A SURVEY OF WILDLIFE SPECIES UTILIZED AS BUSHMEAT IN ONDO STATE, NIGERIA

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ABSTRACT

A survey of wildlife species utilized as food(bushmeat) was carried for six- months; October to December 2004 and June to August 2005. The study was to investigate the species of wildanimals utilized as food (bushmeat), preference species, seasonal abundance and other uses of wildanimals apart from food. Three methods; direct observation, use of structured questionnaire, and oral interview were used to collect data for this work. Two bushmeat markets; Oja-oba and Owena were selected as sites for a detailed market survey. Data was collected on daily basis during the work. A total of 1500 questionnaires was administered to hunters, bushmeat sellers and consumers in 10 selected local government areas in the state. Oral interview was adopted to enhance and confirm information obtained from the first two methods adopted. The results revealed that 14 species of wildanimals belonging to 6 classes were utilized as food in the study area. It was also observed that rodents formed the majority of the species utilized. Primates and carnivores had a low percentage of the meat value in the state. The results at the two study sites in both dry and wet seasons indicated that grasscutter (*Thryonomys swinderianus*) is the most preferred species followed closely by Maxwells' duiker(*Cephalophus maxwelli*).The statistical analysis revealed that there is significant difference between the wildanimals utilized at different locations ($F_{cal} > F_{tab}$; 3.34 > 0.32). The result also showed a slight correlation between wildanimals utilized at different seasons; r=49. Apart from the meat value, wildanimals were also valued for their trophies in traditional drum making. The management implication of the study was also discussed.

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CERTIFICATION

I certify that this project work was carried out by Miss George, Emem Akpan (B.Sc) of the Department of Ecotourism and Wildlife Management, Federal University of Technology, Akure.

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DEDICATION

To all committed Ecologists. Thank you for the worthy course you have chosen for our invaluable planet earth. Most importantly to my heavenly father and almighty God whose love, grace, mercy and faithfulness have made me all I am and ever hope to be. Thank you immensely Daddy; you are ever my source, my strength, my hope, my life and my all.

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CHAPTER ONE

INTRODUCTION

Global conservation policy has come a long way in the last four decades. It has gone from placing emphasis on specific species of wildlife and habitat protection to what can be described as integrated biodiversity conservation and development. It has come this far because of the realization over the years that conservation goals can not be achieved without ensuring that the interests of many local communities in terms of sustainable livelihood are not jeopardized. Hitherto, Wildlife utilization as a major conservation tool has risen to sudden prominence in recent times. The rise has been traced to its invaluable economic importance commercially, scientifically, industrially, ecologically and aesthetically (Fleagle, 1999; Ajayi 1971; Koppet *et al* 1993; Agbelusi and Afolayan 1987).

The rate of unsustainable use of bushmeat aroused the concern of international non-governmental organisation (NGOs) like Bushmeat Crisis Task Force (BCTF) in partnership with the Great Apes Survival Project (GRASP) and other foremost international NGOs. These NGOs are dedicated to the conservation of wildlife population, threatened by certain factors, especially hunting for bushmeat. Through relevant researches in Africa between years 2001 and 2005, they have discovered that wildlife species share their habitats with millions of people who live below the poverty line in West, Central and East Africa. As a result, the majority of these people make their livelihood from hunting and sales of wildlife including some endangered species as bushmeat. BCTF has reasonably developed its databases concerning the bushmeat issue from the trend in wildlife exploitation.

Hunting of all animals for bushmeat has been a cultural traditional activity for a longtime in Africa. Wildanimals are the main source of meat and an important source of income in many rural localities; and also a valued food for many urban dwellers (Juste *et al,* 1995). This situation is also true for southwestern Nigeria (Agbelusi and Afolayan 1987; and Fleagle 1999). Agbelusi and Afolayan (1987), Agbelusi et al (2000; and Agbelusi *et al* (1999) have studied such aspect like composition; species diversity and general values of wildlife. Wildlife hunting for bushmeat is also an important traditional and economic activity in Ondo State. Hunters are commonly encountered in the free forest areas as well as the forest Reserves in the state. Bushmeat sections in markets have been established for decades now in all the local Government Areas and along major highways in the state. Demand for bushmeat at homes and restaurants are also on the increase. These have improved the livelihood of some citizenry, particularly the poorest sector of the state economy that depends solely on wildlife hunting as a major source of income.

1.2 JUSTIFICATION OF THE STUDY

Previous work by wildlife researchers had been on the ecology and general biology of wild animals. Such aspect like species composition; species diversity, general values of wildlife, among others have also been studied. However, there is no comprehensive study that has been conducted exclusively on wildlife utilized as bushmeat in Ondo State.

Furthermore, information on the use of wild animal (bushmeat) as suppliers of animal protein are difficult to obtain (Wilson 1994) due to non-availability of relevant data in Nigerian (Ajayi 1979). This study is therefore necessary to provide knowledge of the abundance of wildlife species utilized as bushmeat in the state. It is hoped that the findings from this study will provide the necessary baseline data where further researches on this invaluable aspect of wildlife utilization could be done.

1.3 OBJECTIVES:

The main goal of the survey reported here was to obtain information on bushmeat utilization in Ondo State.

The specific objectives of the study are to determine the:-

(i) species utilized as bushmeat in the state

(ii) preferred species for consumption.

(iii) uses of wildlife in the state, other than bushmeat.

(iv) seasonal availability of the harvested species in the market survey

1.4 THE SCOPE OF THE WORK

In this study, wildlife species from members of the class; primates, rodents, ungulates, paenunquilata, suids and carnivores were surveyed. Invertebrates, reptiles, aves and aquatic wildlife species were not recorded during the study because of the limited time for the work.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 GLOBAL WILDLIFE UTILIZATION REVIEW

Wild animals are also useful in other ways in Africa apart from exploitation for bushmeat. They are useful as raw materials for local factories in production of shoes, handbags, bangles, necklaces, local drums, purses and other leather works. Wildlife trophies (souvenirs and decorations) are sold to tourists or exported (with license) to generate foreign exchange. A number of antiquities in our museums and gift shops are made from skins of leopard(*Panthera pardus*), Cheetah(*Acinomys jubatus*) African civet(*Vivvera civetta*), antelopes(*Cephalophus* spp.) among others. They are of great industrial purpose in America, London and Europe as modern designers prefer them to materials sourced artificially. The skin of lion(*Panthera leo*), Leopard and other big cats are also of invaluable use for making expensive wears for high chiefs, and other traditional rulers. In the Biblical era, God used the skin of wildanimals to cover the nakedness of our forefathers; Adam and Eve. This confirms that animal furs were used for cloth making in the older days and now as the fur/skin of wildanimals such as Monkeys(*Cercopithecus spp.*), Elephant (*Loxodonta africana*), antelopes and other colourful animals are still being used today for cloth making.

. The feathers of most birds are also of invaluable use. Colourful birds like Peacock, Crowned crane, guinea- fowl etc are useful in this aspect. They provide an incomparable touch on leather works and wears for designers and models. By- products of wildlife also constitute basic raw materials for traditional medication. It has been established that wildlife species are being used for this purpose. The parts of animals being utilized include bone, heart, tusk, skin , horn, tail, nose, feathers, liver, intestines, skull, teeth, urine, beak, and soil collected from foot-marks (Akinyanmi, 2005).

Throughout Africa, hunting for food constitutes the most extensive form of wildlife utilization (Juste *et al* (1995). It is still an important source of income and protein in many rural localities and is a valued food for many urban dwellers. It is a source of income which has become a common component of household economies. Recent evidence suggests simply that bushmeat is often the only source of animal protein always available and tends to be safer. (Juste *et al* 1995).

Bushmeat species include apes, other primates, ungulates, rodents and birds. The species hunted depend on the geographical area, preference and taboos of the hunters, consumers and sellers. Bushmeat has long

played a role in the livelihood of people living in the forest and savannah areas. For many rural people, bushmeat is not only an important source of animal protein in their diets, but it may also increasingly be a key component of their livelihoods in providing flexible cash income from its sale to traders and consumers.

2.2 GLOBAL BUSHMEAT TRADE

Although there is significant bushmeat trade in Asia and Latin America, BCTF and wildlife conservationist have focused their attention on Africa where the problem is acute. Large growing urban population in most part of Africa view bushmeat consumption as a way to reconnect with their cultural tradition. Burhnam, (2002) stated that the scale of bushmeat consumption is threatening the survival of species such as Elephants (*Loxodonta africana*), Gorillas (*Gorilla gorilla*) and Chimpanzees (*Pan troglodytes*) in Africa. While bushmeat provides animal protein and a source of income for many African families, the bushmeat trade has recently increased dramatically.

2.2.1 BUSHMEAT TRADE IN CENTRAL AFRICA.

Hutchins (2002) conducted a survey in Central Africa. He discovered that approximately 30 million people live within the forested region of C/Africa; 40-60% of this population lives in cities and towns and mostly on the meat of wildlife. He observed that central Africans eat approximately the same amount of meat as many Europeans and North Americans, yet over 60% of this come from indigenous wildlife. He stated that over 1 million metric tons of Antelope, primates, elephants, and rodents; the equivalent of million cattle are killed each year to supply central African families with what is either their primary source of protein or a derived luxury. He stated that forest antelopes (duikers), wild species of pig and primates were most often eaten.

2.2.2 BUSHMEAT UTILIZATION TRADE IN WEST AFRICA

For many rural people from the West African region, wild animals (bushmeat) are highly valued forests products. They provide an important source of meat in both rural and urban household diets. Forest dependent animals are of particular importance in humid West Africa. While many households have a few domestic animals: goats, sheep or chicken etc, they do not provide a regular source of food because they are generally consumed only on ceremonial and festive occasion (Ajayi 1979; Asibey 1974; Chadonnet *et al* 1995 and Dietworst 1987). Bushmeat consumption is generally accepted in West Africa. The most commonly consumed wildlife is species of fish, small and big mammals, reptiles, birds, and even insects. There is a growing body of literature on the economic importance of bushmeat in West Africa forest region as a result of large scale bushmeat sales(Bowen-Jones, 1999). Wildlife utilization as bushmeat in Cote d'voire was studied by Asibey(1974). He observed that consumption of bushmeat in Cote d'voire on the Northern Province was 0.03kg/person/day.

Hunting of wild animals is an important component of household economies in the Congo Basin. Wilkie et al (1998) demonstrated the benefits that are achieved by hunters, traders and restaurant owners who sell bushmeat. Among others, they traced the sale of 3 monkeys hunted in the area. In this case the hunter netted $6.3 (30% profit) from the sale of the monkeys, the trader made $10.2 (19% profit) and the restaurateur made $ 20.6 (21% profits). In another case, he stated that on average, all captured bushmeat sold between 36-52% and generated income of approximately $300 per household/year.

Anstey (1991) found out that nearly half (48%) of the bushmeat available in urban Liberian Markets was from duiker, with rodents (20%) and primate (20%). In the rural areas, he reported that the majority (75%) of species collected were antelopes.

Njiforti (1996) found similar preference patterns in Cameroon. Porcupines specifically were the most preferred bushmeat and were reported by respondents to be declining. Also in Cameroon, Ellis and Kamou (2005) conducted a long-term bushmeat consumption study in 3 villages bordering an 115,000 Ha protected area. Data were collected on hunting and selling zone. Results of the first 24 months of data indicated that bushmeat; (represented by more than 45 species) plays a key role in local economics for selected individuals. Heavy hunting months in the area were between August-October.

Morgan and Dixson (2005) reported their findings from a detailed hunter interviews conducted in 15 remote villages. It suggested among other things that there was a decline in most hunted species.

2.2.3 BUSHMEAT UTILIZATION/TRADE IN NIGERIA

Dietworst(1987) noted that wildlife is most highly valued as food in Nigeria. Ajayi (1971) estimated that 80% of the people in southern region consume bushmeat and that bushmeat supplies an average of 20% of the animal protein consumed. He stated that wildlife is still an important source of protein in many rural localities and a valued food for many urban dwellers. The total value of wildlife throughout the country in 1978 was about N30million (Ajayi 1978). This is about one-third the values of all protein obtain from indigenous species of wildlife animals. Although these estimates may not be too accurate, they give a good indication of the importance of wildlife as a source of bushmeat in Nigeria. Happold (1987) analyzed the economic value of bushmeat in Nigeria. His analysis assumed that a particular wildlife species is worth a certain sum of money to the hunter and seller. Angelici *et al* (1999) carried out a survey of the mammals traded by local people in bushmeat markets of the rainforest of South-Eastern Nigeria. In all, 37 different species were recorded. They found out that few small-sized mammals of the orders Rodentia and insectivora were traded. Among the traded species the majority were ten species each of carnivores, Artiodactyles and 7 species of rodents. With regard to the latter order, majority of the traded species were giantrats (*Cricetomys gambianus)*, grasscutter(*Thryonomys swinderianus*), Porcupine(*Artherurus Sp*) which represent an important source of protein for local bush people. Frequently traded also were Pangolins (*Manis gigantea*), bush pig(*Potamochoerus capensis*), bush buck(*Tragelaphus scriptus*) and duiker(*Cephalophus maxwelli*). Some of these mammals may serve other purposes; animistic ritual & medical practices. Some of these animals are also important from the conservation point of view for instance Leopard(*Panthera pardus*) and Elephant(*Loxodonta africana*). Fruit bats were traded for food only in small villages surrounded by forests.

Anadu *et al* (1988) found similar patterns of preference and availability in markets of south Western Nigeria. Through interviews with hunters and market vendors, they found out that consumers preferred grasscutter(*Thryonomysswinderianus*), pangolin(*Artherurus Sp.*), duikers(*Cephalophus maxwelli*) and bushpig(*Potamochoerus capensis*). Hunting was noted to take place in all months of the year, but became more intense during the dry season. Out of 27 species of mammals that were reported to be hunted, 22 were found on sale. Retailers reported that the grasscutter(*Thryonomys swinderianus*) was the most popular specie among customer. It was also the widely sold species, followed by giant rat(*cricetomys gambianus*), monkeys (*Cercopithecus Sp.*) and Maxwell's duiker(*Cephalophus maxwelli*). Game animals in this area

were shot and sold with little regard to existing laws, with the result that the larger mammals have become rare in the area and population of the smaller ones have come under severe pressure. Another work by Martin (1978) in a roadside bushmeat market along Benin City, Nigeria revealed that most commonly consumed species are grasscutters. Small antelopes and giant rat was consumed by the majority of both urban and rural people.

2.3 WILDLIFE CONSERVATION IN ONDO STATE

Wildlife conservation implies the wise use of the wild animal populations to meet the needs of the present and future generations. Ayeni *et al* (1982) recommended that proper control methods of hunting could ensure that wildlife numbers remain high. Adherence to such methods as restriction of various types of weapons and hunting methods, imposition of closed seasons to hunters, and creation of reserves could lead to eventual increase in animal numbers.

Ondo state is famous for its significant contributions to the Nigerian economy because of its high biodiversity richness. It was the recognition of this that prompted some areas in the Ondo province to be carved out in 1963 as sites for potential wildlife sanctuary so that certain important endemic fauna and flora resources could be preserved. However wildlife management suffered greatly from neglect. Massive deforestation through unsustained logging in forest reserves and uncontrolled hunting became the norm for indigenous and visiting exploiters in the free forest areas as well as Government forest reserves in the state. Greengrass (2006) linked these activities to serious biodiversity loss especially wildlife where bigger species like Elephants(*Loxodonta africana*) and chimpanzee (*Pan troglodytes*) have become rare.

In the same vein, some failed attempts were made to develop wildlife conservation in the state. Notable were the efforts of the first states wildlife officer, Mrs Agbelusi and the wildlife inventory study carried out in Ifon forest Reserve by some wildlife experts from FUTA in 1990. After these attempts, and the failure of the state Government to grasp the importance of wildlife conservation, there was need for intervention by a non-governmental organization; Nigeria Conservation Foundation (NCF). NCF officially entered into partnership with the Ondo State Government to develop and promote wildlife conservation in the State beginning with Ifon forest Reserve in year 2006. The collaborations between the state government and NCF have adopted the global trend of Community Based Management System (CBMS) for the project

implementation. Greengrass(2006) recommended that the NCF/ODSG conjunction to protect Ifon Forest Reserve be done with strict law enforcement activities. She stated both hunting and logging must be prohibited inside the reserve if wildlife populations are going to recover. It is expected that the disturbed portion of the ecosystem would recoup with the intervention of NCF for adoption of suitable management practices and ultimately promote wildlife conservation in the state.

2.4 WILDLIFE ABUNDANCE AND UTILIZATION IN ONDO STATE

Agbelusi and Afolayan (1991), Agbelusi (1994) and Agbelusi *et al* (2000) identified some wildlife still occurring in Ondo State. Monkey(*Cercopithecus mona*) , Chimpanzee (*Pan troglodytes*), Pangolin(*Manis gigantea*), Duiker (*Cephalophus Sp*), forest elephant(*Loxodonta africana*), hyrax(*Procavia capensis* and *Dendrohyrax Sp.*), forest buffalo (*Syncerus caffer*), bushbuck(*Tragelaphus scriptus*), porcupine(*Atherurus Sp.*), grasscutter(*Thryonomys swinderianus*), giant rat(*Cricetomys gambianus*), bush pig(*Potamochoerus capensis*) and crocodile(*Crocodilus Sp.*) Civet Cat(*Viverra civetta*), genet cat(*Genetta Sp.*), Leopard(*Panthera pardus*), Warthog(*Phacochoerus aethiopicus*), sitatunga(*Tragelaphus spekei*), Hartebeest(*Alcelaphus Sp*), Oribi(*Ourebia ourebia*) and monitor lizard(*Veranus nicolitus*) . A few of these animals still occur in their natural habitat in the forest and/or Savannah areas in the state. Other species are seen displayed for sale along major highways, in bushmeat markets and restaurants across the state. In year 2000, 2003 and 2006, a forest elephant was reported seen in some part of Ifon Forest Reserve. The latter was reported during the biodiversity survey by NCF in Ifon Forest reserve, while the former (2000, 2003) where seen by forestry officers during the removal of logs by concessionaires in the same forest. Buffalo(*Syncerus caffer*), chimpanzee(*Pan troglodytes*), mona-monkey(*Cercopithecus mona*), Baboon(*Papio Sp*) Bushbuck(*Tragelaphus scriptus*), Civet cat(*Vivvera civetta*) and Duiker(*Cephalophus Sp.*) were also recorded in the forests reserve during the exercise. Elsewhere within the state these species and many others have been recorded. Greengrass (2006) during a recent study equally recorded Duiker(*Cephalophus Sp.*), galago(*Galagoides demidovii*), hyrax(*Dendrohyrax arboreus* and *Procavia capensis*), porcupine(*Artherurus Sp.*), white-throated monkey(*Cercopithecus Sp.*), troop of olive baboon(*Papio Sp.*), male bushbuck(*Tragelaphus Sp.*), Aardvard(*Orycteropus affer*) and chimpanzees(*Pan troglodytes*) in the seven state forest reserves she surveyed in the state.

CHAPTER THREE

MATERIALS AND METHODS

3.0 STUDY AREA

3.0.1 HISTORY AND GEOGRAPHY

The Present Ondo State was an integral part of Ondo Province in the post – independence western region of Nigeria. In 1967, Ondo province was part of the then newly evolved Western State. In 1976, the country was further restructured into 19 states and Ondo Province became a state (ODSEEDS, 2005). In 1987 and1991, Nigeria was further subdivided into 21 and 30 states respectively, while in 1996, the states were further expanded to 36.

Ondo State is located in the south Western part of Nigeria (fig 3.1). The state lies within Latitudes 5^0 45^1 and 8^0 15^1 North and longitudes 4^0 45^1 and 6^1 East. It is bordered in the Northwest by Ekiti and Kogi State; West-Central by Osun State; South west by Ogun State and South east by Delta State. The State has a surface Area of approximately 15, 317km^2. There are 18 local Government Area (LGAs) in the State (fig 3.2).

3.1.1 ENVIRONMENT AND PHYSICAL CHARACTERISTICS

The climatic conditions in Ondo State follow the pattern in south western Nigeria, where the climate is influenced mainly by the rain bearing southwest monsoon winds from the ocean and dry Northwest winds from the Sahara Desert. High temperatures and high humidity also characterize the climate, which facilitates the growth of tropical crops and high forest. There are two distinct seasons; the rainy and dry seasons. The rainy season lasts for about seven months (April to October) while the main dry season lasts generally from late October to March. In general terms, the state is well endowed with high rainfall that varies from about 2540mm a year in the south-eastern strip to 2032mm in the middle part, and 1270mm along the Northern part made up mainly of the four Akoko L.G.As. The atmospheric temperature ranges between 28^0c and 31^0c and a mean annual relative humidity of about 30 percent.

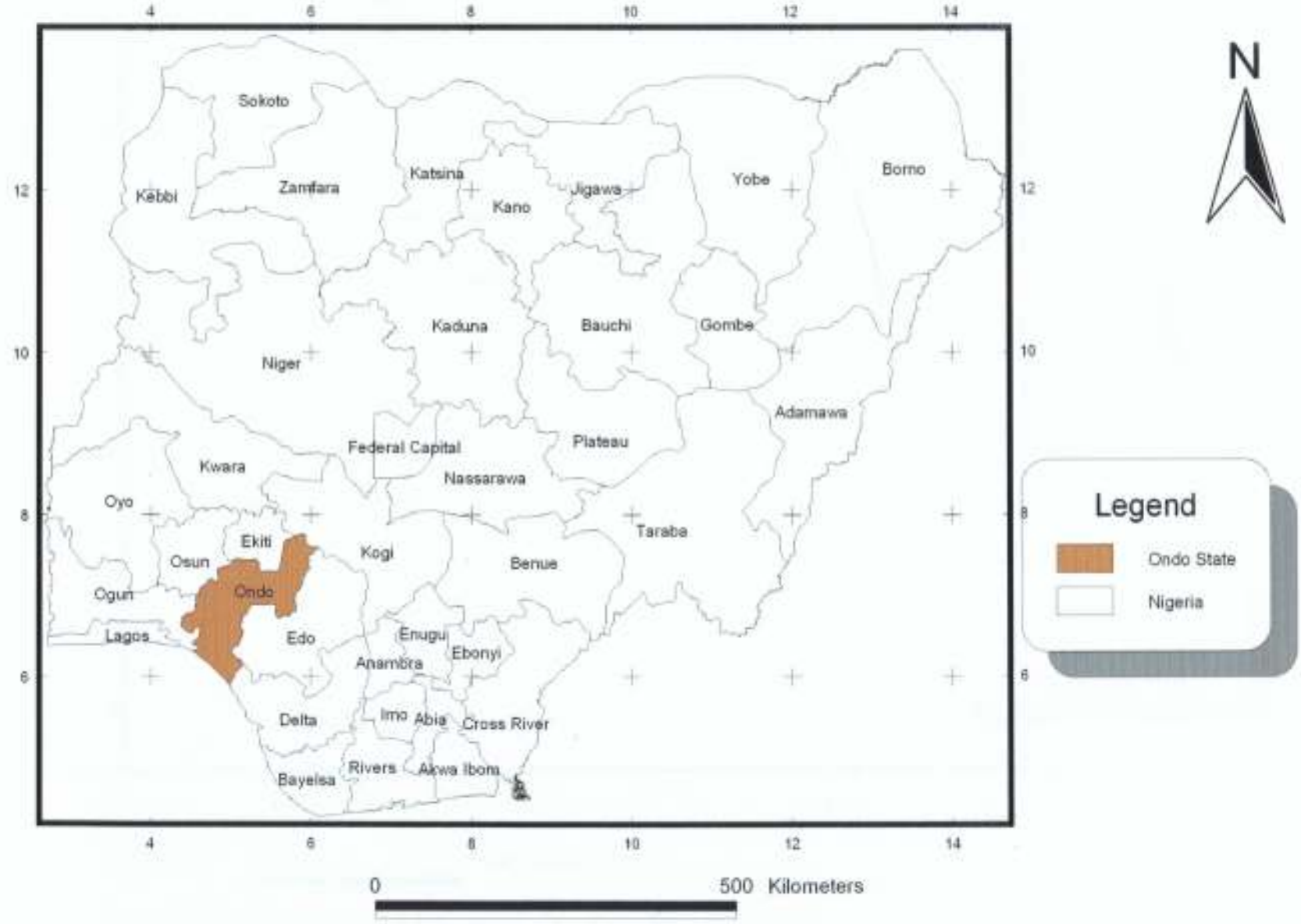

Fig3.1: Map of Nigeria, showing study Area (ondo State)
Source: NCF, GIS Unit 2007

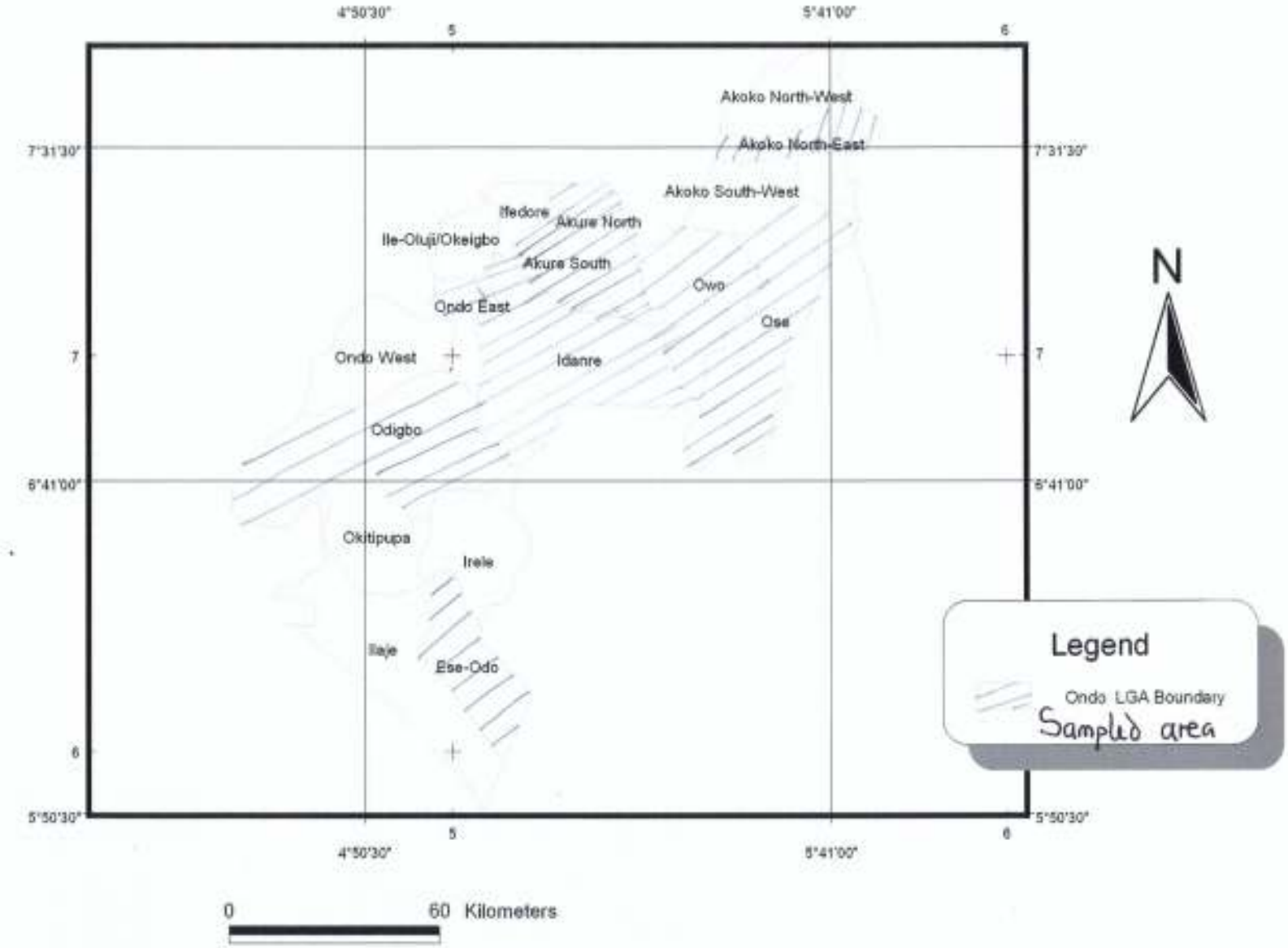

Fig3.2: Map of Ondo State, showing Administrative Divisions of Local Government Areas.
Source: NCF GIs unit 2007

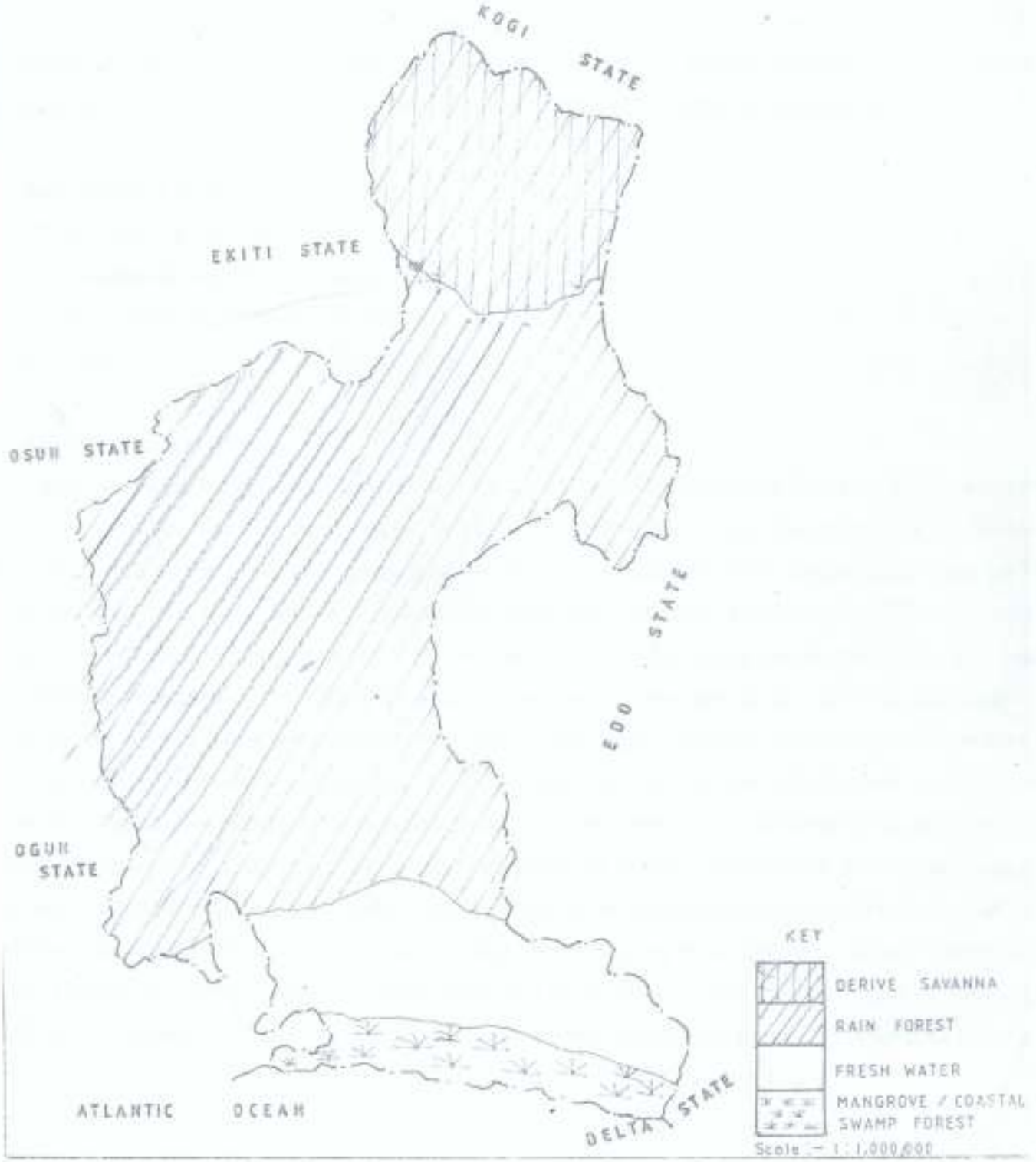

Fig3.3: Map of Ondo State, showing vegetation Distribution
Source: Forestry and Wildlife Services Department, Ondo State.

3.1.2 DEMOGRAPHY AND ITS EFFECTS ON NATURAL RESOURCES EXPLOITATION

The 1991 census recorded a population of 2,249,548 in Ondo State, This population is presently thought to have increased to over 3 million. About half of this population occurs in the states' forest areas which are the historic range of wildlife species. This rapidly growing human population has resulted in large scale dependence on natural resources as a primary source of income with a resultant large scale fragmentation of the natural habitat for a number of economic purposes but with grave ecological consequences.

3.2 METHODOLOGY:

Three methods were used namely

(i) Market survey (Direct observation)

(ii) Use of structured questionnaires

(iii) Interview

3.2.1 MARKETS SURVEY

Two bushmeat markets were selected as sites for a detailed survey which lasted for six months and covered two seasons. The bushmeat market in the state capital(Akure) was selected as one of the two sapling site because it accommodates indigenous people from all categories with representation from the 18 L.G.As and there is a rising demand for bushmeat from urban dwellers. The Martins; (1978, 1983) and Angelici *et al* (1999) method were adopted for this exercise. The dry season survey was carried out from October 2004 to December 2004, while the rainy season survey was done in June 2005 to August 2005. The Owena bushmeat Market was the other study site. It is located in Idanre L.G.A along the Akure-Ondo at Km Express-way and a rural surrounding of The second study site was the bushmeat section within the popular Oja-Oba Market located in the heart of Akure, the state capital. Two field assistants, employees of the Federal Department of Forestry and State Department of Forestry respectively accompanied me as interpreters during the market survey which was to document the wildlife species utilized as bushmeat and the seasonal abundance. Both sites were visited daily in the morning hours between 8.00 to 11.00hrs and 16.00 to 18.00hrs except on Sundays. These periods are the usual times for hunters to supply bushmeat to the sellers. A maximum of 1hours 30 minutes was spent at each site on each survey day depending on how

early hunters made their supply. At other times a period of 20 minutes was spent on data collection where bushmeat had been supplied before reaching the sites. All specimens (fresh and dried) on display were identified and recorded on the first day of the survey at both sites for each season while subsequent visits recorded only fresh specimen. This was to avoid double recording of specimen. For each specimen recorded, identification of the species and the number of specimen for the specie was noted. Days without fresh specimen were also noted. Closures of market on certain days for traditional reasons were experienced during the survey. No data was collected on the affected days.

3.2.2 USE OF STRUCTURED QUESTIONNAIRE

Extensive Survey on social acceptance of various species of wildlife as bushmeat using structured questionnaire as described by Agbelusi & Afolayan, (1991) and Ajayi & Olawoye (1974) was employed to provide relevant information on bushmeat utilization in the study area. Ten Local Government Areas (LGAs) (fig.3.2) were selected at random for the administration of the questionnaire. The 10 L.G.As including their rural surroundings were selected from the three senatorial divisions in the state. Three (3) sets of questionnaires (Appendix iv; a – c) were prepared for the sampling with targeted respondents; hunters, bushmeat sellers and consumers.

1,500 copies of the questionnaire were used for all sampling groups. 500 was administered to each group while 150 of the copies were sampled in each selected L.G.A. For each group and L.G.A sampling was conducted by research assistants interviewing people and completing the questionnaires.

The questionnaires were designed to obtain relevant information on some aspects of bushmeat utilization in the state. Such aspects included:

(i) commonly utilized wildlife species for bushmeat
(ii) preferred wildlife species for bushmeat
(iii) seasonal availability in market
(iv) wildlife utilization other than for bushmeat
(v) hunting
(vi) methods, among others.

3.2.3 INTERVIEW

In addition to the structured questionnaire, interview method described by Anadu *et al*, (1988) ; Morgan and Dixson(2005) were also used to find out the pattern of utilization or wildlife and their preference; with the local hunters, bushmeat sellers and *consumers*. This was aided by the work of Dorst and Dandelot, (1970) and Ayodele *et al* (1999). Local hunters were the best source of information regarding wildlife in the state since they spend more time in the forests and at times sell off some hunted species in-situ before getting to the markets. Interviewing bushmeat sellers and consumers was to enhance and confirm information already provided during the questionnaire sampling and in most cases to support result obtained during the market survey.

3.2.4 STATISTICAL ANALYSIS

The data obtained from all methods were subjected to one way analysis of variance (ANOVA) procedure. Results obtained from the market survey were subjected to student t-test to hypothesize if there were any effects of the seasons (dry and rainy) on the utilization of bushmeat in the two sites. Interactions between results obtained from the market value were correlated using Microsoft Excel. All sampling data obtained the methods were analyzed using frequency distribution, simple percentage description and charts.

CHAPTER FOUR

4.0 RESULTS

4.1 WILDLIFE SPECIES PREFERRED AS BUSHMEAT IN ONDO STATE

The results of this study are summarized in tables 4.1 to 4.9, figure 3.1 to 4.4, and plates 1 to 6. The total number of wild-animals recorded during the market survey was 3,096, belonging to 6 classes and 13 species. The species recorded were grass-cutters (*Thryonomys swinderianus*), giantrat(*Cricetomys gambianus*), ground squirrel(*Xerus erythropus*), pangolin(*Manis gigantea*), bushpig(*Potamochoerus capensis*), rock hyrax(*Procavia capensis*), tree hyrax(*Dendrohyrax Sp.*), Maxwell's duiker(*Cephalophus maxwelli*), bushbuck(*Tragelaphus scriptus*), African civet(*Vivvera civetta*), porcupine(*Artherurus Sp*), red-flanked duiker(*C.rufilatus*), and warthog(*Phacochoerus aethiopicus*). This indicates that wildanimals are still invaluable as food in the study area as reported by Agbelusi(1994) and Anadu *et al* (1988). Rodents were the most commonly encountered animals during this study with the highest number of recorded individuals; 1,239, which represented 40.0% of the total record. This was closely followed by members of the class ungulates with a total of 1,100 which represented 35.5% of the recorded animals. The suids and paenunquilates numbered 277 (i.e. 8.9%) and 253 (i.e. 8.2%) respectively. The sharp decline in number for members of the class carnivores and complete absence of primates in the sites opposed the pattern recorded by Anadu et al (1988) where a good number of primates and 10 species of carnivores were recorded. Furthermore, there was a marked difference in the number of species recorded within each class of wildanimals. For instance, within members of the class rodents, 950 grasscutters(*Thryonomys swinderianus*) were recorded which represented 76.7% of the total number(1,239) of rodents recorded during the study while giant rat(*Cricetomys gambianus*) and ground squirrel(*Xerus erythropus*) numbered 129 (10.4%) and 160 (12.9%) respectively. This trend was also applicable for members of the class ungulates where 959 (87.2%) Maxwell's duikers(*Cephalophus maxwelli*) were recorded out of a total record of 1100 animals in the class. Red-flanked duiker(*C. rufilatus*) (72) and bushbuck(*Tragelaphus scriptus*) (69) made up for the remaining 12.8%.These indicates that majority of the traded species in the area were grassscutters(*T. swinderianus*) and Maxwell's duiker(*C. maxwelli*).

The findings from the three categories of respondents supported the results obtained from the market survey. Out of 1,500 respondents, 680 (45.3%) indicated preference for rodents while 494(32.9%) preferred ungulates. The remaining respondents opted for insectivores, carnivores, suids, Paenunquilata and even primates which were not encountered throughout the market survey. This indicates that Primates are consumed in some parts of the study area but are rare possibly due to over logging and uncontrolled hunting (Greengrass 2006) and NCF 2006).These results further indicated the preference for rodents in the area followed by ungulates. Throughout the selected L.G.As, at least a respondent consumed meat sourced from insectivores, rodents, suids and ungulates, while there was selective or zero consumption of carnivores, paenunquilates and primates by respondents in most L.G.As. In some L.G.As like Idanre, Akoko N/E, Akoko S/E, Ese-odo and Ore, duikers were preferred over grasscutters. In Ondo/E, no respondent opted for Giant rat thus confirming the result from the interviews which indicated that Giant rat consumption was forbidden by indigenous people from Ondo/E and Ondo/W. Elsewhere in Owo and part of Ose L.G.A results from interview revealed that consumption of primates by indigenous was forbidden. This was confirmed by the results from the questionnaires.

4.2 SEASONAL AVAILABILITY OF HARVESTED SPECIES IN THE MARKET SURVEY

In this study more animals were recorded during the dry season than the raining season at the two sites in terms of species and number. Eleven species and Nine species was recorded during the dry and raining season period respectively in Oja oba while Thirteen and eight species was reported in Owena market. This is in conformation with the work of Fleagle (1999), Ajayi(1973), Anadu et al(1987) and Happold(1987). The statistical analysis revealed that there is signicant difference between wildanimals utilized in different locations at different seasons; $F_{cal} >/ F_{tab}$ ($P<0.05$). The results also showed a slight correlation between wild animals utilized at different seasons $r= 0.49$.

Table 4.1: WILDANIMAL SPECIES UTILIZED AS BUSHMEAT IN ONDO STATE IN BOTH SEASONS; Oja Oba Market.

S/N	Class	Specie	Common Name	Number recorded Dry/season	Rainy/season
1.	Pholidota	*Manis gigantea*	Giant pangolin	52	38
2.	Rodentia	*Thryonomys swinderianus*	Grass cutter	348	223
3.	"	*Crycetomys gambianus*	Giant rat	48	37
4.	"	*Xerus erthropus*	Ground squirrel	46	24
5.	Suids	*Potamochus capensis*	Bush pig	34	27
6.	Paenunquilate	*Procavia sp*	Rock hyrax	18	-
7.	"	*Dendrohyrax sp*	Tree hyrax	24	27
8.	Ungulates	*Cephalophus maxwelli*	Maxwell's duiker	287	275
9.	"	*Tragelaphus scriptus*	Bush buck	13	-
10.	Carnivora	*Viverra civetta*	African civet	2	1
11.	Insetovora	*Atherurus sp*	Porcupine	26	29
				898	**681**

Table 4.2: WILDANIMAL SPECIES UTILIZED AS BUSHMEAT IN ONDO STATE
Site: Owena Bushmeat Market

S/N	Class	Specie	Common Name	Dry season	Rainy season
1.	Pholidoota	*Manis gigantea*	Giant Pangolin	38	13
2.	Rodentia	*Thryonomys swinderianus*	Grass Cutter	204	175
3.	"	*Cricetomys gambianus*	Giant Rat	44	-
4.	"	*Xerus erythropus*	Squirrel	56	34
5.	[illegible]	*Gatherers' sp*	Porcupine	18	7
6.	Suids	*Potamochoerius capensls*	Bush Pig	104	64
7.	"	*Phacochoerus aethiopicus*	Warthog	48	-
8.	Canivora	*Viverra civetta*	African Givet	3	-
9.	Paenunquilate	*Dendrohyrax sp*	Tree Hyrax	81	25
10	"	*Procavia capensis*	Rock Hyrax	78	-
11.	Ungulates	*Cephalophus maxwelli*	Maxwell's Duiker	244	153
12.	"	*Cephalophus rufilatus*	Red-Flanked	72	-
13.	"	*Tragelaphus scriptus*	Bush Buck	39	17
				1,029	**488**

Table 4.3: WILDANIMAL SPECIES UTILIZED AS BUSHMEAT IN ONDO STATE
Period:- Oct. 2004-Dec. 2004 Site:- Owena

S/N	Class	Species	Common Name	Local Name	No	%TAGE OF NUMBER
1.	Pholidota	*Manis gigantea*	Giant pangolin	Akika	38	3.8%
2.	Rodentia	*Thryonomys swinderianus*	Grass cutter	Oya	204	19.8%
3.	"	*Cricetoms gambianus*	Giant rat	Okete	44	4.3%
4.	"	*Atherurus sp.*	Bush tailed Porcupine	Oore	18	1.7%
5.	"	*Xerus erythropus*	Ground squirrel	Ikun	56	54%
6.	Carnivora	*Viverra civetta*	African civet	Eta ologode	3	0.3%
7.	Suids	*Potamochoerus capensis*	Bush pig	Esi	104	10.1%
8.	"	*Phacochoerus aethiopicus*	Warthog	Imado	48	4.7%
9.	Penunquilate	*Procavia capensis*	Rock hyrax	Elekuta	78	7.6%
10.	"	*Dendrohyrax sp.*	Tree hyrax	Ofafa	81	7.9%
11.	Ungulates	*Cephalophus maxwelli*	Maxwell's duiker	Edu	244	23.7%
12.	"	*C. Rufillatatus*	Red-flanked duiker	Esuro	72	7%
13.	"	*Tragelaphus scriptus*	Bush buck	Agbonrin (Igala)	39	3.8%
14.	"	*Ceropithecus mona*	Mona monkey	Owe		
					1,029	

Table 4.4: PERCENTAGE COMPOSITION OF WILDANIMAL SPECIES UTILIZED AS BUSHMEAT IN ONDO STATE; Oja Oba (Oct. 2004-DEC.)

S/N	Class	Common Name	Species	Yoruba Name	Number Recorded	%Tage
1.	Pholidota	Giant pangolin	*Manis gigantea*	Akika	52	5.8%
2.	Rodents	Grass cutter	*Thryonomys Swinderianus*	Oya	348	38.8%
3.	"	Giant rat	*Cricetomys gambianus*	Okete	48	5.3%
4.	"	Porcupine	*Atherurus sp*	Oore	26	2.9%
5.	"	Ground Squirrel	*Xerus erythropus*	Ikun	46	5.1%
6.	Canivores	African civet	*Viverra civetta*	Eta Ologode	2	0.2%
7.	Suids	Bush pig	*Potamochoerus capensis*	Esi	34	3.8%
8.	Paenunquilate	Rock hyrax	*Procavia capensis*	Elekuta	18	2.0%
9.	"	Tree hyrax	*Dendrohyrax sp*	Ofafa	24	2.7
10.	Ungulates	Maxwell's duiker	*Cephalophus maxwelli*	Edu	287	32%
11.	"	Bush buck	*Tragelaphus scriptus*	Agbonrin	13	1.4%
12.	Primates	-	-	-	-	-
					898	

Table 4.5: PERCENTAGE COMPOSITION OF WILDANIMAL SPECIES UTILIZED AS BUSHMEAT IN ONDO STATE; Oja Oba (June-August 2005)

S/N	Class	Common Name	Species	Local name	Number	%Tage
1.	Philodota	Giant pangolin	*Manis gigantea*	Akika	38	5.6%
2.	Rodent	Grass cutter	*Thryonommys swinderianus*	Oya	233	33%
3.	"	Porcupine	*Atherurus Sp.*	Oore	29.	4.3%
4.	"	Ground squirrel	*Xerus erythropus*	Ikun	24	4.5%
5.	"	Giant rat	*Cricetomys gambianus*	Okete	37	5.4%
6.	Carnivores	African civet	*Viverra civetta*	Eta ologede	1	0.1%
7.	Paenungulate	Tree hyrax	*Dendrohyrax Sp*	Ofafa	27	0.4%
8.	Ungulates	Maxwell's duiker	*Cephlophus maxwelli*	Edu	275	40.4%
9.	Ungulates	Bush buck	*Tragelaphus scriptus*	Agbonrin	27	4.0%
					681	

Table 4.6: PERCENTAGE COMPOSITION OF WILDANIMAL SPECIES UTILIZED AS BUSHMEAT IN ONDO STATE; Oja Oba (June-August 2005)

S/N	Class	Common Name	Species	Local name	Number	%Tage
1.	Philodota	Giant pangolin	*Manis gigantea*	Akika	13	2.7%
2.	Rodent	Grass cutter	*Thryonomys Swinderianus*	Oya	175	36%
3.	"	Porcupine	*Atherurus Sp.*	Oore	7	1.4%
4.	"	Ground squirrel	*Xerus erythropus*	Ikun	34	7%
5.	Carnivores	African civet	*Viverra civetta*	-	-	-
6.	Suids	Bush pig	*P. capensis*	Esi	6	13.1%
7.	Paenunguilate	Tree hyrax	*Dendrohyrax Sp*	Ofafa	25	5.1%
8.	Ungulates	Maxwell's duiker	*Cephlophus maxwelli*	Edu	153	31.4%
9.	Ungulates	Bush buck	*Tragelaphus scriptus*	Agbonrin	17	3.5%
					488	

Table 4.7 **PERCENTAGE COMPOSITION OF WILDANIMAL SPECIES IN SELECTED L.G.As, ONDO STATE.**

SN	Wildlife	Akure North	Akure South	Ose	Owo	Ondo E	Idanre	Akoko N/E	Akoko S/E	Ese Odo	Ore	Total	Remark
1.	Pangolin	17	33	7	11	23	12	15	9	4	7	138	9.2%
2.	Grass cutter	69	55	63	69	47	51	36	44	57	51	542	39.13%
3.	Giant rat	4	12	12	7	0	2	6	9	13	12	77	5.13%
4.	Porcupine	7	2	2	3	11	7	4	0	0	0	38	2.53%
5.	Squirrel	0	0	0	0	7	4	12	0	0	0	23	1.53%
6.	African civet	0	1	0	4	3	0	0	0	0	0	8	0.5%
7.	Bush pig	9	11	17	6	17	9	6	8	0	12	101	6.7%
8.	Rock hyrax	6	1	0	3	0	0	8	5	0	0	23	1.5%
9.	Tree hyrax	7	2	0	5	0	0	5	0	0	0	26	1.7%
10.	Duiker	27	21	42	31	28	53	47	49	59	57	424	28.2%
11.	Bush buck	0	1	5	11	14	7	5	13	9	5	70	5%
12.	Mona monkey	1	0	0	0	0	5	2	0	4	0	12	0.8%
13.	Warthog	3	1	0	0	0	0	2	2	4	6	18	1.2%
	TOTAL	**150**	**150**	**150**	**150**	**150**	**150**	**150**	**150**	**150**	**150**	**1500**	

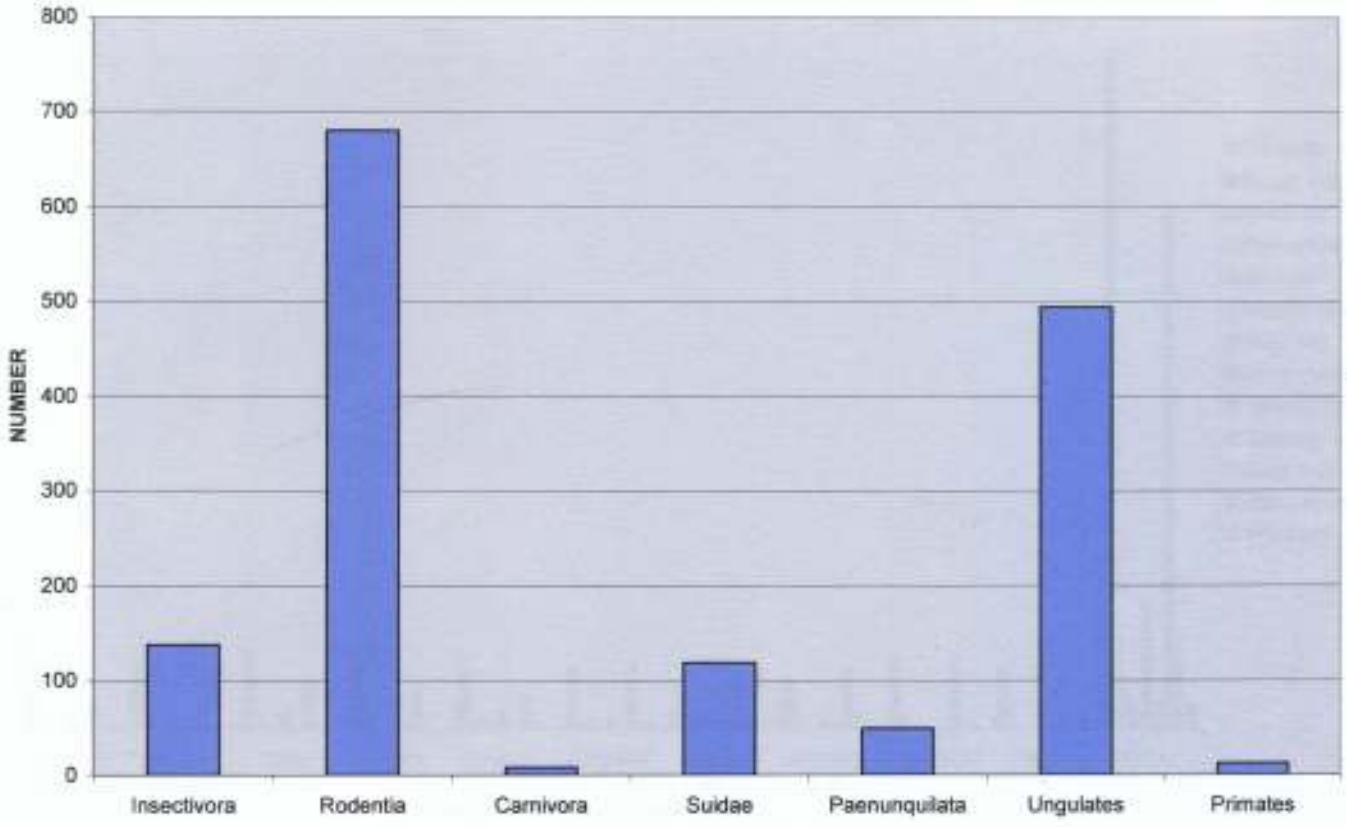

Fig.4.1 WILDLIFE SPECIES UTILIZED AS BUSHMEAT IN ONDO STATE

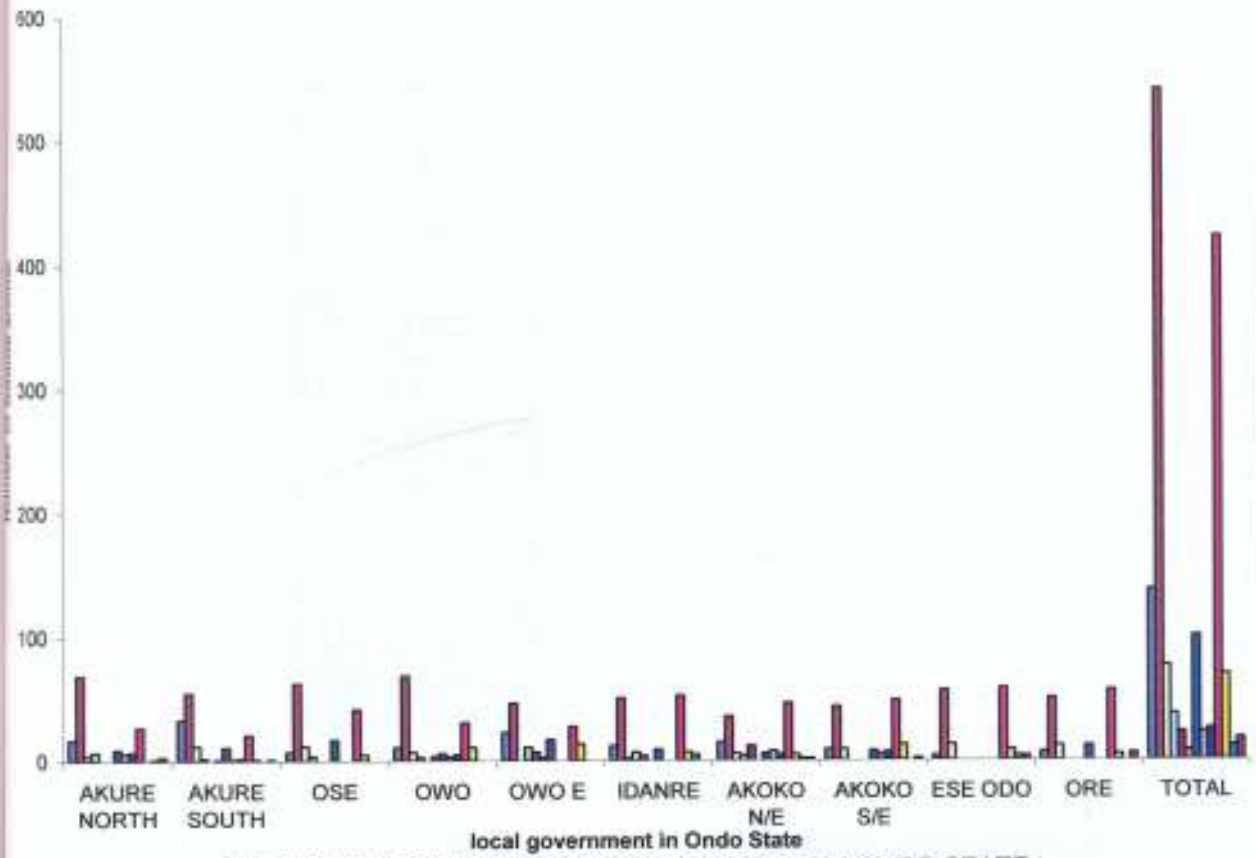

Fig.4.2 PREFERRED SPECIES OF BUSH MEAT IN ONDO STATE

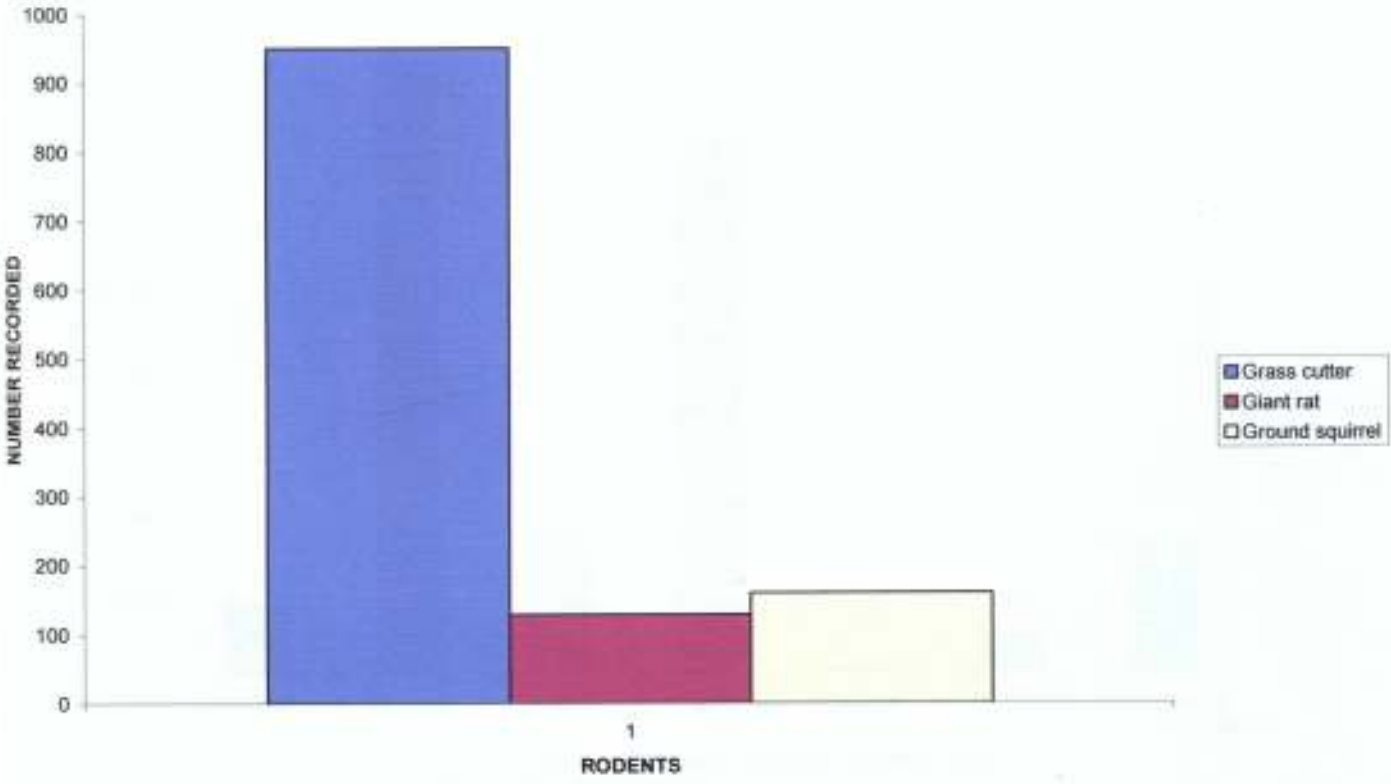

Fig. 4.3 Species of rodents sampled at the bushmarkets

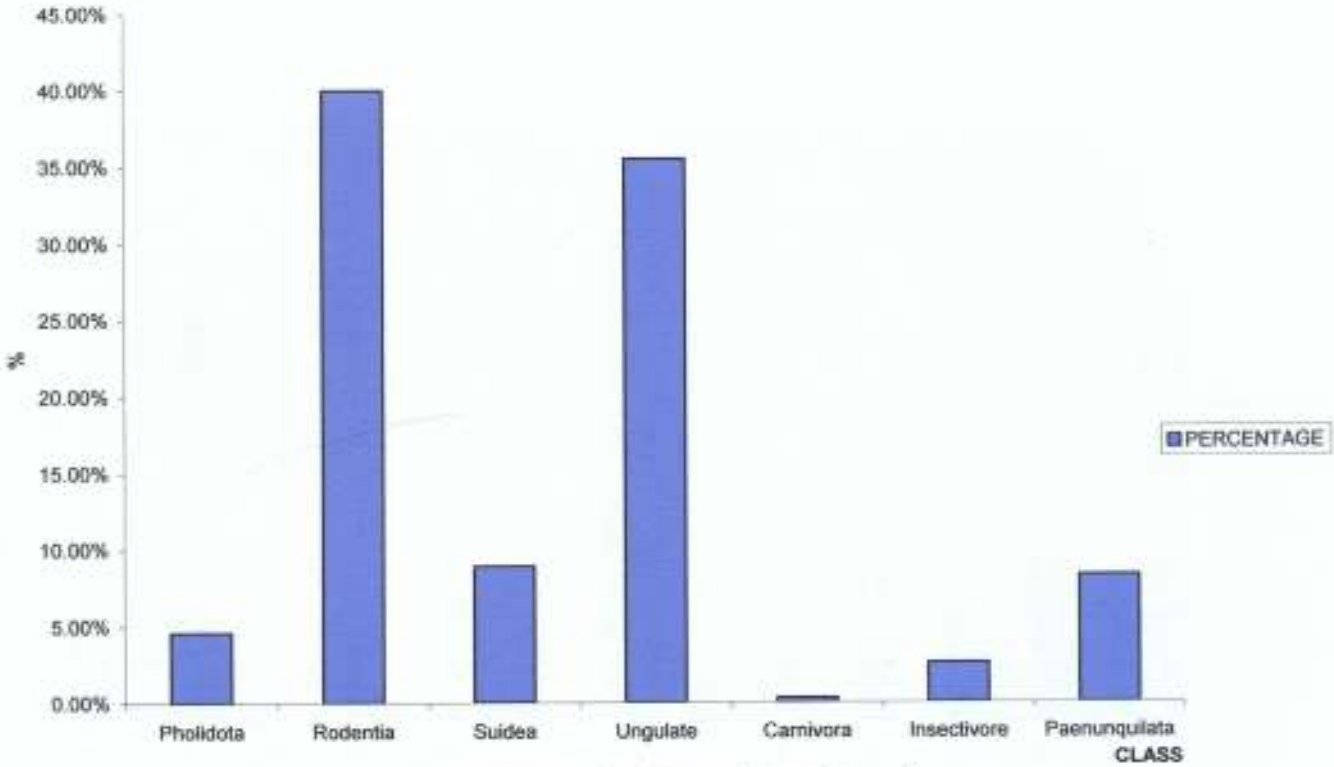

Fig. 4.4 Percentage of wildlife recorded at the two sites for the dry and wet seasons

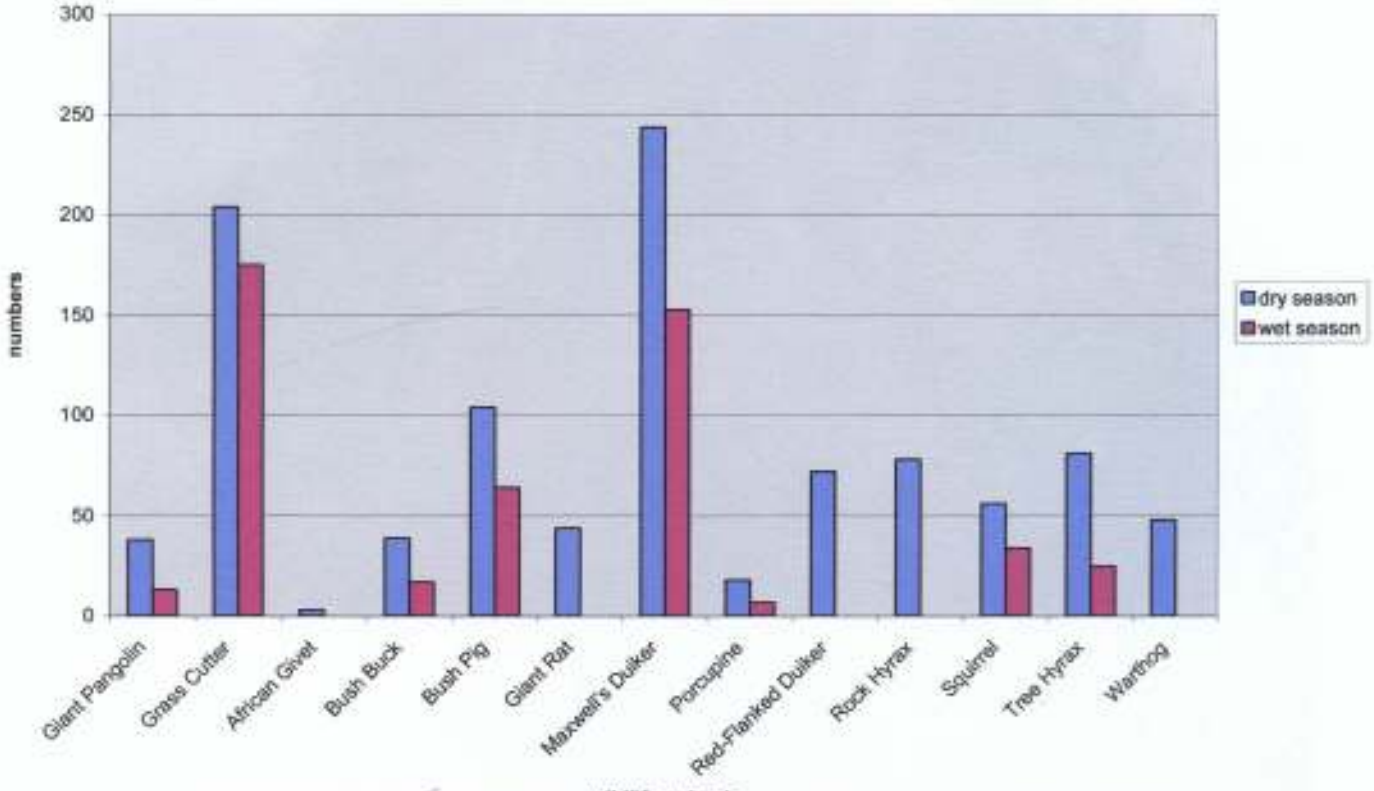

Fig. 4.5 WILDLIFE SPECIES UTILIZED AS BUSHMEAT IN ONDO STATE Site: Oja Oba market

Plate 1: Smoked Grasscutter (T. Swinderianus) displayed along Akure-Ondo express way (near Owena Bushmeat Market)

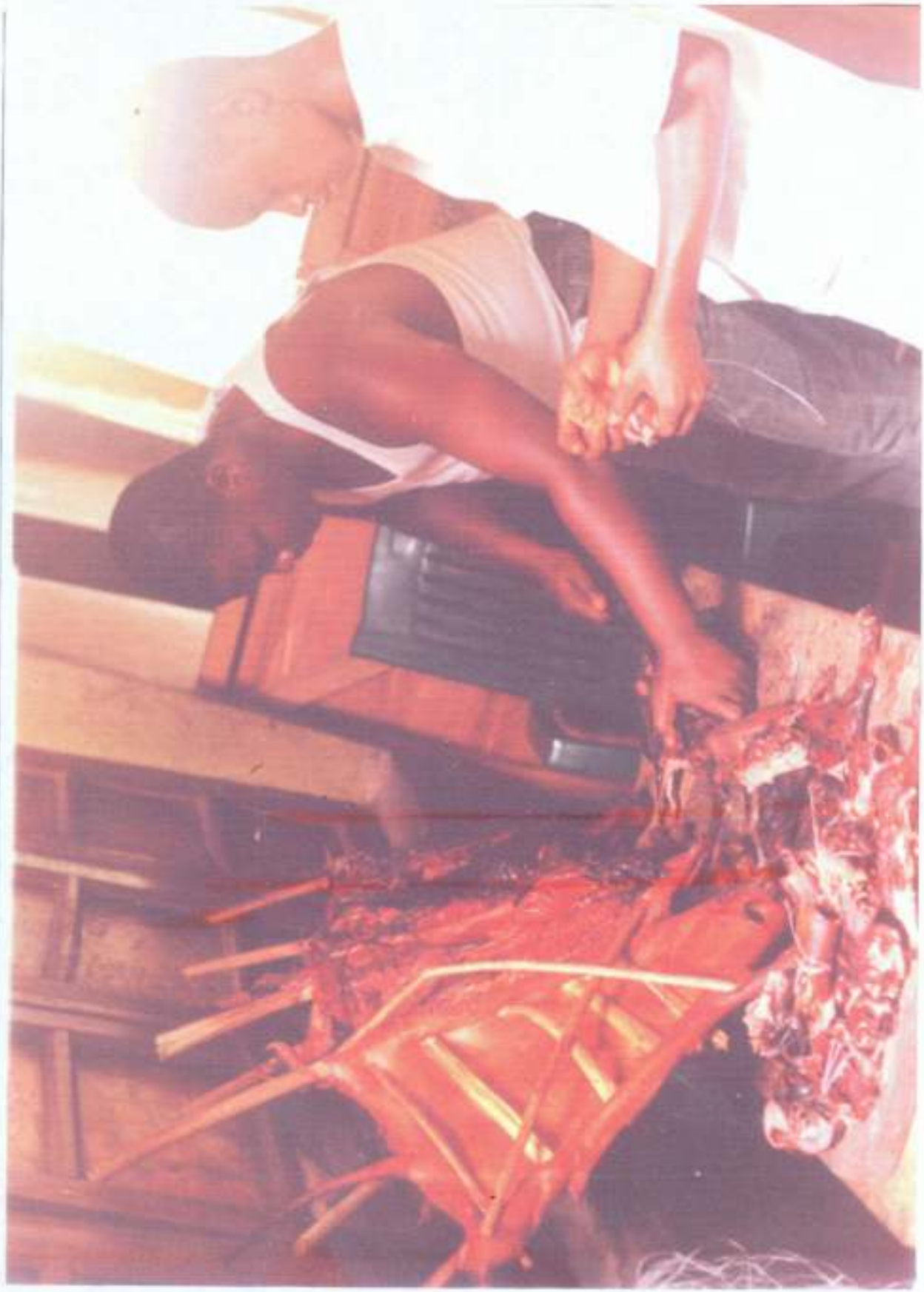

Plate 2: smoked Grasscutter (T. Swinderianus) being cut into consumeable sizes in a restaurant in Akure, Ondo State.

Plate 3: Maxwells' duiker (Cephalophus maxwelli) in a restaurant in Akure, Ondo State.

Plate 4:Chimpanzee (Pan troglodyte) : recently confiscated from smugglers in Ondo State (Akure ofosu forest reserve)

Plate 5: A bushmeat seller proudly display.
Fresh grasscutter in Oja-Oba bushmeat market,
Akure, Ondo State.

Plate 6: A young bushmeat seller display smoked Grasscutter along Akure_Owo express way, Ondo State

4.3 HUNTING METHODS IN ONDO STATE

Various methods are adopted by hunters to kill wildanimals. 324 out of 500 respondents use dan gun. This represented 64.8% of the total. It was discovered in this study that the use of traps was not fairl popular as 141 (28.2%) opted for it. Bush burning and other methods (hunting dogs) contributed to 5.4% and1.6% of the total respectively. The above indicated that must hunters use dane gun for bushmeat huntin in the area. There were also variations in the hunters daily bag limit on species basis. The highest number o wildanimals killed by hunters was eleven (11) grass-cutters, eight (8) Maxwells' duikers, six (6) squirrel three (3) rock hyrax, two (2) each of bushbuck, bush pig, pangolin, Tree hyrax and mona monkey (see Tabl 6) single catches were made for Africa civet, Warthog and buffalo.

4.4 UTILIZATION PATTERN OF WILDLIFE OTHER THAN FOR BUSHMEAT

Wildlife species have been used for various purpose in the past and present. It is of invaluable importance i traditional medicine, bio-medical research, education, recreation utility satisfaction, game viewing, sport camping and some other uses to mention but a few. It is an important part of natural resources directl concern with the health and wellbeing of the indigenous people of Ondo state. Pangolin(*M. tricuspis* Grasscutter(*T.swinderianus*), Porcupine(*Athererus sp*), Elephant(*L. africana*), Chimpanzees(*P. troglodyte* and duikers(*Cercopithecus sp.*) have been used singly or made into concoction for specific health reason They are locally prepared according to tradition and health needs. Hides and skins from wildanimals ar used for drum making and leather works. Leopard, Africa civet, duikers, bushbuck and forest buffal among others are used for this purpose. Other by-product of wildlife e.g. horns, skins bones, tails of som animals are of importance in decoration. For instance the bones (limbs) of Elephants, Lions and Bushbuc are used to decorate the palaces of traditional rulers in the area. Skins of African Civet, bushbuck an duikers are useful in the king's palaces too. These play an important role in the socio-economics aspect o the indigenous people of Ondo State. According to a hunter in Idanre, the forelimbs of Chimpanzee are very prized possession as it is believed to prosper anything it comes in contact with.

CHAPTER FIVE

5.0 DISCUSSION

The concept of utilization of wildanimals as a source of meat is no longer new as hunting ha continued to be a major occupation of many people (Williamson and Payne, 1978). Globally, wildanimal contributes substantially to the livelihood of the indigenous people in tropical countries (Anstey, 1991) Burman(2002) observed that the bushmeat trade has recently increased dramatically primarily because of it invaluable use in providing protein and as a source of income for many families. These factors combine with the development of social and economic networks to support the bushmeat industry and an increasin demand internationally, have transformed bushmeat harvesting from a subsistence activity into commercial enterprise.

The findings of this work reveal that the sales of bushmeat have become a highly commercia business that thrives on a day-to-day basis in the state. The market survey indicates that th following species are generally accepted and consumed; Grasscutter(*T. swinderianus*), Maxwells duiker(*C. maxwelli*), bushpig(*P.capensis*), warthog(*P. aethiopicus*), Pangolin(*M. tricuspis*) porcupine(*Atherurus Sp.)*, rock and tree hyrax(*Procavia Sp. & Dendroyrax sp.*), Giant rat(*C. gambianus*), bushbuck(*T. scriptus*), African Civet(*Vivvera civetta*), Ground Squire(*X. erythropus*) Mona monkey(*C. mona*) and Chimpanzee(P. troglodytes). Bigger mammals like Elephants(*L. Africana*) and buffalo(*S. caffer*) have been utilized where available as indicated in the findings of th questionnaire survey and interviews. Throughout the study area Grasscutter(*T. swinderianus*) an Maxwells' duiker(*C. maxwelli*) were popular and were the commonly utilized as bushmeat. Thi result is interesting as it contradicts with the finding of (Angelici et al, 1999) were pangolins(*M. tricuspis*), bushbuck(*T. capensis*), giant rat(*C. gambianus*) and grasscutter(*T. swinderianus*) were th frequently traded species. Whereas African Civet (*V. civetta*) and Mona monkey(*C. mona*) were th least utilized in this study, it was not listed in their work because of their rare status in the area. Thi suggests that there could still be more wildanimal species utilized as bushmeat in Ondo state but no encountered during this study possibly due to a related rare-status factor. However, Burman(2002 stated that the scale of bushmeat consumption is threatening the survival of species such as

Elephants (*L. africana*), gorillas (*Gorilla gorilla*), and chimpanzees (*P.troglodytes*) in Africa. This may be applicable to the findings of this study as none of these animals were recorded during the work. Information from respondents suggests that these animals were present in the area about five to ten years ago when over-logging was not widespread in forests in the area.

The findings from the interviews supported the results from the surveys carried out in the selected sites. Grasscutters (*T. swinderianus*) were preferred over other available wildanimals. Hunters prayed to harvest grasscutter(*T.swinderianus*) at every outing. Bushmeat sellers preferred to display grasscutter in their stalls as it was every consumer's delight. Ironically the prize tag on grasscutter is high throughout the study area as recorded during the interview; as an average sized one cost between N2,500.00k and N3,700.00. The same is applicable to the second most preferred species; Maxwells' duiker. In the absence of grasscutter meat or in most cases where a consumer cannot afford to buy grasscutter(*T. swinderianus*), the next bushmeat on demand was Maxwell's duiker(*C. maxwelli*). This trend prevailed everywhere in the study area. Anadu et al (1988) reported a total of 27 species of mammal out of which Grasscutter was the most popular species among consumers. This was followed by Maxwells' duiker, giant rat and monkey. The findings of this work closely follow their pattern except that Giant rat and Monkeys were not popular bushmeat species in the state and were not commonly seen in bushmeat markets, possibly because the consumption of Giants-rat is traditionally forbidden in Ondo East and Ondo West L.G.As, while that of Monkeys is forbidden in Owo L.G.A of the State as earlier stated. The latter trend is of importance in the conservation point of view as it controls indiscriminate killing and commercialization of bushmeat hunting from members of the already threatened primate status in the area. Hutchins (2005) stated emphatically that increasing demand and the commercialization of bushmeat hunting is responsible for the loss of large mammals from unprotected areas of West Africa. He traced the causes of these excesses to widespread poverty, increasing consumer demand for meat, development of roads by extractive industries, increasing human populations, lack of economic or protein alternatives, social political instability, lack of capacity to enforce existing laws and modernization of hunting technologies. Due to the complexities associated with the bushmeat trade, Burman(2002) stated that efforts to proffer any solutions will require a global partnership for long-term success to be achieved.

It was noted that hunting took place in all months of the year during the study, but became more intense during the dry seasons. The result from the survey sites (Oja Oba and Owena) indicated that

wildanimals utilized as bushmeat were readily available in both dry and rainy seasons. In other words, seasonal variation did not affect bushmeat utilization in the area. The number and species composition of bushmeat was also higher during the dry seasons (Angilici et al 1999; Anadu *et al* 1982; Happold 1987). At Oja-oba, there were eleven (11) species of animals recorded for the dry season survey while nine(9) species were recorded during the rainy season. At Owena, thirteen(13) species of animals were recorded during the dry season while only eight (8) species where reported for the rainy seasons.

By most accounts, the availability of wildanimal has declined in most parts of West African region because of dramatic change in the rural wildlife habitat and over hunting (Ajayi 1971). Most hunters were as active during the rainy seasons as in the dry season in the study area. This is due in part to widespread over-exploitation (logging) in the forest reserves resulting in wildlife habitats' destruction and migration to less disturbed areas, sometimes across the state borders. Hunters therefore must work harder in order to kill animals even during the dry season. Notable methods adopted by hunters to kill wildlife include the use of dane gun, bush burning and trap. Most hunters prefer the use of dane gun to increase their chances of killing more animals. The use of traps was adopted by 28.2% of the hunters during the study. The reason for this decline is that most trapped species have been removed by other hunters and higher carnivorous species before the real owner is able to trace his way back to where the trap was set. Bush burning and use of hunting dogs were also very realistic methods to most hunters in the study area. This is why 7.0% of the hunters used this method, which they see as a resort to their inability to acquire a dane gun. However, if any wildlife management methods would be adopted in the state in the future, closed seasons for hunting during dry seasons should be considered, to enhance wildlife conservation in the area.

As earlier mentioned, this study reports that most wildlife species may serve the purposes of animistic ritual (Chimpanzee) sexual initiation and medical practices (Buffalo, Elephants, etc). Angelici *et al* (1999) recorded that Lions and Elephants where available, were traded for these purposes apart from for food. In addition wildlife are useful as raw materials for local factories for the production of handbags, bangles, purses, necklaces, local drums, and other leather works. Information obtained during this study also indicates that wildlife trophies from Elephants, buffalo, etc (Souvenirs and decoration) are prized gift items and also of traditional values in decorating the palaces of traditional rulers. By–products of wildlife also constitute basic raw materials for traditional medication. The parts of animals used include bone, heart,

tusk, skin, horn, tail, nose, feather, liver, intestine, skull, teeth, beak etc. They are used singly or combination for the treatment of many diseases. For instance information gathered from respondents suggests that the consumption of any part of an Elephant enhances longevity and prevents terminal disease like hypertension, cancer and paralysis.

5.1 CONCLUSSION AND RECCOMMENDATION

Commercial indiscriminate hunting of wild animals in Africa, particularly slow-growing species such as Elephants, Gorillas and Chimpanzees already exceeds their replacement rates with grave impacts from the conservation perspective (Hutchins 2002). In Ondo State for instance, these slow growing species were not encountered throughout the study, suggestive of a threatened status. Effective solutions to the bushmeat problem in the state require a multifaceted approach that will address the fundamental, social, political and economic causes of the problem. However, the following recommendations are suggested for sustainable wildlife conservation in the area.

5.1.1 PILOT PROJECT ON BUSHMEAT PRODUCTION

The establishment and development of relevant projects on bush meat production should be viewed as priority in the area especially where its consumption has become generally accepted in Ondo state. This could sorely be handled by relevant Non Governmental organization (NGOs) on bushmeat production or such NGOs collaborating with the state Government to implement this very important aspect. The implementation of this project should include planning for organizing routine stakeholders' seminar, workshops, and training especially for the indigenous people. Animals with high fecundity rate should be considered in this case for example Grasscutter(*T. swinderianus*), Duikers(*Cephalophus sp.*) and Giant rats(*C. gambianus*). These will check indiscriminate hunting of wildanimals in the area.

5.1.2. ENCOURAGEMENT OF BACKYARD FARMING OF MINILIVESTOCK;

Individuals could be assisted by Government or other relevant non- government organisations NGO(s) on wildlife farm. Animals with high fecundity rate and fast growing species like Grasscutter and duiker should be considered here in view of its preference. These will provide alternative source of meat protein. Emphasis should be on improving access to inexpensive source of other domestic meat and fish.

5.1.3 ESTABLISHMENT AND DEVELOPMENT OF A GAME CONTROL AREA:

This could be implemented by the State Government or any relevant NGO(s) on wildlife conservation and the area restricted as a sanctuary for wildanimals. A state forest reserve that is relatively intact could be set aside for this. Greengrass (2006) suggested the protection of the remaining habitat in both Idanre and Oluwa Forest Reserve, either in the form of a wildlife sanctuary or a game reserve. This would complement the on-going game reserve development project in Ifon Forest Reserve by the State Government in collaborations with NCF.

5.1.4 REVIEW OF LAW GOVERNING THE HARVESTING OF WILD ANIMALS (CLOSE AND OPEN SEASON)

Laws governing the harvesting of wild animals should be reviewed and enforced in the state. Qualified game guards should be employed by the state Government to ensure compliance with these laws in the state. In order for this to succeed, there is need sensitize the indigenous people on conservation issues and subsequently organize workshops and training on the values of biodiversity conservation education and minilivestock farming. This will create an alternative livelihood source for the people and enhance strict compliance of the reviewed laws.

5.1.5 STAKEHOLDERS SEMINAR ON BIODIVERSITY CONSERVATION

A forum should be organized annually by the state government to bring together the stakeholders on bushmeat utilization. The hunters, bushmeat sellers, the consumers and the general public should be encouraged to participate where relevant and workable principles could be addressed to enhance conservation awareness and education. Due to the significant contribution of the bushmeat trade, as an important source of meat protein and income, to local and national economies, the state government should make wildlife resources a central component of broader natural resource management plans.

5.1.6 MARKET ASSOCIATION

Control on the urban bushmeat should be implemented through co-operative management strategies between government authorities and market association.

5.1.7 Community-based management of natural resources should be encouraged in the state with active participation in biodiversity conservation by the indigenous people. This could be done in collaboration between the state government and relevant NGOs in Biodiversity conservation. The rights to the utilization and ownership of wildlife should be clearly defined in this model.

5.2 CONCLUSION

The survey of wildlife utilized as bushmeat in Ondo State reveals that thirteen (13) species of wildanimls (grasscutter, giant rat, ground squirrel, pangolin, porcupine, rock hyrax, tree hyrax, Maxwells' duiker, bushpig, warthog, African civet, bushbuck, and red-flanked duiker) belonging to seven class (insectivores, rodents, paenunquilates, ungulate, suids, carnivores, and primates) are generally consumed in the area. These animals are available in bushmeat markets and along major expressways in the study area all-year-round irrespective of the season. Throughout the study areas, Grasscutter was the most popular and preferred species followed by Maxwells' duiker.

Ondo state forests and the fauna they contain are of conservation prioty in the southwest Nigerian region. However, the rate of bushmeat consumption as recorded in this work is potentially the most immediate threat to the states' biodiversity. The indiscriminate killing of wildlife especially primates is the greatest threat to the survival of the species in the state. Bushmeat trade and consumption represents a resource from which many indigenes benefits. The challenge ahead is to find a compromise that meets the states' biodiversity conservation goals; vis-à-vis the ongoing collaborations with the Nigerian Conservation Foundation on Ifon Forest Development and carbon credit implementation; while integrating the management of this valuable resource into a broader framework that increases the states' and National management capacity. Wildlife is utilized for other purposes in the area other than for bushmeat. They are also of invaluable use in the traditjonal health sector and of great socio economic and industrial purposes. However, wildlife utilization is not carried out on a sustainable basis in the area. Immediate and appropriate conservation measures should be taken to ensure that there is bushmeat for the present generation to consume while the potential to meet the needs of future generation in the area is not jeopardized.

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LISTS OF APPENDICES

APPENDIX I: WILDANIMALS RECORDED AT THE TWO SITES DURING THE MARKET SURVEY FOR BOTH SEASONS.

S/N	CLASS	NUMBER	REMARKS
1.	Pholidota	141	4.6%
2.	Rodentia	1239	40.0%
3.	Suidea	277	8.9%
4.	Ungulate	1100	35.5%
5.	Carnivore	6	0.29
6.	Insectivore	80	2.6%
7	paenunquilate	253	8.27%
		3,096	

APPENDIX II: RODENTS RECORDED DURING MARKET SURVEY AT THE TWO SITES FOR THE TWO SEASONS.

S/N	Common Name	No. recorded	Remarks
1.	Grass cutter	950	76.7%
2.	Giant rat	129	10.4%
3.	Ground squirrel	160	12.9
		1,239	

APPENDIX III: UNGULATES RECORDED DURING MARKET SURVEY AT THE TWO SITES FOR THE TWO SEASONS.

S/N	Common Name	Number	%tage
1.	Maxwell's duiker	959	87.2%
2.	Bush buck	69	6.3%
3.	Red-flanked duiker	72	6.5%
		1100	

APPENDIX IV(a)

FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY DEPARTMENT OF FISHERIES AND WILDLIFE MANAGEMENT QUESTIONAIRE ON BUSH MEAT UTILIZATION SURVEY IN ONDO STATE (HUNTERS)

1. Local Government Area:.....
2. Village/Settlement:.....
3. Age:.....
4. Sex:.....
5. Academic Qualification:.....
6. How do you hunt for animals
   (i) Use of trap ( )
   (ii) Dane Gun ( )
   (iii) Bush burning ( )
   (iv) Others please specify).....
7. Can you name an animal that you commonly hunt in your area?
   (i).....
8. How do you often hunt bush meat (i)Daily ( ) (ii)Weekly (iii)Monthly ( )
   (iv) Occasionally ( )
9. What is the number you successfully hunt/trap (i.e. the number of species hunted at each outing (i).....
10. What is the maximum number of animal you we ever killed in an outing...
11. (What did you kill them? (i)1-3 years ago ( ) (ii)4-6 years ago ( ) (iii)7-9 years ago ( ) (iv) Others (Please specify).....
12. Do you set traps (i) YES ( ) (ii) NO ( )
13. If yes, which animal is commonly trapped.....
14. Which type of animal do you pray to hunt on every outing?.....
15. Why do you prefer the animal in 14 above?.....
16. Do you plan to leave hunting someday? (i) YES ( ) (ii) NO ( )
17. Give reason for your answers in (16 above)

Appendix iv(b)

FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE SCHOOL OF AGRICULTURE AND AGICULTURAL TECHNOLOGY DEPARTMENT OF FISHERIES AND WILDLIFE MANAGEMENT QUESTINAIRE ON
BUSH MEAT SURVEY IN ONDO STATE

(Bushmeat sellers)

1. L.G.A.....
2. Respondent Name.....
3. Age.....
4. Sex (i) Male ( ) (ii) Female ( )
5. Occupation.....
6. How long have you been selling bush meat?.....
7. What is the source of bush meat?

(a) Hunters ( ) (b) Other(please specify).....

8. At what season do you sell more bush meat

   (i) Raining Season ( ) (ii) Dry season ( )

9. List the wild animals that you sell ?

   (i).....(ii).....(iii).....(iv).....

10. Please list them in order of preference? (i).....(ii).....

    (iii).....(iv).....

11. Which of the wild animals you sell cannot be found throughout the year?

    (i)..... (ii).....(iii).....(iv).....

12. Which type do your customers prefer most?
13. For the preferred animal do they like it fresh, half smoked or dried in nature.?

ppendix iv(c)

FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE
SCHOOL OF AGRICULTURE AND AGICULTURAL TECHNOLOGY DEPARTMENT OI
FISHERIES AND WILDLIFE MANAGEMENT QUESTINAIRE ON BUSH MEAT
SURVEY IN ONDO STATE
(CONSUMERS)

Local Government Area:.....

Village/Settlement:.....

Age:.....(4) Sex.....

Academic Qualification:.....

Occupation (i) Trader (ii) Farmer (iii) Civil Service (iv) Others (Please specify)...

How often do you eat bush meat (i) Daily (ii) weekly (iii) Monthly

(iv) Occasionally

Which type of bush meat have you eaten before (name them)

(i).....

(ii).....

(iii).....

(iv).....

From your list on no. 7 above. Which bush meat do you like most

(i).....

Which other purpose do you use wild animals for other than bush meat

(i) Medical purpose (juju) medicinal purpose

(ii) Traditional health purpose

(iii) Trophy

(iv) Hides/Skin

(v) Others (please specify).....

10. Name one animal that you have used for the purpose(s) on no. 11 above

(i).....

(ii).....

(iii).....

11. Is there any animal that is forbidden to be killed (for any purpose) by your culture/custom (i) Yes

(ii) No.

12. If the answer to 13 above is Yes, name them and state the reason why the killing of the animal(s) is

forbidden. Animal Reason

13. Will you be pleased if hunting of bush meat is regulated? (1) YES (2) NO

APPENDIX V: STATISTICAL RESULT OF MARKET SURVEY OF WILDANIMALS UTILIZED AS BUSHMEAT IN ONDO STATE

	Variable 1 (Dry season; Oct-Dec 2004)	Variable 2 (Rainy season; June Aug. 2005)
Mean	81.64	75.67
Variance	14019.25	9939.25
Obs	11	9
df	10	8
Ftab	0.31947	
Fcal	3.34	

N/B Fcal>/Ftab