The Range and Status of the

MOUNTAIN NYALA

(2005)

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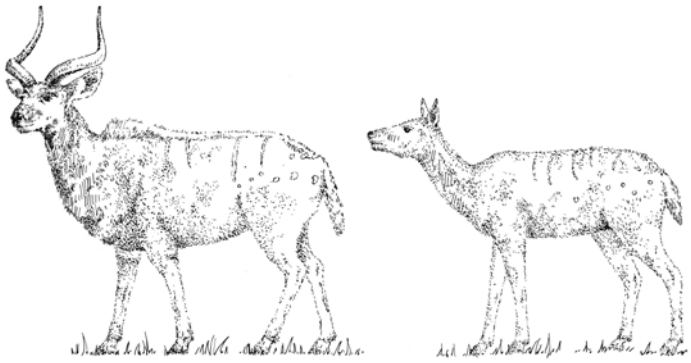
ACKNOWLEGEMENTS

A large number of people past and present contributed to this report. I was most grateful for the open and generous responses to my enquiries from all members of the Ethiopian Wildlife Conservation Organisation, notably Tesfaye Hundessa, Manager, Menassie Gashaw, Fanuel Kebede, and Leykun Abunie. In the Bale Mountains I was helped by Fekadu Garedw, Warden, and assisted ably in the field by Mohammednur Jemal. Sophia and Abdullah helped at the lodge. The Oromia Department of Natural Resources facilitated the work especially Tsegaye in Finfinne and Belay in Arsi. Thomas Mattanovich and his Game Scouts helped in Dindin as did Haji Ereso of the Hareghe Wildlife Zone. Dr. Kifle Argaw and Fanuel Kebede shared information about Kuni-Muktar. Dr Stuart Williams of the Ethiopian Wolf Conservation Project was consistently hospitable and helpful together with his family. Thomas Mattanovich, Dimitiri Assimacopolos and Hakan Pohlstrand provided valuable information. Mekonnen Mesfin and the staff of the Hollywood Guest House provided sanctuary in Addis Ababa. Sileshi Haile provided invaluable help and companionship.
I thank Claudio Sillero-Zubiri, Jorgelina Marino and Stuart Williams for comments on the report.
I am very grateful to Dick Estes and Mrs Jerry Mann for providing financial support.
I thank Robert Caputo for permission to use his photographs



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CHAPTER ONE

INTRODUCTION AND SPECIES BIOLOGY

Introduction

The mountain nyala is a magnificent antelope restricted to a small part of SE Ethiopia. In 1969 Leslie Brown estimated a world population at 7-8000. It is close to 40 years since Brown made his surveys and human expansion has occurred throughout the species range. It is the purpose of this report to compile current information on the species and to assess its conservation status.

The Mountain Nyala

The mountain nyala was the last large antelope to be reported from Africa. In 1910, R. Lydekker described the skin and horns of a large antelope shot by Mr. Ivor Buxton in the Arussi Mountains of Ethiopia[1]. The spiral horns and the distinctive white markings across the chest and face link the mountain nyala to the tribe of spiral horn antelopes called the Tragelaphines. Lydekker supplied the latin name *Tragelaphus buxtoni.*

The only weight published for a male mountain nyala is 280kgs (Obussier 1978). Judging from their relative sizes, females appear to weigh 55-65% of the males or about 170kgs. The species is comparable in size to their relative the greater kudu (*Tragelaphus strepsiceros*), They are stockier than greater kudus standing 145cms at the shoulder compared to a kudu's 158cms. The distal segments of the limbs are relatively short compared to both lesser and greater kudus. However they are larger around the chest measuring 158 cms to a greater kudu's 141cms (Obussier, 1978).

Only males carry horns. Horns appear as cream colored nubs at six months (Raethal, 1980) and grow in a spiral pattern through life. There is some variation in the final horn form. Some males have horns with two and a half spirals (but never reach the three spirals seen in greater kudus). Other males have horns that diverge laterally forming a lyrate pattern more like an impala but do not complete the final spiral. Growth rings are visible on the horn sheaths, but annual patterns are hard to read. Horns can become battered with age but the cream colored tips persist. Sportsmen have looked for the longest horns and the record is 119cms long measured around the curves and 22cms basal circumference (Ward, 1975).

Nyala have a uniform tan-gray coat. This grades from a fawn color in calves to a charcoal in old males. Males have a short dark crest running along the middle of the back. White markings decorate the coat. The most conspicuous are a white chevron connecting the eyes, a white throat patch, white across the chest and under the tail. The lower part of the

[1] Mr. Ivor Buxton returned from a hunting trip in Ethiopia and took his trophies to Rowland Ward's, the taxidermist. It was Rowland Ward who spotted the new animal and notified Richard Lydekker at the British Museum. Lydekker made the first announcement in a letter to the London Times published on September 23rd 1910.

legs are pale on the insides with clear white spots just above the hooves. A line of white spots numbering up to 10 may lie along the middle of the sides and in some animals there are faint vertical stripes running from the back to mid way down the flank.
The front of the legs may be a yellow shade in some animals, and there are dark spots on the 'knees' and at the end of the tail.

Little is known about the senses, but the large ears reflect acute hearing and the species is sensitive to humans moving upwind of them. They walk gingerly in thick habitats, placing their feet with care. They can run at about 40kmph if alarmed and the males will lay their horns back as they flee.

Range and Habitat

The species has only been recorded in a series of volcanic mountain ranges that lie parallel to the SE wall of the Great Rift Valley. The range extends from 6^0 30' to 8^0 40'N and from 38^0 20' to 42^0 00'E. Mountain nyala are restricted to six separate populations in this range. Each of these populations will be discussed in detail in the next chapter.

In one area, Munessa, mountain nyala occur as low as 2400m. They are found almost to the summit of Mt Tullu Deemtu on the Bale Mountains at 4377m. Their habitat includes all vegetation types, excluding settled agriculture, between these two elevations. The montane forest belt (Hedberg, 1951) extends from 2000m to 3400m . Variations in slope, aspect and rainfall produce considerable variability across the range of the nyala. However in most places the forests are evergreen with a canopy from 20-40m. *Podocarpus, gracilor, Croton macrostachyus,* and *Warburgia ugandensis* are common. Above 2700m *Hagenia abyssinica* is often dominant in dryer area and *Hypericum revoltum* may extend above the *Hagenia* to 3200m.

The limits of the giant heath zone (*Erica* and *Philippia)* is variable with some heather occurring as low as 2400m on dry slopes, However, it is the predominant vegetation from 2800-3400m. The plants can vary from small trees up to 10m in lower protected sites to 2-3m thickets above the treeline.. Much of the remaining habitat for the nyala is in the heath zone. This ecosystem is susceptible to both human and natural fires. The role of heath burning in nyala ecology is discussed in the section on the Arsi Mountains below.

Between 3600-3800m, the heath zone gives way to alpine moorlands. These are dominated by annual grasses with small evergreen shrubs in the genus *Helichrysum* common in the dryer areas.

A small area of montane grassland at 3000m by Dinsho in the Bale Mountains has provided an important habitat. Grasses in the genera *Bromus, Festuca* and *Poa* cover a small opening in the surrounding montane forests.

The mountains which the nyala inhabit intercept rain both from the Atlantic (March-June) and from the Indian Ocean (June-October) Rainfall above 2500m usually exceeds 1000mm annually. There are numerous perennial streams through the mountains. There

is a steep rainfall gradient with elevation. Annual rainfall in Munessa at 2400m, the lowest point at which nyala are now found, is about 650mm per year. Temperatures fluctuate little through the year. At 3000m in the Bale Mountains the mean monthly temperature is close to 10^0C in all months. Frost occurs above 2700m particular in the cloud free nights of the dry season. Temperatures may dip to -10^0C at night on the alpine moorlands. Snow falls but does not settle.

Food and Feeding

Like the other spiral horned antelopes, the mountain nyala is primarily a browser but will graze on occasion. They eat a wide array of plant parts including leaves, shoot and fruits. Most of the information comes from studies of J.C. Hillman in the Bale Mountains (Hillman, 1986). In this area important food species included *Artemisia afra* (African sage), and *Hagenia abyssinica* (the kosso tree). Dead *Hagenia* leaves are picked off the ground and males may use their horns to bend branches towards them. *Solanum sessilistellatum* provided yellow fruits up to 5cms in diameter. Large fleshy leaves are eaten from the *Lobelia rhyncopetalum* and *Lobelia gibberoa* ***(***the giant lobelias***),*** and from *Knifofia foliosa* (the red-hot poker). *Helichrysum* splendidum (everlasting plant) is taken together with many smaller plants that are hard to identify close to the ground. Some grass is eaten in the early wet season.

Mountain nyala have narrow muzzles with small teeth compared to grazing species of the same size . They are adapted for a selective diet choosing precisely from the plant material available. Many of the plants in their diet have conspicuous protective chemicals, particularly the aromatic sage and everlasting. The digestive adaptations to cope with these foods have not been investigated.

Predators and Parasites

Adult mountain nyala are large enough to be immune from predators other than man. (Lions (*Panthera leo)* may have been a predator in the past but are now absent). Calves can be attacked by leopards (*Panthera pardus)* and dogs. There is no record of Ethiopian wolves (*Canis simensis*) harassing nyala calves.

Very little is known about parasites of the mountain nyala. A fluke (*Cotylophoron cotylophoron)* and two nematodes *(Oesophagostomum walkeri & Haemonchus vegliai*) (Graber, Blanc & Delavenay, 1980) have been recorded

Sociality and Movements

The only stable social group in the species is between a mother and her calves. Young of both sexes will remain close to their mother for most of the first two years. Young females will begin to breed between 18-24 months and will move away from their mothers. Males have grown horns by two years and are challenged by local males and forced to leave.

Young males usually link up with others and bachelor groups of ten or more are common in areas of high density. Sparring is common in these groups with locked horns and pushing. Mature bulls will associate with groups of females checking the estrus state of each female by a sniff of the bottom. Males do not have territories and several males may be associated with the same groups of females. Access to females is decided by ritual contests in which two male stand tall, erect their white tipped manes and circle one another. If this ritual does not reveal the stronger animal, brief, powerful horn clashes decide the issue. Only three percent of nyala were seen alone in the Bale Mountains (Hillman, 1986) as even mature males will often associate with one another or with females.

Females often group into temporary herds. In the Bale Mountains group size averages 9, but the range is from two to 150. The large herds occurred in the late 1980's and will be discussed below.

There are both daily and to a lesser extent seasonal movements. Nyala tend to spend the middle of the day in protective cover. They move to the edge of cover in the evening and may cross completely open ground at night. (In the freezing temperatures of the alpine plateau, nyala were seen to shelter in protected coves at night.). During the dry season in the Bale Mountains, some nyala were seen to leave the grasslands and spend time in the surrounding forest, a migration of 1-2kms. In the much less productive alpine habitat, groups of nyala often traveled several kilometers a day.

Overall the species is quiet and reclusive. They lack any loud vocalizations and courtship is also muted. In open country they flee from humans at about 100m. In the woods around the headquarters of the Bale Mountains National Park, they have acclimated and can often be approached to within 20m.

Breeding

Newborn calves have been seen in all months of the year in the Bale Mountains National Park. However, there is a birth peak from September to November. About half the females give birth each year. The gestation period is not known but there is a peak of male following from October to December suggesting a gestation of 8-9 months.

Protected Status

The limited range of the mountain nyala was recognized in the 1920s and 30s (Osgood 1933 in Harper, 1945) estimated that the world population cannot number more than a few thousand and might be much lower. It was placed on the A list of endangered animals by Harper (1945). It has retained this status except for a brief period from 1969-1975 following the optimistic report of a total population of 7-8000 by Leslie Brown who considered the species not to be in danger. The current category is Endangered due to reduced populations (A1) and continued decline (C1) (IUCN, 2001).

The species is fully protected under Ethiopian law. Some males are shot under hunting licenses.

Origins

Its stocky build, relatively thick coat and broad diet all suggest that the species evolved in the rich uplands of the Ethiopian plateau. The nyala's relative, the greater kudu, lives in arid environments at lower elevations and is lankier, more svelte and more of a specialist browser than the mountain nyala. There is an interesting parallel between these spiral horned antelopes and the evolution of mountain sheep. As Geist (1971) has shown, sheep evolving in rich peri-glacial habitats are heavy with large horns with few spirals. Similarly the nyala has heavier horns with fewer spirals than the kudu.

Several fossil species from the genus *Tragelaphus* have been described (Gentry, 1978) from the African Pleistocene but none appear to be directly ancestral to the mountain nyala.

The People

The range of the mountain nyala is in the heartland of the Oromo people, and is part of the administrative region of Oromiya. The area was disrupted and depopulated at the end of the nineteenth and start of the twentieth centuries by the imperial expansion of Menelik II. The region has received less than its share of investment and development, and until 1992 use of the Oromo language in print was forbidden.

The culture of the Oromo people is based on pastoralism. Cattle, sheep and goats are everywhere. However, the majority of their subsistence comes from farming. Above 2200m (and up to 3500m) barley is the staple crop. In much of Bale and Arsi, it is possible to take two crops a year (and sometimes a third). The soil is fertile and the in many places the slopes are not so steep as to precipitate the destructive erosion endemic in northern Ethiopia. A plain lying at about 2000m between the Bale and Arsi Mountains provides much of the wheat grown in Ethiopia.

The Oromo do not have a tradition of hunting nyala except for one day close to Easter when all able-bodied men set out on their horses to hunt.

Annual percentage growth rate of the human population runs from 2.5 to 3.2% per year across the region (National Conservation Strategy, 1994). This is exacerbated by immigration from poorer and dryer areas mainly to the East. The population of the region has doubled in the last 25 years and will double again in another 20 years at current growth rates.

Cultural significance

The mountain nyala does not play a major role in the culture of the Oromo people. In a compilation of over 600 proverbs, Sumner (1995) records no references to nyala despite the mention of other animals (cattle, hyenas, lions and elephants).

In the ninety years since the animal was named, it has permeated the general Ethiopian culture. Despite the fact that nyala is a South Africa word, it is used as the name of many prominent businesses (e.g. Nyala Insurance and Nyala Motors) It is a common name for bars and coffee houses and a nyala is often painted on the walls. The head of nyala is shown on the obverse of an Ethiopian ten cent coin, and tourist curios portray the species.

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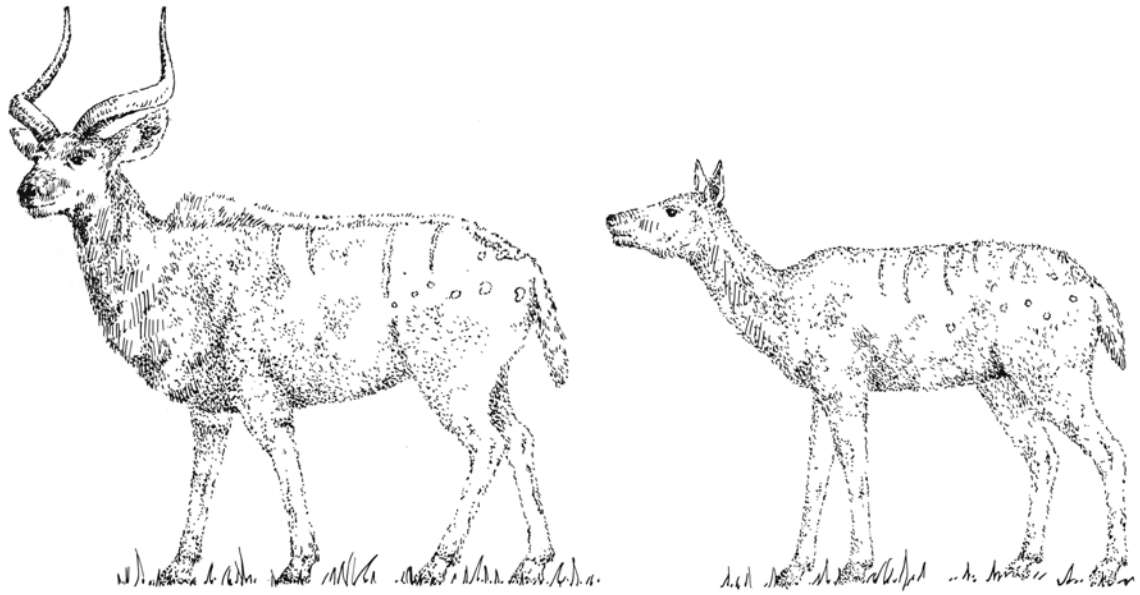


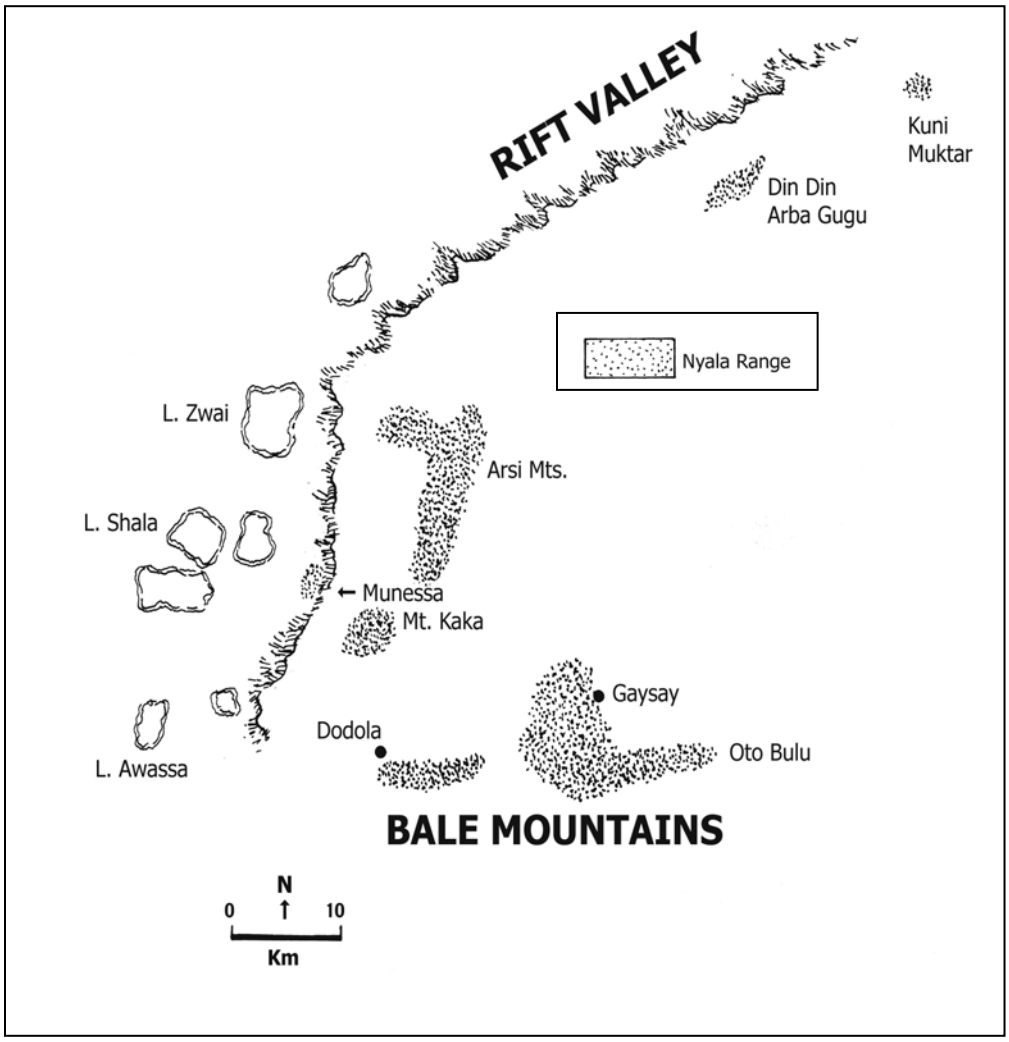
CHAPTER TWO

DISTRIBUTION AND POPULATION STATUS.

Introduction

The species is known to occur in six locations. From south to north, these sites are **The Bale Mountains, The Arsi Mountains, Munessa, Arba Gugu, Din Din and Kuni Muktar**, (Map 2:1). The largest area of habitat lies in the Bal Mountains The 2200km^2 Bale Mountains National Park includes about 75% of the nyala habitat.. There is one nyala hunting block on the northern side of the mountains (Soba) and a proposed block to the east of the park (Oto Bulu). The Arsi Mountains are not protected and two parts of the range (Bora Luku and Kaka) are hunting blocks. Munesssa is a hunting block in an area of forestry plantation. The three northern sites occur along the narrow range of mountains, The Ahmar Mountains, which flank the Rift Valley. Din Din and Arba Gugu are hunting blocks. The most northerly site is a reserve.

There are other areas either where there are unconfirmed reports of the species or areas where they were known from the past. These areas will be discussed after information has been presented on the known populations.



Map 2:1
Known populations of the Mountain Nyala

Methods

Several methods have been used over the years in trying to assess nyala populations. These will be described briefly.

1.Total Count

Mountain nyala have been studied most intensively in the montane grasslands close to the National Park Headquarters in Dinsho. In 1984 and 1985 C. Hillman individually identified most of the male nyala resident in the area, and relied on the behavior of the animals to descend to the open grasslands in the evening where counts are possible.

Between August 2000 and March 2001, Befekadu Refera (Refera & Bekele, 2004) performed four censuses both on the grasslands and in the sanctuary area around the park headquarters. The grasslands and surrounding woods were divided into five blocks varying in size from 1.25-3.25 km^2. Five people spent 2-2.5hrs traversing each block. Every effort was made to keep track of individual nyala to avoid double counting.

2. Bale transect counts

In 1986, C. Hillman (1986) established three monitoring routes in the Bale Mountain National Park. A 14.2 km circuit traversed the grasslands by Dinsho in prime nyala habitat. The route was driven in the late afternoon when nyala were in the open. A circuit in the short grass area of the Ueb Valley covered 24 kms and was monitored from horseback. The third transect used the motor road that crosses the alpine moorlands of the Sanetti Plateau covering 32kms. The Ueb and Sanetti transects have continued with some gaps up to the present (2003). The Gaysay Plains are not regularly monitored after the mid-1990s. Population estimates were derived from sighting data using sighting distances. In 1977 P. Stephens (Stephens et al. 2001) analysed the data using Finite Population Sampling and Distance Sampling. He also collected data on his own transects. These count provide comparatively good relative population data at least for the area around Dinsho.(Woldegabriel Gebrekidan, 1996)

3. Ethiopian Wildlife Conservation Organization line transects

The Ethiopian Wildlife Conservation Organisation (EWCO) since the mid-1990s has attempted to conduct systematic censuses of trophy species so as to set hunting quotas. Every two years teams of 3-5 wildlife officials spend up to a week in a hunting block and attempt to follow Line Distance sampling techniques. This is extremely hard given the thick cover and mountainous terrain. Their population estimates may not be perfect but are the only data for the areas concerned.

4. Lincoln Index

In the mid-1980s Hillman estimated the population of nyala in the Gaysay by comparing the ratio of individually recognizable animals to unknown animals.

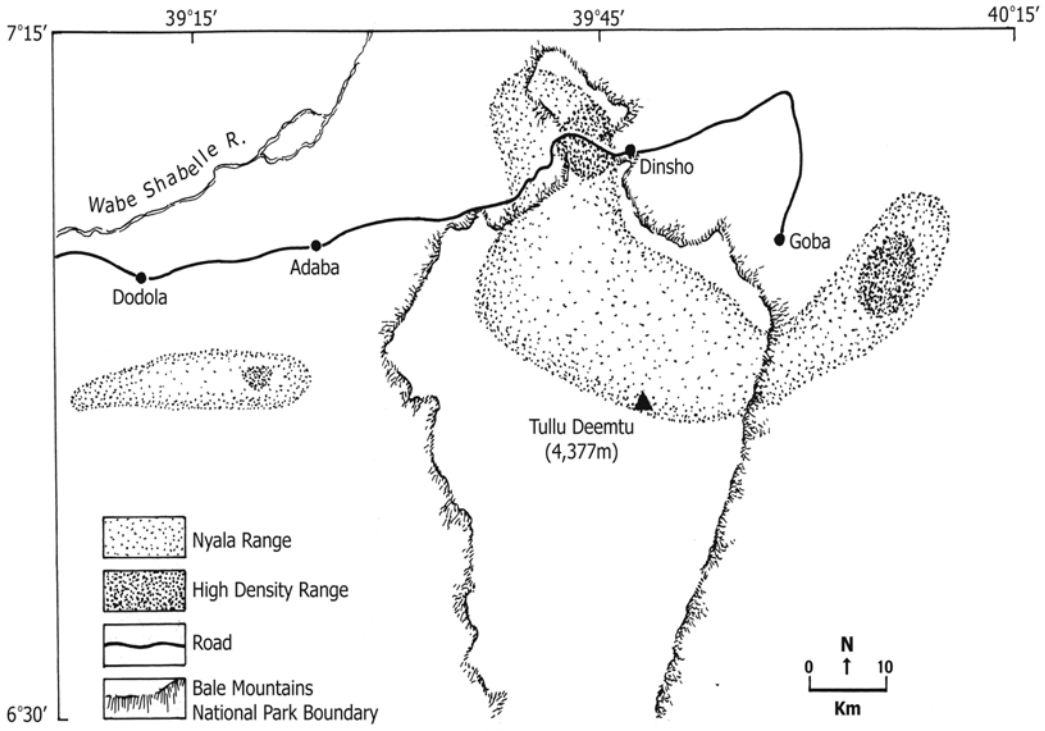
5. Ground Surveys and Incidental Sightings

Most of the data on the species come from ad hoc sightings of mountain nyala. These range from the four months of trekking by Leslie Brown (1969) through much of the range of the species to hunters' reports and information provided by local people.

Estimating population size from sightings is hard and very dependent on both habitat type and time of day Brown (1966) used two estimators:1. The number sighted is about half the total population and 2. In a survey of only 2-3 days you may see 10% of the population. In the area around the Park Headquarters, nyala shelter at a density of up to 175/$km^{2.}$ In this wooded habitat, they are seen from the track running to the Headquarters at a rate of about three per kilometer. Approximately 15 percent of the population may be seen in clearings in the evening. These figures suggest that Brown's correction factors may be approximately valid.

I visited four of the six nyala locations from January to May 2002. On these brief trips I collected incidental sighting information and information from others working in the area.

The range of the mountain nyala will be discussed from South to North. I will attempt to summarize historical information and report data I collected in 2002.



Map 2:2 Distribution of Mountain Nyala in the Bale Mountains

THE BALE MOUNTAINS

The area of the Bale Mountains occupied by mountain nyala lies along an EW strip approximately 120 kms long. It extends from the slopes above the town of Dodola in the West to forests East of the town of Goba in the East. The width of suitable habitat varies from a narrow ridge no more than 15 kilometers in the east to approximately 55kms in the middle of the National Park and contracting again at the Eastern end to about 10kms. About 75% of the range falls within the Bale Mountains National Park. However, the

narrow western part of the range extends for almost 60kms outside the park. A northern extension of the Bale Mountains lying to the north of the Park Headquarters at Dinsho and called the Lajo Spur also falls outside the park but includes the Soba Hunting Area, The species range extends a few kilometers to the East of the National Park boundary beyond the town of Goba.

The species has not been recorded from the large areas of montane forest on the south of the range known as the Harenna Forest. Much of the central part of the range is occupied with heathlands with moorlands above 3900m. In the North nyala occupy a mosaic of open woodland and grassland around 3000m close to the park headquarters at Dinsho.

The number of nyala recorded in the Bale Mountains and the habitat they have occupied have varied over time. An historical survey is interesting. Arnold Hodson (1927) found plentiful nyala in the Lajo spur in 1916, and shot a specimen from the top of the Harenna forest in the same year. Maydon and Blaine hunting in about 1930 (Maydon, 1932) found nyala present but not common in Lajo. Mooney (1961-62) recorded nyala in the alpine moorlands at about 3800m when visiting in 1959. In the 1960s The Ethiopian Wildlife Conservation Department started to plan for a network of National Parks. As part of this effort Leslie Brown surveyed mountain nyala in Bale for 12 days in 1963 and for three months in both Bale and Arsi from January-April 1966. He trekked over very large parts of the habitat (although he did not survey the area around Dinsho).

Above Goba in heath and Hypericum forest, Brown saw 35 nyala in one day and 18 the next. A second area of high population was the heath zone around the peak of Morabowa in the middle of the Bale Mountains National Park. He saw more than 20 nyala a day in the western ridge above Dodola and the town of Adaba. In contrast he saw only a few animals on the alpine moorlands and on the edge of the southern forests. A ridge with short heather that runs north towards Dinsho (Darkeena-Adelay) did not support many nyala.

Gaysay Area

The Bale Mountains National Park was established in 1970 and an early decision was made to focus the park's resources on the areas around Park Headquarters and Gaysay Mountain (Waltermire 1975). Game guards were used to patrol the grasslands and surrounding woodlands. Nyala were not commonly seen (Tesfaye Hundessa pers comm.) Driving across the grasslands in the mid-1970s nyala might be seen every third trip (pers obs) .Through the 1970s and 1980s the population expanded dramatically. By the late 1980s it was typical to see 2-300 nyala in the Gaysay grasslands in the evening, and aggregations up to 500 were not unknown. Stephens et al. (2001) analysed the census data and found encounter rates of from 20-26 nyala per kilometer for the period 1983-1990 and Hillman, using transect and Lincoln Index data, estimated a total population in the Gaysay area of 1100 in 1986.

In the Spring of 1991, the government of Mengistu Haile Mariam was overthrown by forces from Tigre in the North. Mengistu fled before the Tigreans arrived in the capital

and for a month there was no central government. During this time the people in Bale took the opportunity to express their violent antipathy to the central government. In the Bale Mountains National Park, they looted three of the National Park's buildings, drove their herds into areas where they have been excluded and shot any visible animal. Woldegabriel Gebre Kidan (1996), an Assistant Warden at the time found nyala meat available in restaurants throughout the area. The slaughter only lasted for two months before the new government took over. However, the incursions into the park have been much harder to reverse, and domestic herds now graze over large parts of the Gaysay area.

The encounter rate of nyala on the census route dropped from around 20/km to around 4/km following the change of government. There has been a modest recovery in the intervening 13 years, but the species has never returned to the abundance of the 1980s. In the total counts performed by Befekadu in 2001, he estimated between 300-360 nyala in the Gaysay area with the smaller numbers in the dry season.

The National Park Headquarters

Nyala populations in other parts of the park have shown less drastic fluctuations. An area of particular interest lies surrounds the Park Headquarters. An area of 1.2 km^2 around the park buildings is fenced but is outside the boundaries of the park. Inside the fence mature trees have survived and there is extensive juniper regeneration. Outside the fence only a few trees survive and there is close-cropped grass. The area inside the fence is now an island. Befekadu in 2001 made four total counts of the sanctuary area and reported from 204-216 nyala. Many of these animals must leave the fenced area at night and forage in the surrounding pastures and barley fields.

The Lajo Spur

This area lies to the north of Dinsho and the Park Headquarters. It is outside the National Park. Heathland gives way to extensive juniper forests on the northern slopes of the range. The area contains a hunting block called Soba or Hanto. This covers about 250$km^{2.}$ Members of EWCO conducted a census in the hunting block in November 1998. They counted 15 nyala in an area of 10km^2, and estimated a population of 375 animals. I together with Mohammednur Jamal of the National Park. visited the area in February 2002 and saw six female nyala. These animals were only 4.3kms from the National Park Boundary, and it seems very likely that animals from the Park move into this hunting block. I also visited the juniper forests along the Hako or Luloo stream about 2kms west of the hunting block. These large forests are populated and locals reported seeing nyala occasionally on the heathland side of the valley.

The Central Mountains Region

The center of the Bale Mountains National Park includes the highest peaks of the range. The lower slopes up to 3500m are dominated by heath while the highest areas above 3800m are mainly moorland. The intermediate zone is a mosaic of heath and grassland with grass in areas of reduced drainage. Mountain nyala have been seen throughout the area, although they are very rare in the Ueb Valley, an area of grassland that has been used by pastoralists for at least 50 years. Brown reported that the species was strongly associated with the heath vegetation and others (Waltermire, 1975) report nyala taking shelter in patches of high heather.

At the eastern end of the range in 1973, the Ethiopian military built a road across the alpine moorlands. Parties of nyala were seen on a daily basis in the course of fieldwork on the alpine moorlands in 1975 and 1976 (pers. obs). Monitoring of nyala along the road started in 1983. The encounter rate for the period 1983-1985 (for 42 census trips) was 0.075/km (Stephens et al., 2001). After 1985 the encounter rate declined precipitously with no nyala reported in the majority of years, and a maximum encounter rate of 0.020/km in 1988 and 1989. Nyala are still encountered on the alpine moorland but at a rate of one sighting a week rather than one a day. Brown saw 35 nyala in a single day above Goba. This is the area through which the road passes. There are no records of nyala below 3800m on the slopes above Goba since the road was built.

Brown reported a high density of nyala from the western side of the central mountains in the region of the mountain Morabowa. Sightings from this area are now extremely uncommon. There are occasional sightings from the southern limits of the peaks around Mt Tigrita and Mt. Wasama (e.g. Miehe & Miehe, 1994). The presence of nyala can also be inferred where they have browsed the leaves of the giant lobelias.
Map

East of Goba

Since 2000, a professional hunter, A. N. Roussos, has been surveying in the forests East of the town of Goba. The habitat consists of very steep montane forest and is not heavily used by humans. Nyala are observed regularly. More of this slope habitat occurs along the eastern flank of the Bale massif and may support a significant population of nyala. This area needs to be surveyed in the near future. A population as large or larger than that around Dinsho is very possible.

The Western Highlands

The high peaks that lie south of the towns of Dodola and Adaba at the western end of the Bale Mountains are labeled Somcaru on most maps. Leslie Brown identified them as an area of high nyala density and at that time there was some hunting in the area (Mellon & Shatto, 1975).

The range still has dense forests on the northern slopes. Very large examples of both heath and *Hypericum* are common above 3200m. Above 3500 the vegetation is mainly short heather standing only 0.5-1m with grass beneath. There is a small area of alpine moorland close to the peaks.

The Ethiopian Forestry Department in cooperation with German Technical Aid (GTZ) have established a trekking business in this area. Horses are retained in Dodola and four huts have been built at the edge of the treeline. The opportunity to see mountain nyala is an important incentive. Sadly the number of nyala has fallen substantially from Leslie Brown's days. The trekking operation employed a biologist to survey the habitat in 2001. He used sightings and indirect evidence in the form of droppings, footprints and browse. He estimated 49 nyala in the area.

I visited the area with Mohammednur Jemal in Janaury 2002 and spent three nights in the huts. During that time we saw one group of four female nyala. Scouts employed by the trekking operation reported three other groups of nyala. The group we saw was at about 3500m. They were on a steep slope above the forests and below the open heath country. Cattle were visible both above them in the short heathlands and below them in the forests.

The Population in the Bale Mountains.

Habitat Use

Mountain nyala require two kinds of habitat, cover in which to conceal themselves and foraging grounds. In the Bale Mountains the species uses almost any tall vegetation for cover including Juniper, *Hagenia,*and *Hypercium* forests, and especially tall stands of giant heath. They have also been recorded feeding in most of the habitats available in the Bale Mountains including, grasslands, heathlands, moorlands and woodlands. They also make incursions into farmed land. They have not been seen in two areas. One is the short grasslands at 3600m of the Web Valley. This area is very exposed and heavily grazed. The other area is the forests that cover the southern slopes of the range called the Harenna Forest. This is the largest tract of high altitude forest left in Ethiopia and includes large clearings as well as closed canopy forest.. In other places, notably Munessa, to be discussed later, nyala live in forests as low as 2400m. Apart from the first record of nyala in Bale by Hodson,(1927) who may have seen them at the top of the Harenna forest, there is no evidence that they exploit this area. Most of the Tragelaphine antelopes to which the nyala belongs are forest dwellers, and there is no large browsing species in the Harenna.. The reason for their absence is not clear but it is possible that the forest has always been settled at a density to exclude nyala.

Leslie Brown (and many of the hunters' reports) considered the stronghold of the mountain nyala to be in the heathlands, and the great majority of his sightings were in the heather. Once the Bale Mountains National Park was established and some protection was provided, the nyala congregated on the grasslands and woodlands around Gaysay at about 3000m. Data from other parts of the species' range (see below) show that the species can flourish in forest and wooded areas. Hillman (1986) considered the grasslands and woodlands as the species optimum habitat and the higher vegetation zones, the heath and moorlands, were refuges from human disturbance.

Population trends

Table 2.1
Population Surveys of Mountain Nyala in the Bale Mountains.

AREA	Brown 1966	Hillman 1986	Stephens et al.1997	Befekadu 2001	This report 2002
Gaysay	No Data	1100	610	545	550
Lajo	500	w/ Gaysay	No Data	No Data	100
Central Mts	1250	220	80	120	100
E. of Goba	100	No Data	No Data	No Data	500
Western Mts	600	No Data	No Data	No Data	200
TOTAL					1450

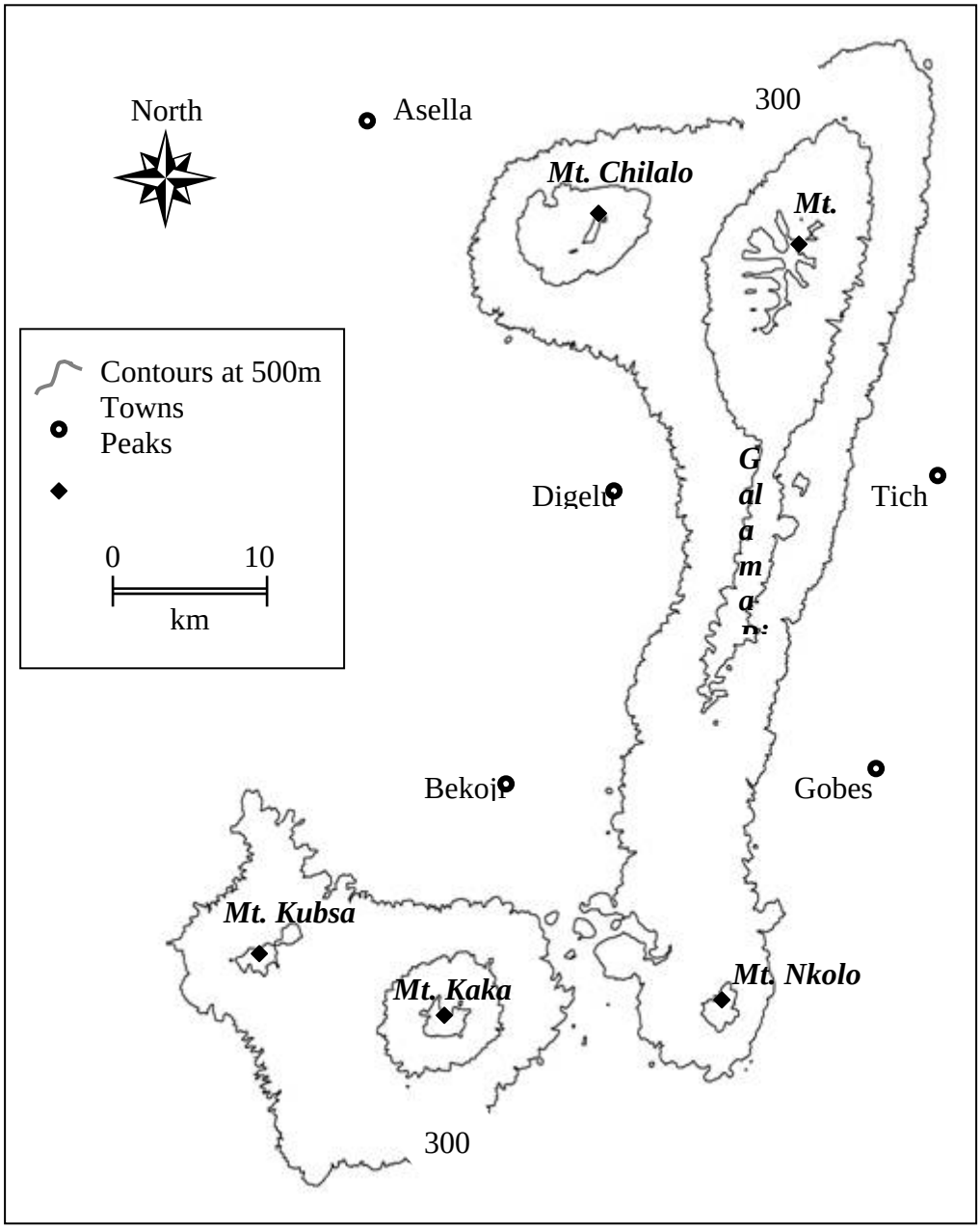
It may be misleading to produce a compilation of numbers as the reliability of any count of nyala is low. In addition the total column does not include data from the same regions. Brown (1966) identified a series of potential hunting blocks and estimated the nyala population in these limited zones. The number of 2450 in the table refers to these proposed blocks. He estimated from 4000-4500 nyala for the whole mountain range.

The best data come from the Gaysay area, which is also by far the largest aggregation in the Bale Mountains (and the world). Data from 1997 and 2001 are reasonably consistent and suggest that the numbers are about half of those in the peak during the 1980s. Nyala are still encountered across much of the National Park. However it is very had to gauge their density given their occasional sightings. It is also clear that this is the area of greatest decline since Brown's survey. Areas where he found a dense population are now deserted.

The Lajo spur supports nyala which probably move back and forth from the Gaysay area. The EWCO estimate of one nyala per 1.5km^2 seems high on the basis of my surveys.

Summary

Mountain nyala occur in at least six areas of the Bale Mountains. By far the highest density is now found in the woodlands and grasslands around Gaysay Mountains. As many as 650 animals may live here and in its northern extension, Lajo. The species appears to have been reduced by as much as 90% over most of the rest of the range since the surveys of Brown in 1966.



Map 2:3

Land above 3000m in the Arsi Mts. The former range of the Mountain Nyala

THE ARSI MOUNTAINS

By Paul Evangelista

The Arsi Mountains lie about 60 km East of the Rift Valley Lakes of Ziway and Langano. They are dominated by the Galama Ridge, which runs North to South for 55 km; Mt. Kaka, which lies south-west of the Galama Massif; and Mt. Chilalo, which lies to the north-west of the Ridge and has recently become separated by human settlements and agriculture. Elevations range between 2,000 and 4,300 m. Three peaks (Kaka, Chilalo, and Baddu) exceed 4,000 m, while the spine of Galama Ridge is at about 3,700 m.

Three vegetation zones have historically characterized the Arsi Mountains: the mixed montane forest (> 3,300 m), dominated by *Juniperus procera*, *Podocarpus gracillior* and *Hagenia abyssinica*; the ericaceous zone (3,300-3,900 m), characterized by *Erica arborea* and *E. trimera*; and the Afro-alpine ecosystem (3,900-4,300 m), comprised largely of the species *Alchemilla*, *Helichrysum*, and the endemic *Lobelia rhynchopetalum* (Hedberg 1951, Breitenbach 1961, Friis 1982). Fens and wet meadows occur in small basins between 3,000 and 4,000 m and descend along drainages to lower elevations. These montane grasslands remain moist for most of the year and have relatively deep soils, presumably from sedimentation (Hedberg 1971). *Carex* and *Poa* species are dominant in these depressions and are often bordered by *Alchemilla* and *Helichrysum* species.

Today, vegetation structure in the Arsi Mountains is significantly different than how it was historically described by early expeditions (Sanford and LeGendre 1930) and by local elders (Kubsa 1999). Human encroachment and activities have greatly impacted these unique montane ecosystems. Six woredas comprising over 182,000 people reside around the Arsi Mountains and rely heavily on the highlands for fuel-wood, cultivation, and livestock grazing (Kubsa 1999). Only remnant stands of the mixed montane forest still exist on the eastern slope, where steep terrain has offered protection from cultivation. Afforestation Areas containing *J. procera, H. abyssinica,* and non-native *Eucalyptus globulus* have been established at several sites on the southern and western slopes of the Galama Ridge by the Ministry of Agriculture near the town of Bokoji. The ericaceous belt (heather) of the Galama Mountains continues to persist between 3,300 to 3,900 m; however, cultivated barley fields now define its lower boundary. We found cultivation of barley as high as 3,410 m. The intrusion of agriculture into the ericaceous belt has pushed livestock herders into higher elevations where large areas of heather are burned to promote better forage. In 2000, we estimated 95% of the ericaceous zone on the Galama Ridge had been burned within the last seven to nine years. Burning practices have been a part of this system for well over a century but is not believed to have occurred at such a large scale or high frequency as it occurs today. As a result, most of the heather does not exceed 1.5m in height and occupy less than 50% ground cover, allowing the persistence of herbaceous vegetation.

The Arsi Mountains are the central range of the mountain nyala with the Bale Mountains comprising the southern most range and the Ahmar Mountains, including the Din Din and Chercher Mountains, representing the northern most range. The first

specimen brought to the west was shot by Major Buxton on Mt. Baddu in 1910, which is centrally located in the Galama Mountains. Most of the early hunting expeditions for mountain nyala took place in the Arsi Mountains (Osgood and Fuertes 1936, visited 1926; Maydon 1925, visited 1924; Sanford and LeGendre 1930, visited 1929). By most of these accounts, nyala were plentiful. Maydon (1925) described the slopes of Mt. Chilalo as being pitted with nyala footprints, and it was common to see 30-40 in a day. Sanford and LeGendre (1930) found nyala difficult to find on the Galama Ridge, but found Mt. Kaka to have plentiful numbers. Most of the nyala taken by sport hunters were in the ericaceous zone, where visibility allowed greater opportunities. The large bulls, however, have been reported to be seldom seen in the open heather and prefer the security of the forest and dense stands of *Erica* (Mellon 1975, Roussos 2000).

Leslie Brown (1967) surveyed several parts of the Arsi Mountains in 1966. By this time, the flanking forests had already disappeared. He reported nyala, or signs of, in all areas that he visited from Mt. Kubsa to the Galama Ridge and Mt. Bada. He estimated their population in Arsi to be 700, but stated that nyala are "now a scarce and beleaguered species existing in a fraction of its previous habitat." About the same time, James Mellon (1975) reported similar conditions from his hunting experiences in the Arsi Mountains, suggesting nyala densities were highest near Mt. Badda with few inhabiting areas around Mt. Chilalo or Mt. Kaka.

During the late 1980s, the Galama Mountains were still considered to have promising nyala hunting opportunities because they produced the large majority of trophy animals (Roussos 2000). Although deforestation was nearly complete by this time, large stands of heath still remained and provided adequate habitat for nyala populations. The establishment of a permanent hunting camp in 1988 centered on the eastern slope of the Galama Ridge by a professional outfitter provided local employment, and to some degree, security against illegal poaching and excessive burning of heath. However, the fall of the Marxist Derge regime in 1991 resulted in a period of instability throughout Ethiopia. Poaching during these years greatly increased nationwide as weapons distributed and sold by ex-military soldiers infiltrated rural communities. In addition, hunting was temporarily suspended between 1993 to 1996 while regulations were being revised under the new federal government. During these few years, there was little monitoring of human activities; therefore, uncontrolled burning and illegal poaching became increasingly widespread. Minimal hunting resumed for only two years and then ceased due to inadequate wildlife populations and the extensive loss of habitat (Roussos 2000). In 1999, the Ethiopian Wildlife Conservation Organization conducted a census of mountain nyala estimating the population to be 377. No nyala were reported on western slope of the Galama Mountains, but 41 were seen on the eastern slope. In 1999, Sillero-Zubiri (pers comm..) visited Mt. Kaka and saw a group of three nyala

In 2000, as part of a preliminary assessment of human impacts on the Galama Mountains, the authors of this report led a series of field studies to determine health and risk of the area's flora and fauna. As part of this work, we employed six experienced game scouts from a past professional hunting outfitter who were very knowledgeable of the distribution and behavior of local wildlife to monitor the north, central, and southern

portion of the Galama Ridge to record sightings of all wildlife. Each portion of the ridge was surveyed simultaneously every day for ten weeks by at least one scout. Mt. Chilalo, Mt. Kaka, and areas below 3,500 m were not included in the surveys, although we did inquire about mountain nyala and Ethiopian wolf populations through a series of interviews with local people and resource managers (Kadir, 2000, Kubsa 2000, Gemeno 2000).

These surveys were intended to guide future research objectives, and we recognize that our observations were not supported by scientific or statistical methodology. However, our efforts, at minimal, are as accurate as previous observations and we are comfortable stating that mountain nyala populations in the Arsi Mountains range between 125 to 150 individuals. We believe that there are approximately 80 to 100 nyala inhabiting the Galama Mountains, approximately 10 to 20 around Mt. Chilalo, and 30 than 40 on Mt. Kaka. According to local informants, mountain nyala are believed to have relocated from Mt. Kaka and moved to the lower elevation Munessa/Shashamane National Forestry Area to the west which offers better habitat and less human disturbance.

On the Galama Mountains, most nyala were reported to be on the northern end of the ridge; in lower elevations of the ericaceous zone near the remnant montane forest on the eastern slope; and in close proximity to the Afforestation Areas. Guards at the Afforestation Areas in Bokoji reported seeing small groups of nyala on a regular basis and during our brief visit to the site we encountered a group of twelve. This was the largest group recorded by our study. Our estimates of Mt. Chilalo and Mt. Kaka are based solely on interviews with local community members who reported seeing nyala in cultivated fields occasionally. Although human activities now isolate Mt. Chilalo from the Galama Mountains, we believe that movement of nyala between areas may still occur. However in 2002, J. Malcolm visited Mt. Chilalo and did not see any nyala or signs of them.

Our study concluded that mountain nyala populations in the Arsi Mountains may be at a historic low and could continue to sharply decline. Habitat loss from agriculture and deforestation, and degradation from uncontrolled burning are the greatest threats to mountain nyala and other wildlife species. Landsat satellite interpretation from 1989 and 2000 show that cultivated lands have continued to expand into the ericaceous zone. For example on the western slope of the Galama Mountains, between 2800 and 3400 m, agriculture has increased from 28,160 ha to 31,980 ha, while the heathlands and forests have been reduced from 18,987 to 16,030 ha, and 1,805 to 942 ha respectively Waltermire unpublished work). Although the Galama Mountains are a federally designated Forest Priority Area (EFAP 1994), few resources have been allocated to prevent further degradation or protect the landscape. In the absence of adequate law enforcement, an active conservation initiative, cooperative participation among weredas, and invested hunting outfitters, we believe that mountain nyala populations in the Arsi Mountains could cease to exist in the next eight to ten years.

MUNESSA

Munessa is a district and town in the Arsi region. It lies on the eastern slopes of the Rift Valley. A ridge of woodlands runs in a north south orientation to the east of the town at an elevation of about 2400m. The woodlands lie between Lake Langano which is as close as 10kms on the West and Mt. Kaka, the SW extension of the Arsi Mountains, which is 25kms to the East. The woodlands used to run for more than 60kms extending south to the area of Wondo Genet. Continuous tree felling over the past 40 years at least has reduced the tree coverage in the south and the woodlands now extend over about 40kms varying in width from 4-8kms. An area of 120 km^2 is owned by Shashemane Wood Industry Enterprise and run as a soft wood plantation growing mainly Cypress. The Enterprise, which started in 1969, attempts to keep cows out of the plantation.

Mountain nyala were not known from Munessa when Brown did his surveys in the 1960's. They appear to have flourished in the plantations. There is now a hunting block in the area. I visited the area in April 2002 and EWCO estimated the number of nyala in 1995 and 1999.

Habitat

Conifers cover most of the area. Growing 12-18m, they cut out light to the ground and have little understory vegetation. Blocks are felled and weedy herbaceous vegetation colonizes within two years. Fields of maize and barley and pastures abut the plantations. In Figure it is possible to see a paler zone interdigitating along the drainage lines with the darker conifers. This is the native forest which remains on the steeper areas and in a few of the flatter areas that have never been cleared. Native woodlands appear to occupy from 15-20% of the area. *Podocarpus* is the largest tree with *Dombeya* and *Pittosporum* common. The canopy is at 20-30m with a tangled shrub layer and lianas.

The population

Working with two experienced trackers, I saw nyala on three of the four times that I went looking. We saw one herd of 13 females with a single male and on later occasions saw a party of four and two males jousting. Droppings and footprints were common. The nyala were all using the native woodlands (although their tracks led across the plantations). They were browsing on the herbaceous layer of the forests.

EWCO counted nyala in Munessa using a transect method in 1995 and 1999. Their figures were 95 and 81 animals respectively. I saw several nyala but with the assistance of people who knew the population and had scouted the area before taking me out. I did not find out the full area over which the nyala roam. Given the secretive nature of nyala my guess would be higher than the EWCO estimates and would be closer to 200 animals.

Conservation issues

Mountain nyala have been able to survive in an area where domesticsherds and farming have been excluded. This population of the species is living almost 500m lower than any other and indicates that the species might have occupied large woodlands zones in the past.

Shashemane Wood Industry Enterprise encourages the nyala. They receive some direct compensation from hunting fees. They employ one man to act as a game scout and work with hunters and tourists. One other man left the Wood Industry to become a free-lance tracker for the hunters.

The area cannot be effectively patrolled by one man and illegal grazing occurs. My visit coincided with the annual holiday for the Oromo people which is traditionally celebrated by a group hunt. Twenty of the plantation's workforce were mobilized in case of incursions but the day past quietly. However, the next morning we saw two men riding through the forest with spears, and the guard was sure that they were after nyala.

Hunting brings revenue and indicates the value of the wildlife resources to the population. In addition Munessa is very close to the most popular resort destination for people living in Addis Ababa namely Lake Langano. An expensive safari lodge (Bishan Gari) has recently been built on the Munessa side of the lake. Developing the area for wildlife viewing seems very possible.

DIN DIN

The mountains flanking the Rift Valley subside NE of Arsi to reemerge 50 kms later as a steep ridge rising to 3000m. This range is known as the Chercher or Ahmar Mountains. Nyala survive at the northern end of the range and there are two hunting blocks with Arba Gugu lying south of Dindin. I visited Dindin in March 2002 and talked with Thomas Mattanovich, the hunter associated with the block.

The Arba Gugu block occupies about 25kms of the ridge and is up to 10kms wide. Farming occurs both below the forested ridge and on parts of the plateau. The forests on the NW side cover the flanks of the main ridge above 2500m and are dominated by *Podocarpus,* and *Schefflera* . Above 2800m to the summit at 3000m, *Raphanus* and, *Hagenia* are common with a few *Hypericum.*. The forests on the SE slopes have more drought resistant species. Spurs from the main ridge have shrubbier vegetation caused by burning and very rapid drainage. These slopes have *Erica* and *Vernonia* as dominants above grass. The vegetation grows to about two meters.

The hunting block is approximately 12 kms long and varies in width from 3-10kms. Using local scouts and a guide from the Oromiya Department of Natural Resources, we scanned for nyala from vantage points in the morning and evenings. In four sessions we

did not make a direct sighting. However we found very fresh tracks saw droppings and other game guards saw nyala in the vicinity. According to the scouts, nyala are found above 2700m, and occur mainly on the wetter NE slopes. The head scout identified twelve locations where they can be seen regularly.

Nyala have been hunted in the region since at least the mid-1960s (Selassie Haile, pers comm.), but the locality was not mentioned by Brown in his survey in the mid-1960s. T. Mattanovich (pers comm..), the professional hunter, has visited the area since the 1970s. He reports that the population declined in the era of the Derg (1974-1991) when game laws were ignored and the population of nyala has never recovered to the levels of the early 1970s. Hunting census groups have visited Dindin three times, in 1995 and twice in 1999. The population estimate for 1995 was 100. The first group that visited in 1999 saw seven nyala and estimated a population of 116. Later in the same year a biologist from EWCO visited the area but failed to see any nyala and concluded the population had declined. The satellite image suggests that there is probably less than 150km^2 of habitat which includes the high forests and the shrub covered slopes. One hundred and fifty seems like the maximum possible population and the figure of 100 might be reasonable.

There is little human presence in the hunting block at Dindin. No livestock were seen at the high elevations in two days, and there no evidence of tree cutting. This situation exists because T. Mattanovich personally retains a force of 12 game guards to keep people away. The shrub covered slopes burn, and 10 nyala were reported to have died in a fire in the 1990s. Low levels of poaching probably continue..

ARBA GUGU

The Arba Gugu is separated from the Didin block by a narrow neck of cultivated land. I did not visit this area but was able to look over a part of it from Dindin. The elevation and habitat appears to be very similar to that of Dindin although in places there is cultivation on the plateau above the nyala habitat. I talked to Dimitri Assimacopolus the professional hunter with the concession on the area. He reported that the nyala use the steep shrubby slopes as well as the mature montane forest above 2800m. He said that two areas of forest were so steep as to be inaccessible to humans and these areas acted as sanctuaries for the antelope.

Census information for the area is very sketchy. The EWCO estimate in 1995 of 445 seems very high (and could be based on a density of 1/km^2 where in reality the nyala habitat hardly exceeds 100 km^2). An EWCO team in 1996 set an annual quota of three nyala which would represent a population in the neighborhood of 150. Dmitri says that the population is growing and it is now possible to see 20 nyala in a day. A population of 150 seems possible.

I did not have a chance to assess human impact on the area, but Dmitri told me that he has helped the local population restore a church and they have provided some funds for patrols.

KUNI MUKTAR

The ridge flanking the SE wall of the Rift Valley descends and curls eastward past Dindin. The whole ridge used to be extensively wooded and two areas supported mountain nyala, Asbe Teferi, with Kuni Muktar (recorded as Asbe Teferi by Brown) and further to the north Gara Muletta. The species only survives in Kuni Muktar and the fate of Gara Muleta will be discussed below.

Kuni and Muktar are two villages, and each has a patch of native forest associated with it. To the west of Kuni there is a steep ridge from 2300m to the summit at 3074m. *Juniperus* and *Podocarpus* dominate up to 2900m with *Dombeya* the commonest species on the summit. From landsat imagery, it appears that native forests cover about km^2. The native forests lying S and E and Muktar Terara cover elevations from 1500-2700. The nyala habitat is mainly along one steep slope that runs from 2200-2700m and covers only km^2.

A team of biologists from EWCO (Dr. Kifle Argaw, Fanuel Kebede, Almaz Tadesse and Haji Ereso of the Harerghe wildlife office) have recently completed four surveys of wildlife in Kuni-Muktar. They used survey questionnaires and counted nyala in the evening when they emerged from cover. For the first two surveys (Oct 2001 and Feb. 2002), they concentrated on Kuni. They counted 25 nyala in October and 28 in February surveying the eastern or Muktar forests. In the limited habitat available, they were confident that they had seen most of the population.

Kuni-Muktar was established as a mountain nyala sanctuary by EWCO starting in 1989 It had been a hunting block. Three scouts and a biologist were assigned to the area. Fanuel Kebede was the biologist in Kuni-Muktar in 1989 and has campaigned to preserve the area.

Leslie Brown visited the area in 1966 and estimated perhaps $40km^2$ of nyala habitat in the Kuni forest. It is clear that the habitat has been reduced by at least 50%. The EWCO team report extensive forest clearance for cultivation in both the Kuni and Muktar areas. In February 2001 an outpost of 20 soldiers on Muktar Mountains were subsisting on wild animals. The skulls of five bushbucks were lying around the camp.

Fifty nyala may persist in the two patches of habitat. This is down from an estimate of 100 given by Brown in 1966. It is perhaps remarkable that the population of nyala has persisted so long in this pocket of habitat. Indeed Ian Grimwood, the consultant head of Ethiopian Wildlife in 1963, considered the population doomed at that time (Brown, 1966).Control of the tree felling will be necessary for long-term survival.

Two factors favor nyala. First it is typical in this area that forage for livestock is cut by hand and carried back to the homestead. This reduces the disturbance to nyala. Second German Aid (GTZ) has financed some softwood plantations. A new plantation of cypress (Cupressus lusitanica) provides protection for nyala.

Historic and potential habitat

The species is known to have been extirpated from one area (Wondo Genet). As described above, the species range has also shrunk within the areas where it still exists notably in both the Bale and Arsi Mountains. However nyala have been reported from several other areas but their presence never confirmed. Identification is a problem as it is not always easy to distinguish mountain nyala from greater kudu. Immature kudu can have horns that are very similar in shape to those of an adult nyala and although kudu typically have vertical stripes on their flanks while nyala have only spots, this character is not completely reliable. Similarly most kudu have paler coats than most nyala, but there is overlap on this trait too. The two common languages spoken in the species range do not distinguish between kudu and nyala both being called Agazin in Amharic and Gedemsa in Afaan Oromo.

Historic Location

WONDO GENET

The forests of Wondo Genet cover a basin that rises steeply from 1800m to 2100m 15 km from the north end of Lake Awassa in the Rift Valley and kms SE of the town of Shashemane. These forests represent the extreme western edge of the ridge which extends westward from the Bale Mountains. The forested area covers about 28km^2 but there is extensive cultivation in the forests .Potential nyala habitat covers no more than 15km^2 .

The species occurred in these forests in the 1960s and 1960s (T. Mattanovich pers comm.; Ward,1975). When I visited in February 2002 one of the local guides, aged about 12 years, said that he could show me mountain nyala but we were unsuccessful and there was no sign of the species. This area is regularly visited by tourists and nyala would be seen if they were present.

Possible Locations

GARA MULETTA

Gara Muletta would be the most north-westerly location for the species on the ridge that flanks the Rift Valley. It is an isolated, rocky peak rising to 3405m. It is 40km due East

of the city of Harar and almost 90km NW of Kuni where the nearest extant population of mountain nyala survive.

There have been occasional reports of nyala from this area for many years. Leslie Brown visited the area in 1966 after a nyala was reported to have been shot. He inspected the skin (but not the horns) and could not tell if it was a dark kudu without stripes or a nyala (Brown, 1966). He reported that the habitat was unlike any of the nyala habitat he had surveyed. There was little tree cover, with grass and rocks at the higher elevations. In 2001 a team from EWCO visited Gara Muletta for two weeks and found no evidence of the species. (Duressa et al. 2001).

ADOLA/KEBRE MENGIST

An area in the Sidamo region about 120kms South of the closest nyala habitat in the Bale Mountains has often been quoted as supporting the species. The area is called Adola and the main town is Kebre Mengist. Leslie Brown (1969) mentions the area as does Befekadu (2001). In 2002 I heard reports of horns from hunted antelopes that looked like nyala from this area. (H. Pohlstrand pers. comm.).

I visited the area in April 2002. The elevation ranges from 1700-2200m and extensive woodlands persists. A steep slope above the town of Kebre Mengist appears to have undisturbed forest. It is mainly *Schefflera/Aningeria* with a dense understory with many lianas. Smaller patches of forest in flatter areas usually have villages close to them. The patch that I walked though had well-marked cattle paths (although black and white colobus (*Colobus guereza*) and bushbuck were present)

I worked with Daniel Kebede of the Natural Resources Office of the Sidamo Regional Government in Kebre Mengist. He did not know of any reports of mountain nyala, but volunteered to query others in the area. No reports were forthcoming. He did report that the forest reserve is largely intact and that a ban on selling native wood has caused several sawmills to relocate

Although hunting by the local people is not common, there are certain days in the Oromo culture when group hunting is permitted. On those days hordes of men with guns or spears scour the area. Mountain nyala have not been reported killed.

Although the landscape appears wooded, most of it is penetrated by humans and their cattle every day. The areas of relatively undisturbed forest are probably small. The absence of any evidence either from sightings or hunters kills make me doubt that any nyala live in the area.

AGERE MARYAM

The town of Agere Maryam is 80kms west and slightly south of Kebre Mengist, in the Sidamo Region. It is about 180kms from the nearest known nyala habitat in the Bale Mountains. It remains densely wooded and as with Kebre Mengist, there have been

reports of sightings of mountain nyala in the area (T.Mattanovich pers. comm..). I did not visit the area although it is accessible on the main north/south road connecting Kenya and Ethiopia.

Although it would be interesting to check, the area is densely inhabited and seems more suitable for greater kudu than mountain nyala.

SHEIK HUSSEIN

Some forested high ground about 15 kms South of the sanctuary of Sheik Hussein may contain nyala (H. Pohlstand pers comm.). One peak in the area rises to 2630m (at N 7^0 28' E 40^0 32) and forest appears to exist on a slightly lower peak 10kms to the NE. This area is planned to be assessed by the Ethiopian Wolf Project.

Summary of mountain nyala numbers.

Table 2.2 compiles the best estimates of the numbers in 2002 from the locations reported above. The various methods used to arrive at these numbers are given under the locational information The total number must be considered as highly tentative.. It is difficult to census a shy woodland antelope and I did not have time for more a brief visit to most sites. The number of about 2000 corresponds to two other recent estimates by East (1998) and Sillero Zubiri (in press). Even if these numbers are 100% too low, there is little doubt that the species has declined drastically since the 1960s when Brown (1969) estimated a world population of 7-8000.

Table 2.2
Estimates of Mountain Nyala population numbers

AREA	NUMBER
Kuni Muktar	50
Din Din	100
Arba Gugu	150
Munessa	200
Arsi	130
Bale	1450
TOTAL	1980

CHAPTER THREE

CONSERVATION ISSUES

I. HABITAT

The mountain nyala has been considered a habitat specialist (Brown, 1969) occurring mainly above 3400m and being particularly common in the heath zone. It is now clear that the species is capable of persisting in a wide range of habitats from 2500m to 4300m. The vegetation where the species is found ranges from closed canopy woodlands to grasslands, heathlands and open alpine moorlands. The diet of the species where it has been studied in the Bale Mountains is quite varied with leaves, fruits and twigs together with some fraction of grass. It may have a wider diet than some of the other members of the Tragelaphine antelopes.

The restricted range of the species seems to be related to patterns of human disturbance. Nyala in several places e.g. the Chercher Highlands and in the W. Bale Mountains occur in steep wooded areas where livestock do not penetrate. In addition an important element of the habitat is sanctuary or refuge areas where the species can hide particularly in the middle to the day.

The absence of the species from two large areas, namely the southern forests of the Bale Mountains and from all areas North and West of the Rift Valley require an explanation. The Harenna Forest on the southern slopes of the Bale Mountains is the largest expanse of montane forest left in Ethiopia (Malcolm, 1995). It extends from 3500m to 1500m. The nyala that Arnold Hodson shot in 1916 may have come from the upper levels of the forest but there are no records since then. People live in the forest and there are well-traveled pack roads. If nyala were common, they would be recorded. The whole area is used by the Oromo and their livestock and it seems likely that the levels of human disturbance have precluded nyala for at least a century. Kingdon (1997) suggested that the lower limit of the nyala's range was set by competition with its congener the greater kudu, a more arid adapted species.

Mountain nyala have only been reported from the South and East side of the Rift Valley. Suitable habitat appears to be present on the other side of the valley. In the ice age that ended 15,000 years ago, very large parts of the Ethiopian plateau had montane vegetation. It is not clear if the mountain nyala is a recent species that has never

expanded from its initial range or whether it is a relict (Gentry in litt.) restricted to a small part of a former range.

II THREATS

Factors in the species decline will be discussed from most to least damaging.

Habitat Loss

Cutting trees whether for firewood or to permit farming is the most permanent destruction of habitat. War and disease in the nineteenth century probably saw some reduction in the human population in the range of mountain nyala. However, the number of people has been rising steadily since the start of the 20th century. Deforestation has been occurring incrementally all the time. Nyala were recorded in forests around the edges of the Arsi heathlands by hunters in the 1920s and 1930s where there are only fields today. The new road built across the Bale Mountains provided access to wooded slopes south of the town of Goba. Over a period of 20 years the closed canopy forest of *Hagenia* and *Rapanea* has been whittled away with only remnant trees left standing and livestock grazing on the new sward.

Since the species was noticed by the west, the range of the mountain nyala has probably shrunk from 10-20% due to deforestation. These forested areas were probably excellent habitat and could have supported many animals. The process is continuing in a few areas e.g. Kuni Muktar, but in many places the species has retreated to places that are inaccessible to farming and impractical for wood collecting.

Human Disturbance

1. Attitudes towards nyala

In May 1991 when the central government fell, people living around Dinsho in the Bale Mountains resettled the National Park and shot nyala indiscriminately. Since that time the wildlife authorities have paid considerable attention to the attitudes of the people in the area (e.g. Regassa, 1992; GebreMarkos et al. 1994; Flintan, 2000). The population of nyala living in the Gaysay area close to Dinsho is the largest surviving and the cooperation of the people in the area is crucial for their survival.

The Dinsho/Gaysay area is a rich montane grazing area well known for its mutton with a tang of African sage (*Artemisia afra*). However cattle remain the foundation of the grazing economy. Increasingly people have tried to cultivate barley at higher elevations, and almost every household cultivates as well as keeping livestock. The people are of the Oromo ethnic group and mainly Muslim. Traditional forms of government by elders coexist with the modern governmental infrastructure of village chairmen and deliberative councils.

People have been forced to leave their land on four separate occasions in the last 40 years. A Belgian sheep farmer was given land close to Dinsho in 1963. Those living on the land, owned at that time by an Amharic landlord, were moved out. Some Oromo were relocated when the National Park was established in 1970. In 1980 an area was added to the Park just North of Dinsho. This provided a valuable corridor for nyala. More recently, in1999, the Oromia Government has attempted to maintain the boundaries of the park by moving people out. In most cases an attempt has been made to find an alternative site for those displaced. However there is always disruption, and few of the alternatives are as desirable as the old location. There has been no direct compensation. In addition to relocation, the park also made access to traditional prayer and burial sites more difficult (Ragassa, 1992). (On the other side, the park has never limited access to mineral springs located in the park and many thousands of cattle are herded to these places.)

Five villages surround the Gaysay area (Dinsho, Soba, Karari, Gofingera and Gojera). Flintan (2000) estimated a population of 10,800 people in 1999. The annual growth rate is around 5%. Approximately 66% of boys and 37% of girls attend the primary school in Dinsho. From 1994 figures the five villages have 9500 cattle, 11,000 sheep and 4000 other animals (goats, horses, mules and donkeys).

Gauging attitudes is difficult as people are wary of officialdom. Flintan (2000) after talking to 29 villagers found their attitude towards the National Park and nyala accepting. Government officials had told them of the importance of the park and they acceded. In at least two villages, nyala raided their barley fields at night and they accepted this too. In 1994 (GebreMarkos et al. 1994) the elders in Dinsho said that they had defended the park in the troubles of 1991 and continued to support it. They were hoping that the tourist trade would bring the long-promised benefits. In 2000, many respondents recognized that the park had donated a clinic to Dinsho in 1996. It provides some simple medical services but had already fallen into disrepair by 2002 from lack of maintenance.

On the negative side, many villages refused to accept that they were living inside the park boundaries, even when maps were readily available (Flintan, 2000). All of the programs of relocation have produced bitterness. The largest and most authoritarian program instituted under the communist Derg regime in 1985 appeared to cause the most resentment. During the uprising of 1991 all the land emptied 6 years earlier was reclaimed and the park authorities have been unable to exclude cattle from several areas that were not grazed from 1970-1991.

Attitudes towards nyala outside Bale are even harder to assess. They do not appear to impinge directly on the lives of many people and are not seen as competition. The problem of occasional hunting is discussed below. Ragassa (1992) was told of a man in Bale who nursed a wounded nyala calf in his hut.

2. Illegal Hunting

Many men in Ethiopia carry rifles and the potential for the unfettered use of these firearms against nyala was seen in the Dinsho area in 1991. The number of animals killed

is unknown but probably 2-300 over a period of four months. This episode stands in marked contrast to the usual situation in which the shooting of nyala is rare. Group hunting on horseback with dogs and spears occurs mainly around an Oromo holiday in April but few nyala are affected. Horns and other remains have been collected when found by park staff in the Bale Mountains National Park. About two a year are found (Woldegabriel, 1996). In most cases the ivory colored horn tips have been cut off. They are used as nipples in baby's bottles and have some prestige value. Ten pit traps (two meters deep and one meter wide), one live trap and one snare were found in the Kuni Muktar area (Kifle Argaw, 2002) on the edge of the cultivated zone. Although warthogs may be the primary target, nyala could be killed.

The impact of illegal hunting does not appear to be too severe. However the populations of nyala everywhere outside the Bale Mountains is so low that even an occasionally poached animal can affect the demographics. The situation in Kuni/Muktar where farmers are eliminating all large herbivores may be an exception.

3. The presence of humans and their livestock.

Chris Hillman (pers. comm.) observed that he never found mountain nyala in the vicinity of cows. This result helps to explain much of the distribution and abundance of the mountain nyala. The major changes in the distribution of nyala in the Bale Mountains in at least three places can be related to the prevalence of livestock.

In 1966 Leslie Brown saw 30 nyala in a single day on the slopes above the town of Goba. He estimated that the species reached their peak density in the area. In 1974 a road was built through the area where Brown walked. Vehicles and livestock use the road. It has also been used as a census transect by the National Park. No nyala have ever been recorded along that part of the road where Brown walked or in surveys off the road. Gradual deforestation and human settlement along the road (see habitat loss above) has now eliminated any possible nyala habitat.).

The largest population of mountain nyala occurs around Gaysay Mountain. Its fortunes have been closely tied to the levels of disturbance from humans and livestock. Over a period of more than ten years from the establishment of the park when livestock grazing was curtailed, the population of nyala increased dramatically. The herds of 4-500 animals seen in the mid to late 1980s probably reflected both fecundity and in-migration. Groups of nyala were visible in the middle of the grasslands 200m from the nearest tree cover. Immediately following the uprising of 1991, the number of nyala estimated in from census transect fell from 1760 to 145 (Woldegabriel, 1996). Although many were shot, many animals must have moved out of the area. Since 1991 the National Park has been able to exert its control on a part but not the entire nyala habitat. The estimated population in 2001 of 320 (Befekadu, 2001) reflects the reduction in habitat.

A third area where nyala seem to have disappeared from the Bale Mountains is in the western part of the peaks. This is mainly heathland, and Brown recorded a dense population in 1966. Nyala are no longer seen in the area. It is clear walking through the

area that it is all grazed, and much of the tall heath seems to have been burnt. Some sense of the increase in livestock in the mountains can be seen in Figure 3.1. The average number of cows seen on census drives across the alpine plateau has increased from to . Data from the Web valley, the main drainage in the middle of the peaks are reveals a similar pattern.

In Bale the presence of livestock excludes nyala. In some of the other surviving populations it is the absence of cows that allows them to survive. The forestry plantation at Munessa does not permit grazing, probably permitting the nyala to remain. In Dindin and Arba Gugu very steep slopes and some patrols by game scouts also keep cattle out. Even in the western part of the Bale Mountains, nyala seem to survive in a zone where livestock are not herded.

The exact relationship between livestock, humans and nyala needs further investigation. The nyalas' reactions seem to change at night when they become bolder. The nyala by Gaysay are also acclimated to the main road which is heavily used by vehicles, horse riders, pedestrians and livestock. The nyala are often within 150m of the road. They have also become tame in the sanctuary area around Park Headquarters where their flight distance is as low as 30m.

4. Burning

Heathlands are fire prone and much of the area covered by giant heather (*Erica* and *Philippia spp*) in the range of the mountain nyala is burnt. Left unburnt the heath forests can grow to 10m in protected areas and 4-5m in more exposed locations. (Miehe & Miehe 1994). Fires ignited by lightening have been present over geological time. Humans have probably been starting fires for several millennia at least. Photographs of the Arsi Mountains taken in 1926 (Sanford, 1930) show a mosaic of heather sizes from less than 1m to 6m tall suggesting that burning was common at the time.

The frequency of fires has probably increased with human density. Fires are started for several reasons: It facilitates the collection of firewood if the leaves are burnt off; it opens the canopy and encourages grass on which the livestock can feed; it permits visibility and reduces the discomfort of walking or riding through the springy and often wet heather stems. Continual burning can eventually eliminate the heath. In parts of the Bale Mountains large heather stumps are still present but the living heather is less than a meter high with a sward of grass and small herbs. On the alpine moorlands Miehe & Miehe (1994) believed that the heather was replaced by *Helichrysum* scrub with heavy burning.

The impact of heath burning on the mountain nyala is complex. The species may benefit from the opening of the habitat and the grass community that follows burning. Nyala are often seen in areas that have been recently burned (e.g. Brown, 1966). However burning may eliminate the patches of tall heath which are critical lying-up areas for the species. Small stands of mature heather up to 8m tall occur up to about 4100m in the Bale Mountains. They persist in protected, often rocky, locations. However, the number of

such patches has been declining over the last 20 years corresponding with the increase human traffic over the moorlands.

Forest fires below the heather zone may affect nyala particularly in the small habitat patches where the species survives. A fire in the forest of Dindin in the Chercher Mountains may have killed several nyala because they had not means of escape off the mountain ridge. However, as in the heath zone, nyala appeared to be foraging mainly in areas that had been burned in the past.

Predators and Parasites

There is almost no information on the non-human factors that could regulate populations of mountain nyala. Both leopards and spotted hyenas could kill nyala calves, and both predator species occur in the range of the nyala. Spotted hyenas subsist on livestock and are present throughout the nyala's range. Leopards are uncommon away from tree cover and most common in wooded habitats. Many Oromos keep dogs and these animals could chase and kill nyala calves. However there are no eye witness accounts of predation except for a group of warthogs attacking a newborn calf in the woodlands around the Park Headquarters in Dinsho in the Bale Mountains (Woldegabriel, 1996).

There are no data on the role of parasites or disease on mountain nyala demography.

As in many ungulates fighting between males seems to exact some cost. Broken horns are common.

LEGAL HUNTING

From the moment the first mountain nyala specimen arrived in London in 1910, it was immediately adopted as an important trophy animal. The horns are large and spectacular and its remote home guaranteed an adventurous hunt in the wild Ethiopian mountains. James Mellon, editor of an imposing volume called African Hunter (1975) considers the mountain nyala and the bongo as the only two trophies worth shooting more than one specimen. Virtually all we know of the nyala until 1960s comes from hunters reports, particularly the large expeditions in the 1920s launched by the Field Museum in Chicago (Fuertes & Osgood, 1936) and the American Museum of Natural History (Sanford, 1930). Both these museums still have dioramas of mountain nyala killed on these expeditions.

Up until 1965 hunting was largely unregulated although regional governors of the imperial regime granted permission. With the creation of the EWCO, a system of hunting blocks and fees was established. From about 1993-1996 there was a ban on all sport hunting in Ethiopia. Mountain nyala occur in six of the country's 17 hunting blocks. Two of these blocks are not currently used as nyala are too rare. There are six licensed professional hunters in Ethiopia and they can buy the rights to hunt in one of the blocks. Their clients pay US$5000 to shoot a mountain nyala (lion $2000, elephant $10,000). The

professional hunters mount quite lavish expeditions for their clients and many have permanent campsites in 'their' blocks. The professional hunters make use of a network of scouts to locate animals. The prey is usually stalked although in the past men were often dispatched to drive nyala from cover towards the client.

The impact of legal hunting is two-edged. For a species with a world population of less than 3000, any culling is risky. At the same time, the professional hunters are doing more for mountain nyala conservation than any other group in Ethiopia. To start with the positive, the Ethiopian Government has collected from US$50,000-100,000 each year from license fees. (Only a part of which comes back directly to EWCO). Safaris to hunt mountain nyala are usually luxurious and bring more revenue into the country. In addition people are employed by the professional hunters in their camps and more importantly as game scouts. All four professional hunters active in Ethiopia retain local people in their hunting blocks to promote their interests. This may include patrolling, persuading people to relocate out of the best hunting areas and monitoring nyala populations. At least two of the hunters have maintained camps when hunting was banned. When I was traveling in Arsi in 1994, people expressed distress that the hunting camp was not used.

The negative side of sport hunting is simple. The species is currently hunted in four small patches of habitat. Estimating the exact population size is almost impossible and human encroachment is increasing throughout. The survival of these populations is tenuous and the shooting of any member of the population can only make matters worse.

CHAPTER FOUR

CONSERVATION ACTIONS

EX SITU

The world population of mountain nyala is sufficiently low that it might be pushed below the point of recovery by disease, civil strife or other stochastic events. A population in captivity and captive propagation could represent a lifeboat. The prospects for ex situ conservation will be considered briefly.

1. Captive propagation

There are two records of groups in captivity and both groups died as a result of the Second World War. There have been none in captivity since then

An animal dealer in Dire Dawa supplied the collecting firm of Hagenback's with a male nyala calf in 1932. It was bought by the West Berlin Zoo for 3000 marks. Two years later a female calf was bought from the same source. They were housed in a small outdoor pen. Despite advances made by the female towards the male, no young were produced. The female died in 1940 and the male was killed in a bombing raid (Raethal, 1980).

A. M Taibel (1948) was sent from Italy to form a captive herd of mountain nyala. On his first collecting expedition on Mt. Kaka in Arsi, 200 beaters flushed a herd of 12 nyala which they pursued until all the animals died of exhaustion. After that he offered a reward for calves brought to him alive. He received two newborns, one with a spear wound. They were hand fed and the female calf formed a strong attachment to her keeper. After 10 months in captivity, Taibel was called away on military duty and both nyala succumbed to a 'plague'. A third calf was collected in early 1941 but was killed in an ambush by rebel troops at which time Taibel also lost his notes on the species.

All of the Tragelaphine antelopes, with the exception of the mountain nyala, have been bred in captivity. Care must be taken as males can be aggressive to their own and other species especially if they are hand raised. In contrast females can be very timid unless they have been hand raised.(J. Christman, pers. comm..)

A self-sustained captive population would require 30-50 animals and would cost probably US$400,000/ year. The capacity to save a few animals in a time of emergency would be less expensive.

2. Other approaches

New technologies exist to help maintain genetic survival. Surrogate motherhood has been used on species related to the mountain nyala, namely the eland. Fertilized eggs from a bongo are brought to term in the womb of an eland (Dresser, 1988). The technology for the frozen zoo has also progressed in recent years. Freezing sperm is easy, but it now possible to store both fertilized and unfertilized eggs ()

All ex situ techniques require that animals be captured. Techniques for immobilizing antelopes are safe and reliable but have never been tested on this species.

A species will not survive and evolve without habitat. Ex Situ techniques may be needed as a short term haven if survival in the wild is impossible. However efforts at ex situ methods should in no way detract from conservation in the wild.

IN SITU

This section will be short. The general conditions that favor mountain nyala seem clear. The species requires sanctuary areas for concealment during the day and minimal disturbance from livestock and people. Within these constraints nyala can occupy a range of habitats from 1700-4000m.

60-80% of the world's population survives in the Bale Mountains. The other five populations are small and vulnerable. If resources are limited efforts should be made to secure the population in Bale.

The Bale Mountains National Park is run by the Oromia Department of Natural Resources. It is staffed with a warden, four junior experts (recent graduates with a background in biology or forestry), 15 game scouts and a bookkeeper. There is a stable of 15 horses. This staffing level is considerably lower than in the past. In 2002 the park had a working vehicle only intermittently, and the warden had to catch lifts to attend meetings in Addis Ababa.

EWCO has been successful in encouraging nyala in the Gaysay area of the Bale Mountains National Park. It is a measure of their success that the largest and perhaps only viable population survives in this area. The challenge remains to work with the local people to regulate the grazing so that the nyala can continue to flourish.

Currently about a quarter of the Gaysay population rests during the day in a patch of trees around the Park Headquarters, which is detached from the rest of the National Park. These animals have to cross, and frequently forage from, farmland each evening. Conflicts with the farmers occur. There are several possible solutions. It might be

possible to plant shelter trees in the National Park or to buy land to create a corridor from the Park Headquarters to the Park.

The Bale Mountains have tremendous potential for ecotourism. The local people have long been promised benefits from the tourist industry but the flow of visitors remains a trickle. A smooth road from Addis Ababa would be a great improvement but some investments in hotels and restaurants will be needed to accommodate visitors in Dinsho.

If a significant population of mountain nyala exist in the Oto Bulu area east of Goba, it would be important to secure this area to the extent possible. This would be another reason for a Park outpost in the area above Goba which would provide EWCO presence on the Sanetti Plateau as well as in the surrounding forests

Trophy Hunting

As detailed in the last chapter, sport hunting can yield important benefits. However quotas have to be strictly controlled. Menassie Gashaw (pers comm. February 2002) said that EWCO followed guidelines provided in Bothma (1989) to allow 5% of the male population to be harvested annually. This is reasonable if the population is stable and if there are good census data. For most of the hunting concessions neither of these conditions applies and extreme caution is necessary. The Soba hunting area on the NW of the Bale Mountains National Park attracts male nyala from the National Park. Any quota above two males per year in this area probably represents a harvest on the Park population.

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