

NCF-WCS BIODIVERSITY RESEARCH PROGRAMME

A SURVEY OF CHIMPANZEES IN SOUTH-WEST NIGERIA



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DISCLAIMER

The author's views expressed in this report do not necessarily reflect the views of either the Wildlife Conservation Society or the Nigerian Conservation Foundation.

Cover Photo: the author in Okomu NP with guide Alfred Ohenhen and driver (photo by John F. Oates)

Executive Summary

1. Sixteen forest reserves and one national park in southwestern Nigeria were surveyed for chimpanzees. The survey concentrated on five states: Ondo State, Ekiti State, Osun State, Edo State and Ogun State. Almost half of the sites occur in Ondo State.
2. Information was gathered through directed searches, using hunters as my guides, and extensive interviews with local hunters and government personnel from both the state and local forestry departments.
3. Only a very small proportion of natural habitat remains at 14 of the sites because of extensive logging, forest clearing, farming, and cultivation activities. Two forest reserves, Ogbesse Forest Reserve in Ekiti State and Oni Forest Reserve in Osun State have been completely converted.
4. Chimpanzees were confirmed to be present in seven of the 17 sites: Idanre, Ifon, Oluwa, Omo, Ise, Ologbo, Forest Reserves and Okomu National Park.
5. Chimpanzees were either extinct or judged to occur at too low a density to ever recover at four out of the 17 sites: Ala, Oni, Ogbesse and Oba Hills, Forest Reserves.
6. Four sites were not surveyed well enough to confidently ascertain whether or not chimpanzees were present. These were Akure-Ofosu, Owo, Shasha and Ohosu Forest Reserves, although what information could be gathered suggested that chimpanzees only remain in Shasha and Akure-Ofosu Forest Reserves.
7. Chimpanzees were present at all sites approximately 10-15 years ago. Results of the survey suggest that they are now extinct in about half of the sites and present only at eight.
8. The main threats to remaining populations of chimpanzees are hunting and unsustainable and uncontrolled logging and forest conversion activities leading to a high degree of fragmentation and loss of habitat. Much of this activity is tolerated despite being illegal, and all forest reserves support a large number of illegal and permanent settlements.
9. Data collected suggested that there was a large and steady influx of people from other regions, settling in southwestern Nigeria. Interviews suggested that the south-west is considered easy to settle within because law enforcement is weak. The forest reserves of the south-west are, in effect, absorbing the rural poor from other regions of the country.
10. Other threats to remaining populations of chimpanzees include: a demand for bushmeat by urban dwellers; insufficient resources in forestry departments; a general lack of knowledge by all stakeholders (from hunters to state governments) on the importance and potential of wildlife conservation; a general

focus of government to over-exploit natural resources for short-term economic gain and a lack of political will to protect areas.

11. Encounter rates of primates were highest at Okomu National Park and far higher than those reported by Anadu & Oates (1982), suggesting that protecting the site has resulted in the recovery of at least some primate populations. Regular sightings of chimpanzees, suggest that the chimpanzee population may also be recovering.
12. Specific recommendations focus on the formal protection of other sites, notably Idanre, Oluwa and Ifon Forest Reserves in Ondo State, Ise Forest Reserve in Ekiti State, and Omo Forest Reserve in Ogun State. Recommendations focus on on-going protection in the form of law enforcement activities but stress the need for managers of these protected areas to focus on long-term goals of protection, notably in gaining the support of the general public through awareness and tourism.
13. One site, Ishan Aiyede Forest Reserve and the surrounding forest-free area in Ekiti State, was identified as perhaps the only intact ecosystem left in southwestern Nigeria. Further survey work is required in order to establish whether or not chimpanzees are present here. Threats to this area are low, however, and the site falls within the natural distribution of chimpanzees. It is recommended that following further research, this site be established as a protected area.

1. Introduction

1.1: Background

Nigeria has the largest human population in Africa, estimated by the World Bank at 121 million in 1998 but now presently thought to have increased to above 150 million. About half occur in the country's southern moist forest zone, within the historic range of chimpanzees (Oates *et. al* 2003). The main natural vegetation types in this area are lowland moist forest and swamp forest, together with some savannah woodland (Agbelusi 1994). This dense and rapidly growing human population has resulted in large scale fragmentation of the natural habitat.

Much of the remaining forest is contained within state forest reserves that were established during the colonial era to ensure timber supplies and safeguard watersheds. Wildlife within forest reserves is not given special protection and hence all larger wildlife species are seriously threatened. Nigeria's relatively high level of economic development (due in large part to oil revenues) has led to continuing high rates of forest conversion and other forms of natural resource exploitation both outside and inside forest reserves and national parks. Such economic development includes expansion of agriculture in the form of farms, plantations and commercial tea estates, road networks and oil extraction activities. Nigeria has a well-developed road system and much of the remaining chimpanzee habitat is no more than one day's walk from a road. Some forest reserves are divided by major expressways. All these factors have contributed to the highly fragmented nature of chimpanzee habitat and remaining populations in the south-west region of Nigeria. Presently very little suitable chimpanzee habitat remains outside of state owned forest reserves.

Hunting of all animals for bushmeat has been a traditional activity for a very long time in southern Nigeria, but hunting pressure in recent times has risen sharply with the size and prosperity of the human population and as natural forest has been exploited and converted for economic benefit. Although theoretically protected by both State and Federal Law, chimpanzees are still widely hunted for their meat and secondary products. Chimpanzees are particularly vulnerable to hunting and other human-induced pressures, given their generally low population densities and slow rate of reproduction. Females reproduce only one infant on average every five years but rates of reproduction are highly sensitive to human-induced pressures such as hunting and habitat disturbance.

The chimpanzees of south-west Nigeria are of special importance because their evolutionary affinities still need to be clarified if conservation plans are to properly take account of evolutionary significant units or subspecies. Until recently, the lower Niger River was assumed to be the boundary between the subspecies *Pan troglodytes verus* and *P. t. troglodytes*. A recent genetic study (Gonder 2000) indicates, however, that all Nigerian chimpanzees (and also those in south-west Cameroon) share a more recent evolutionary relationship with the chimpanzees of the Upper Guinea region (*Pan t. verus*), to the west of Nigeria, than with those in western equatorial Africa (*P. t. troglodytes*). But Gonder also found significant differences in the mtDNA between Upper Guinea populations and those in eastern Nigerian and western Cameroon, leading to the suggestion that the latter should be recognized as a separate sub-species,

P. t. vellerosus (Gonder *et al.* in press). As part of these studies, Gonder was only able to extract mtDNA from a few hair samples of chimpanzees from western Nigeria; this mtDNA grouped with *P. t. verus* according to some tree-building models, but with the rarer *P. t. vellerosus* according to others. Thus the evolutionary relationship of chimpanzees in the south-west region of Nigeria remains unresolved, at least in part because too few samples were collected. Resolving this issue is important, not only in terms of its biological significance, but also for the planning of a strategy that can ensure the conservation of representative diversity in the living great apes.

1.2: Aims

The continued survival of chimpanzee populations in south-west Nigeria is greatly threatened by human activity, but very little is known about these chimpanzees. No wide-ranging survey of the primates or other wildlife of this region had been conducted since 1982, and that survey (Anadu & Oates 1982) concentrated on the guenon *Cercopithecus erythrogaster*, and the forests of one state, Bendel (now divided into Edo and Delta States). There have been limited surveys in Ondo State (Agbelusi 1994), Omo Forest Reserve (Persson & Warner 2003) and on the eastern edge of the Niger delta (Bocian 1999). Persson & Warner, who conducted their survey in Omo in November 1999, encountered chimpanzees on seven occasions and according to their guide, Remi Oladepo, observed a group of six chimpanzees on one of these. Results of their vegetation survey confirmed that the chimpanzees preferred less disturbed habitat and that logging was likely to be the most serious threat to this population through disturbance and habitat alteration.

The Conservation Action Plan for West African Chimpanzees (Kormos *et al.* 2003) identified the forests of south-west Nigeria as of highest priority for a survey to assess chimpanzee status. Areas where effective conservation action could be taken need to be identified urgently before populations go extinct. A better knowledge of the abundance and distribution of chimpanzees and other species and the threats to their survival, as well as the challenges facing conservation policy makers, is vital for a realistic and effective conservation strategy to be planned.

The main goal of the survey reported here was therefore as follows: To obtain information on key areas where chimpanzees survive in viable numbers, in order to plan for the more effective conservation of these areas, and to resolve the evolutionary relationships of chimpanzees in south-west Nigeria.

The specific objectives of this survey were three-fold:

1. To conduct a six month survey to collect data on the distribution, abundance and threats to the survival of populations of chimpanzees in the forests of south-west Nigeria.
2. To clarify the evolutionary relationships of chimpanzees in south-west Nigeria, by collecting chimpanzee faecal and hair samples (the latter collected from nests constructed at night for sleeping), analysing the mtDNA from cells, and comparing base sequences in this mtDNA with known sequences from other populations in West Africa.
3. Based on findings of this study, to plan follow-up work that would lead to the establishment of effective protection for several populations of south-west Nigerian chimpanzees.

2. Survey Procedure

2.1: Timing, Coverage and Personnel

A preliminary survey was conducted over a ten day period during February 2005. After funds were successfully raised for a longer, more detailed survey, I initiated the work in February 2006. During the first three weeks, I was accompanied by the state wildlife officer of Ondo State, Ms. E. Umoh. During initial visits to forest reserves in Osun and Ekiti States, I was also accompanied by the state wildlife officers, Mr. Popoola and Mrs N. Agbelusi, respectively. Most of the fieldwork was conducted between February 15, and June 20, 2006 but two field trips were made during July 2006.

The survey covered 17 sites in five states (Table 1). Most of the sites were chosen by John Oates who has extensive knowledge of potential areas where chimpanzees might survive in viable numbers. He had visited some of these sites during his 1982 survey for white-throated guenon monkeys which helped initiate the protection of what is now Okomu National Park. I also accepted requests to visit an additional site for the Ekiti state government (Ishan Aiyede) and two additional sites in Edo State (Ologbo and Gilli-Gilli) for Aude Verwilghen, an agro-ecologist, working for Presco Plc., an international palm oil company with a plantation in Edo State and a concession in Ologbo Forest Reserve. Most of these sites were forest reserves, although one site was a national park, another was regarded by many as a game reserve, and another was an intriguingly intact forest reserve surrounded by a much larger and intact forest-free area (see Table 1 and Figure 1). The natural vegetation of most of these reserves was lowland moist forest and swamp forest. However Iyon Game Reserve/Forest Reserve falls within the transitional zone between high forest and true Guinea savannah; termed "derived" savannah, this habitat is mostly composed of dry savannah woodland. Ishan Aiyede, the most northerly site visited, is composed also almost entirely of dry savannah woodland habitat. Other sites visited also occupy this transitional zone, although due to forest conversion and over-exploitation of natural resources, it was difficult to determine what the natural vegetation was composed of. Chimpanzees are known to occupy all these different habitat types elsewhere in Africa.

Table 1: showing the name of each site, its status and size and the dates visited.

	Name	State	Status	Size km²	Dates visited (2006)
1	Idanre	Ondo	Forest Reserve	541	15-16 Feb; 21-22 Feb; 4-6 July.
2	Akure-Ofosu	Ondo	Forest Reserve	401	24 Feb; 8 Mar
3	Ala	Ondo	Forest Reserve	199	17 Mar; 21-22 Mar
4	Owo	Ondo	Forest Reserve	241	13 Apr
5	Ifon	Ondo	Game Reserve?	282	12 Mar; 15 Mar
6	Oluwa	Ondo	Forest Reserve	828	19 Apr; 20 Apr; 4-5 May
7	Akure	Ondo	Forest Reserve	70	5 Apr; 7 Apr
8	Shasha	Osun	Forest Reserve	90 (30 de-gazetted)	14 Jun
9	Oba Hills	Osun	Forest Reserve	68	25 May; 29-30 May; 1-2 Jun
10	Oni	Osun	Forest Reserve	56	24 May
11	Ogbesse	Ekiti	Forest Reserve	75	8 May
12	Ise	Ekiti	Forest Reserve	62	9 May; 10 May; 11-12 May; 21-22 May
13	Ishan Aiyede	Ekiti	Forest Reserve & Forest-Free Area	60-70?	25 May
14	Okomu	Edo	National Park	212	25 Feb- 2 Mar; 17-21Jul
15	Ohosu	Edo	Forest Reserve	471	13 Jun
16	Ologbo	Edo	Concession in Forest Reserve	60	30-31 Mar; 2 Apr
17	Omo	Ogun	Forest Reserve	1305	7-8 Jun; 10 Jun; 16-17 Jun; 19-20 Jun

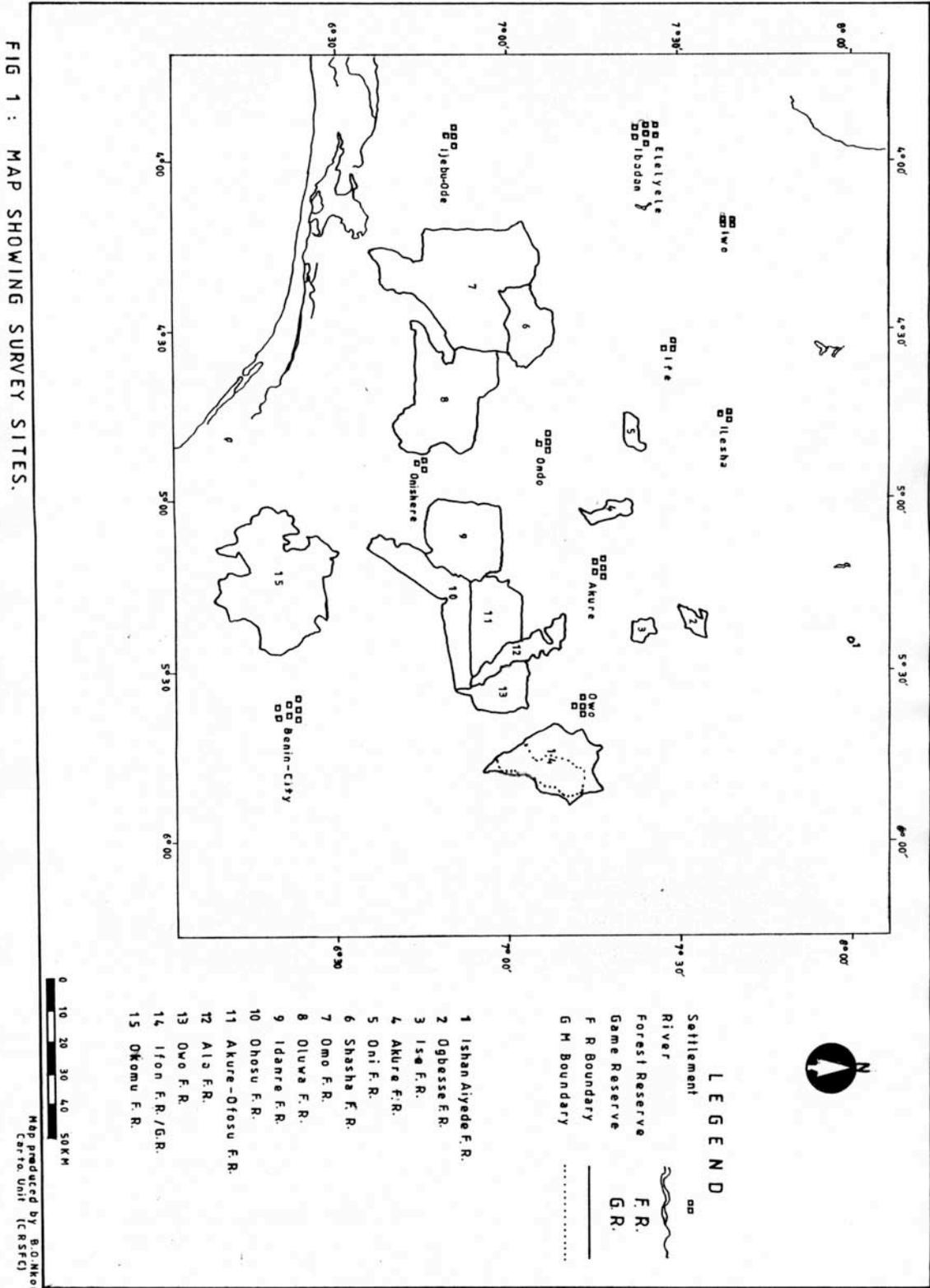


Fig 1: Survey Sites in SW Nigeria

3. Planning the Survey

After arriving in Lagos, Nigeria on February 9, 2006, I discussed with John Oates a potential survey plan. I started with the forest reserves of Ondo State because almost half the sites occurred in this one state and I had visited the state government of Ondo, Department of Forestry the previous year. I had met the state wildlife officer, Ms E. Umoh, who had shown keen interest in the project and who I had maintained correspondence with. I was therefore keen to increase her capacity as a wildlife officer by including her as much as possible with survey work in Ondo State. Subsequently, I left Lagos to travel to Akure, the state capital of Ondo, where I was to be based, on February 13, 2006.

4. Conducting the Survey

4.1: General Methods

The general method that I employed in visiting forest reserves from each state was as follows. First, I visited the state forestry department to introduce both myself and the project to the senior state government officials. This was obligatory, since all forest reserves are state managed and permission had to be sought for surveys. It also meant that I could interview forestry officials and gauge just how responsive the state would be to any future conservation action that the project recommended.

From here, state officials directed me to the relevant local forestry department office (which controls each reserve). At the local office, the officer in charge gave me the services of a forest officer/guard or zonal forest officer who knew the forest reserve well to direct me into the reserve. Most forest officers knew of hunters and assisted me in making contact with them. Even if they could not do this, however, during these initial excursions it was relatively easy to meet hunters inside the reserves, since the forest officers were often able to direct me to hunting camps or enclaves. Making contact with a reliable hunter was the most crucial stage of this process, since hunters acted as my guides. Initial excursions, which were often conducted in the vehicle or by motorbike, also provided general information on the state of the natural habitat in each reserve. This was particularly true for small reserves with relatively good roads. For some reserves, I was able to drive through the reserve within a short period of time and assess the impact of human activity, the extent of habitat alternation and the potential for wildlife populations to survive there.

After an initial meeting with a hunter, I arranged a time to return alone to the reserve in order to conduct more detailed fieldwork. I was always very careful to stress to both state and local government the need for me to conduct this fieldwork alone with a hunter, despite their enthusiasm to involve other personnel. The best chance of observing unhabituated chimpanzees, especially those living under heavy hunting pressure, is through not being detected. This becomes increasingly difficult as the numbers of survey personnel increase.

All subsequent visits were short, one to three days in length. Where possible I camped, mostly in hunters' camps, but sometimes close to an area I wanted to survey. Late evening and early morning are the most common times for chimpanzees to vocalise, so it

was important to be present in the forest at these times. Limitations on the amount of time I could spend in each reserve limited what information I could gain. One of the limitations involved the logistics of spending time in the field camping and bringing enough supplies with me. I decided not to hire porters, in part because the involvement of many people can make a project unmanageable and also potentially more logistically difficult and expensive. In the most promising sites, however, I repeatedly returned on a number of occasions. Generally, though, I was able to confirm the presence or (more difficult to confirm with certainty) absence of chimpanzees. At some sites I was also able to gain some information on their distribution. Additional information on their status and relative abundance was gained through interviews with local hunters and local forestry staff and also on the quality of remaining natural habitat.

The survey over five different states involved a great deal of road travel. Andrew Dunn, the project manager of WCS Nigeria, kindly lent us a project vehicle for just over four months. While one day was often sufficient enough time to survey some of the smaller and most degraded sites, some of the larger sites with relatively good remaining chimpanzee habitat, could not be surveyed for as long as I would have liked. This meant that while I could often confirm the presence of chimpanzees at a site, it was much more difficult to gauge their abundance.

Ologbo Forest Reserve was not initially listed as a study site. But while I was at Okomu National Park I was introduced to Aude Verwilghen, an agro-ecologist working for CIRAD and employed by the oil palm company, Presco Plc. Presco had recently obtained a 6,000 ha concession in Ologbo Forest Reserve and they were keen to have it surveyed for its conservation potential. If it was of conservation value, and other land could be attained by Presco, then the company was prepared to protect and preserve half of the concession.

I spent 55 days in the field, of which 231 hours were spent walking in chimpanzee habitat, between the middle of February and the end of July 2006. While all sites were visited during this period, inevitably there were some sites, four in total, which I did not survey well. Despite not being able to survey many of the reserves as thoroughly as I had hoped and spending a shorter period than anticipated actually in the field, I obtained a good overall picture of the status and distribution of chimpanzee populations and some other wildlife in southwestern Nigeria's forest reserves of which the recommendations are soundly based.

4.2: Sample Collection

Both hair and faecal samples were collected according to instructions provided by M.K. Gonder. All faecal samples were preserved in RNAlater, a buffer designed to stabilise and protect RNA from degradation at room temperature for several days and DNA fairly intact, for several months. For faecal material, a wooden spatula was used to collect a sample, preferably from the outer surface of the bolus, where the greatest shed of intestinal cells is expected. The sample, of about 2-3 cubic centimetres, was then transferred to a tube containing about 5ml of RNAlater.

Hair samples were collected from nests using latex gloves and placed into an envelope that was then sealed and stored with desiccant packets to avoid excess moisture. All faecal and food wadge samples have been sent to the US to await analysis.

Unfortunately, only two faecal samples were collected along with two hairs that were found on the ground close to a food wadge. Food wadges, bits of fibrous vegetation which chimpanzees chew and then discard, were also collected, in the hope that DNA could be extracted from these.

Finding samples, particularly fresh ones, was very difficult, in part because the animals are very shy and difficult to locate. Because I was never able to locate a nesting party of chimpanzees, I was never able to find fresh nests. Fresh nests are more likely to contain hairs than old nests and since chimpanzees defaecate outside nests before leaving the nesting site in the morning, fresh nests are the best place to find faecal samples. The nests that I was able to search were old and degraded and did not contain hairs. Many nests were also constructed too high up to search safely. Since most hunters that accompanied me were unaware that chimpanzees sleep in nests, I made a point of not drawing attention to nesting sites. If we did not hear or see chimpanzees, hunters drew the conclusion that chimpanzees no longer utilised that area, even if we had passed straight under a number of nests.

4.3: Interviews

Both local hunters and forestry personnel were interviewed. Generally, local hunters were the best source of information regarding the wildlife in forest reserves since forestry personnel spent less time there. Forestry officials were able to give me information regarding the size of different forest reserves, the overall condition of the habitat and sometimes maps. The Ondo State forestry department was the most useful in this regard, since they are presently preparing up-to-date maps of their reserves. Most other maps that I was given were over 40 years old and only showed designated compartments for logging activity, rather than information on the vegetation cover.

I returned to local and state forestry offices after I had completed fieldwork to discuss my findings, potential problems regarding implementing conservation strategies, my provisional recommendations and any conservation actions that they were keen to see implemented. The Ekiti state forestry department, which has a wildlife and conservation unit, for example, is keen to protect Ishan Aiyede and Ise Forest Reserves. I foresaw that integrating what state forestry departments themselves would like to see implemented with regards to potential conservation actions was an integral part of making effective recommendations.

Interviewing hunters on the presence and abundance of mammal species, especially chimpanzees, was extremely unreliable and subject to many biases. First, hunters often use their own naming system, inconsistent with zoology. For example, in many reserves, chimpanzee is called "gorilla", baboon is called "chimpanzee", civet cat is called "leopard" and leopard called "tiger". There were also problems with asking untrained people to identify animals from a pocket guide to African mammals (Kingdon 2004). While hunters would positively identify chimpanzees, they would also do the same for other primate species with no known distribution in Nigeria. While accurate information

on chimpanzee (and other species) abundance could not be obtained (because if chimpanzees were occasionally observed, they were considered “abundant”) hunters could at least indicate to some extent, whether or not a cohesive community of chimpanzees remained in the reserve. If hunters told me that they had not seen chimpanzees since 1996, for example, or they had migrated, it was probable that they had gone extinct in that area, or occurred at such low density that individuals rarely formed groups and vocalised. If I was told that chimpanzees were abundant then I concluded that at least one somewhat cohesive community (of an unknown number) remained, coming together to socialise and vocalise relatively regularly. These observations were often supported by my own findings.

Along with questions on wildlife, I also asked hunters where they had originated from and how long they had been living and working inside the reserve (Table 2). This information gave me a better idea of the accuracy of the information that they gave me and a better perspective on their opinions. Only two hunters originated from the vicinity of the reserve in which they hunted daily. Most other hunters had moved to the reserve very recently, although one immigrant hunter had been hunting at one site for almost 20 years.

4.4: Habitat Quality

The most accurate information on primate abundance therefore came from direct encounters (observing or hearing vocalisations of primates) in the field. However, this is itself problematical as encounter rates are extremely sensitive to changes in human activity. Because of this and owing to the fact that chimpanzees occur at very low density, the quality of the habitat became an important factor in estimating the likelihood of chimpanzees surviving in viable numbers.

All remaining natural habitat inside reserves in south-west Nigeria has been highly disturbed to a greater or lesser extent by logging activity and the clearing of land for farms. However, while chimpanzees prefer less disturbed habitat (Persson & Warner 2003), and avoid areas that are being presently logged, studies have shown that they thrive in secondary forest (e.g., Gombe National Park in Tanzania) where they feed on a wide range of fruits characteristic of secondary forest vine species. Although there is no closed canopy forest remaining in any of the forest reserves I visited, due to logging activity, chimpanzees are not restricted to closed canopy forest. In some areas of some forest reserves I visited, an absence of very large trees indicated that these had been extracted. However, where thick secondary growth had been allowed to regenerate, these areas are potentially the most favoured by chimpanzees. Alternatively, where reserves had extensively been cleared of their entire natural habitat and only small patches of highly disturbed forest remained there was almost no chance that chimpanzees could survive there.

Up-to-date maps therefore became an extremely useful source of information regarding the extent of remaining natural forest cover. By looking at maps lent to me by the Ondo State government, I was also able to see a general pattern of forest conversion and natural resource exploitation emerge. In some of the larger forest reserves, natural forest still remained as a solid block in the centre of the reserve, suggesting that conversion and exploitation had initially started from the reserve edges and gradually moved

inwards. In contrast, the fact that no natural vegetation remained in many small reserves that were often divided down the centre by a road and located close to a major town, suggested that better accessibility and higher overall human pressure (as two factors) had led to rapid and widespread over-exploitation throughout.

4.5: Direct Census

Surveying focused on areas of the reserve where natural habitat remained. Because this generally constituted a small proportion of a forest reserve it was not difficult to locate areas potentially used by chimpanzees. Censusing relied on directed searches using hunters as my guides. If hunters actively hunted inside the forest, I relied on the fact that they knew the forest well and could subsequently lead me to places where chimpanzees had been encountered (sighted, or more usually, their vocalisations heard). On one occasion however, I identified an area myself from a map that was shown to me by a local forestry department, based on the fact that it was situated in the centre of a reserve, lay adjacent to a river and a hunter had observed chimpanzees there the previous year.

Surveys were implemented by just me and one guide. Because we slept in hunter camps that were not always close to areas where hunters had encountered chimpanzees, we often rose before sunrise to trek to potential areas; for very distant areas we would sometimes use motorbikes for access.

All evidence of larger mammals, particularly primates, was recorded when encountered (Tables 3-6). The date, time and behavioural information of the encounter were recorded. Encounter rate allows some comparison of primate densities between sites. However, because often we were trekking far to areas where guides thought we had the best chance of encountering chimpanzees, we did not always walk as slowly as is recommended for primate surveys, and treks did not always coincide with the best time for primate viewing (early morning, late evening). Often we heard a troop of monkeys but were unable to identify the species or roughly estimate numbers because they were encountered en route to a destination that we were hurrying to reach. Identification was also made difficult by the dense forest cover and the fact the troops were often seen in darkness, before sunrise or after sunset. Owing to limited time and the large number of sites that we visited, we could not sample the routes we took repeatedly, to give more robust estimates for comparison. Furthermore, as previously mentioned, encounter rate is probably subject to large fluctuations, even over short periods of time, due to changes in human activity in an area, something that was impossible to control and not easy to assess.

Chimpanzee vocalisations were heard on three occasions. The following data were recorded: date, time, type of call, and the number of individuals calling. On one occasion the vocalisation resulted in a direct observation of the individual (the only occasion on which chimpanzees were seen), while on the other two, movement towards the vocalisation led to no more encounters. On one of these occasions, the vocalisation was food grunts followed by a scream, when the individual spotted my guide and subsequently ran off. However, after the scream I heard buttress drumming from a different direction. Buttress drumming, where individuals pound the buttress of a large tree with their hands and feet, provides information to other community members on the position of that individual, and possibly the direction the animal is moving in, if it is

repeated at intervals while travelling. Sometimes individuals drum when they are excited. Some researchers claim that drumming imparts even more precise and exact information (e.g., each individual has his own particular drumming rhythm), although this is unlikely.

The frequency with which chimpanzees were directly observed and their vocalisations heard was too low to provide any useful information on relative abundance, although it confirmed the presence of chimpanzees in a particular area and was useful in identifying group size (see Table 3). It is difficult to know whether this low encounter rate was due to high hunting pressure (inhibiting animals from vocalising) or lower than normal density; it is probably due to a combination of these factors.

Confirmation of chimpanzee presence and information on distribution and relative abundance therefore relied predominantly on the presence of nests and nest sites (Table 4). Nest age was difficult to estimate, since rates of deterioration depend on a number of factors (such as weather conditions and the way the nest has been constructed). Nest ages given (Table 4) are only rough estimates, based on the extent of forest cover above the nest, the proportion of leaf discolouration, and whether or not the main branch supporting the nest was broken or simply bent (affecting the rate of nest decomposition). Most nests were single nests, indicating that the individual had nested alone, although in some cases it was not always possible to search the surrounding area for other nests. Males and females generally differ in the style with which they construct nests. Male nests tend to resemble a platform and are often built relatively low down, while female nests are more elaborate, and are generally built higher up in the canopy. I was therefore able to record with some confidence the sex of the nest builder. Since females never build a platform-like structure close to the ground but male nests are sometimes built high up and resemble that of females, I was more confident in the labelling of nests that were built close to the ground, as having been built by males. Nests built by juveniles are distinctly smaller, although there is no sex difference in the style of construction.

GPS readings of areas where chimpanzees were encountered (observed or heard) were taken, along with areas where they had been encountered by hunters previously. Nest sites were also recorded using a GPS handset. Due to dense forest cover, however, recording GPS points were not always successful.

5. The Status of Particular Forest Reserves

5.1: Ondo State

Ondo is one of the most forested states in Nigeria, with 16.4% of the total area demarcated as forest reserves (Omoluabi *et al.* 1990, in Agbelusi 1994). Forest reserves total an area of 3,370 km² although 12% of the reserved area had been converted to government plantations by the early 1990s (Agbelusi 1994). Most of the forest reserves I visited in Ondo state, Oluwa, Idanre, Akure-Ofosu, Ala, Owo and Ifon, once formed a continuous stretch of forest from Omo in Ogun state in the west to Ohosu in Edo state, to the south-east. Idanre, Akure-Ofosu, Ala, Owo and Ifon, still form a contiguous stretch of forest reserves, but most of the natural habitat has been cleared and converted, leaving any remaining natural habitat extremely fragmented. The economy of Ondo State is based on timber extraction and cocoa production.

5.1.1: Idanre Forest Reserve (540km²)

Idanre Forest Reserve has one remaining patch of natural forest at its centre. The eastern side of the forest reserve has been converted to teak plantations and farms. There are many camps on this side of the reserve, indicating a high human population.

The size of the remaining forest could not be quantified but it is probably less than 50km². Like all the forests I visited, and as a result of selective logging, it is composed of thick, regenerated secondary forest and large trees are conspicuously absent. Its size and the fact that it does not appear highly fragmented by land clearing and farms, suggests that it still has conservation value, especially since chimpanzees are confirmed to be present here (see Table 3). According to hunters, chimpanzees are heard vocalising relatively regularly at Idanre, suggesting that a group is maintaining its social structure and natural behaviour, despite the pressures on it. In fact, Idanre was the only reserve where I heard chimpanzees pant-hoot. Pant-hoots (raucous, long distance calls) are the best-known chimpanzee vocalisation among hunters but were conspicuously infrequently heard throughout this survey. Idanre is probably large enough to sustain a few chimpanzee communities, if hunting and logging activity were absent.

However, the human pressure on Idanre is great; this reserve along with Akure-Ofosu had the highest observed prevalence of logging activity. During July when I visited, and when most legal logging in this region had stopped because of heavy rainfall, chainsaws could still be heard throughout the forest. Scattered throughout this remaining forest are illegal hunter camps. My guide showed me two out of four that he and others used. The closest one to Ofosu Town was used during the rainy season when the logging roads were in too poor a condition to make it further into the forest (a one hour motor-bike trip from Ofosu Town). This camp was being shared by 7-10 men involved in illegal hunting or logging activity. As a consequence of the camp being in permanent use, a large adjacent area had been cleared and farmed. Behind this cleared area were an extensive cocoa plantation and another illegal camp. Another camp I visited that was further inside the forest was only used during the dry season and the area around it had not been cleared for farming. An area relatively close to it had been cleared and farmed by my guide and clearing was continuing when I visited in July. These observations suggest that presently, clearing of remaining forest and conversion to farmland is being undertaken by people pursuing illegal activities such as logging and hunting.

My first guide at Idanre claimed to have killed six chimpanzees in his lifetime including one that he had killed last year. My second guide, who was an active hunter, said he had killed two chimpanzees in his lifetime. Between February and July, when I visited, a mother and her juvenile had also been killed. Both guides lived in Ofosu Town on the reserve's southern border, where there are many hunters. The first guide claimed that he only killed chimpanzees on order, whereas my second guide said he had killed his two opportunistically. While chimpanzee meat is eaten, the most valued parts, the hands, feet, head and skin, are sold for juju or traditional medicine.

5.1.2: Akure-Ofosu Forest Reserve (401 km²)

The pressure for timber on Akure-Ofosu may be even greater than that on Idanre. While the Ondo State government acknowledged that there were still extensive forested areas

inside this reserve, available information on the vegetation cover and general state of the forest was minimal. There are, according to a recent map, many camps in the northern portion of the reserve and also many camps along the Ofosu River marking the western boundary with Idanre. While logging activity appears widespread and intense in the reserve (I was told that logging was occurring in all compartments) I did visit one illegal camp, located within thick secondary forest, further inside the reserve, which looked, at least superficially, like suitable chimpanzee habitat. This camp, however, not only housed men but also women, suggesting that it was more or less a permanent settlement. The habitat around other camps that I visited was extremely degraded and much had been cleared for farming.

Most hunters that I talked to told me that chimpanzees were present inside the reserve. Many claimed to have observed chimpanzees recently, although there were some areas where chimpanzees had not been encountered for years. Around February time, a female was reported to have been killed and her infant sent to Ibadan Zoo where it was said to have died later. Elephants still survive in Akure-Ofosu and migrate between this reserve, Idanre Forest Reserve and Ohosu Forest Reserve in Edo state. All hunters appeared reluctant to assist me, at least in part because I was accompanied by personnel from the forestry department.

In summary then, I believe that chimpanzees still survive in Akure-Ofosu and this may be a relatively significant site in terms of remaining populations of both chimpanzee and forest elephant, especially since the very best forested sites are those that are presently being exploited for their timber. The human pressure on these populations and the threats to their survival may, however, be even greater than those at Idanre.

5.1.3: Ifon Game Reserve/Forest Reserve (282 km²)

The legal status of Ifon was difficult to confirm. According to some, Ifon is a game reserve and was gazetted as such in 1976. Other people, however, infer that it is a forest reserve (e.g., Agbelusi 1994) and suggest that although the intention was for it to become a game reserve, the process was never completed. Despite its possible status as a game reserve it clearly is as poorly protected as the forest reserves I visited. At various times it has suffered as a direct consequence of being insufficiently funded for law enforcement activities.

The vegetation of Ifon is composed mainly of savannah woodland but riverine forest and high forest also occur here. Four rivers run through it, the Osse, the Omo, the Owesse and the Okowa Rivers. According to 30 year-old maps, the main road from Akure Town to Ifon Town runs just south of the reserve's southern boundary. However, I had to drive ten kilometres in a northerly direction from the main road, passing extensive farmland, before I reached natural vegetation. Land clearing is continuing and encroachment from the south-west is extensive. Both illegal logging and hunting are widespread. I encountered one large Hausa camp, established just three months previously, and another small camp that had also only been established within the last month or so. Hunters from this camp were shooting a troop of mangabeys when I visited. In places, much of the undergrowth had been burnt by hunters and signs of tree felling were common. During one morning, I passed three full logging trucks on their way out of the reserve within two hours.

Notwithstanding, the savannah woodland that I surveyed is in surprisingly good shape, probably because savannah woodland offers few commercial tree species for harvesting. A large olive baboon troop was observed at close quarters and Ifon was the only site I visited where I heard the bark of a male bushbuck. While neither baboons nor chimpanzees were reported to have been encountered by the hunters we met in one camp, I found evidence that chimpanzees had been present just a day or two before behind the camp, in the dried bed of the Okowa River (stripped stems of vegetation and food wadges, Table 3).

In February 2005, when I visited, one hunter confirmed that chimpanzees were present in the thick forested habitat and reported that he had observed 10-11 chimpanzees just a few days previously. I was not able to visit areas of high and riverine forest, but I understand that they are subject to illegal logging.

In summary, I believe that Ifon Game Reserve/Forest Reserve still has a high conservation potential despite the fact that its status has largely been neglected and it is under high pressure from hunting, logging and encroachment/land clearing, for farms around its boundary.

5.1.4: Ala Forest Reserve (199km²)

Ala Forest Reserve is long and thin and a road runs straight through it from north to south. According to the Ondo State government's map of the reserve, the northern half has been taken over by teak and oil palm tree plantations. South of these plantations lies Dada camp (where I hired a guide) that borders an enclave that has expanded considerably since it was assigned in the 1940s. In the southern half of the reserve are more teak plantations and natural forest and close to the southern border lies Aga Oyinbe Camp within a largely encroached area.

Ala was surveyed by foot but also extensively in the vehicle on a road from its northern boundary to its southern boundary and beyond. While logging continues, particularly in the south, timber extraction has largely finished off all the natural forest. In fact, before we reached Dada camp we passed only farms, cocoa plantations and farming communities. Beyond Dada camp we passed more farmland, a patch of secondary forest and then an extensively cleared area that stretched to the horizon on either side of the road. Only beyond this did we encounter highly disturbed secondary forest with clear signs of logging activity (approximately 12 kilometres south of Dada camp or 20 kilometres south of Ala town). To put this in perspective, while travelling from Ala Forest Reserve to Owo Town through farmland that is shown as such on a 30 year-old map, there is no longer any difference between the vegetation inside and outside the northern half of the reserve.

Chimpanzees are only reported to occur on the southeastern boundary with Owo Forest Reserve, close to Obatedo Camp. This is a very large camp established at least 30 years ago. While superficially the forest looks in better condition than further north, logging pressure appears higher here. From talking to members of the local community it became apparent that chimpanzees and all large mammals are scarce now. One

chimpanzee was reported to have been killed at the end of last year, but encounter rates were said to be very low. Chimpanzees are apparently not seen or killed every year.

I surveyed the area of Ala where I was told that the chimpanzee had been killed and where chimpanzees were often seen many years ago. The area is a very thin riverine stretch, traversing the Ogbesse River, dividing Ala and Owo Forest Reserves. The forest on the Ala side is being logged and is very open. What I could observe of the forest on the Owo side was highly disturbed and in some parts, cleared. Many hunter trails pass through this riverine strip and I saw a relatively large number of discarded cartridges on the ground.

While chimpanzees favour riverine forest it is doubtful that a sizeable group could survive here today. Chimpanzees range widely. Not only is the hunting pressure high in this area, but large scale logging and extensive land clearing is occurring on either side of the river. It remains unclear how intact this riverine strip is along the river, or whether the human pressure along the Ogbesse is less in other areas of the reserve but south of Obatedo Camp are a string of other large camps, towns and widespread farms. Under these conditions I have to conclude that chimpanzees are extinct or nearly extinct in Ala Forest Reserve.

5.1.5: Owo Forest Reserve (242km²)

While Gonder observed two nests in Owo Forest Reserve in 1997, it remains unconfirmed whether or not chimpanzees still survive here. I was only able to make a short visit to Owo and the reserve was therefore only superficially surveyed. The immediate area along the Ogbesse River marking its western boundary that I visited from Ala Forest Reserve (where chimpanzees were known to have occurred) was highly disturbed (see above) and running the length of Owo's eastern boundary are extensive teak and gmelina plantations. I drove down one road inside the reserve from the northern boundary but the area I passed was largely cleared, some areas were burnt by hunters and remaining forest patches were highly fragmented. Although I did not observe any suitable chimpanzee habitat, some forested areas are reported still to remain. Because I did not locate a hunter, I was unable to assess the suitability of remaining habitat. What I saw of Owo Forest Reserve suggested a high degree of exploitation, land clearing and cultivation on the same scale as Ala Forest Reserve, but I was unable to confirm this pattern for the whole reserve by taking subsequent trips.

5.1.6: Akure Forest Reserve (70km²)

Logging in Akure forest reserve ended ten years ago. Presently, almost all of the reserve has been cleared and cultivated into teak and gmelina plantations and the taungya system of farming. One camp inside the reserve has, since last year, officially been designated a town. Its small size, location close to a major town (Akure) and the old Lagos road running through it may all be factors that have contributed to its rapid development and the loss of its biodiversity.

Only one small area of natural vegetation remains where no logging has occurred for over 40 years (the Queen Elizabeth Plot). Therefore, some of this forest is mature; although closer to the Owena River (marking one of its boundaries) the forest becomes secondary, supporting reports that from time to time trees are felled illegally. In 2004, a

buffer/enrichment plot was established next to it. The whole area, encompassing Queen Elizabeth Plot, the enrichment plot and some remaining stands of forest is very small, probably no larger than three to five square kilometres. While the state government has conserved the natural vegetation of that small area, they have not conserved the biodiversity within. My guide estimated that there were over 50 hunters that utilised this area from numerous camps. I encountered snares on hunting tracks and the small camp next to the plot appeared largely composed of hunters. No monkeys were observed, although one of my guides claimed to see a monkey on three occasions when I surveyed the plot. If present, it is probable that only single individuals remain now. Chimpanzees were said to have been sighted, however, on three occasions between February and April 2006. On one occasion my guide observed the hindquarters of one moving away and on another occasion a woman observed one close to camp sitting on the path. While I walked through the area, I heard a vocalisation close to the Owena River that could have been made by a chimpanzee, although I could not be certain of this. The vegetation is certainly suitable chimpanzee habitat. Due to the size of the area, however, and high hunting pressure, it is doubtful that the forest can support more than a few individuals. It is even possible that only one chimpanzee remains there now.

5.1.7: Oluwa Forest Reserve (828 km²)

Oluwa Forest Reserve, located along the Lagos-Benin expressway, is the largest reserve that I visited in Ondo state. Most of the reserve lies north of the road but some (perhaps about one-sixth of the total area) lies south of the road. Its eastern boundary lies very close to the Ondo Road, a major road that goes to both Ondo Town and Akure Town. Because of its position along a major road and close to major towns, the human pressure on Oluwa must be significant. There are, for example, many bushmeat sellers along this stretch of the expressway. While Oluwa used to be contiguous with Omo Forest Reserve there is now a dense human population along its western boundary. The Owena River cuts right through its centre in a north-south direction.

Before I surveyed Oluwa I was told by Ondo State government officials that there was little if any forest left, due to over exploitation and cultivation. Because of its large size, and the fact that forest clearing and cultivation probably began from its outside edges, there is still, however, a patch of natural forest at its centre. I had to drive 24 kilometres northwards from the Lagos-Benin expressway to reach it, passing plantations and farms. Forest begins 13 kilometres in from the expressway and its overall condition improved the further in I drove.

Perhaps because a major river cuts through the remaining forest, the forest appeared to be relatively high in biodiversity. The Owena was the only place where I observed a chimpanzee. During one evening at about 1800 hours, I heard chimpanzee food-grunts and observed both mona monkeys *Cercopithecus mona* and red-capped mangabeys *Cercocebus torquatus* feeding on fruits by the river. I heard the cry of a juvenile chimpanzee and observed an adolescent - probably male - climb the slope away from the food source, on the river's eastern side, and pause to look around (probably to locate his mother) before resuming travel and disappearing in the undergrowth. Two weeks later when I returned I located a fresh-looking nest in the same vicinity from the opposite bank. Not only did I observe a chimpanzee on the river's eastern bank but there were also a relatively large number of nests located on its western bank, suggesting that the

Owena River is an important nesting site for chimpanzees (see Table 4). Most of the nests I observed were old (greater than 2 months) suggesting that the area might be of particular importance during the dry season.

This reserve was also the only site where I encountered buffalo (we disturbed three in the Owena River) and encounter rates with monkeys were particularly high here (Tables 5 and 6). While the forest was disturbed by logging activity, it was ideal chimpanzee habitat (riverine forest traversing lowland moist forest) and some of the best that I saw during this survey. Due to time limitations I was not able to visit another, nearby, area where hunters observed chimpanzees (also along the Owena River) or Lege Forest on the reserve's western boundary. However, reports of allegedly wild forest patches that guides had not visited tend to be unreliable. Lege Forest is close to Lege town on the reserve's western boundary where the human population is particularly dense but its position close to Omo Forest Reserve's eastern boundary, an area where chimpanzees have been observed repeatedly, suggests that it deserves surveying.

The presence of nests on one side of the Owena River and the observation of chimpanzees on the other, confirms that chimpanzees use both sides of the river. Some troops of monkeys that I encountered were relatively unafraid of people and this, together with the fact that encounter rates here were relatively high, suggest that hunting pressure has up to recently been relatively low. I was unable to determine the size of the forest but presently it is under high logging and hunting pressure. The hunting camp that we encountered, 12 kilometres from the Lagos-Benin expressway, coincided with where land clearing and farming stopped and where secondary forest began, but the condition of the forest only markedly improved a further six kilometres in. Most logging activity was occurring on the eastern side of the Owena River, where chimpanzees were observed, and the forest on that side looked in worse condition than the side on which I walked. Gunshots also predominated on this side, in the same area where logging was occurring, suggesting that hunters may access this forest on logging trucks. On one evening a whole serious of gunshots suggested that a hunter was targeting monkeys and the following day, at the camp, I observed two smoked monkeys. One was a female red-capped mangabey. I was shown her live infant, in the hope that I would buy it.

In summary then, chimpanzees still survive in Oluwa Forest Reserve. The remaining forest is still of high biodiversity value (relative to other sites I visited) but is highly threatened and may be lost within the next year or so if no action is taken to save it.

5.2: Ekiti State

5.2.1: Ogbesse Forest Reserve (73km²)

Ogbesse Forest Reserve lies close to the Ekiti state capital of Ado-Ekiti. The reserve has been completely logged and cleared for farms and teak and gmelina plantations. Widespread burning and clearing of the land is apparent and only very small patches of forest remain. While illegal logging continues, these patches are too small to hold any conservation value. Chimpanzees have not been sighted since 1996 and it is certain from the habitat that they are extinct now. The reserve's small size, its location close to the state capital and the fact that a road runs through it to Ise Town are probably all factors

that have contributed to the over-exploitation of its natural resources in a relatively short period of time.

5.2.2: Ise Forest Reserve (62km²)

In contrast to Ogbesse Forest Reserve, very little of Ise Forest Reserve has been cleared, although a large enclave on the reserve's eastern side has encroached and (according to an old map of the reserve) a large area in the north, close to Ise Town, was cleared over 30 years ago. However, previous research conducted over a 33 month period, by Ogunjemite *et al.* (2005a), revealed that logging pressure on the forest is intense and increasing. The authors found that while regenerated forest (forest that had not been exploited for at least five years) decreased over the study period, actively exploited forest increased and the rate of exploitation was over five times higher than the rate of regeneration. While the proportion of the forest that was regenerating but disrupted (representing the extent of illegal logging activities), stayed constant, the number of concessionaries increased. Along with the fact that the mean girth of felled trees was far less than that recommended, they concluded that the species composition and structure of the reserve was radically altering (Ogunjemite *et al.* 2005). Important hardwood species were rarely encountered or completely absent.

According to my guide there are two separate communities of chimpanzees in Ise Forest Reserve, one on the western Ogbesse River side and one on the eastern side. Almost certainly, the location of these two communities, correspond to areas of regenerated forest identified by Ogunjemite *et al.* (2005a). Chimpanzees in this reserve were shown to use areas of regenerated forest or regenerated but disrupted forest, where their food and nesting requirements were adequately met (Ogunjemite 2005b) but not areas that were being actively exploited. My guide told me that few chimpanzees remained on the western side and this may be directly related to the fact that the area of regenerated forest here is significantly smaller than that on the eastern side.

The area that I surveyed was in regenerated forest on the reserve's eastern side. While some parts of this area looked as if no logging activity had occurred there for decades, some logging activity was occurring. My observations seemed to suggest that this was being conducted illegally. Despite the presence of some human activity, we observed two nesting sites located close to each other, approximately two weeks apart in age and containing five nests each (Table 2). These were the largest nesting sites observed during this survey. Along with recent encounters of four, five or more chimpanzees, observed by hunters and tree fellers in the area, this suggests that a cohesive group of chimpanzees still remains here.

The area of Ise surveyed contains very good chimpanzee habitat and chimpanzees are fairly regularly heard and observed in the eastern section of the reserve that I surveyed. However, the number of chimpanzees is decreasing because of high hunting pressure and increased habitat alteration caused by intense logging activity. In 2005, a chimpanzee mother was shot and her baby captured and in 2002 the state wildlife officer observed the head and body parts of a freshly killed chimpanzee. Hunters enter not just from Ise Town but all along the main Ikere Road running north of the reserve, across the Ogbesse River, running along its western boundary, and as far a field as Akure Town in Ondo State. M. K. Gonder encountered six individuals in Ise Forest Reserve during the

mid 1990s. Her guide came from Owo Town, suggesting that she may have entered the reserve from the western side. Certainly, the monkeys that we observed were extremely shy indicating that hunting pressure was high even in the area that I surveyed.

In summary, chimpanzees still survive in Ise Forest Reserve. As one of the few sites where the greater part of the area has not been cleared and cultivated but has been allowed to regenerate, Ise is a good site to protect and may be able to support a relatively significant population of chimpanzees. Numerous reports of sightings of around 4-6 individuals and the presence of two nesting sites, each with five nests, suggests that in the eastern area surveyed, at least 5 individuals survive. However, it is probable that this area could support ten or more individuals. Chimpanzees probably still survive in regenerated forest on the reserve's western side and also in regenerated but disrupted forest habitat that constitutes approximately 35-40% of the total area of the reserve (Ogunjemite *et al.* 2005a), suggesting that the reserve could support more than the 20 individuals previously estimated (Oates *et al.* 2003). The size of the reserve is relatively small, making it more susceptible to "edge effects" or external influences that negatively impact the integrity of the forest. Arguably, however, its small size should make protecting the site easier. Data collected by Ogunjemite *et al.* (2005a) suggests that the total area under active exploitation is increasing. Along with the high hunting pressure, exacerbated by the reserve's small size, these conditions make it increasingly hard for a chimpanzee population to sustain itself into the future.

5.2.3: Ishan Aiyede Forest Reserve and Aiyede Gede Forest-Free Area (60-70 km²)

At the request of the Ekiti State government I also visited Ishan Aiyede Forest Reserve. This small reserve (which I estimate from Figure 1 of being about 60-70 km²) is surrounded by a very large forest-free area (bordering Kwara State) and is a site where the Ekiti State government would like to establish a game reserve. The habitat is predominantly dry savannah woodland and very hilly with, according to the Ekiti state wildlife officer, patches of riverine forest. Ishan Aiyede and the surrounding area was the only site that I visited where the habitat looked intact and "pristine". There has never been any logging here due to an absence of commercial tree species, and hunting and grazing of cattle is minimal (due, I was told, to the presence of "dangerous" animals, notably hyena and possibly leopard). The human communities sustain themselves by farming but the one community I passed through outside of the reserve's border (Omoga camp) was very small and quite isolated (people here were still using earthenware pots as opposed to plastic containers). The area did not appear densely populated.

While I could not confirm whether or not chimpanzees are present, the area falls within their natural range and chimpanzees can live in a wide range of habitats including very dry woodland savannah. Therefore, there is no reason why they should not be present. While one local man told me that they were present, another told me that they were not. However, if people do not extensively use the area, it is doubtful that many people really know.

Ishan Aiyede appeared to lack all the human pressures apparent at the other sites I visited. Because human density appears markedly lower here and there is no widespread use of the land for economic gain (e.g., cultivation and timber extraction),

the Ekiti State government believe that it would be fairly easy to acquire it for a game reserve. Whether or not chimpanzees are present, this area certainly deserves special attention. While there is no immediate rush or urgency to afford it some kind of formal (and effective) protection, Ishan Aiyede may represent one of the last intact ecosystems in the whole of southwestern Nigeria. This makes it a unique place. The sitatunga is reported to be present here, an antelope that has gone extinct in many other parts of Nigeria. Further research is therefore necessary to determine which wildlife species are present with special emphasis on chimpanzees.

5.3: Osun State

5.3.1: Oni Forest Reserve (56km²)

Just like Ogbesse Forest Reserve in Ekiti State, Oni Forest Reserve, the smallest site visited, has suffered from extensive clearing and farming by illegal settlers. While timber extraction did not begin here until 1987, I was informed that illegal and widespread clearing and farming occurred during the 1990s with the assistance of a corrupt police administrator, who prevented the forestry department from acting against this encroachment. This reserve has been plagued with many social problems. When I visited there were 20 policemen keeping the peace after a border dispute led to five people being killed in Alowri Camp, and violent attacks on forestry staff have occurred on several occasions in the recent past.

Chimpanzees have not been observed since 1993 and the site holds little value in terms of its natural biodiversity. All the land that I saw was farmed and there were large and well established farming camps along the road. It has in effect become unofficially, de-gazetted. Even in the surrounding forest-free area that was in far better condition than the reserve, people had not encountered chimpanzees for over ten years. I therefore have to conclude that within relatively recent times (<13 years) chimpanzees have gone extinct at Oni.

5.3.2: Oba Hills Forest Reserve (68km²)

I paid special attention to Oba Hills Forest Reserve, especially because the Nigerian Conservation Foundation had approached the Osun State Government a few years previously with an interest to have it protected as a game reserve. Oba Hills is a small reserve encompassing three hills with a wide valley running in between. A large teak plantation is present on its western side, covering 12% of its total area (Oates *et. al.* 2003 in Kormos *et al.* 2003) beyond the hills. The plantation has been over-exploited and now only coppices remain.

Presently all the land in the valley bottoms surrounding all three hills, is subject to taungya farming. This farming has also spread half way up the hill slopes. Most of the farming is being done by immigrant farm labourers from Togo. All the hills are being deforested and logged. Consequently streambeds on the slopes are dry, and dense scrubby vegetation covers all three hills. This vegetation is burnt back in the dry season preventing regeneration. The most northerly hill has some forest/woodland remaining on its peak and has two gullies on its eastern side. One of these has been completely deforested. The other is very deep and, probably due to inaccessibility, is still forested with very large trees. The middle hill has two peaks. The southerly peak is completely deforested. The northerly peak still has some forest on its upper slopes and one forested

gully on its south-facing side but signs of logging and disturbance are apparent. The most southerly hill also has some forest on its slopes, but again the habitat is sub-optimal and highly disturbed.

While there are reports of people sighting chimps around the Olori enclave, it is unclear when these reports were made, although chimpanzees were last reported to have been seen four years ago and a dead chimpanzee was offered for sale in a nearby market in 1999 (Oates *et al.* 2003 in Kormos *et al.* 2003). People no longer see chimpanzees, and claim, since none have been hunted over recent years, that they have migrated, although there is no natural vegetation outside of the reserve. A 1994 satellite map that the Osun State government has of the reserve shows that most of the natural habitat (forest, marsh and grassland) still remained at that time. According to one guide, land clearing and farming only began 8-10 years ago when, according to another, chimpanzees used to be observed regularly.

It is hard to imagine how chimpanzees could survive in this reserve today. While two forested gullies remain, on two different hills, other forested areas are highly disturbed and do not constitute suitable chimpanzee habitat. Chimpanzees, on a daily basis, have to range widely. One hill would not provide sufficient food for a group, even if it was in pristine condition. Mangabeys, however, were heard on all three hills and one mona monkey observed on one of them. On one hill, among mangabey vocalisations, I heard barks and food grunts that might have been made by a chimpanzee or by mangabeys. Although I was uncertain, it seems most likely that these were mangabey calls. Despite the fact that chimpanzees could hide under the scrubby vegetation on the slopes and travel undetected, the fact that chimpanzees are not seen by farmers, moving between the hills on the valley floor, suggests that chimpanzees are either extinct here now or that at most only one or two individuals survive. While my survey results as a whole demonstrate that chimpanzees can persist even under high human pressure, Oba Hills reveals that where rapid land clearing and extensive forest conversion occur, chimpanzees can go extinct within a very short period of time. This is what happened to the Kalande community of chimpanzees at Gombe National Park in Tanzania. A decrease in numbers occurred at about the same time that uncontrolled fires (from the burning of farmland outside of the park) caused massive deforestation inside the park.

5.3.3: Shasha Forest Reserve (90km²)

Shasha Forest Reserve in Osun state is contiguous, on its southern border, with Omo Forest in Ogun state. Originally 120km², 30km² in the northern portion of the reserve has been de-gazetted for oil palm plantations and cocoa farms.

Only a few hours were spent in the reserve, visiting hunters in one enclave. The Osun state wildlife officer, Mr Popoola, used to work here 15 years ago and described it as almost pristine at that time, when logging was managed well and concessions were allocated on an annual and rotating basis. Presently, illegal and uncontrolled logging has destroyed a lot of the forest.

An indigenous hunter that I interviewed believed that the chimpanzees had all migrated from Shasha to Omo Forest Reserve. Last year, during the dry season, hunters had allegedly reported chimpanzees along the Omo border, where the Shasha and Owena

Rivers meet (in the south-west corner of the reserve). I visited this area from Omo Forest Reserve but there is no natural habitat left. The whole area has been extensively farmed and no chimpanzees have been heard here for over ten years. Shasha Forest Reserve was not surveyed adequately and areas of the reserve where chimpanzees might survive could not be identified. However, Ogunjemite *et al.* (2006, *in press*) encountered nests in the reserve during their survey in 2005, suggesting that chimpanzees do survive here, in at least some parts of the reserve. Clearly, however, their numbers have declined sharply over recent times and if they are not extinct now, then they occur at extremely low density.

5.4: Edo State

5.4.1: Okomu National Park (212 km²)

Okomu National Park is 180 km² with a proposed extension area of 32km². While the area experienced heavy selective logging just before it became a Wildlife Sanctuary in 1986, it is still the best example of lowland moist forest in the whole of the south-west.

According to Oates *et al.* (2003) chimpanzees have not been sighted inside the national park. However, I observed recent and fresh signs of chimpanzees in both the northern and the southern section of the Park (Tables 3 and 4) suggesting there are at least two separate communities of chimpanzees, although the park could certainly support more. Monkey encounter rates were also significantly higher here than at other sites (Tables 5 and 6). To put this in perspective, during Anadu and Oates's 1982 survey, monkey sightings occurred at a rate of 0.3 per hour. While their results are not directly comparable to those in Table 4 (that include all encounters, both sightings and vocalisations heard), during one evening I observed four different monkey troops within one hour, suggesting that, in some areas of the park, populations have recovered.

Sightings of chimpanzees in the northern area of the Park around the rangers' and tourist accommodation have been regular since my two visits during February and July. On March 23, a chimpanzee was observed crossing the main road to compartment 53. On April 1st, a chimpanzee was observed at the rangers' camp (compartment 54 or 55) feeding on a ripe paw-paw fruit. During my February 2005 visit, a chimpanzee was likewise observed to feed off the same paw-paw tree. On April 5, a chimpanzee was observed again in compartment 54 and on July 14, a chimpanzee was observed on the eastern boundary, on the edge of compartment 54, by the oil palm plantation there. This individual vocalised and was answered by two more individuals inside the compartment. On July 21, as I was leaving Okomu National Park I was told that villagers had seen four chimpanzees (one carrying an infant) feeding on palm nuts in the oil palm plantation that week. On the 23rd July, a large chimpanzee was observed in compartment 44.

Okomu National Park is an example of the positive effect that protection measures can have on wildlife populations. Chimpanzees definitely survive here, but while the population may be a significant one, very little is known about it. While monkey populations appear to have increased in numbers, changes in the abundance of chimpanzees are unclear as they had not been recorded on earlier surveys. Regular sightings of members of one community suggest that chimpanzees in this area of the

park are less wary now. Possibly they have increased in numbers. The observation of an infant is also an encouraging sign.

On all three occasions that I visited Okomu, hunting activity was apparent in both the southern area of the Park and also in the vicinity of the tourist and rangers' accommodation. Stretched resources and an array of management issues mean that law enforcement activities are not as strong as they should be, and that a certain level of hunting is tolerated. Observations of primates were more frequent close to the tourist facilities than elsewhere, suggesting that not all areas of the Park are protected to the same degree. However, without wildlife monitoring, the impact of even modest amounts of hunting cannot be ascertained.

In lieu of the fact that new tourist accommodation is set to attract more visitors, two hunters were arrested during July and neglected trails have been re-cut. Attracting tourists and increasing the profile of a Park is another very important way of ensuring its integrity and protection. A lack of resources has meant that investment in tourist and education facilities has been minimal and attracting tourists has been difficult. Visitor expectations provide the motivation to manage an area well and providing high quality facilities and services is all the more important in a park where animals cannot be seen on demand.

5.4.2: Ologbo Forest Reserve (60km² concession)

I was also invited to survey a 6000 ha concession of Ologbo Forest Reserve, obtained by Presco Plc, an oil palm plantation company. Previous research conducted by Aude Verwilghen (an agro-ecologist, working for CIRAD) suggested that the northern portion of the concession, constituting about 55-60% of the area, was potentially the most suitable habitat for chimpanzees. Thick secondary swamp and lowland rain forest remains in much of the concession and many encounters of chimpanzees were reported to occur in this area. Human disturbance appeared relatively low compared to the southern portion of the concession, which is situated close to another (the Ikara concession) where many hunters are reportedly based. The hunting pressure in the southern area may be particularly high. Two chimpanzees were killed on the Ikara concession during 2005, suggesting that chimpanzees did still use this area.

While hunting and logging activity was still on-going in the northern area, a previous socio-economic survey identified land clearing and farming rather than hunting as having the greatest impact on wildlife and only one community, the Ogboyibo farming community, was encroaching from the Ogba River along the western boundary of the northern half of the concession. As a result of plans to drill for oil in the Ikara concession, there are plans to build a tarmac road through the southern portion of the Presco concession, with the potential to negatively impact wildlife even further.

Two hunters who I interviewed both claimed to have seen chimpanzees in the proposed area last year. One of them allegedly saw 21 chimpanzees in December 2005 (unlikely but possible). Despite uncontrolled logging, and an extensive network of logging roads, the forest bordering a large swamp is intact. Large trees are absent but I did not encounter any cleared land either. I confirmed the presence of chimpanzees in this area of the concession (Table 4) along a hunting trail running through one compartment. Two

troops of monkey were also observed along this trail. Troops of monkeys were rarely seen on previous searches of the area, suggesting that primates may avoid hunters by avoiding the logging roads. I also observed the fruit of a secondary forest vine species that resembled and tasted exactly like a fruit eaten by chimpanzees at Gombe National Park in western Tanzania, *Salacia leptoclada*.

In summary, chimpanzees still occur in Ologbo Forest Reserve but their abundance remains unknown. The high human pressure on the reserve suggests that their numbers have decreased, as at other sites, and they probably only survive at very low density. However, if the report of 21 chimpanzees observed is true (significantly greater than any other report I obtained anywhere else) then this would make Ologbo a significant site.

5.4.3: Ohosu Forest Reserve (471 km²)

Ohosu Forest Reserve in Edo State borders both Akure-Ofosu and Idanre Forest Reserves in Ondo State, and the Lagos-Benin expressway lies close to its southern border.

I accessed the reserve from the expressway at Ugbogui Town and through Ulorin camp, on its border. All the people I interviewed told me that chimpanzees used to range close to the camp many years ago but large scale logging activity has since caused them to migrate north into Ondo State. One man told me that he had not seen chimpanzees since 1991-1993 and even then encountered them on the border with Ondo.

I was told that logging was intense in this reserve. Indeed, the logging roads were only passable by foot and large and medium sized trees were conspicuously absent, although the forest was thick. As long ago as 1982, Anadu & Oates reported that Ohosu was being heavily exploited for its timber. Forest guards told me that there were also many illegal farm settlements inside the reserve, suggesting that much of the activity inside the reserve is uncontrolled. Indeed, a forest guard in Akure-Ofosu Forest Reserve commented that many armed loggers, having over-logged Ohosu Forest Reserve, were now moving across the border into Akure-Ofosu and intimidating forestry guards. One settler inside the reserve told me that hunters also believed that chimpanzees no longer survived here.

While Ohosu Forest Reserve was inadequately surveyed (only a few hours were spent inside the reserve), the small amount of information I could gather suggests that chimpanzees are no longer present there. Either they have gone extinct, or very few remain due to high human pressure on the reserve. Only further survey work can confirm this for certain.

5.5: Ogun State

5.5.1: Omo Forest Reserve (1305km²)

Omo Forest Reserve, the largest forest area visited during this survey, is contiguous with five other reserves including Shasha Forest Reserve in the north and Oluwa Forest Reserve in the east and lies only 135 km northeast of Lagos. Despite its size, almost half of the reserve has been converted to plantations (primarily gmelina) and farms. The remainder of the reserve is composed of logged forest (Oates *et al.* 2003).

There are about 20 enclaves inside the reserve, mainly located on the periphery, and four timber camps and one small town. There are an estimated 20,000 inhabitants living inside the reserve (Amador & Uijetwaal 1997) and during the dry season there is a temporary influx of Hausa people from the north, Igbo people from the east and non-Nigerians (Perrson & Warner 2003).

Omo contains a Strict Nature Reserve (<6km²), a Biosphere Reserve and a Biosphere Extension Area (142km²). The Biosphere Extension Area was the focus of elephant research during the 1990s and NGO conservation efforts, but research efforts have since declined and illegal farming in the area prevents elephants from ranging there any longer. Perrson and Warner (2003) conducted a mammal survey in Omo, in 1999 and observed chimpanzees on the eastern side of the reserve and dried chimpanzee parts in a local market.

In 2005, I attempted to reach the area which Perrson and Warner surveyed in 1999, with their guide, Remi Oladepo. We approached the eastern boundary of the reserve from Akilaja village in Ondo State. It was quickly apparent that the area where chimpanzees had been observed just a few years before had now been completely over-exploited. Logging was on-going but much of the area had been cleared and illegal farms were established. After many hours of trekking we still did not reach forest. In June 2006, I returned to the eastern side through Omo Forest Reserve to another nearby area where ten years previously sightings of up to 30 chimpanzees were reportedly common (relatively close to Idi-Opepe Abeku Camp). In March 2005, my guide had visited this site and had observed a group of chimpanzees. Within the last year, however, illegal farmers have settled and begun clearing this area. While a fresh chimpanzee nest was observed (Table 2), the future for any remaining individuals looks extremely bleak. It is almost certain that much of the forest in the immediate area will be gone within the next year, while forest in the proximate area (surveyed during 2005) has already been cleared. Two chimpanzees were reported to have been shot very recently in this area after they had strayed across farmland. The farmers we encountered had apparently only settled since March 2006, but the area they had cleared was extensive. Perrson and Warner (2003) rightly recommended that being situated outside of the Biosphere or Strict Nature Reserve, these chimpanzees urgently needed protecting. Because of the extensive, uncontrolled and illegal clearing of land within the last six years, however, and general lack of concern, this group of chimpanzees are undoubtedly on the verge of extinction.

Both logging and hunting activity are apparent in the Biosphere Extension Area around the old elephant research camp (established by the Nigerian Forest Elephant Wildlife Survey and Protection Group) and some areas have been cleared and farmed. However, the forest that I observed was still in relatively good condition and resembled that found at Okomu National Park. While researchers never observed or heard chimpanzees in this area during the 1990s, there is no apparent reason why they should not occur here. It is probable that, for ecological reasons, they occurred at lower density than in other areas. I did observe what could be regarded as a loosely constructed day nest, in a tree. Chimpanzees sometimes construct nests to rest in during the day, but because they only rest for relatively short periods these are usually not constructed as carefully as those made during the night. Because of this, the observation remains uncertain.

I also visited a site located fairly close to a camp called Abegu Camp. This site lies somewhere between the eastern boundary of the reserve and the elephant research camp. This area, like others in Omo Forest Reserve, is under intense pressure from logging, clearing and farming. Farmers are encroaching from Abegu Camp and have already farmed an extensive area of the forest. It appears, however, to be the best site presently for any conservation action. Despite the inevitable encroachment chimpanzees are regularly heard and seen by my guide, who has a small camp in the area. While we were there, I heard food grunts and then a scream by an individual chimpanzee who saw my guide. A few minutes later I heard two rounds of buttress drumming in the distance, from a different direction. During May 2006, my guide found the remains of a dead chimpanzee in this area. Although decomposed, its head and bones had not been removed, suggesting that it did not die as a result of being shot by a hunter.

Omo also has a federally owned area, also called Queen Elizabeth Plot, in the north of the reserve, which is apparently the only area of undisturbed and “pristine” forest left. This is, I believe, the Strict Natural Reserve. I was informed that officially no one is allowed to enter without a permit from a federal government office in Abeokuta. The site is only patrolled once every three months and therefore, along with its small size and its location close to farming communities, must be subject to the same intense hunting pressure found at other sites.

Omo Forest Reserve has largely been neglected over the last decade. It is an example of what can happen to a site when conservation and protection activities wane. Omo Forest Reserve suffers from large scale fragmentation, uncontrolled and illegal logging and farming activities and a dense human population that is apparent all over the reserve. Twenty thousand inhabitants must now be a conservative estimate, since illegal farmers I encountered had only settled recently. A significant population of chimpanzees in the east of the reserve that should have been protected years ago are set to go extinct within the next year and chimpanzees may go extinct in the reserve within the next 5-10 years due to large scale clearing of the land.

6. General Findings

6.1: Over-exploitation and High Human Pressure

The findings of this survey, that natural resources are being over-exploited at an unsustainable rate and large scale commercial hunting is depleting wildlife populations, are not new. In fact the general findings reported by Anadu and Oates (1982) or by Agbelusi (1994) could be reported here, word by word. These are also similar to findings reported by Petrides in 1965 (Anadu & Oates 1982). The only difference is that, inevitably, an even greater overall area has now been deforested and natural biodiversity lost.

State forest reserves are under government control in which government is supposed to limit settlement and manage the forest (and the exploitation of its products) in the best interests of the state and its people (Anadu & Oates 1982). The emphasis of forest management was to sustain timber yields in perpetuity. But as far back as 1982 Anadu & Oates reported that “Working Plans” to achieve this were being abandoned for uncontrolled and intensive exploitation. They reported that along with legal contractors,

illegal felling by groups of armed men who intimidated forest guards was being undertaken. They also reported that the taungya system of farming was largely being abused. (Taungya farming is a farming system where farmers are given temporary farming rights in return for planting commercial tree species. As these trees grow, the farmers are expected to move on, after obtaining several harvests from their crops (Oates 1999)).

It is often suggested that it is poverty that compels people to hunt. It is true that in the absence of any alternative form of income, people revert back to subsistence farming in order to sustain themselves. However, it is a consequence of weak law enforcement and timber extraction that people are now hunting on a massive scale. Hunting and logging are invariably linked because logging activity creates the infrastructure facilitating access for hunters and the transport of meat towards urban centres (Tutin 2002). One of two indigenous hunters that I worked with told me that neither his father nor his grandfather hunted during the colonial period, despite living on the boundary of a forest reserve. At that time hunting was only permitted through the acquisition of a hunting license and the reserve was regularly patrolled by the forestry department. Because timber extraction had not yet opened up the forest, access to the forest was limited to just a few rough paths and potentially dangerous animals were present. As a consequence, hunting was traditionally a low level subsistence activity. This hunter stated that hunting pressure has increased as a direct consequence of heavy logging activity and weak law enforcement that has occurred in recent decades.

Hunting is indiscriminate; laws forbidding the killing of endangered species are not enforced and hunting laws that were established to sustain wildlife populations are ignored. Hunters were oblivious to the fact that these laws exist. Most say that God created animals for humans to hunt and do not care if one species becomes extinct as long as others are still present to hunt. Hunting efficiency has been further exacerbated by the widespread use of motor-bikes that are often subsidised by state governments in an effort to create employment opportunities for their electorate. Motor-bikes are often the only means of transport down logging roads during the rainy season and are the quickest and most efficient means of travel to the core of any reserve. Most hunters I encountered over the course of the survey owned a motor-bike.

Hunting is promoted by market demand. Bush meat is very expensive, and it is mostly the relatively rich and educated urban dwellers who can afford to buy it. I found a pervading notion in the survey region that because there is so much bushmeat on sale on the roadside, there must be plenty of wild animals in the bush. This opinion is a misconstruction at best. Certainly, some species do persist, even under heavy hunting pressure, such as the Maxwell's duiker and the grass-cutter, but most hunters hunt these only because they are the most common species (which also flourish in degraded habitats) and because other species have dramatically decreased as a direct result of increased levels of hunting. Many hunters who consider all wild animals as "meat" do not have qualms about hunting rare or endangered species since they neither know that they are rare nor understand their significance. While many urban dwellers are extremely choosy regarding what bushmeat they consume (refusing to consume monkeys, for example, because of their resemblance to humans), consumption of more

common species is directly supporting the lifestyles of hunters and therefore indirectly supporting the hunting of rare and endangered species.

State and local forest departments appear unable to control large scale illegal activities within their reserves and state forest reserves have become “commons”. It is my impression that presently these illegal activities are causing the most harm to wildlife populations. While, by law, hunting in a reserve is permitted to some local residents and their descendants, almost all of the hunters I met came from far off regions. Table 2 shows that only three out of 15 people (20%) interviewed were indigenous. Half of these illegal settlers came from the northern or eastern regions of Nigeria. Over half of these people had settled in the survey area within the last year, suggesting that the human population in forest reserves is increasing. Forest reserves in south-west Nigeria are, in effect, absorbing the poor or landless from other regions, an issue that never been seriously addressed. Interviews with these immigrants revealed that they had chosen to move to southwestern Nigeria because it was an area known to be weak on law enforcement and tolerant of such activities.

Tolerance of illegal activities (such as hunting) leads to an influx of illegal immigrants, the establishment of illegal settlements and large scale clearing and forest conversion. In some instances, these activities (along with the establishment of plantations) have resulted in absolute destruction of all of the forest vegetation (e.g., Ogbesse and Oni Forest Reserves) and the reserves have informally been de-gazetted. Illegal activities that culminate in land clearing and farming impact more on wildlife populations than logging activity or hunting per se (Perrson and Warner 2003; Aude Verwilghen, personal communication).

Table 2: Origin and length of time spent at a site by people undertaking illegal activities

Site	State	Length of time at site/years	Activities undertaken	State of Origin
Idanre FR	Ondo	20	Hunter	Cross River
Idanre FR	Ondo	1	Hunter	Ondo
Akure-Ofosu FR	Ondo	Jan 2006	Hunter	Ebonyi
Ifon FR/GR	Ondo	indigenous 50	Hunter/Farmer	Ondo
Ifon FR/GR	Ondo	Dec 2005	Hunter	Hausa/northern region
Ala FR	Ondo	19	Hunter	Lagos
Akure FR	Ondo	Feb 2006	Hunter	?
Ogbesse FR	Ekiti	3	Hunter	?
Oni FR	Osun	Recent	Farmer	Akwa-Ibom
Shasha FR	Osun	Indigenous 30	Hunter	Osun
Ohosu FR	Edo	Feb 2006	?	?
Ologbo FR	Edo	Indigenous 30	Hunter	Edo
Omo FR	Ogun	March 2006	Farmer	Cross River
Omo FR	Ogun	March 2006	Farmer	Cross River
Omo FR	Ogun	March 2006	Farmer	Osun

6.2: Attitudes to Conservation

Forestry departments complain of not being adequately financed for law enforcement activities and of being understaffed by guards who are not empowered to carry arms.

Forest guards often live in the same community as local hunters and are therefore subject to strong social pressure to overlook or ignore illegal activities. Often the problem is too large to manage. At worst they may turn this situation into personal gain and there may therefore be little incentive for enforcing the law.

One of the problems associated with the widespread exploitation of forest reserves is that management of reserves has largely been directed towards the management of tree crops rather than towards the management of the ecosystem. Most of the land in many forest reserves has already been cleared, first by logging and then by the taungya system of farming. Another reason is the fact that both governments and the general public do not understand why it is important to conserve and protect at least some of their wildlands and the potentially long-term economic gain from doing so. The Oyo State government, for example, is presently passing legislation that will allow them to “put into use” more of their land. A survey conducted by Agbelusi (1988) revealed that most people from Ondo State, whether educated or illiterate were ignorant of the value of wildlife conservation.

While state governments do have wildlife officials, money earmarked for wildlife management activities is often not released (according to one wildlife officer of one state) and of two state government forestry departments I worked closely with, neither were actively pursuing field-based activities such as wildlife monitoring. Agbelusi (1994) recognised that the resources within the Ondo State government, including number of personnel, were inadequate for wildlife protection and it was very clear to me that even with adequate available funding, many wildlife officers, with experience in forest management were not adequately trained in wildlife conservation. Under ever-increasing pressure to convert forest to farmland, no state government I visited had an active and practising wildlife conservation unit.

Developing countries commonly depend to a large extent on their natural resources to generate revenue, and governments are under a great deal of pressure to generate short-term economic gains. It was my impression that state governments only seriously considered conservation as an alternative land-use strategy once economic gains from timber extraction had fallen as a direct consequence of natural resource exploitation and forest conversion. This is problematical from a conservation viewpoint since some of the very best remaining chimpanzee habitat occurs in the one state where timber extraction is presently the driving force behind the economy. I received the best reception from those state governments whose forest reserves had been over-exploited, where the forest had disappeared and where chimpanzees had almost certainly gone extinct. It was these governments who were now most keen to conserve some of their forest reserves.

6.3: Extinction and Persistence

In 1994, Agbelusi reported that chimpanzees were present in four of the forest reserves in Ondo state: Ala, Idanre, Ifon and Ogbesse. This survey suggests that chimpanzees had an even wider distribution across the state, also occurring in Oluwa Forest Reserve, and probably in Akure-Ofosu and Akure Forest Reserves. Up to 10 to 15 years ago chimpanzees almost certainly persisted at all the sites surveyed in all states. However, over the last decade chimpanzees have gone extinct (or have decreased to such a level that recovery will be impossible) at almost half the sites visited. These sites are Ala,

Ogbesse, Oni, Oba Hills, and Akure Forest Reserves and possibly Owo, Shasha and Ohosu Forest Reserves.

What this survey highlights, however, is the remarkable ability of chimpanzees to persist even under high human pressure. Tables 3 and 4 show the evidence for the presence of chimpanzees, collected at different sites and evidence of other large mammals. In particular, signs of bush pigs (*Potamochoerus porcus*) were conspicuously absent in all forests that I visited. Although occasional signs of digging were seen, other signs such as pig spoor were not and no direct sightings were observed. (In comparison, signs of bush pigs - sightings and especially faecal matter on trails - were a common sight at Gombe National Park in Tanzania, where I worked previously.) While pigs were thought to be common in Ondo State (Agbelusi 1994), they are probably endangered now. Hunters reported killing pigs, but did not include them as the most common species killed (those were the grass-cutter *Thryonomys swinderianus* and Maxwell's duiker *Cephalophus maxwelli*), although bush pig can be found at the Owena bush meat market, just outside of Akure Town.

Understanding how chimpanzees have persisted can help with their protection. Perrson and Watson (2003) found that chimpanzees preferred less disturbed areas and Ogunjemite *et al.* (2005b) found that chimpanzees avoided actively exploited areas where logging was presently underway. They were, however, observed in regenerated forest areas and regenerated but disrupted forest areas where their food and nesting requirements were adequately met (Ogunjemite *et al.* 2005b). This was supported by hunters' claims that chimpanzees only returned to actively logged forest during the rainy season, when most logging had stopped. Chimpanzee ecological requirements are best met in regenerated forest where they feed on a range of fruits characteristic of secondary forest (mainly fruits of vine species), but chimpanzees also live in a range of habitats from tropical forest habitat to dry arid savannah-woodland. Also, unlike many primate species, chimpanzees live in a "fission-fusion" society or community. All community members socialise in temporary groups of different sizes but are extremely hostile to members of other communities. Since they are large-bodied, they have to adapt to their energy requirements on a daily basis. At times of food abundance, large groups form but in times of shortage, individuals will range alone or in smaller groups.

Because of their intelligence, which affords them the ability to adapt to a wide range of conditions, chimpanzees also adapt to human presence. While chimpanzees are naturally very vocal, I have found in my previous research that they are inhibited from vocalising in areas of human settlement and travel silently and markedly more vigilantly so that they cannot be followed or detected. Chimpanzees also mainly travel on the ground where they are camouflaged and all hunters I interviewed only shot chimpanzees when they were feeding above them in trees. Therefore, estimates of chimpanzee population size are often lower than in actuality in areas where humans are frequent because chimpanzees respond to the pressures on them by staying alone or in small groups that are harder to detect. While a conspicuous absence of large groups may be the result of an overall decrease in numbers caused by hunting, loss of important food resources, through land clearing, may also *prevent* large groups from forming. This reduction in their ability to socialise has obvious consequences for reproduction and the

ability of a population to recover. However, their ability to adapt appears to have saved this species from the total extinction that has befallen other species in the same habitats.

Ogunjemite *et al.* (2005b) therefore correctly recommended that degraded forest areas should be incorporated in chimpanzee conservation efforts. While selective logging originally opened up these forest reserves to hunters, it may also have served to enrich the ecological conditions for chimpanzees and degraded but regenerated areas offer very good habitat for chimpanzees. Whether or not these remaining chimpanzee populations are viable is a contentious issue, since, the rule of thumb that there should be at least 500 females of breeding age in any population is based largely upon studies of small mammals occurring at relatively high density, while all great apes species occur at relatively low density, even in areas where threats to their survival are low. There are also no estimates available regarding the minimum area required to protect a chimpanzee population, although chimpanzees are large-bodied animals that have to range widely in order to meet all their energy requirements. Nevertheless, this survey demonstrates that chimpanzees still survive in many parts of southwestern Nigeria, despite the odds, and their highly adaptable nature offers some hope that if the political will is there and some populations are protected, chimpanzees, like those at Okomu National Park, may see an apparent recovery.

Table 3: Evidence of the presence of chimpanzees at different sites

Table gives information on direct observation, vocalisations, samples taken and other evidence, along with other mammals observed and those observed to be killed by hunters.

Forest	Size	Hours Trekking	Total no. hrs inside FR	No. Seen	Date/Time	Samples taken	Vocalisation	Date/time vocalisation	Other signs	Date/time	Large mammals encountered (not monkey)	Other mammals seen killed by hunters
Omo	1305	21.3	78	-	-	1 old faecal	Food grunt; scream	19/06/06 1715 19/06/06 1728	Tree drum x 2	19/06/06 1748, 1749	Tortoise, buffalo prints, duiker	Aardvark
Oluwa	828	11.8	51.3	1 juvenile (with family grp)	20/4/06 1809 hrs	-	Food-grunts cry	20/04/06 1725 1737; 1809	-	-	Duiker, hyrax, buffalo (3)	Female mangabey, infant kept as pet
Idanre	541	40	89.5	-	-	-	Pant-hoots (2 individuals)	05/07/06 1712	-	-	Duiker, galago, hyrax	Duiker; monkey; porcupine; white-throated monkey
Akure-Ofosu	401	0	10.3	-	-	-	-	-	-	-	-	Duiker; skulls: monkey, baboon/mangabey
Ifon	282	15.5	17.5	-	-	1 food wadge	-	-	Stripped vines (1-3 dys old)	12/03/06	Pig tracks; duiker spoor; olive baboon troop; male bushbuck	Mangabey; skulls: 3 pig, 1 baboon/mangabey, duiker, small monkey
Owo	241	0	3	-	-	-	-	-	-	-	-	-
Okomu	212	17.5	130	-	-	1 fresh faecal; 2 hairs; 2 food wadge	-	-	-	-	duiker; buffalo footprint/spoor	-
Ala	191	7	40	-	-	-	-	-	-	-	-	-
Ohosu	?	2	2	-	-	0	-	-	-	-	-	-
Shasha	90	-	3	-	-	0	-	-	-	-	-	Hyrax, Mona monkey
Ogbesse	75	1.5	5.5	-	-	0	-	-	-	-	-	-
Akure	70	5.5	6.5	-	-	-	?	07/04/06 1200	-	-	-	-
Oba Hills	68	31.5	38	-	-	-	Bark/ Food-Grunts?	30/05/06 1041 hrs	-	-	-	-
Ise	62	26.3	60	-	-	-	-	-	-	-	-	Duiker
Ologbo	60	29	12	-	-	-	-	-	-	-	-	-
Oni	56	2	2	-	-	-	-	-	-	-	-	-

Table 4: Evidence for the presence of chimpanzees at different sites: Nests

Table gives information on nests sighted along with information provided by hunters, and the general state of the forest reserve. Because of the difficulty in defining how large a population of chimpanzees need to be, to be considered viable, and during this survey it was impossible to estimate numbers at each site, the final column, based on all sources of information, summarises whether or not I believe a cohesive group of chimpanzees still survives. Here, a cohesive group is defined as being made up of individuals who interact on a fairly regular basis and one that is potentially large enough to be of conservation value.

Forest	Dates nests observed	No. nests	Sex of Builder	Age of Nests	Habitat	Hunters comments on chimpanzee	General status of habitat	Cohesive group present?
Omo	08/06/06; 16/06/06	2	-Male -Female & possible 1 nest built by infant (no thorough search of area for more)	1 dy-1wk 1dy - few days	Secondary forest	Present. 2 killed by illegal farmers recently	Known in 2 places, in the east of the reserve. 1 severely threatened by farms- habitat will be gone this year. Other area threatened by logging. Omo has a high human population, high levels of human activity and remaining habitat is extremely fragmented.	Yes
Oluwa	19/04/06- 05/05/06	5	-Male -Female -Female -2 unknown	>2 mths 1 mth 1 new? >2 mth	Secondary /riverine forest along either bank of Ore R.	Present	Strip of natural habitat in centre of reserve of unknown size, particularly on west river bank. Presently being logged esp. on eastern bank.	Yes
Idanre	04/07/06- 05/07/06	3	-Male 2 unknown	2 wks 1 mth 2 wks-1 mth	2 nests in thick secondary forest, 1 over stream close to cleared area	Present. Vocalisations heard fairly regularly. Between February & July, female and juvenile killed.	A block of thick secondary forest remains in centre of reserve. Rest has been converted & cleared. Presently being logged.	Yes
Akure-Ofosu	Insufficiently surveyed	-	-	-	-	Present. Female killed in February. Baby given to Ibadan zoo where it died	Little information on vegetation cover. A lot already cleared and converted. Still some thick secondary forest-probably in centre of reserve but presently being logged.	Yes
Ifon	-	-	-	-	-	Present	Extensive savannah woodland habitat. Presently being illegally logged. A lot of hunters inside the game reserve.	Yes
Owo	Insufficiently surveyed	-	-	-	-	Hunters from Ala kill one every two years on western boundary.	Extensive plantation on eastern side. Presently being logged indicating some secondary forest remains. Very thin riverine strip on western border with Ala FR.	No
Okomu	02/03/06 18/07/06	4	-1 male & 1 female nest together - 1 ground/ day nest	-1 week + -Appeared new	-Thick secondary forest, compt. 90 -Compt. 53	Present Observed by rangers in compt. 44, 53, 54, 55: 23/03/06, 01/04/06	National Park. Forest hasn't been logged since the 1950s. Some hunting apparent in evening & at night.	Yes

			-1 nest?	-2 weeks +	-Compt. 54 behind ranger's' camp (inconclusive)	05/04/06, 14/07/06 23/07/06 Observed feeding in oil palm plantation, by villagers, July 2006.		
Ala	-	-	-	-	-	Few present around Ogbesse river on Ala/Owo border. 1 killed last December & eaten	Extensively cleared. Little secondary forest remains. Known to be present along very thin riverine strip on the Owo/Ala boundary but rarely encountered.	No
Ohosu	Insufficiently surveyed	-	-	-	-	Present 10 years ago. Thought to have migrated to Akure-Ofosu FR	Thick secondary forest remains. Buffalo and elephant present	?
Shasha	Insufficiently surveyed	-	-	-	-	Present on south border with Omo FR	Illegal logging has destroyed much of the forest within the last 15 years. No forest remains on southern boundary with Omo where encountered by hunters.	No
Ogbesse	No search deemed necessary	-	-	-	-	Not sighted since 1996	Extensively logged and now cleared. No suitable habitat remains	No
Akure	-	-	-	-	-	One individual seen twice between January & April	Queen Elizabeth plot and surrounding regeneration area only about 3-4 km ² . Heavily hunted. Rest of reserve is plantation and farms.	No
Oba Hills	-	-	-	-	-	Present 8-10 years ago. Last heard 3 years ago. Some sightings from enclave. Thought to have migrated	Valley bottom and lower slopes of hills are cleared & farmed. One area converted to teak plantation. Hilltops logged and burnt during summer. Only 2-3 logged but forested gullies	No
Ise	12/05/06	10	2 groups x 5 nests. 1 group: 3 adult, 1 female, 1 juvenile. Both groups close to each other	1 group 1 month old. Other 2 weeks old	Thick regenerated secondary forest. Most nests in 2 nd group in Abaluma tree (feed on the fruits, Jan-Feb)	Present & seen regularly (2 weeks previously). Hunter heard them during May.	Still extensively covered in secondary forest that has been allowed to regenerate. Logging activity controlled here.	Yes
Ologbo	02/04/06	1	1 male	1 week	Secondary forest close to swamp	Present	Illegal logging continues but area still extensively covered by secondary forest. An absence of high canopy and large trees.	?
Oni	No search deemed necessary	-	-	-	-	No sightings since 1993	Most land has been cleared and converted to farms illegally.	No

6.4: Chimpanzees and other Primates

Agbelusi (1994) reported that the only site where white-throated monkeys *Cercopithecus erythrogaster* were known to occur in Ondo State was Okelusi Forest Reserve, although they had previously been reported to be present by hunters at Ifon Game/Forest Reserve (Anadu & Oates 1982). I observed these monkeys in Idanre Forest Reserve and reports from hunters suggested that they had a much wider distribution. Mona monkeys, putty-nosed monkeys (*Cercopithecus nictitans*) and red-capped mangabeys, were also heard and observed throughout the south-west. Tables 5 and 6 summarise the data collected on the encounter rate of monkeys at different sites visited.

There is an insignificant tendency for larger sites (>200km²) to have a higher overall monkey encounter rate (Mann-Whitney $U = 3$, $Z = -1.715$, $n_{>200} = 5$, $n_{<200} = 4$, $p = 0.054$, 1-tailed). Probably because much of the natural habitat at these larger sites has been converted and cleared and the sizes of remaining forested areas, difficult to estimate, a significant relationship between encounter rate and site size could not be deduced. Overall monkey encounter rates were significantly higher at more “intact” sites than at more “fragmented” sites (Mann-Whitney $U = 0$, $Z = -2.324$, $n_{\text{intact}} = 6$, $n_{\text{fragmented}} = 3$, $p < 0.02$, 1-tailed). The extent to which a site was considered fragmented or intact was based on my own qualitative impressions of each site, rather than on quantitative criteria. These data suggest that monkeys may survive better at larger sites that haven't experienced large scale fragmentation.

Monkey encounter rate was markedly greater at the one protected site, Okomu National Park, and also at the one site where chimpanzees were observed, Oluwa Forest Reserve. As previously stated, monkey encounter rates at Okomu National Park appear to have increased, at least in certain areas, since 1982, when Anadu & Oates conducted their survey, prior to the forest's original establishment as a wildlife sanctuary.

Where overall monkey encounter rate was greater than 0.5 encounters per hour (Table 6), chimpanzees were also confirmed to be present at that site. At sites where overall monkey encounter rates were lower than 0.5 encounters per hour, chimpanzees appeared absent and probably extinct. Sites where chimpanzees were confirmed to be present had a significantly higher overall monkey encounter rate than at sites where it was concluded they were absent, or occurred at too low a density to ever recover (Mann-Whitney $U = 0$, $Z = 2.049$, $n_{\text{present}} = 7$, $n_{\text{absent}} = 2$, $p < 0.03$, 1-tailed). These data suggest that while chimpanzee encounter rates are rare and signs of chimpanzees scarce, the encounter rate of monkeys (or rates of sightings) might be a good indicator of whether or not chimpanzees are present, indicating the quality of the habitat, the level of hunting pressure or a combination of both. Certainly, some hunters and a ranger at Okomu National Park all commented that chimpanzees follow monkeys and are often observed together. I was initially dubious of this observation; particularly because chimpanzees at Gombe National Park in Tanzania are rarely observed in the company of monkeys and do not often tolerate feeding at the same food source as olive baboons. However, while I was at Okomu National Park, I followed a mona monkey troop and found clear signs (fresh faecal sample and discarded food wadges) of a chimpanzee. This suggests that the ecological requirements of both monkeys and chimpanzees may be very similar in lowland moist forest and swamp forest. Alternatively, it could be an anti-predator device in response to high hunting pressure caused by humans.

Table 5: Encounter rate of monkeys.

Table shows: name of site, the date of each survey, number of hours trekking, number of encounters, encounter rate per hour, whether hunting and logging activities were apparent and the general condition of the habitat surveyed. To control for the fact that encounters rate changes with the time of day, just treks that coincided with the best time for primate viewing are included.

Forest	Date	Hours Searching (between 0600-0900 & 1500-1900 hours)	No. Encounters (single individuals or troops observed or vocalisations heard).	Encounter Rate /hr.	Gunshots Heard?	Chainsaw Heard?	Habitat quality
Omo	07/06/06	3.00	3	1.00	Yes	yes	Elephant research camp. Good secondary forest. Large trees present
Omo	08/06/06	2.50	3	1.20	No	yes	Elephant research camp. Good secondary forest. Large trees present
Omo	16/06/06	5.50	2	0.36	Yes	no	Some secondary forest remaining on slopes. Being cleared for farming (area surveyed by Persson & Warner 2003)
Omo	19/06/06	4.00	0	0.00	No	no	Secondary forest on edge of cleared land for farming.
Omo	20/06/06	3.00	1	0.33	No	no	Secondary forest on edge of cleared land for farming.
Oluwa	20/04/06	3.00	5	1.67	Yes	no	Secondary riverine forest
Oluwa	04/05/06	3.00	5	1.67	Yes	yes	Secondary riverine forest
Oluwa	05/05/06	2.00	4	2.00	Yes	yes	Good secondary riverine forest
Idanre	22/02/06	2.00	2	1.00	No	no	Secondary forest
Idanre	04/07/06	3.50	2	0.57	No	no	Secondary forest
Idanre	05/07/06	4.00	2	0.50	No	no	Selectively logged secondary forest
Okomu	17/07/06	2.25	1	0.44	Yes	?	V. good secondary forest
Okomu	18/07/06	1.50	8	5.30	No	no	V. good secondary forest
Ifon	12/03/06	2.50	2	0.80	Yes	no	Savannah woodland
Ifon	15/03/06	3.00	3	1.00	no	no	Savannah woodland
Ala	17/03/06	3.00	0	0.00	No	yes	Secondary forest & riverine forest
Oba Hills	29/05/06	2.50	2	0.80	No	no	Wooded slopes, most land

							cleared for farming
Oba Hills	30/05/06	2.00	1	0.50	No	no	Wooded slopes, most land cleared for farming
Oba Hills	01/06/06	4.00	1	0.25	No	no	Wooded slopes, most land cleared for farming
Oba Hills	02/06/06	2.67	0	0.00	No	no	Wooded slopes, most land cleared for farming
Ise	11/05/06	3.00	2	0.67	No	yes	Secondary forest
Ise	12/05/06	2.50	2	0.80	No	no	Secondary forest
Ise	21/05/06	3.00	2	0.67	Yes	yes	Secondary forest
Ise	22/05/06	3.00	3	1.00	No	no	Secondary forest
Ologbo concession	02/04/06	3.00	2	0.67	No	yes	Secondary forest, no large trees

Table 6: Overall rates of monkey encounters in different forests.

The chimpanzee populations of forest reserves with low overall rates of monkey encounters (below 0.5/hr) are thought now to be extinct/almost extinct, whereas those with values above 0.5/hr are enduring. Of all forest reserves, Oluwa had the highest monkey encounter rate, after Okomu National Park, corresponding to the only area where chimpanzees were seen and where a high relative density of nests (of various ages) were observed. All areas that were visited and where the habitat was thought suitable for chimpanzees had a monkey encounter rate higher than 0.5/hr.

Forest	Area/km²	General Condition of remaining habitat (for chimpanzees)	Overall Monkey Encounter Rate (encounters/hr)
Omo	1305	Good	0.58
Oluwa	828	Good	1.78
Idanre	541	Good	0.69
Okomu	212	Very good	2.87
Ifon	282	Good	0.90
Ala	199	Bad	0.00
Oba Hills	68	Bad	0.39
Ise	62	Good	0.76
Ologbo	60	Good	0.67

7. Recommendations

7.1: General Recommendations

None of the following recommendations are novel. They are similar to those made by Agbelusi in 1994 and Anadu & Oates in 1982 and follow that proposed by the IUCN's Conservation Action Plan for West African Chimpanzees (2003) that states:

“Survival prospects would be improved by increasing the effectiveness of protected areas in the chimpanzees’ range, creating new protected areas and better implementation of state and federal wildlife laws, especially those relating to hunting.”

7.1.1: Formal Protection

Conservation needs to be regarded as an integral part of development. Wildlife protected areas provide economically valuable ecological services that are largely overlooked and underappreciated. Humans and their environment are part and parcel of one intricate ecosystem and where this is protected, we benefit also. Most reserves that are still worthy of conservation action in southwestern Nigeria already have a system of different land use designations - such as plantations and farms - but few include a protected area. Presently, any remaining rain forest only covers a small percentage of the reserves with the rest of the land assigned to government - controlled monoculture plantations of exotic species and to farming. Rain forest provides services to these other land uses by promoting rainfall and by safe-guarding watersheds. Forests are also an important store of carbon emissions, significant now in light of the fact that the Climate Control Convention is looking to allow industrial countries to achieve some of their reductions in emissions by paying developing countries to conserve their forest.

The rainforests of southwestern Nigeria are unique. Managed properly they would provide valuable and renewable resources of educational, scientific, recreational and historical value also. So little of the natural forest remains and so much has been modified by intense human activity that unless the remainder is urgently afforded some kind of formal protection it will soon be of little conservation value. Because the remaining natural forest areas in these reserves are small and chimpanzees are large-bodied and range widely to meet their energy requirements, it may be necessary to include exploited habitat within the protected area, habitat that if left to regenerate would provide good chimpanzee habitat.

7.1.2: Law Enforcement & Better Implementation of Wildlife Laws

Wildlife conservation is inextricably linked with the preservation of the forest itself (Agbelusi 1994). Protecting wildlands through strict law enforcement is the only proven method to conserve natural resources and wildlands. Okomu National Park is evidence of this. Like all national parks it has its management issues, but even the modest protection that it offers has stopped land clearing, has resulted in decreased levels of hunting and as a result has seen an apparent increase in many of its primates. In fact Okomu offers the very best in monkey observation in the whole of southwestern Nigeria and is probably the only place there where the endangered white-throated monkey is increasing in numbers.

Over the last 25 years, conservation efforts focusing on law enforcement have been disfavoured and replaced by “community conservation/sustainable development” projects, largely because these projects avoid unpopular and uncomfortable issues such as the removal of people from land that they have claimed as a direct result of weak governance and also because funds are more readily available for such projects than for more traditional conservation efforts. Recognizing that protected areas need the support of the local human population, community conservation projects (also known as integrated conservation and development projects/ICDPs) have attempted to gain this support by focusing on the rural poor who live in the immediate vicinity of a protected area, through the provision of incentives, compensation and alternative livelihoods. Unfortunately, while such projects may, to some extent, be successful in changing the lives of the rural poor, they fail, for a variety of reasons, to have a positive effect on wildlife conservation. The Banyang-Mbo Wildlife Sanctuary, in southwestern Cameroon is a good example of where a community-based conservation approach failed to halt or decrease significant levels of hunting but where subsequent support of anti-poaching patrols had immediate effect.

I observed that while wildlife laws are in place prohibiting the killing of endangered animals and for managing hunting in a sustainable way, these are not enforced. On a national and state level in Nigeria, fines for breaking wildlife laws have to be substantially increased along with the level of wildlife training given to forest guards. As Agbelusi (1994) has recommended, forest guards should be sent on short training courses and temporarily re-deployed as game guards, not only to permit effective management and anti-poaching patrols, pending recruitment of fully trained guards, but also to increase the general level of awareness and training of forest guards in wildlife protection. Effective law enforcement is achievable, especially if NGOs or scientific research projects assist with logistical support and supervision. With just two to three game guards and a relatively small budget the Kibale Research Project (Uganda) was able to effectively protect a large proportion of Kibale Forest (80-90 km²) at a time when the civil war of Iddi Amin was decimating wildlife populations right across the country (Struhsaker 2002).

7.1.3: Tourism

In order for law enforcement activities and good management practises to endure, protected areas and the protection of wildlife have to gain the support of the general public. Protected sites need protecting in perpetuity. There is little point in protecting a site in the short-term if it inevitably falls into neglect, as has been the case for some of the sites visited during this survey.

The only method of generating public awareness and support that has met with success is tourism, or more specifically, nature-based tourism. In some developing countries tourism is the primary source of economic growth and job creation. Tourism remains conspicuously under-developed in Nigeria, while other countries on the continent (e.g., Kenya and Tanzania) have met with great success in developing this industry. The goal of the government of Nigeria should be to invest more into both protected areas and the tourist industry. The scope for domestic tourism in Nigeria is particularly great and attracting domestic tourists would not only generate long-term revenue, it would serve to increase public awareness of the importance of biodiversity conservation and wildlife

protected areas, thereby legitimising their very existence and gaining valued support. Ways of funding such endeavours (through NGO and international donor support, Debt for Nature Swaps and so on) should be built into the plans to protect an area from the start. What a protected area needs from the very beginning is a strong commitment to good management, a very clear and long-term management plan, especially where the remaining forest area is small and the corresponding pressures on the forest large. If governments wait until timber extraction has completely finished all remaining natural resources inside forest reserves, as a way to lift their economies, forest reserves will be of no conservation value and therefore hold no value to the nation.

7.2: Recommendations for Ondo State

Since Anadu & Oates' 1982 survey very little recommended action (other than the establishment of Okomu National Park) has been taken and overall the trend towards over-exploitation of natural resources has worsened. The following recommendations that focus on sites that are considered to be of conservation value involve relatively short-term measures, based on the establishment of protected areas. This involves passing the necessary legislation and transforming these areas into effective wildlife protected areas by prohibiting hunting and logging activities none of which requires large sums of money. However for these short-term goals to be sustained, long-term goals related to increasing public support of wildlife protected areas are necessary.

7.2.1: Idanre and Oluwa Forest Reserves

Despite the very encouraging step that the Ondo State government has taken to collaborate with NCF to protect Ifon Game Reserve/Forest Reserve in the transitional zone between tropical forest and savannah, there is still a need for a protected site in the moist forest zone. I suggest that remaining habitat in both Idanre and Oluwa Forest Reserves deserves protection, either in the form of a Wildlife Sanctuary or a Game Reserve.

If the government cannot commit to both these sites, then from a conservation viewpoint (as opposed to an economic one) further research may be necessary to determine which site holds the most value for chimpanzee conservation. Clearly, from the point of chimpanzee conservation, the most important thing to determine is which site has the potential to support the largest population of these apes in the long-term. This is difficult to determine directly but the largest area of remaining forest will potentially hold the greatest number of animals. My impression was that Idanre Forest Reserve had a larger area of remaining natural forest than Oluwa Forest Reserve, although this may not be correct. Information from satellite images could be used to confirm this. However, hunting pressure at Idanre appeared greater than that at Oluwa.

The remaining forest in Oluwa Forest Reserve appeared to support relatively high biodiversity, especially along the Owena River (Tables 3-6). Encounter rates of monkeys were higher here than in any other forest reserve that I visited, including Idanre. Another advantage of Oluwa is the low number of illegal settlements inside the forest. Hunters appeared to access the forest on logging trucks predominantly from the one hunting camp along the only access road, situated on the edge of the forest. Prohibiting logging activity would, I believe, be an effective way of preventing hunters from gaining access to areas inside the forest without having to necessarily remove them off the land

(although this should be considered with regard to how much forest is presently being cleared for farms). Protection of Idanre Forest Reserve might be more difficult to implement, since there are many more illegal and permanent settlements scattered within the forest supporting a higher number of humans. Removal of these settlers would be very necessary but potentially problematical.

Although I recommend that, as a preliminary measure, protection should be increased in at least part of each of these forests without delay, further survey work will be required to determine which areas are used by chimpanzees; these areas should then be incorporated into the protected area. The protected area should ideally encompass all of the remaining forest (including disturbed areas that can be allowed to regenerate) and should be surrounded by a buffer zone.

7.2.2: Ifon Game Reserve/Forest Reserve

While NCF in conjunction with the Ondo State government have plans to protect Ifon Game/Forest Reserve through a proposed ICDP, I recommend that this is done in conjunction with strict law enforcement activities. Both hunting and logging must be prohibited inside the reserve if wildlife populations are going to recover and there is much evidence to show that ICDPs fail to do this by themselves. In particular, the people living around Ifon are different from those that hunt inside, a large proportion of whom appear to come from northern Nigeria. If the ICDP targets those living around the boundaries, without addressing those living inside the reserve, hunting and settlement will continue.

7.3: Recommendations for Ekiti State

7.3.1: Ishan Aiyede Forest Reserve and Forest-Free Area

The Ekiti State government is very keen to formally protect Ishan Aiyede Forest Reserve and the surrounding forest-free area, and should do so eventually. Ishan Aiyede may represent one of the last intact ecosystems in the whole of southwestern Nigeria and presently appears under little threat. I suggest that funding should be sought for a survey to confirm whether or not chimpanzees are present and also to carry out a wildlife inventory of the area. This could be seen as a preliminary step towards gazetting the forest as a Game Reserve. Any threats to this area could be assessed along with an assessment/census of the human population dependent on the area. Areas thus identified as of high biodiversity value and of high relative human density, could then be taken into account of in establishing the Game Reserve's boundaries.

7.3.2: Ise Forest Reserve

Ise Forest Reserve is the only forest reserve in Ekiti State where chimpanzees are known to be present. The remaining chimpanzee population, along with other wildlife, is seriously threatened by hunting activity and habitat alteration through intense logging activity. If this site is to be of conservation value in the future, it is urgent that Ise be protected as a Game Reserve or as a Wildlife Sanctuary and that funds be sought for its active protection. Anti-poaching patrols must be implemented to deter hunters, most of whom are not local. If the number of hunters from the enclave is low, then restricted hunting and the provision of licenses to these individuals could be permitted; hunting of endangered species and hunting at night must be prohibited and the establishment of closed seasons for some species adhered to.

7.4: Recommendations for Edo State

7.4.1: Ologbo Forest Reserve

I plan to conduct a further survey of primate populations later in 2006 to determine the conservation value of Ologbo Forest Reserve. The survey will primarily concentrate on primates but with a special emphasis on chimpanzees. The plantation managers would subsequently monitor primates. Confirmation of a sizable population of chimpanzees, along with confirmation of other endangered primates such as the white-throated monkey, could support moves to protect this area. The concession also has a relatively large area of swamp and swamp forest. If protected, Ologbo might represent the only sizeable area of swamp and swamp forest under effective protection in southwestern Nigeria.

7.4.2: Okomu National Park

A research centre is badly needed at Okomu in order to monitor populations both of chimpanzees and other wildlife species. A research centre could provide vital resources and facilitate management by providing personnel that could monitor human activities (and wildlife) inside the Park.

With new tourist accommodation set to attract more tourists, Okomu National Park also badly needs an education centre offering high quality information for visitors. Such information, including the history of the park, the endangered species present, and the function of tropical forests in terms of the ecological services they provide, can also be supplemented and enhanced by details of on-going research projects. Scientific research can therefore play a very important role. As well as providing information that will be of education value to visitors, researchers can provide information on where charismatic species can be observed, can advise on the zoning of protected areas (e.g., where tourist trails are best cut to maximise the chances of viewing animals, while minimising disturbance in ecologically sensitive areas) and by implementing wildlife monitoring schemes. All of these things serve to enrich the tourist experience. Visitors are usually interested in current research activities at a site, and seminars given by researchers can boost the quality of the tourist experience. Researchers are often the most articulate and enthusiastic supporters of national parks and can talk most passionately about the threats to and the importance of wildlife protected areas. Establishing an education centre, would not necessarily require a lot of money. The new accommodation has a large bar area that could accommodate educational displays and posters and the old accommodation building could be renovated to house an education centre and/or a small seminar hall.

I have noted that law enforcement activities at Okomu are not as strong as they could be, due to an array of management issues that stretch resources to the limit. I was told, for example, that the rangers only have two unreliable guns between them. If Okomu National Park can attract more visitors in the near future then some of these issues may be resolved, since the popularity of a protected area is often enough to strengthen the morale and organisational ability of the law enforcement team. In addition however, the Park should consider revising their park entrance fees, to maximise the revenue from tourism but to also raise money for law enforcement activities. For example, presently park entrance fees are very low. Expatriates, for example, would be prepared to pay a

higher entrance fee, especially if the quality of the overall tourist experience is improved. In the case of Okomu National Park, a certain percentage of park entrance fees could be earmarked for conservation activities, especially law enforcement ones, in the park. Previous studies have shown that tourists do not mind an increase (sometimes substantial) if they know that their money is directly going to conservation.

The fact that chimpanzees are feeding on palm nuts in the oil palm plantation neighbouring the park, may have serious implications and may bring the park in direct conflict with the oil palm company and the chimpanzees in direct conflict with humans. While it is doubtful that chimpanzees can do a great deal of damage to oil palms by consuming palm nuts, some formal kind understanding between the oil palm company and the national park (such as the establishment of appropriate protocol) might be necessary if observations of crop raiding are frequent. Palm nuts are a favoured food source for chimpanzees, and therefore it is of no surprise that they are venturing into the plantation to feed. Unhabituated chimpanzees pose no real threat to humans and will usually run off if they detect them. However, several hunters during this survey reported incidents of chimpanzees attacking hunters when the hunter shot one of them, suggesting that they will defend themselves and each other, if seriously threatened. Also to be considered is the fact that the only crop raiding incident so far reported, was by villagers as they were walking to or from their village. Chimpanzees have been known to kill human babies and attack very small children who have been left alone/separated from an adult (e.g., on the boundary of Kibale National Park, Uganda). If crop raiding becomes frequent, it may therefore be important to educate local villagers on changes to their behaviour that limits the chances of this happening. This should only be done if the risk is high enough; focusing on the less than benign aspects of chimpanzee behaviour will only succeed in reducing support by local communities for the park.

Finally, I make one recommendation regarding an observation I made on my last visit to the national park. I noticed a great deal of discarded rubbish around ranger's' camp, including chemical sprays. Since this is an area where chimpanzees range, I highly recommend the construction of secure pits for the disposal of rubbish. At the visitor's accommodation I was told that waste was thrown behind the accommodation and staff "tried" to cover it up, suggesting that this was not always done. If large numbers of tourists do visit Okomu, then waste will become an issue. It is highly important that tourists/visitors do not negatively impact on the wildlife populations that they come to see. Unhygienic methods of waste disposal attracts primates and other animals, can cause "problem animals", and increases the parasite load (and therefore decreases the health) of animals. At Gombe National Park, Tanzania, the close proximity with which chimpanzees get to humans has caused reoccurring health problems, particularly fatal diseases, and is one of the main causes of decreasing population size.

7.5: Recommendations for Ogun State

7.5.1: Omo Forest Reserve

While Okomu National Park is an example of how relatively modest amounts of protection can effectively conserve wildlife, Omo Forest Reserve is an example of where, if protection measures are not sustained, a site of high biodiversity value can fall into

neglect. While protecting the remaining population of chimpanzees is urgent now, the ability of various stakeholders to sustain active law enforcement activities appears to be low, in light of the fact that other protected areas inside the reserve have been disregarded, despite ongoing pressure from NGOs. In particular more research is needed to deduce how large the chimpanzee sub-population is that occurs close to Abegu Camp (further east but not within the Biosphere Extension Area) and how large the human population is, in this area of the reserve. This area is the best potential site for conservation action inside the reserve. I recommend that this area be protected as a wildlife sanctuary and managed by an NGO.

7.6: Other Sites

Finally, of four reserves that I was unable to survey adequately, Akure-Ofosu and Shasha deserve further surveying. These were the only reserves out of the four where chimpanzees were reported to be present or evidence of their presence had been collected. Idanre and Akure-Ofosu Forest Reserves in Ondo State and Ohosu Forest Reserve in Edo State are also important reserves for forest elephants. Protecting all three reserves would be of conservation value for this species but it is doubtful, considering the forests' economic value in terms of timber production, that all three could be set aside for wildlife protection.

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