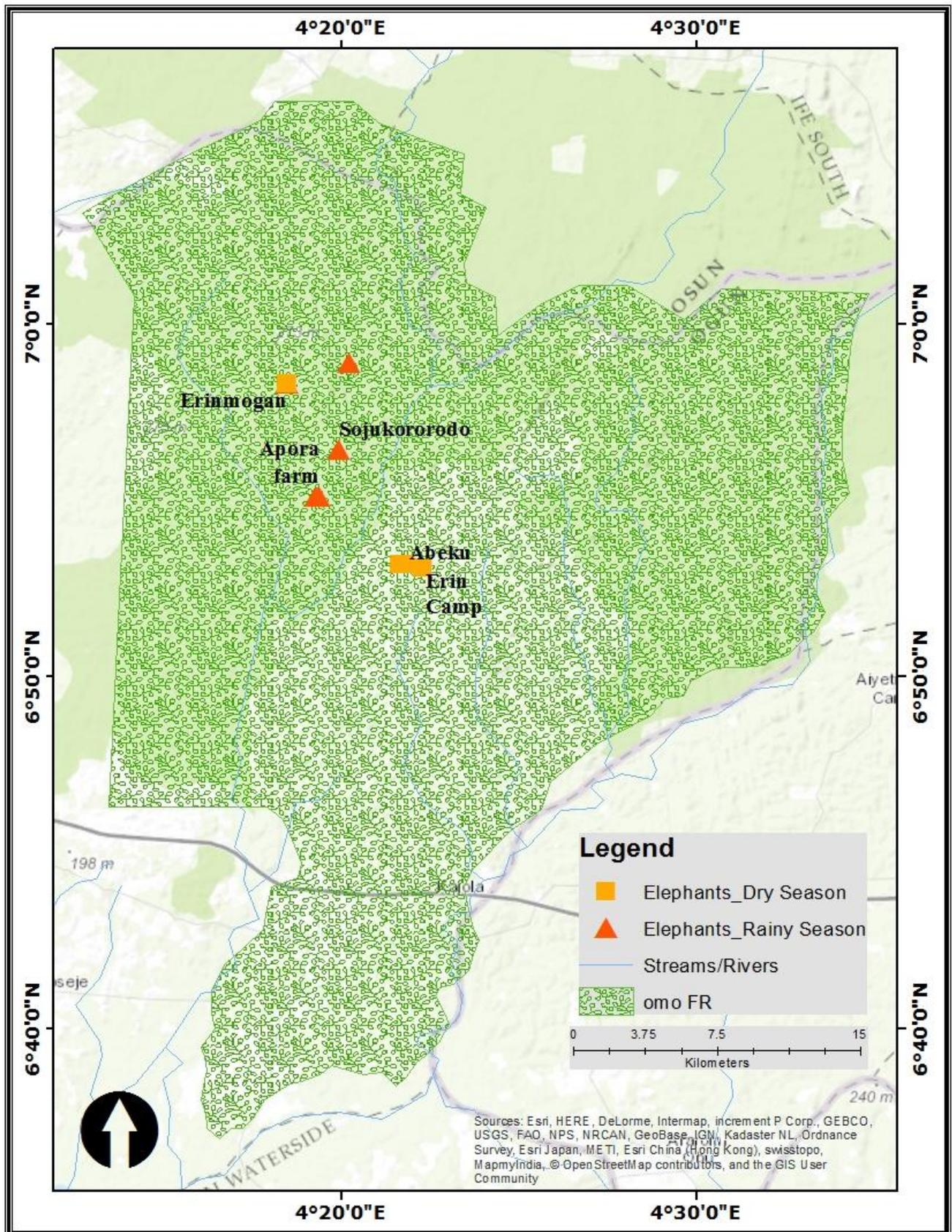


Figure 3: Map of Omo Forest Reserve showing the distribution of elephants for dry and rainy season

3.3 Threats to elephant populations in southwestern Nigeria

Table 6 shows a number of identified threats to elephant populations in southwestern Nigeria. These include poaching/hunting, logging, farming activities and prevalence of illegal settlements within the forest complex. Poaching was the only threat identified in ONP, while logging, farming activities and illegal settlements were the identified threats in OFR. These threats, apart from the landscape features may explain why elephants are confined to narrow bands within the study sites.

Table 6: Identified threats to elephant populations in Okomu National Park (ONP) and Omo Forest Reserve (OFR)

Identified Threats	Frequency		Percentage	
	ONP	OFR	ONP	OFR
Poaching/hunting	5	4	100.0	40.0
Logging	---	4	---	40.0
Farming	---	1	---	10.0
Settlements	---	1	---	10.0

3.4 Some project accomplishments

- i. The project identified key elephant habitats within the project area. These include: Okomu National Park, Omo and Ifon (now Osse River Park) Forest Reserves. We believe Wildlife managers and conservationists should focused attention and resources on elephant conservation in these three areas within southwestern Nigeria.
- ii. Our estimate of elephants' population size and status in the project area will go a long way in determining appropriate conservation needs and measures in the areas where they occur. Ours is the latest information on the distribution and status of elephants in southwestern Nigeria.
- iii. The project activities have also helped in stimulating environmental sensitivity and awareness among local communities towards elephant conservation in the area.
- iv. The project has also helped in increasing the practical capacity of forest guards and park rangers on systematic elephant survey. We have received informal request from research officers of the Nigeria National Park Service at the Okomu National Park to help further in raising the capacity of Park staff involved in data collection on ways of processing and analysing the data with the relevant softwares.
- v. The forging of a very strong tie with the Nigeria Conservation Foundation (NCF) and the National Park Service (NPS) is a platform for sharing the gains and recommendations for conservation and management of forest elephants in the area.

3.5 Recommendations

- i. There is need for continuous sensitization, support and empowerment of local people through community initiatives outside protected areas in the landscape to ensure they participate in the conservation and protection of elephants and other natural resources.
- ii. There is need to carry out a ground survey and re-demarcate the core elephant habitats within Omo Forest Reserve.
- iii. There is also need to set up Rangers squad, and provide equipment and vehicle for patrol as part of critical activities for the protection of large mammals such as elephants in the project area.

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References

- Barnes, R. F. W. and Jensen, K. L. (1987). How to count elephants in forests. Technical bulletin 1. African Elephant and Rhino Specialist Group, World Conservation Union, Gland, Switzerland.
- Barnes, R. F. W. (1988). A short-cut method for obtaining preliminary estimates of elephant abundance. Wildlife Conservation International.
- FORMECU. (1998). The Assessment of Land Use changes in Nigeria between 1976/78 and 1993/95: Federal Department of Forestry. 117pp.
- Hedges S, Lawson D. (2006). Dung survey standards for the MIKE programme. Central Coordinating Unit, CITES–MIKE Programme, Nairobi, Kenya.
- Ikemeh, R. A. 2009. Preliminary data on forest elephants (*Loxodonta africana cyclotis*) in southwestern Nigeria. *Pachyderm* No. 45 July 2008–June 2009. 117-123.
- McClanahan, T. R. (1986). Quick population survey method using faecal droppings and steady state assumption. *Afr. J. Ecol.* 24, 61-68.
- Sayer, J. A., C. S. Harcourt, and N. M. Collins. (1992). The Conservation Atlas of Tropical Forests: Africa. IUCN and Simon & Schuster, Cambridge.
- Toham, A.K., D'Amico, J., Olson, D., Blom, A., Trowbridge, L., Burgess, N., Thieme, M., Abell, R., Carroll, R.W., Gartlan, S., Langrand, O., Mussavu, R.M., O'Hara, D. and Strand, H. (2006). A Vision for Biodiversity Conservation in Central Africa: Biological priorities for Conservation in the Guinean-Congolian Forest and Freshwater Region. World Wildlife Fund, Washington, D.C. pp. 112.
- White, L. J. T., and J. F. Oates. (1999). New data on the history of the plateau forest of Okomu, southern Nigeria: an insight into how human disturbance has shaped the African rain forest. *Global Ecology and Biogeography Letters* 8: 355-361.
- Wing, I. D. and Buss, I. O. (1970) Elephants and the forest. *Wild. Monog.* 19, 1-92.