

## WILDLIFE IN NORTHERN DARFUR, SUDAN: A REVIEW OF ITS DISTRIBUTION AND STATUS IN THE RECENT PAST AND AT PRESENT

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### ABSTRACT

*The literature in both published and unpublished government sources on wildlife in Northern Darfur is reviewed mainly relating to the first half of the 20th century.*

*The area concerned covers some 250,000 km<sup>2</sup> ranging in habitat type from desert to broadleaved deciduous woodland and there are records relating to at least 31 different species of larger mammals. Of these only six were seen in aerial surveys carried out in late 1976 although a small number of others still survive.*

*Four species of principal international concern are the scimitar-horned oryx, the addax, the barbary sheep and the addra or dama gazelle: of these only very small numbers of addax and dama gazelle certainly still occur. A table provides information on the oryx and addax from primary sources, both published and unpublished.*

*The reduction in the number of species, the presumed reduction in total numbers of animals and restrictions in range are attributed as much to the indirect effects of increasing human and domestic livestock populations as to hunting pressure, except in the case of carnivores which were systematically exterminated in the 1940s and early 1950s.*

### RÉSUMÉ

*L'article reprend la littérature de sources publiées et gouvernementales non publiées, sur le gibier du Nord Darfour, et principalement pour la première moitié du vingtième siècle.*

*Le territoire concerné couvre 250,000 km<sup>2</sup> et s'étend du désert à la savane boisée, et il y a des renseignements concernant au moins 31 espèces différentes de mammifères. De ces dernières six seulement ont été vues lors de reconnaissances aériennes effectuées à la fin de 1976, alors qu'un petit nombre d'autres espèces sont toujours existantes.*

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*Parmi les espèces de premier intérêt international nous trouvons: l'oryx algazelle, l'addax, le mouflon à manchettes et la gazelle dama; de ceux-ci, un certainement très petit nombre de gazelle dama et d'addax existe encore. Un tableau procure des informations de première sources sur l'oryx et l'addax, des publiées et des non publiées.*

*La réduction du nombre d'espèces, la réduction présumée du nombre d'animaux et la réduction de la biosphère sont plus attribuées aux effets indirects de l'augmentation des populations humaines et du bétail domestique, qu'à la chasse, sauf en ce qui concerne les carnivores qui furent systématiquement exterminés vers les années 40 et debout 50.*

#### INTRODUCTION

Northern Darfur lies in the far west of the Republic of the Sudan and covers an area in excess of 250,000 km<sup>2</sup>. The area and its relation to northeast Africa as a whole are shown in Fig. 1. Almost half of the area is desert receiving less than 100 mm of rainfall per year and about 90% of the province receives less than 400 mm.

A description of the principal vegetation types can be found in Harrison & Jackson (1958). True desert occurs north of the 100 mm isohyet where there is little permanent vegetation except in some favourable water receiving sites: an ephemeral winter vegetation known in the Sudan as 'gizu' occurs in this area in some years as far north as 17°N and provides valuable grazing for domestic camels (see Wilson, 1978, for an account of this phenomenon). The semi-desert area to the south is a mosaic of grassland, mainly *Aristida* spp. and *Cenchrus* spp., and *Acacia mellifera*-*Commiphora africana* desert scrub on sandy soils. The remainder of the province is low rainfall woodland savannah. The central part is mainly *Acacia mellifera* associated with *Commiphora africana* and *Boscia senegalensis* on clay soils; to the south of El Geneina and in the extreme southeast the sandy soils support an association of *Combretum cordofanum*-*Dalbergia melanoxyton*-*Albizia amara* subsp. *sericocephala*; the central southern area is principally gum arabic, *Acacia senegal*. The recent series of dry years coupled with increasing human and livestock populations have affected not only the distribution of these vegetation types but also their composition. The true desert is estimated to have advanced southwards approximately 100 km between 1955 and 1975 (Lamprey, 1975). Large areas of *Acacia senegal*, through overexploitation and lack of rainfall, are being replaced by the xerophytic *Leptadenia pyrotechnica*.

The settled human population is concentrated in the south of the province and cultivates mainly millet and some groundnuts, often in areas which have become increasingly marginal for rainfed cropping. There are estimated to be almost one million cattle, 1.5 million sheep, 1.2 million goats, 226 thousand camels, 151

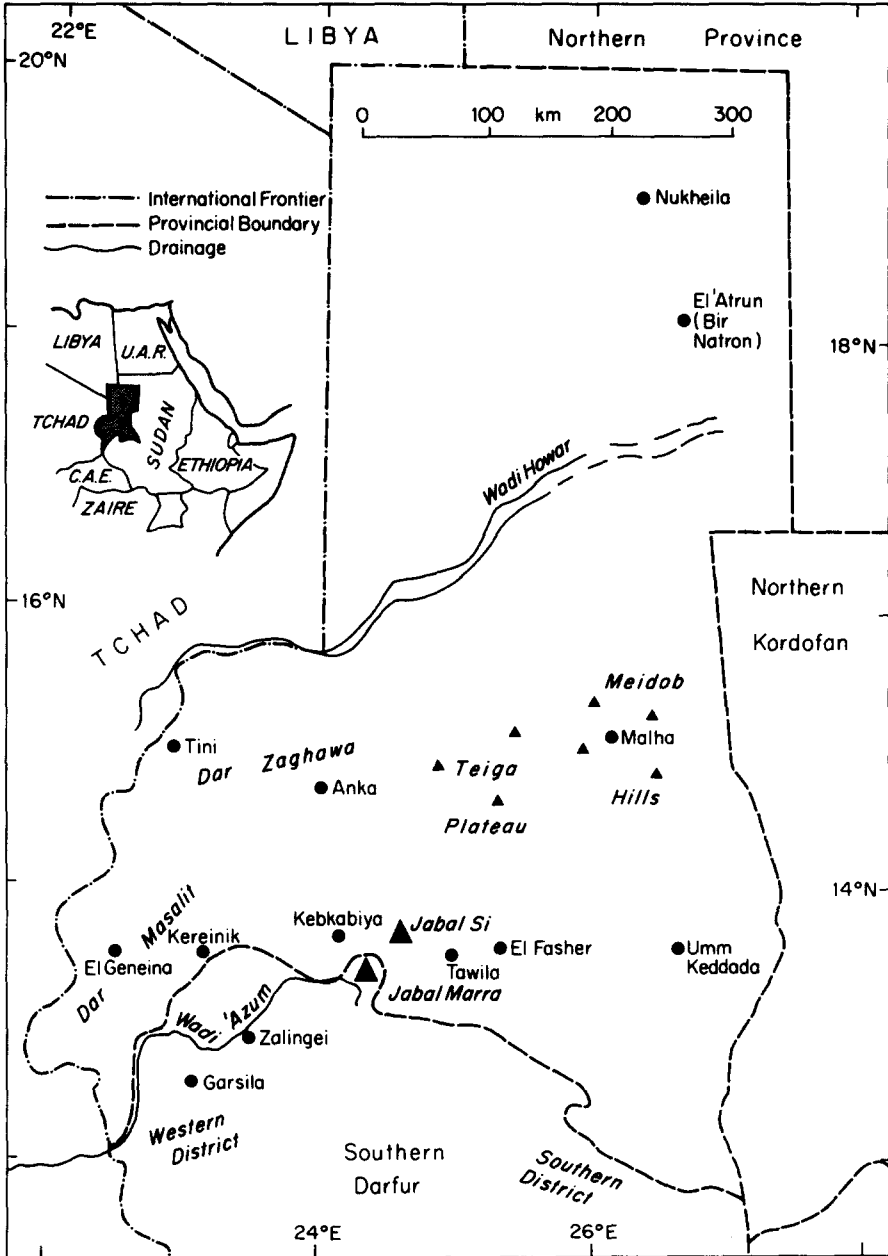


Fig. 1. Northern Darfur showing principal places referred to in the text.

thousand donkeys and 40 thousand horses in the province (Watson *et al.*, 1977). Except for camels most of these are concentrated in the southern third of the area for most of the year but migrate northwards during the rainy period of July and August. In years in which there is a gizu large numbers of camels from Kordofan enter the southern fringes of the desert.

#### LITERATURE AND SOURCES OF INFORMATION

Most of the available data on the wildlife of Northern Darfur comes to us in the form of isolated references in published work dealing with other topics. Early travellers often give some information on distribution, and occasionally on abundance (Browne, 1799; Brocklehurst, 1931; Nachtigal, English edition, 1971). The reminiscences and memoirs of serving officers of the Egyptian army and of the Sudan Political Service provide some information but in general are disappointing as far as Darfur is concerned (French-Comyn, 1911; Chapman, 1921; Dugmore, 1924), although it must be remembered that much of Northern Darfur was not reincorporated into the Sudan until 1916.

A considerable amount of data is obtainable for the distribution and abundance of wildlife in the third and fourth decades of this century, mainly as a by-product of exploration being undertaken by camel and motor car on the southern fringes of the Libyan desert. Most accounts of this exploration are published either in the *Geographical Journal* of the RGS or in *Sudan Notes and Records*.

Three works deal specifically with the game of the Sudan. The first is a comprehensive cover of the distribution of all the major species by a former Chief Game Warden (Brocklehurst, 1931) but it does appear to have some gaps in relation to Darfur. A catalogue of wild ungulates was later compiled by a member of the veterinary services (Mackenzie, 1954) but is rather disappointing in its textual material: in general it is content merely to list the species and provide maps of distribution, but the latter are at too small a scale to be of more than general use. The third details the results of a study of museum material (Setzer, 1956) and provides useful information on systematics, although there are some omissions for the country as a whole, and particularly for the Jebel Marra area just to the south of our area, perhaps because museums have a paucity of specimens from the Sudan: these omissions are dealt with by Happold (1967).

Invaluable and rich sources are to be found in the archival material in the Sudan Library of the University of Khartoum. In particular these are the Sudan Intelligence Reports of the Governor-General from 1892 to 1924, and their successor, the Sudan Monthly Record, suffixed New Series; and the regular reports of the Governor of Darfur known as the Darfur Monthly Diary. Subsequently these sources will be referred to as SIR, SMR(NS) and DMD respectively, followed by a number and/or date.

Finally, up-to-date information has been obtained from personal correspondence and intercourse with Darfur residents and visitors, from the results of aerial surveys (Lamprey, 1975; Watson *et al.*, 1977) and from personal observations of the author.

#### HISTORICAL RECORDS

##### *Carnivora*

The larger carnivores of the families Canidae, Hyaenidae and Felidae have undoubtedly declined drastically in numbers and geographical distribution, and particularly so in the last 30 to 40 years. Much of this reduction can be attributed to systematic campaigns by the authorities, either by poisoning or shooting large numbers of animals. For example, 152 hyaenas and 123 jackals were killed in Masalit district in the south-west of northern Darfur in 1934 (SMR(NS) 105, November/December 1934) and data collected from the Darfur Monthly Diary for 1947–1952 indicate that 76 lion, 20 leopard, 688 hyaena and 656 jackals and foxes were legally exterminated (and reported) during the six-year period.

The first records of lion, leopard, hyaena and jackal go back almost 200 years (Browne, 1799) and whilst it was said that lion and leopard were common in some districts, only the hyaena and jackal were regularly seen. Nachtigal (1971), who passed through the area in the 1870s, also remarked on the abundance of the hyaena, but noted a general lack of other wildlife.

The lion *Panthera leo* has received most attention in the literature. Considerable numbers were in attendance on the large herds of addax, oryx and addra gazelle on the Wadi el Melik (in northwest Kordofan) at the turn of the century (SIR 94, May 1902). Ten years previous to this they were said to be common at Jebel 'Atshan (Arabic: Mount Thirsty), also in northwest Kordofan, and were reported to obtain their liquid requirements from the stomach contents of their prey (Brocklehurst, 1931). They have been recorded well into the desert north of 16°N latitude (Brocklehurst, 1931), were present at Wad el Haraz in 1922 (Maydon, 1923) and were recorded on the Wadi Howar, where one was shot, in 1934 (Shaw, 1936). Just prior to the outbreak of the Second World War they were said to be 'not uncommon and extend to the fringes of the desert, with at least one every 40 km between the Wadi Howar and Kebkabiya' (Thesiger, 1939). Lion continued to be fairly numerous throughout the 1940s, being reported from several areas of the province. In early 1944 two were shot near El Fasher, although they had not been seen in the area for several years (DMD, February 1944) and later in the year they were reported as numerous at Dibo, north-east of El Fasher (SMR(NS) 180, August/November 1944). One was killed by spears in the Wadi Kej, 50 km SSW of El Fasher (DMD, November, 1950) and numbers were in attendance on the 'great concentrations' of game at Lake Undur on the Tchad border (DMD, December 1950). In 1951 it was said that 'depredations by lions and hyaenas in Dar Masalit

continue' (DMD, September 1951) and the Game Department was using poison in an effort to reduce the 'tremendous damage to stock' (Game Preservation Branch, 1951). As late as 1955 lions were reported to have killed 113 cattle, 81 donkeys, 56 camels, 25 horses and large numbers of goats and sheep in one small area (SMR(NS) 297, September 1955).

It can hardly be supposed that leopard *Panthera pardus* were less common than lions, at least in the southern areas of the province, but they have received much less attention in the literature. When Ali Dinar was Sultan of Darfur (1898–1916) he was nominally tributary to Khartoum although his 'tribute' was often made up according to his own whim and on one occasion included a live leopard and three leopard skins (Theobald, 1965). Apart from this incident there appears to be only isolated references to them at Geneina Royal Air Force Camp (DMD, October 1945), at Umm Keddada (DMD, July 1947) and at Kutum (DMD, December, 1950), and tracks of leopard, along with those of lions were seen at Wad el Haraz in 1923 (Maydon, 1923).

Cheetah *Acinonyx jubatus* were probably not uncommon in the southern areas of the province, there being several records from adjacent areas in Southern Darfur (Wilson, 1979a). They have also been recorded from Jebel Tageru (Brocklehurst, 1931) and a female and two cubs were seen south of El 'Atrun oasis, almost 18°N in the winter of 1927/28 (Newbold & Shaw, 1928).

Both the spotted hyaena *Crocuta crocuta* and the striped hyaena *Hyaena hyaena* occur but the innumerable references to hyaena make no distinction between them. Similarly, references to jackal are not specific but it is probable that only the common jackal *Canis aureus* is represented in Darfur. Also recorded from the area of the Wadi Howar are foxes (Bagnold, 1933) and specifically the fennec fox *Fennecus zerda* and Ruppell's fox *Vulpes ruppellii* (Shaw, 1936).

The African hunting dog *Lycaon pictus* appears to have been widespread and fairly common. There are some records for Southern Darfur (Wilson, 1979a) but the first northern record actually refers to Jebel 'Atshan in the northwest of Kordofan where a pack of nine was seen by a military patrol in 1926 (Brocklehurst, 1931). The Wadi Howar, as for other carnivores and many herbivores (domestic as well as wild), used to provide a refuge and suitable habitat, with 14 being seen there in 1934 (Shaw, 1936) and a pack of nine in the winter of 1945 (DMD, February 1946). In the latter instance the dogs approached a hunter in search of addax and oryx who shot three before his rifle jammed, although this fortuitous occurrence probably had little else than an immediate effect on the dogs' survival. In 1946 a pack of dogs was said to have killed 33 cattle and 25 donkeys in the area of Tini Wells (DMD, December 1946) and even as late as 1952 packs from the Teiga Plateau were attacking cattle in the area of Malha (SMR(NS) 265, December 1952/January 1953). Outside our immediate area there were many hunting dogs at Jebel 'Uweinat in 1938 (Bagnold *et al.*, 1939).

*Proboscidea*

Ivory was for long one of the principal exports of Darfur, second only to slaves in value. Ali Dinar was wont to pay part of his tribute in ivory, for example 42 rotls (=20 kg) in August 1903 (SIR 109), 4 kantars (1 kantar = 100 rotl = 45 kg) in September 1904 (SIR 122) and 2 kantars in November 1904 (SIR 124) when the value of ivory at El Fasher was £Egyptian 15–16.50 per kantar (SIR 104, March 1903), and in 1913 about 600 kg of ivory was transported to Mecca as part of the pilgrimage (SIR 231, October 1913).

But early records of elephant *Loxodonta africana* regarding numbers and distribution are confusing. Browne (1799) contents himself with reporting their presence, and 20 years later Burckhardt (1819), on the evidence of pilgrims questioned in Cairo, remarked that they were 'very common in the country'. In recent times it is likely that very few elephants have ventured into the main area of Northern Darfur although there are rock paintings of them at Zolat el Hammad, and Newbold (1924) quotes one as being reported at 15°N. It is perhaps surprising that none is recorded for Dar Masalit, there being at least 15 different records of elephant in the adjacent Zalingei and Garsila areas for the late 1940s and early 1950s (Wilson, 1979a).

*Artiodactyla*

The giraffe *Giraffa camelopardalis* was remarked on by both Browne (1799) and Burckhardt (1819), the first reference to it in the 20th century being in 1902 when the Sultan sent a live one to Khartoum as part of his tribute (Sudan Government Archives, Intelligence File 2/4—16 April 1902). There are few other records of giraffe although three were seen north of the Wadi Howar in 1932 (Shaw, 1936). Records for the post-Second World War period indicate that the giraffe appears to have been fairly common in the Geneina area—eight were killed by Arabs in 1946 when the court of the Sultan of Masalit confiscated the horses of the offenders and fined them £10 each (DMD, May 1946) and a further record is for 1950 when a herd was seen (DMD, January 1950; SMR(NS) 230, January/February 1950). They also appear to have been regular visitors as far north as El Fasher in the post rains/early dry season with the 'Fasher giraffe already in their usual haunts in the Wadi Beira' (DMD, October 1945) and 'the five Wadi Beira giraffe reported as having moved away' in early 1948 (DMD, January 1948). As late as 1950 they were recorded in the Kebkabiya area and from near Tini Wells (DMD, May 1950). Although there are no records from southern Dar Masalit there are numerous historical records from adjacent areas in Southern Darfur and in 1976 there were an estimated 60 head in Western District south of Garsila (Wilson, 1979a).

Burckhardt (1819) makes a vague reference to an animal 'about the size of a calf' in Darfur but the vernacular name he quoted—'Djalad'—is quite specific to the greater kudu *Tragelaphus strepsiceros*. The distribution in Darfur is given by Brocklehurst

(1931) as north and west Darfur as far north as the Meidob. Other specific references are few, it being said that they were increasing in the area of Lake Undur on the Tchad border (DMD, December 1950), and having reappeared on Jebel Murai, the Sultan of Masalit consequently making an order for their preservation (DMD, January 1951). They were said to be present in fair numbers in Dar Masalit (Game Preservation Branch, 1951), this probably referring to the eastern hilly areas of Basement Complex rocks along the Wadi 'Azum, as there have certainly been fairly large populations in adjacent areas of Western District (Wilson, 1979a).

The West African korrigum *Damaliscus korrigum*, known as 'tiang' in Arabic, was described as being scarce in arid scrub and acacia areas in northwest Darfur (Mackenzie, 1954). In March 1919 the Governor of Kordofan shot a single korrigum in good condition in waterless country to the northwest of Jebel Meidob and it has been said that one could often be seen with a herd of addax or oryx (Brocklehurst, 1931). The ubiquitous 'fair numbers' were said to be present in Dar Masalit (Game Preservation Branch, 1951). It is possible that two distinct subspecies existed in Darfur, the northern one being *D.k.korrigum*, the southern, which probably did extend into Dar Masalit, being the typical West African race of *D.k.tiang* (Brocklehurst, 1931; Mackenzie, 1954).

Three species of gazelle are recorded with certainty from Northern Darfur: the red-fronted *Gazella rufifrons*, the dorcas *G.dorcas*, and the addra or dama *G.dama*, the last being known in the Arabic as 'ril'. It is possible that *G.leptoceros* may also have been an occasional visitor to the extreme northwest of the province: they are recorded in an area bounded by 16°–20°N and 20°–24°E northeast of Borkou in Tchad, and one was shot there in the late 1950s (Edmond-Blanc *et al.*, 1962). The northern limit of the red-fronted gazelle is generally considered to be between 14° and 15°N (Brocklehurst, 1931; Setzer, 1956) but in early 1923 along with dorcas they were said to be common at the north end of the Teiga Plateau, common in Wad el Haraz at almost 16°N and fairly common 30 km north of the Wadi Howar (Maydon, 1923). Early 1923 was, however, exceptional for its good gizu (Wilson, 1978) and this undoubtedly had some influence on the northerly appearance of the red-fronted. Maydon (1923) recorded dorcas as plentiful 190 km southwest of El 'Atrun, and the following winter they were seen in numbers as far north as 17°30'N (Newbold, 1924). They were again noted south of El 'Atrun in the winter of 1927/28 (Newbold & Shaw, 1928) and north of the Wadi Howar in 1932 (Shaw, 1936). The southern limit of dorcas has been given as just north of 12°N (Setzer, 1956). Although there are no specific records of gazelle, other than addra, in government sources this lack may be taken as token of their general distribution and prevalence, at least in the southern and southwestern parts of the province: in contiguous areas in Southern and Western districts they are known to have occurred in considerable numbers and are still comparatively numerous today (Wilson, 1979a).

The addra is of special interest and it can be assumed that most sightings would have been recorded. If this is the case then it can be assumed that it was fairly



widespread in Northern Darfur but has probably never been very numerous. The southern limit has been given as north of 13°N (Audas, 1951) although it was said to be common as far south as the El Fasher–El Obeid road and in the *desert* (my italics) between Kebkabiya and Kereinik as well as in all oryx districts (Brocklehurst, 1931). Maydon (1923) recorded them in the same areas as the red-fronted and the dorcas; they were reported at 17°30'N in 1923/24 (Newbold, 1924), again south of El 'Atrun (Newbold & Shaw, 1928) and north of the Wadi Howar (Shaw, 1936) but very few were seen in 1937 (SMR(NS) 105, January/February 1938). In the early 1950s they were 'said to be fairly plentiful in the northern parts of Dar Zaghawa' (DMD, April 1952).

Generally considered to be confined to mountain massifs or large rocky outcrops the barbary sheep *Ammotragus lervia*, known in Arabic as 'kabsh mai', has also been recorded from the area in general. At the turn of the century they were said to be fairly common but very shy at El 'Ein and Abu Tawiga in the extreme northeast of our area (SIR 94, May 1902). In the early 1920s they were rare in the Wad el Haraz, where tracks were seen along the top of a 30 m cliff (Maydon, 1923). As well as being present in the Meidob area, from where they are most often quoted and where they were said to be 'flourishing' as late as 1951 (Game Preservation Branch, 1951), they have been recorded from Jebel Rahib (Newbold, 1924), from the Teiga Plateau (Lampen, 1928) and from Jebel Dereisa and Jebel Si (Brocklehurst, 1931). In 1937 two hunters collecting for the New York Natural History Museum reported them as comparatively plentiful (SMR(NS) 105, January/February 1938)—this presumably referring to Northern Darfur in general—but one legally shot by a Mr Karam from Alexandria in Egypt was a sufficiently rare occurrence to occasion an official reference (DMD, February 1946). On the other hand they were thought to be 'probably abundant' in northeast Tchad in the late 1950s (Edmond-Blanc *et al.*, 1962), where they were seen some distance from hilly areas (and where they were said to lamb from December to February). Earlier in the 1950s it had been estimated that there were about 1000 sheep in northeast Tibesti at about 20°N, 19°E (Blancou, 1958).

From many points of view—aesthetics, zoogeography, physiology, ecology—Northern Darfur's most important large mammals are the addax *Addax nasomaculatus* and the scimitar-horned oryx *Oryx dammah*, and it is to be expected that over the years they have occupied an important place in the literature. Almost invariably references to one include references to the other, although mixed herds are rare and, indeed, it has been said that oryx will not stay in areas where addax are to be found (Brocklehurst, 1931). The principal primary references covering the period for 1900 to 1950 are given in Table 1, from which can be deduced much of the temporal and spatial variation of both species. Talbot (1960) refers to sightings of addax and oryx by a military patrol in 1953, but I have been unable to find the original reference to this. The oryx has a wider ecological range than the addax with a southern limit at about 14°N although in 1928 it was seen south of the road

TABLE 1  
 PRINCIPAL PRIMARY REFERENCES TO ADDAX AND ORYX IN NORTHERN DARFUR AND ADJACENT AREAS,  
 1900-1950

<i>General remarks</i>	<i>Source</i>
Addax in considerable numbers between Bayaria and Bir Natron and a few between Jebel Gerinat and Jebel Audun, where there are also many oryx. During the rainy season, there is a general migration from the southwest into the Wadi el Melik with a return southwestwards as the water dries up.	SIR 94, May 1902
Omda (Chief) Hassan Khalifa of Hawawir tribe saw numerous addax at Nukheila oasis.	SIR 267, Oct. 1916
Oryx fairly common 12.5 km north of Wadi Howar but no sign of addax. Only saw five addax bulls in three days in area 75 km southwest of 'Atrun, where oryx were plentiful in herds of 50 and 60.	Maydon (1923)
More than 400 addax counted in 1927.	Brocklehurst (1931)
Many addax tracks and herd of 10 oryx at 16°30'N, 26°30'E in mid-November 1927.	Newbold & Shaw (1928)
Addax to north of 16°45'N: oryx continue far to south in herds of 20 to 50.	Bagnold (1933)
In 1932 country well north of Wadi Howar swarming with addax and oryx. Addax normally north of oryx but both together in Wadi Howar with oryx as far south as 15°30'N.	Shaw (1936)
Addax at 18°N in June 1935.	Shaw (1936)
The Assistant District Commissioner, Northern District, blamed reduction in oryx and addax on ease with which Zaghawa and Arabs could hunt in these days of comparative security.	SMR(NS) 83, Nov/Dec 1935
Oryx and addax dangerously low in 1937.	Audas (1951)
Two hunters from New York Natural History Museum saw only 18 oryx and about 80 addax, very few addax, on trip from Ed Dab'a to Natron and back.	SMR(NS) 105, Jan/Feb 1938
Jaafari camel dealer reported increase of addax and decrease of oryx near Bao compared with last year. Plenty of oryx but no addax in Wadi Howar.	SMR(NS) 111, Jul/Aug 1938
No large herds of game in Kutum district except addax and oryx.	Thesiger (1939)
Addax and oryx moved north of gizu on account of large numbers of domestic animals: said to be so fat as to be easily run down by camel.	SMR(NS) 164, Dec. 1942/Jan. 1943
Arabs shooting large numbers of oryx one day's march northwest of Anka. Plenty of oryx in area but no addax.	DMD, Jan. 1946
Oryx in gizu very wild and no addax at all, which probably kept far north away from domestic animals.	DMD, Feb. 1946
Tribal hunting has greatly increased and may soon exterminate all the game. Addax keep to foothills of Ennedi mountains (in Tchad) being too shy to venture east into the plains (remarks by District Commissioner, Northern Darfur).	DMD, March 1946
Arabs hunting addax with rifles and dogs on an extensive scale in area of El Haza four days due south of Bir 'Atrun. This report was given to Major Ionides (described as a Tanganyika game warden) who had shot one oryx.	DMD, Dec. 1946

TABLE 1—*contd.*

General remarks	Source
One addax shot on 6 May by Major Ionides near El Haza.	DMD, May 1947
Major Paton, Officer Commanding, No. 2 Company Western Arab Corps, saw large numbers of addax north of Wadi Howar and many tracks at Wadi Handal. Herds averaged 20 although one of 60 was seen and saw eight herds at once from a high point.	SMR(NS) 217, Dec. 1948/Jan. 1949
Large numbers of addax and white oryx seen by military patrol along Wadi Howar.	Game Preservation Branch (1951)

between El Fasher and En Nahud in the area of Umm Kedada (Audas, 1951). In Tchad it also used to extend regularly to the south of 14°N (Blancou, 1958). In the Sudan the southern limit of the addax has been given as the north end of Jebel Teiga at 15°07'N (Brocklehurst, 1931). The oryx has for long been hunted for its hide which is prized for the quality of rope that can be made from it: the horns of addax were used at El 'Atrun for digging out salt and the pans there used to be littered with them (Newbold, 1924). Whilst there has always been some official concern regarding the status of addax and oryx, one can sometimes wonder how well directed this was when it is possible to read in an official document that 'Northern Darfur District has received an urgent request from the Game Warden to collect as many Addax, Oryx, Reel (sic) and Meidob Sheep as possible. The suggestion is that they should be walked over to Khartoum with herds of sheep and delivered to the zoo.' (DMD, August 1946). In adjacent areas, there were estimated to be 5000 addax and 10,000 oryx in Tibesti in the early 1950s (Blancou, 1958) but in that general area of Tchad a few years later addax were seen only three times in 2500 km of travelling extending over a month and no oryx were seen at all (Edmond-Blanc *et al.*, 1962).

Of other Bovidae there is one certain record of buffalo, *Syncerus caffer*, which was 'the sensation of the month' when it appeared in the Wadi Golo 8 km south of El Fasher, no other buffalo having been seen in the area within living memory (DMD, September 1945). This animal was, in fact, a female and was thought to be the survivor of a pair of which the male had been killed by spearing at Kas earlier in the year (DMD, July 1945). There is also a record of 'great numbers' of lelwel hartebeest *Alcelaphus bucelaphus* in northern Dar Masalit (DMD, August 1947): the Darfur races of this species is *A. b. tschadensis*. In addition to the korrigum and the greater kudu the Game Department could also be complacent about the fair numbers of hartebeest, waterbuck *Kobus defassa* and roan antelope *Hippotragus equinus* present in Dar Masalit (Game Preservation Branch, 1951).

Other possible occurrences of Artiodactyla are bushbuck *Tragelaphus scriptus*, which were seen in adjacent areas of Western Darfur in 1976 (Wilson, 1979a); hippopotamus *H. amphibius*, which were known to exist in Nzili pools as recently as 1964, and possibly the oribi *Ourebia ourebia*, which occurred (and still does) in the

Zalingei area. Certain to have been present but not specifically recorded are the warthog *Phacochoerus aethiopicus* and Grimm's duiker *Sylvicapra grimmia*.

#### *Other groups*

*Primates*. There is one reference to 200 baboons *Papio anubis* being poisoned at Tawila for attacking crops (SMR(NS) 105, January/February, 1938) but they must almost certainly have been common and widespread. Darfur is approaching the eastern end of the range of the Patas monkey *Erythrocebus patas* but, as with the baboon, it must have been common at least in the southern parts of the province. There is, however, only one reference to its occurrence when it was seen—and identified by its alternative name of Red Hussar—in 1932 north of the Wadi Howar and said to be 480 km from the nearest open water (Shaw, 1936).

*Tubulidentata and Rodentia*. There are single records of the aardvark *Orycteropus afer* and a porcupine *Hystrix* sp. for the area north of the Wadi Howar (Shaw, 1936).

*Perissodactyla*. There are no modern records of odd-toed ungulates in Northern Darfur but bones of the white rhinoceros *Ceratotherium simum* and the Nubian ass *Equus asinus* have recently been excavated in the Gilf el Kibir area of southern Egypt (23°N, 26°E) and dated by C<sup>14</sup> as 41,450 BP. It is probable that the Nubian ass has occurred in Darfur within our period—some hundreds were estimated to survive in Tibesti in the 1950s (Blacou, 1958)—but unlikely that the black rhinoceros *Diceros bicornis* has, although seven of the latter were recorded on the Wadi Maarna 65 km south of Lake Keilak in 1914 (Audas, 1951).

#### PRESENT DISTRIBUTION AND STATUS

The main source of information on present distribution and status is the low-level stratified sample aerial survey of November, 1976 (Watson *et al.*, 1977). Only five types of animal were seen during the survey, these being jackal, Patas monkey and three types of gazelle. It is unfortunately not possible to identify gazelle to species level using this method and they were identified as types 1, 2 and 3. In general terms, it is possible from a combination of factors including body size and area of occurrence to equate Type 1 with the addra, Type 2 with the dorcas and Type 3 with the red-fronted gazelle. The survey gives estimates, then, of 24 addra, located just south of the Wadi Howar at about 16°30'N, 26°00'E; 7423 dorcas in two main areas, these being northwest of the Wadi Howar and to the north of Umm Keddada; and 3492 red-fronted mainly in Dar Masalit and southeastern Dar Zhagawa. The identification parameters between Types 2 and 3 are not absolute and some overlapping of dorcas and red-fronted is probable.

No estimates of the numbers of other wild herbivorous species were obtained as

none was seen in the transects during the course of the survey. A small group of addax was, however, seen outside the transects. An estimate of 1244 jackal was obtained, distributed generally over the southern part of the province, and 120 Patas monkey in Dar Masalit.

The estimate of 10,939 gazelle gives a biomass of 0.99 kg/km<sup>2</sup> over the whole province with two relative concentrations—one in Dar Masalit of 10.55 kg/km<sup>2</sup> and the other to the northwest of the Wadi Howar of 7.98 kg/km<sup>2</sup>. In contrast to the impoverished fauna of Northern Darfur 18 species of larger herbivore were seen in the more wooded Southern Darfur province in an aerial survey carried out at approximately the same time, giving an average biomass of 28 kg/km<sup>2</sup> with a maximum of 488 kg/km<sup>2</sup> in the extreme southwest.

In a less systematic and very limited aerial survey carried out in Northern Darfur in November 1975 very few wild animals of any kind were seen (Lamprey, 1975).

Greater kudu are present on Jebel Marra—an estimated 200 head—and its associated uplands—possibly a further 150 or 200 head in the relevant area in Southern Darfur (Wilson, 1979a) and it is almost certain that these extend into Northern Darfur. Dar Masalit is now heavily populated and cultivated and is unlikely to contain any permanent populations of the larger savanna species other than gazelle and warthog. The latter, prohibited as food to Muslims, are not as mercilessly hunted as 'lawful' game and do survive in some numbers throughout the southern half of the province, although they are killed when they cause damage to crops. Patas monkey can be seen almost everywhere on any car journey of more than a few kilometres and, living in small mobile troops, are widespread and common. Baboon also exist in some numbers, particularly on the northern Jebel Marra and the uplands of the Basement Complex throughout the province, as far north as Meidob where several troops were recorded in 1975 (J. Hales, pers. comm.). The distribution, status and abundance of primates in Darfur is the subject of a recent paper (Wilson, 1979b).

Of the four species for which most international concern is expressed—addax, oryx, Barbary sheep and addra—only the addra is still generally recorded. Small, highly mobile groups of addra probably still persist over much of Northern Darfur, a few animals being recorded in the area between Tini Wells and Anka Wells in 1976 and two being seen by me at Umm Badr on the Darfur/Kordofan border on 2 November 1977. During an 18-month period in residence in the Meidob Hills in 1974/75 a social anthropologist was unable to obtain any reliable reports of addax or oryx. He was assured that the 'kabsh mai' or Barbary sheep still survived in the remoter areas of Meidob but on several expeditions to look for it he was unable to find any (J. Hales, pers. comm.). Similarly no game were recorded over large tracts of remoter Northern Darfur by a ground party on a Joint Services (including Sudanese military personnel) Expedition in 1975 although this mission reported signs of addax in the Mauritanian 'Empty Quarter' at 20°N, 7°W (Sheppard, 1976).

## DISCUSSION

Northern Darfur provides a wide variety of wildlife habitats varying from true desert to broadleaved deciduous woodland. Although this range of habitats has enabled a wide spectrum of wildlife to exist—31 larger species have certain records and there is a number of probables, as well as a possible total of about 40 smaller species—almost certainly the numbers of animals have never been very great. Unfortunately, few of the early records are quantitative in terms of total numbers. Brocklehurst (1931) gives the impression that 400 addax in 1927 was considered as a satisfactory number for that species and this perhaps provides some perspective for the subjective reports referring to 'fair quantities' and 'vast numbers'. On the other hand if the official figures relating to shooting and poisoning of carnivores are to be believed, and unless these carnivores subsisted entirely on domestic stock, the southern areas at least must have carried a considerable biomass of wildlife.

In the north the areal distribution and the numbers of both addax and oryx appear to have fluctuated over fairly wide limits, with probably no real reduction in numbers until the 1950s. Both of these species, and particularly the oryx, were probably more or less dependent on the gizu, as to a lesser extent was also the addax. The less frequent occurrence of this phenomenon in the last quarter century and the vastly increased numbers of domestic stock using it (resulting in less feed availability and greater disturbance) have no doubt contributed as much to the decline of these species as increased hunting pressure and the use of modern weapons. But this does not excuse the inexplicable attitude of the Sudanese authorities in continuing to allow hunting permits for addax and oryx to be issued and advertising hunting trips with these species as part of the bag.

At least until the late 1940s and early 1950s wildlife also appears to have maintained a presence in the south of the province. Since that time human and domestic livestock populations have increased rapidly, resulting in more intensive land use: it is the indirect effects of this pressure, at least as far as herbivores are concerned, which have resulted in reduction in numbers of species. Only in respect of the larger carnivores is it apparent that determined attempts at extermination have been carried out.

The prognosis for wildlife in Northern Darfur remains bleak, however. Continued pressure from human and domestic animal populations will lead to even further reductions in the low numbers of the small range of species still surviving. Unless special reserves are set aside and adequately protected not only from hunting but from other forms of human and livestock interference (and in the Sudan context even if reserves are set up it is unlikely that the latter condition can be maintained) then there is unlikely to be any wildlife in Northern Darfur by the end of this century and only in especially favourable areas such as the Jebel Marra uplands (for kudu) and the catchment of the Wadi Howar (for a few gazelle) will wildlife last that long.

## REFERENCES

- AUDAS, R. S. (1951). Game in Northern Darfur. *Sudan Wildl. Sport*, **2**, 11–14.
- BAGNOLD, R. A. (1933). A further journey through the Libyan desert. *Geogr. J.*, **82**, 103–30; 211–36.
- BAGNOLD, R. A., MYERS, O. H., PEEL, R. F. & WINKLER, H. A. (1939). An expedition to the Gifl el Kebir and Uweinat, 1938. *Geogr. J.*, **93**, 281–313.
- BLANCOU, L. (1958). Distribution géographique des ongulés d'Afrique Equatoriale Française en relation avec leur écologie. *Mammalia*, **22**, 294–316.
- BROCKLEHURST, H. C. (1931). *Game animals of the Sudan. Their habits and distribution*. London, Gurney and Jackson.
- BROWNE, W. G. (1799). *Travels in Africa, Egypt and Syria from the year 1792–1798*. London.
- BURCKHARDT, J. L. (1819). *Travels in Nubia*. London, John Murray.
- CHAPMAN, A. (1921). *Savage Sudan: Its wild tribes, big game and bird life*. London, Gurney and Jackson.
- DUGMORE, A. R. (1924). *The vast Sudan*. London, Arrowsmith.
- EDMOND-BLANC, F., DE ROTHSCHILD, A. & DE ROTHSCHILD, E. (1962). Contribution à l'étude des grandes ongulés dans le nord du Borku (Tchad). *Mammalia*, **26**, 489–93.
- FFRENCH-COMYN, D. C. E. (1911). *Service and sport in the Sudan*. London, The Bodley Head.
- GAME PRESERVATION BRANCH (1951). *Annual report of the Game Preservation Branch 1950–51*. Khartoum, Ministry of Agriculture.
- HAPPOLD, D. C. D. (1967). Additional information on the mammalian fauna of the Sudan. *Mammalia*, **31**, 605–9.
- HARRISON, M. N. & JACKSON, J. K. (1958). Ecological classification of the vegetation of the Sudan. *Forests Bulletin, New Series No. 2*. Khartoum, Forests Department.
- LAMPEN, E. (1928). A short account of the Meidob. *Sudan Notes Rec.*, **11**, 55–67.
- LAMPREY, H. F. (1975). *Report on the desert encroachment reconnaissance in northern Sudan*. Nairobi, UNEP. (mimeo).
- MACKENZIE, P. Z. (1954). Catalogue of wild animals of the Sudan occurring in the natural orders Artiodactyla and Perissodactyla. *Publs. Sudan Govt. Mus. Nat. Hist.*, **2**, 1–21.
- MAYDON, H. C. (1923). North Kordofan to South Dongola. *Geogr. J.*, **61**, 34–41.
- NACHTIGAL, G. (1889). *Sahara and Sudan, IV Wadai and Darfur*. (Translated from the German by A. G. Fisher & H. J. Fisher, 1971.) Berkely and Los Angeles, University of Los Angeles Press.
- NEWBOLD, D. (1924). A desert odyssey of a thousand miles. *Sudan Notes Rec.*, **7**, 43–101.
- NEWBOLD, D. & SHAW, W. B. K. (1928). An expedition in the south Libyan desert. *Sudan Notes Rec.*, **11**, 103–94.
- SETZER, H. W. (1956). Mammals of the Anglo-Egyptian Sudan. *Proc. U.S. Nat. Mus.*, **106**, 447–587.
- SHAW, W. B. K. (1936). An expedition in the southern Libyan desert. *Geogr. J.*, **87**, 193–221.
- SHEPPARD, T. (1976). The joint services west-east Sahara expedition 1975. *Geogr. J.*, **142**, 201–15.
- TALBOT, L. M. (1960). A look at threatened species. *Oryx*, **5**, 153–293.
- THEOBALD, A. B. (1965). *Ali Dinar: Last Sultan of Darfur 1898–1916*. London, Longmans.
- THESIGER, W. P. (1939). Galloping lion. *Sudan Notes Rec.*, **22**, 155–7.
- WATSON, R. M., TIPPETT, C. I., RAZK, F., JOLLY, F., BECKETT, J. J., SCHOLES, V. & CASBON, F. (1977). *Sudan national livestock survey and resource census*. Nairobi, Resource Management and Research Ltd (mimeo).
- WILSON, R. T. (1978). The 'Gizu': winter grazing in the south Libyan desert. *Journal of Arid Environments*, **1**, 325–42.
- WILSON, R. T. (1979a). Wildlife in Southern Darfur, Sudan: Distribution and status at present and in the recent past. *Mammalia* (in press).
- WILSON, R. T. (1979b). The primates in Darfur, Western Sudan. *Folia Primatol.* (in press).

## APPENDIX

## GAZETTEER OF PLACE NAMES AND LOCALITIES

This appendix is provided to enable accurate location of all place and locality names mentioned in the text. The spellings conform to the *Index Gazetteer of the Anglo-*

*Egyptian Sudan* published by His Majesty's Stationery Office, London, in 1932. Latitudinal and longitudinal co-ordinates are also from that publication except where stated. The Sheet Number refers to the map sheet in the Sudan 1:250,000 series topographical maps on which the name occurs: some later printings have new numbers but also carry the ones listed here. Where spellings in original references differ, they have been altered to conform with this list.

Place or locality	Sheet number	Latitude		Longitude	
		°	'N	°	'E
Abu Tawiga	44K	17	08	27	06
Anka Wells	54E	14	40	24	51
Bao	43P	16	27	23	01
Bayaria		Not located			
Dar Zaghawa	53D	15	17	23	17
Diba	54F	14	17	25	46
Ed Dab'a	45M	16	02	30	01
El 'Atrun (Bir Natron)	44F	18	12	26	40
El 'Ein	44P	16	33	29	22
El Fasher	54I	13	38	25	21
El Geneina	64D	13	27	22	27
En Nahud	54D	12	42	28	28
Garsila	53P	12	22	23	08
Jebel 'Atshan	45N	16	14	32	34
Jebel Audun	44P	16	41	29	57
Jebel Dereisa	54E	14	24	24	11
Jebel Gerinat		Not located			
Jebel Marra	54I	13	09	24	23
Jebel Murai	54I	13	25	22	57
Jebel 'Owida	53D	15	19	23	25
Jebel Rahib	44K	17	45	27	00
Jebel Si	54I	13	55	24	20
Jebel Tageru	54C	16	00	27	15
Jebel 'Uweinat	34I	21	55	25	01
Kas	54M	12	31	24	16
Kebkabiya	54I	13	39	24	05
Kereinik	53L	13	22	22	54
Kutum	54E	14	12	24	40
Lake Keilak	65H	10	50	29	21
Lake Undur	53H	14	52	22	40
Malha	54B	15	08	26	10
Masalit	53L	13	30	22	43
Meidob (Hills)	54B	15	13	26	30
Nukheila Oasis	44B	19	02	26	19
Nzili Pools	64D	11	05	22	54
Tawila	53H	14	02	22	36
Teiga Plateau	54B	15	45	25	45
Tini Wells	53D	15	01	22	48
Umm Badr	54G	14	15	27	56
Umm Keddada	54K	13	20	27	13
Wad el Haraz	54B	15	48	25	57
Wadi 'Azum	53P	12	53	22	50
Wadi Beira	54I	13	32	25	20
Wadi el Melik	44P	16	00	28	45



<i>Place or locality</i>	<i>Sheet number</i>	<i>Latitude</i>		<i>Position</i>		<i>Longitude</i>	
		<i>°</i>	<i>' N</i>	<i>°</i>	<i>' E</i>	<i>°</i>	<i>' E</i>
Wadi Handal		Not located					
Wadi Howar	44N	16	38			25	36
Wadi Kej		Not located					
Zalingei	53P	12	54			23	29
Zolat el Hammad	44K	17	50			26	50
(approximate position: not located in Gazetteer and taken from map in Newbold & Shaw, 1928)							