6.4 Ethiopian wolf
Canis simensis Rüppell, 1835
Endangered – EN: C2a(i), D (2004)

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Other names
English: Simien fox, Simien jackal; **French:** loup d'Abyssinie; **German:** Aethiopienfuchs; **Italian:** volpe rossa; **Spanish:** lobo Etiope; **Indigenous names:** Amharic: ky kebero; Oromo: jedalla farda (Ethiopia).

Taxonomy
Canis simensis Rüppell, 1835. Neue Wirbelt. Fauna Abyssin. Gehörig. Saugeth., 1:39, pl. 14. Type locality: "…in den Bergen von Simen…" [Ethiopia, mountains of Simen, *c.*13°15'N, 38°00'E].

Gray (1868) placed this species in a separate genus *Simenia*. Clutton-Brock *et al.* (1976) noted that *C. simensis* is the most distinct species in the genus *Canis*, and suggested close affinity with the side-striped jackal (*C. adustus*) and *Dusicyon* spp. The Ethiopian wolf has also been called the Simien or Simenian fox, but is not closely linked to the *Vulpes* group (Clutton-Brock *et al.* 1976), and Simien or Ethiopian jackal, suggesting a close relationship with jackals (Rook and Azzaroli-Puccetti 1997). Other vernacular names used include Abyssinian wolf and red fox, denoting the difficulty faced by naturalists in cataloguing this species correctly.

Phylogenetic analysis using mitochondrial DNA sequencing suggested that *C. simensis* is more closely related to the grey wolf (*C. lupus*) and the coyote (*C. latrans*) than to any African canid (Gottelli *et al.* 1994), and that the species may have evolved from a grey wolf-like ancestor crossing to northern Africa from Eurasia as recently as 100,000 years ago (Gottelli *et al.* 2004). There are fossils of wolf-like canids from the late Pleistocene in Eurasia (Kurtén 1968), but unfortunately no fossil record of *C. simensis*.

Microsatellite and mitochondrial DNA variability in *C. simensis* was small relative to other canid species (Gottelli *et al.* 1994, 2004), suggesting small population sizes may have characterised its recent evolution.

Chromosome number not known.

Description
A medium-sized canid with a reddish coat, distinctive white markings, long legs and an elongated muzzle, resembling a coyote in conformation and size. Males are significantly larger (20%) than females in terms of body mass (Table 6.4.1). The face, ears and upper parts of the muzzle are red. Ears broad, pointed, and directed forward; the pinnae are thickly fringed with long white hairs growing inward from the edge. Palate, gums, and naked borders of the lips entirely black. Characteristic facial markings include a white ascending crescent below the eyes, and a small white spot on the cheeks. The throat, chest, and

Table 6.4.1. Body measurements of the Ethiopian wolf from Bale Mountains (Sillero-Zubiri and Gottelli 1994).

HB male	963mm (928–1012) n=18
HB female	919mm (841–960) n=8
T male	311mm (290–396) n=18
T female	287mm (270–297) n=8
HF male	199mm (193–209) n=18
HF female	187mm (178–198) n=8
E male	108mm (100–119) n=18
E female	104mm (95–110) n=8
WT male	16.2kg (14.2–19.3) n=18
WT female	12.8kg (11.2–14.2) n=8

Claudio Sillero-Zubiri

Ethiopian wolf, Bale Mountains National Park, Ethiopia, 1999.

underparts are white, the ventral part of the neck with a distinctive white band. Pelage is soft and short, ochre to rusty red, with a dense whitish to pale ginger underfur. Boundary between the red coat and the white markings is sharp and well defined. The contrast of white markings against the red coat increases with age and social rank in both sexes; the female's coat is generally paler than the male's. The long, slender legs are reddish outside, with inner aspect white. Front feet have five toes, hind feet with four. The area around the anus is white. There is a short rufus-coloured stripe down the back of the tail, becoming a black stripe leading to a thick brush of black-tipped guard hairs.

The skull is very flat in profile, with only a shallow angle between frontals and nasals. The neuro-cranium is low and narrow, thick, and almost cylindrical. Its width is 30% of the total skull length. Facial length is 58% of the total skull length. The inter-parietal crest is slightly developed, and the coronal ridge is linear. Teeth small and widely spaced, especially the premolars. The dental formula is 3/3-1/1-4/4-2/3=42; m3 occasionally absent. Sharply pointed canines average 19mm in length (14–22mm); carnassials (P4 and m1) are relatively small (Sillero-Zubiri and Gottelli 1994).

Subspecies Coetzee (1977) recognised two subspecies:
— *C. s. simensis* (north-west of the Rift Valley). Nasal bones consistently shorter than those from the southern race (Yalden *et al.* 1980).
— *C. s. citernii* (south-east of the Rift Valley). Redder coat.

A recent study identified differences in the cranio-morphology of wolves on both sides of the Rift Valley (Dalton 2001), but mtDNA analysis from a larger sample of individuals do not support the subspecies criteria of reciprocal monophyly of the northern and southern clades (Gottelli *et al*. 2004).

Similar species Golden jackal (*Canis aureus*): smaller in size, relatively shorter legs, and lack the distinctive reddish coat, white underparts, and throat, chest, and tail markings.

Distribution

Endemic to the Ethiopian highlands, above the tree line at about 3,200m (Figure 6.4.1).

Historical distribution There are no recent records of the species at altitudes below 3,000m, although specimens were collected at 2,500m from Gojjam and north-western Shoa at the beginning of the century (references in Yalden *et al.* 1980). Reported in the Simien Mountains since the species was first described in 1835, but scattered and irregular sightings suggest numbers have been declining. Reported on the Gojjam plateau until early this century (Powell-Cotton 1902; Maydon 1932). South of the Rift Valley, wolves have been reported in the Arsi Mountains since the turn of the century, and, more recently (1959), in the Bale Mountains. Reports of small populations in North Sidamo (Haltenorth and Diller 1980) may be in error. There is no evidence that the Ethiopian wolf ever occurred in Eritrea (Coetzee 1977).

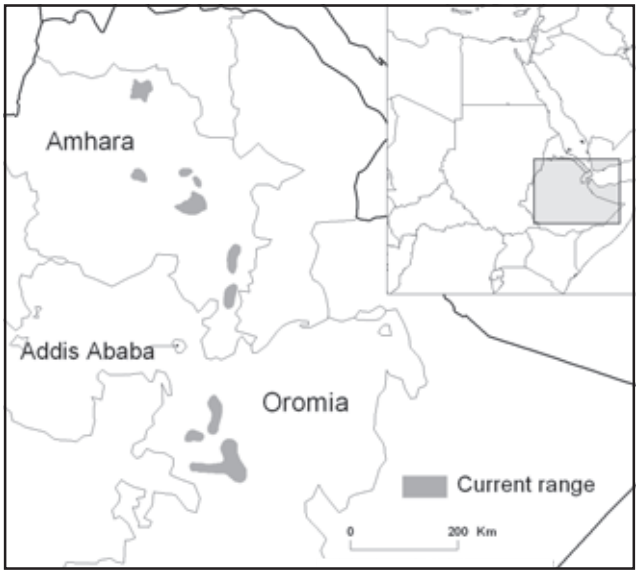

Figure 6.4.1. Current distribution of the Ethiopian wolf.

Current distribution Confined to seven isolated mountain ranges of the Ethiopian highlands, at altitudes of 3,000–4,500m (Gottelli and Sillero-Zubiri 1992; Marino 2003). In the northern highlands wolves are restricted to land above 3,500–3,800m by increasing agricultural pressure (Yalden *et al.* 1980; Marino 2003). Wolf populations occur north of the Rift Valley in the Simien Mountains, Mount Guna, North Wollo and South Wollo highlands, and Menz. Recently extinct in Gosh Meda (North Shoa), and absent from Mt Choke, Gojjam, for a few decades. South-east of the Rift Valley there are populations in the Arsi Mountains (Mt Kaka, Mt Chilalo and Galama range) and in the Bale Mountains, including the Somkaru-Korduro range (Marino 2003).

Range countries: Ethiopia (Marino 2003).

Relative abundance

More than half of the species' population live in the Bale Mountains, where wolf density is high for a social carnivore of its size, and is positively correlated with density of rodent prey and negatively with vegetation height (Sillero-Zubiri and Gottelli 1995a). Highest wolf densities are found in short Afroalpine herbaceous communities (1.0–1.2 adults/km²); lower densities are found in *Helichrysum* dwarf-scrub (0.2/km²), and in ericaceous heathlands and barren peaks (0.1/km²). Wolves are also present at low

density (0.1–0.2/km²) in montane grasslands at lower altitudes.

Elsewhere, overall density is relatively lower. In Menz, wolf density was estimated at 0.2 animals per km² using transect data (Ashenafi 2001). Comparison of census transect data from recent comprehensive surveys (Marino 2003) indicates comparatively higher abundance in North Wollo (0.20 ± 0.20 sightings per km), intermediate in Arsi and Guna (0.10 ± 0.11 and 0.10 ± 0.14, respectively), and lower in South Wollo and Simien (0.08 ± 0.13 and 0.06 ± 0.11, respectively). These results were supported by counts of wolf signs (diggings and droppings) and interview results.

Estimated populations/relative abundance and population trends The most reliable population estimates are those from Bale and Menz where research has been more intense (Table 6.4.2.). The size of the populations in other mountain ranges was derived from field maps of current habitat distribution and extrapolations of wolf densities to the areas of 'optimal' and 'good' habitat in each isolated range (Marino 2003).

Table 6.4.2. The status of Ethiopian wolves in various montane regions of Ethiopia (Trend: I=increasing, S=stable, D=declining, Ex=extinct, ?=unknown).

Region	Population/Abundance	Trend
Simien	40–54	D
Guna	7–10	?
North Wollo	19–23	I
South Wollo	16–19	D
Gojjam	–	Ex
Menz	17–23	S
Gosh Meda	–	Ex
Arsi	93–108	S-D
Bale	250	I

Time series of count data from the Bale Mountains, spanning over 17 years, evidenced marked variation in wolf abundance in association with disease epizootics that affected high-density populations in the early 1990s (Marino 2004). Population numbers returned to previous levels revealing resilience to catastrophes, but at the lower extreme of densities the population rate of increase was inversely density-dependent; delays in the formation of new breeding units appeared to limit the capacity for immediate recovery (Marino 2004).

Habitat

A very localised endemic species, confined to isolated pockets of Afroalpine grasslands and heathlands where they prey on Afroalpine rodents. Suitable habitats extend from above the tree-line at about 3,200m up to 4,500m, with some wolves present in montane grasslands at 3,000m. However, subsistence agriculture extends up to 3,500–3,800m in many areas, restricting wolves to higher ranges (Marino 2003). Rainfall at high altitude varies between 1,000 and 2,000mm/year, with one pronounced dry period from December to February/March.

Wolves utilise all Afroalpine habitats, but prefer open areas with short herbaceous and grassland communities where rodents are most abundant, along flat or gently sloping areas with deep soils and poor drainage in parts. Prime habitats in the Bale Mountains are characterised by short herbs (*Alchemilla* spp.) and grasses and low vegetation cover, a community maintained in continuous succession as a result of molerat (*Tachyoryctes macrocephalus*) burrowing activity. Other good habitats include tussock grasslands (*Festuca* spp., *Agrostis* spp.), high-altitude scrubs dominated by *Helichrysum* spp. and short grasslands in shallow soils. In northern parts of the range, plant communities characterised by a matrix of '*guassa*' tussock grasses (*Festuca* spp.), '*cherenfi*' bushes (*Euryops pinifolius*) and giant lobelias (*Lobelia rhynchopetalum*) sustain high rodent abundance and are preferred by wolves. Ericaceous moorlands (*Erica* and *Phillipia* spp.) at 3,200–3,600m are of marginal value, with open moorlands having patches of herbs and grasses which are relatively good habitat.

Food and foraging behaviour

Food Ethiopian wolves feed almost exclusively upon diurnal rodents of the high-altitude Afroalpine grassland community. In the Bale Mountains, diurnal rodents accounted for 96% of all prey occurrences in faeces, with 87% belonging to three Bale endemic species, the giant molerat (300–930g), Blick's grass rat (*Arvicanthis blicki*), and the black-clawed brush-furred rat (*Lophuromys melanonyx*) (Sillero-Zubiri and Gottelli 1995b). Other prey species include typical vlei rat (*Otomys typus*), yellow-spotted brush-furred rat (*Lophuromys flavopunctatus*), Starck's hare (*Lepus starcki*), and goslings and eggs. Occasionally, wolves were observed feeding on rock hyrax (*Procavia capensis*), and young of common duiker (*Sylvicapra grimmia*), reedbuck (*Redunca redunca*) and mountain nyala (*Tragelaphus buxtoni*) (Sillero-Zubiri and Gottelli 1995b; Malcolm 1997; C. Sillero-Zubiri pers. obs.). Leaves of sedge (*Carex monostachya*) are occasionally ingested, probably to assist digestion or control parasites.

Where the giant molerat is absent, it is replaced in the wolf diet by the smaller East African molerat, *Tachyoryctes splendens* (i.e., *Gaysay* montane grassland in Bale – Malcolm 1997, and Menz – Ashenfi 2001). Similarly, in northern Ethiopia *Arvicanthis abyssinicus* and *Lophurmys flavopunctatus* replace their respective endemic relatives from Bale *A. blicki* and *L. melanonyx*. Elsewhere, *O. typus*, a rare prey item in Bale and Menz, was identified as the commonest prey in droppings collected in other five populations (Marino 2004). This study confirmed that

wolves are specialised hunters of diurnal rodents all throughout their distribution, with some degree of dietary variation along climatic-induced gradients.

Foraging behaviour Although the Ethiopian wolf is a pre-eminent, solitary rodent hunter it is also a facultative, cooperative hunter. Occasionally, small packs have been seen chasing young antelopes, lambs, and hares and making a kill. Ethiopian wolves will take carrion or feed on carcasses; in fact, a sheep carcass is the most successful bait for attracting wolves (C. Sillero-Zubiri pers. obs.). The local name '*jedalla farda*' – the horse's jackal – refers to the wolves' habit of following mares and cows about to give birth so they can eat the afterbirth. In areas of grazing in Bale, wolves were often seen foraging among herds of cattle, a tactic that may aid in ambushing rodents out of their holes, by using the herd as a mobile hide.

In Bale, wolves are mostly diurnal. Peaks of foraging activity suggest that they synchronise their activity with that of rodents above the ground (Sillero-Zubiri *et al.* 1995). There is little nocturnal activity, with wolves seldom moving far from their evening resting site. They may become more crepuscular and nocturnal where human interference is severe (e.g., Simien: Brown 1964; Somkaro and Kaka Mountains: C. Sillero-Zubiri pers. obs.).

Rich food patches are carefully explored by wolves, which walk slowly, pausing frequently to investigate holes or to localise the rodents by means of their excellent hearing. Once the prey is located, the wolf moves stealthily towards it, taking short steps, and freezing, sometimes with its belly pressed flat to the ground. The quarry is grabbed with the mouth after a short dash. A stalk can last from seconds to up to one hour, especially in the case of a giant molerat. Occasionally, wolves run in zig-zags across rat colonies picking up the rodents in passing. Digging prey out is common and is the most favoured technique to catch giant molerats, with the effort expended varying from a few scratches at a rat hole to the total destruction of a set of burrows leaving mounds of earth one metre high. Sometimes, digging serves to reach a nest of grass rats. Kills are often cached and later retrieved.

Damage to livestock or game Until recently, wolves in Bale were unmolested by humans and did not appear to be regarded as a threat to sheep and goats, which are sometimes left unattended during the day (Gottelli and Sillero-Zubiri 1992). Only two instances of predation upon lambs were recorded during 1,800 hours of observation (Sillero-Zubiri and Gottelli 1994). Losses to wolves in the southern highlands were dismissed by herders as unimportant when compared to damage by spotted hyaenas (*Crocuta crocuta*) or jackals. Elsewhere, wolves have been persecuted in the past due to their reputation as predators of sheep and goats. Livestock predation is reported as important in some heavily populated areas of Wollo and Simien (Marino 2003) but livestock remains were uncommon in droppings collected from across the highlands (Marino 2004).

Adaptations

The legs are strikingly long and slender, seemingly suitable for coursing in open country. The muzzle is long, and the small, well-spaced teeth suggest morphological adaptation to feeding on rodents. They have an unusually good sense of smell, and bolt more readily at the scent rather than the sight of man.

The guard hairs are short and the underfur is thick, providing protection at temperatures as low as -15°C. Ethiopian wolves do not use dens to rest at night, and during the breeding season only pups and nursing females use the den. Wolves sleep in the open, alone or in groups, curled up, with nose beneath the tail. Several animals may sleep close together. During the cold nights in the dry season, a 'bed' is carefully prepared from a pile of vegetation debris, the product of giant molerat activity. During the day they take frequent naps, usually resting on their sides. Occasionally, they seek shelter from the rain under overhanging rocks and behind boulders.

Social behaviour

Ethiopian wolves live in packs, discrete and cohesive social units that share and defend an exclusive territory. Packs of 3–13 adults (mean=6) congregate for social greetings and border patrols at dawn, noon and evenings, and rest together at night, but break up to forage individually in the morning and early afternoon (Sillero-Zubiri and Gottelli 1995a).

Annual home ranges of eight packs monitored for four years averaged 6.0km², with some overlap in home ranges. Home ranges in an area of lower prey biomass averaged 13.4km² (n=4) (Sillero-Zubiri and Gottelli 1995a). Overlap and aggressive encounters between packs were highest during the mating season. Dispersal movements are tightly constrained by the scarcity of suitable habitat. Males do not disperse and are recruited into multi-male philopatric packs; some females disperse at two years of age and become 'floaters', occupying narrow ranges between pack territories until a breeding vacancy becomes available (Sillero-Zubiri *et al.* 1996a). Breeding females are typically replaced after death by a resident daughter. Pack adult sex ratio is biased toward males 1.8:1 (n=59), with small family groups closer to 1:1 (Sillero-Zubiri and Gottelli 1995a).

Scent marking of territory boundaries, via urine posts, scratching, and faeces (deposited on conspicuous sites like mounds, rocks and bushes), and vocalisations, are common and function in advertising and maintaining territories (Sillero-Zubiri and Macdonald 1998). All pack members, independent of social rank, regularly scent-mark objects along territory boundaries with raised-leg urinations and

scratches. Aggressive interactions with neighbouring packs are common, highly vocal and always end with the smaller group fleeing from the larger (Sillero-Zubiri and Macdonald 1998).

Calls can be grouped into two categories: alarm calls, given at the scent or sight of man, dogs, or unfamiliar wolves; and greeting calls, given at the reunion of pack members and to advertise pack size, composition and position (Sillero-Zubiri and Gottelli 1994). Alarm calls start with a 'huff' (rapid expulsion of air through mouth and nose), followed by a quick succession of high-pitched 'yelps' (a series of 4–5 'yeahp-yeahp-yeahp-yeahp') and 'barks'. 'Yelps' and 'barks' can also be given as contact calls, and often attract nearby pack mates. Greeting calls include a 'growl' of threat, a high-frequency 'whine' of submission, and intense 'group yip-howls'. A lone howl and a group howl are long-distance calls used to contact separate pack members and can be heard up to 5km away. Howling by one pack of wolves may stimulate howling in adjacent packs. Communal calls muster pack members before a border patrol.

Reproduction and denning behaviour

The only detailed information available on the reproductive habits of these animals comes from four years of observations of nine wild packs in the Bale Mountains (Sillero-Zubiri 1994; Sillero-Zubiri *et al.* 2004).

Pre-copulatory behaviour by the dominant female includes an increase in the scent-marking rate, play soliciting, food-begging towards the dominant male, and agonistic behaviour towards subordinate females. The receptive period is synchronised in sympatric females to less than two weeks (Sillero-Zubiri *et al.* 1998). Courtship may take place between adult members of a pack or with members of neighbouring packs. After a brief courtship, which primarily involves the dominant male permanently accompanying the female, wolves copulate over a period of three to five days. Copulation involves a copulatory tie lasting up to 15 minutes. Other males may stand by a tied pair with no signs of aggression. Mate preference is shown, with the female discouraging attempts from all but the pack's dominant male, by either defensive snarls or moving away; the female is receptive to any visiting male from neighbouring packs. Sillero-Zubiri *et al.* (1996a) found that up to 70% of matings (n=30) involved males from outside the pack.

The dominant female of each pack gives birth once a year between October and January (Sillero-Zubiri *et al.* 1998). Only about 60% of females breed successfully each year. During breeding and pregnancy, the female coat turns pale yellow and becomes woolly, and the tail turns brownish, and loses much of its hair. Gestation lasts 60–62 days (based on the time from last day of mating to parturition). Pups are born in a den dug by the female in open ground, under a boulder or inside a rocky crevice. Neonates are born with their eyes closed and the natal coat is charcoal grey with a buff patch in chest and inguinal regions. Two to seven pups emerge from the den after three weeks. At this time, the dark natal coat begins to be replaced by the pelage typical of the species. Pups are regularly moved between dens, up to 1,300m apart. In eight out of 18 natal dens watched, a subordinate female assisted the mother in suckling the pups. At least 50% of extra nursing females showed signs of pregnancy and may have lost or deserted their own offspring before joining the dominant female's den (Sillero-Zubiri 1994; Sillero-Zubiri *et al.* 2004). Five and six placental scars were counted in the uteri of two females.

Development of the young comprises three stages: (1) early nesting (week 1 to week 4), when the young are entirely dependent on milk; (2) mixed nutritional dependency (week 5 to week 10), when milk is supplemented by solid foods regurgitated by all pack members until pups are completely weaned; and (3) post-weaning dependency (week 10 to six months), when the pups subsist almost entirely on solid foods supplied by helpers. Adults have been observed providing food to juveniles up to one year old. Juveniles will join adults in patrols as early as six months of age, but will not urinate with a raised leg posture until 11 months, if male, or 18 months, if female. Yearlings attain 80–90% of adult body mass, and full adult appearance is reached at two years. Both sexes become sexually mature during their second year.

Competition

The high densities and diversity of raptors (12 recorded species in Bale), many of which have been observed to feed on small mammals, are likely to pose the greatest competitive threat to the wolves (although they tend to clepto-parasitise eagles's kills – Sillero-Zubiri and Gottelli 1995a). In addition, free-ranging domestic dogs, golden jackals and servals (*Leptailurus serval*) may also feed upon the same prey species. There is interference competition with domestic dogs and spotted hyaenas (*Crocuta crocuta*) that will actively chase away wolves from large carcasses. Honey badgers (*Mellivora capensis*) are also possible competitors for food and burrows (Sillero-Zubiri 1996).

Mortality and pathogens

Natural sources of mortality There are no known predators, but unattended young might be taken by spotted hyaenas or the Verreaux eagle (*Aquilla verreauxi*). Attacks of the tawny eagle (*Aquilla rapax*) directed at small pups result in swift defence by guarding adults. Other causes of mortality include starvation of juveniles between weaning and one year of age. The sex ratio (see above) indicates that female mortality is higher than that of males. This is most likely associated with their dispersal as subadults.

Persecution During periods of political instability in the recent past, guns were more available and killings more frequent. In many regions, people living close to wolves believe numbers are recovering through successive years of good breeding and less persecution. The degree of conflict due to predation determines the negative attitude to wolves in some regions where persecution may persist (Marino 2003).

Hunting and trapping for fur There are no reports of exploitation for furs, although some opportunistic use may occur. For instance, in parts of Wollo wolf skins were seen used as saddle pads (C. Sillero-Zubiri pers. obs.). In the past, sport hunters occasionally killed wolves, but no hunting is currently permitted.

Road kills On the Sanetti Plateau in Bale, an all-weather road runs across 40km of prime wolf habitat and is used on average by 26 vehicles (mostly trucks) every day. At least four wolves have been killed by vehicles since 1988 (C. Sillero-Zubiri pers. obs.). Two other animals have been shot from the road and another two were left with permanent limps from collisions with vehicles. Similar accidents may occur on other roads across wolf habitat such as the Mehal Meda road in Menz, and the road to Ticho in Arsi.

Pathogens and parasites Rabies is the most dangerous and widespread disease to affect Ethiopian wolves, and is the main cause of mortality in Bale (Sillero-Zubiri *et al.* 1996b). The disease killed whole wolf packs in 1990 and 1991 and accounted for a major population decline with losses of up to 75% (Sillero-Zubiri *et al*. 1996b; Laurenson *et al*. 1998). A rabies epizootic was reported in late 2003 and has accounted for similar mortality levels, although the full impact of it has yet to be assessed fully (S. Williams pers. comm.). In other regions, rabies cases have been reported in domestic dogs, livestock, people and one Ethiopian wolf (Sillero-Zubiri *et al*. 2000; Marino 2003). The level of rabies awareness amongst people, and the frequency of the reports, suggests high incidence across the highlands.

In Bale dogs travel regularly with their owners in and out of wolf range, and are in contact with many other dogs which are attracted to garbage and carrion in villages, and they may provide the vehicle for pathogens such as rabies or distemper to reach their wild relatives (Laurenson *et al*. 1998). The risk of transmission, however, will depend on the probability of contact between wolves and dogs, which varies with grazing regimes in high-altitude pastures, dog husbandry and the spatial distribution of wolf habitat in relationship to settlements. Long-term population monitoring data from Bale, indicated that high wolf densities may be the most important factor in determining the vulnerability of a local population to epizootics, independently of the abundances of sympatric dogs, people and livestock within the wolf range (Marino 2004). A population viability model indicates that disease-induced population fluctuations and extinction risks can be markedly reduced with the vaccination against rabies of a relatively small proportion of wolves (Haydon *et al*. 2002).

Ethiopian wolves are exceptionally free of ectoparasites, perhaps because of the cold mountain climate; none were found on any of 67 animals handled. Nematodes and trematodes were present in faeces and in the gut of several carcasses, one of which was identified as *Taenia pisiformis* (M. Anwar pers. comm.).

Longevity In the wild 8–10 years; one known male in Bale lived 12 years (C. Sillero-Zubiri pers. obs.).

Historical perspective

There is little evidence of wolves playing a significant role in Ethiopian culture, and they seldom feature in folklore. Nonetheless, the wolf has been recognised by Ethiopian people, with the earliest mention in literature dating back to the 13th century (Sillero-Zubiri and Macdonald 1997). More recently, the government has used the wolf as a national symbol, and it has featured in two stamp series. No known traditional uses, although wolf livers may be used as a medicament in north Ethiopia (Staheli 1975, in Sillero-Zubiri and Macdonald 1997).

The Bale Mountains National Park was established in 1970 partly on the recommendation of British naturalist Leslie Brown to protect Ethiopian wolves (Brown 1964).

Conservation status

The species is more restricted now than in the past (Yalden *et al.* 1980). With probably only 500 individuals surviving, this distinctive carnivore is considered the rarest canid in the world and one of the rarest African carnivores. Recent exhaustive surveys, however, have confirmed the persistence of seven isolated populations, two previously undescribed (Marino 2003).

Threats Continuous loss of habitat due to high-altitude subsistence agriculture represents the major threat. Sixty percent of all land above 3,200m has been converted into farmland, and all populations below 3,700m are particularly vulnerable to further habitat loss, especially if the areas are small and of relatively flat relief (Marino 2003). Habitat loss is exacerbated by overgrazing of highland pastures by domestic livestock, and in some areas habitat is threatened by proposed development of commercial sheep farms and roads. Human persecution triggered by political instability in the past is currently less severe and is associated with conflicts over livestock losses (Marino 2003). Recent population decline in Bale is mostly due to disease epizootics, with road kills and

shooting as secondary threats. Rabies is a potential threat to all populations. Most of these threats are exacerbated by the wolves' specialisation to life in the Afroalpine ecosystem.

In Bale the Ethiopian wolf hybridises with domestic dogs. Gottelli *et al*. (1994) used mitochondrial DNA restriction fragments and micro-satellite alleles to conclude that hybridisation was relatively common in western Bale as a result of crosses between female wolves and male domestic dogs. Hybrids have shorter muzzles, heavier-built bodies and different coat patterns. Although hybrids are confined to the Web Valley in western Bale they may threaten the genetic integrity of the wolf population. Following hybridisation, a population may be affected by outbreeding depression or reduction in fitness, although to date this does not seem to have taken place in Bale. To date there is no indication of hybridisation taking place outside western Bale.

Commercial use There is no exploitation for furs or other purposes.

Occurrence in protected areas Simien Mountains National Park; Bale Mountains National Park; Hunting blocks in Arsi; Denkoro State Forest in South Wollo; Guassa Community Management in North Shoa.

Protection status CITES – not listed.

Current legal protection Full official protection under Ethiopia's Wildlife Conservation Regulations of 1974, Schedule VI. Killing a wolf carries a sentence of up to two years.

Conservation measures taken A number of important steps have been taken in the interests of conserving this endemic species, including: 1) a dog vaccination campaign in Bale, currently extended to Wollo; 2) sterilisation programme for domestic dogs and hybrids in Bale; 3) vaccination of wolves in parts of Bale affected by rabies; 4) community and school education programme in Bale and Wollo; 5) strengthening the capacity of the Bale Mountains National Park – funding patrolling, maintenance of infrastructure, etc.; 6) surveys to determine the persistence and status of all populations of wolves; 7) monitoring of all wolf populations; 8) Ethiopian Wolf Conservation Strategy Workshop, Bale Mountains, November 1999, with representatives of national, regional and local governments and international scientists (Sillero-Zubiri *et al*. 2000); and 9) establishment of the Ethiopian Wolf Conservation Committee within Ethiopia as a national steering committee for dealing with conservation issues.

In 1983, the Wildlife Conservation Society set up the Bale Mountains Research Project, which publicised the wolf's plight and started a regular monitoring programme for the species. A detailed four-year field study followed (Sillero-Zubiri 1994). Based on its findings, the IUCN Canid Specialist Group produced an action plan for the Ethiopian wolf (Sillero-Zubiri and Macdonald 1997), providing a detailed strategy for the conservation and management of remaining wolf populations. This plan advocated immediate action on three fronts – education, wolf population monitoring, and rabies control in domestic dogs – to conserve the Afroalpine ecosystem and its top predator. As a result, the Ethiopian Wolf Conservation Programme (EWCP) was established in 1995 by Oxford University with support from the Born Free Foundation, UK. Its overall aim is to protect the Afroalpine ecosystem and many of its rare highland endemic plants and animals through better management in Bale and the establishment of other conservation areas in Menz and Wollo. The EWCP currently monitors the demography of Bale and selected populations in South and North Wollo, supports park patrols within the wolf range, undertakes domestic dog control and the removal of dog-wolf hybrids. Additionally, the EWCP carries out a community conservation education campaign that targets people living inside the wolf's range and is aimed at improving dog husbandry and combating disease in the park and surroundings. A large-scale dog vaccination programme (targeting up to 3,000 dogs a year) seeks to reduce the occurrence of rabies and distemper within the Ethiopian wolf range and is backed up by further epidemiological and demographic studies. The EWCP is also active elsewhere in Ethiopia, with representatives surveying and monitoring all wolf ranges and implementing education campaigns about the plight of the species. Zelealem Tefera Ashenafi set up the Guassa Biodiversity Project in 1996, looking at the relationships between pastoralists and wildlife in the highlands of Menz.

Occurrence in captivity

There are no animals in captivity. Recent attempts to establish captive populations were abandoned due to lack of permission from the Ethiopian government.

Current or planned research projects

S. Williams (Wildlife Conservation Research Unit, University of Oxford, UK) and Ethiopian Wolf Conservation Programme staff currently monitor the demography of the Bale and Wollo populations. Data collected include pack demographic structures, home ranges and pup survival.

J. Marino (Wildlife Conservation Research Unit, University of Oxford, UK) is studying the effect of habitat heterogeneity and fragmentation on the ecology of Ethiopian wolves at various spatial scales and levels of organisation.

L. Tallents and D. Randall (Wildlife Conservation Research Unit, University of Oxford, UK) have begun

graduate studies on foraging ecology and reproductive strategies.

K. Laurenson and D. Knobel (Centre for Tropical Veterinary Medicine, University of Edinburgh, UK) are testing a combination of vaccination trial and field techniques to investigate the dynamics of canid pathogens, particularly rabies, in domestic and wild carnivore species.

Anteneh Shimelis and Ermias A. Beyene (Addis Ababa University), S. Williams (Wildlife Conservation Research Unit, University of Oxford), S. Thirgood (Frankfurt Zoological Society, Tanzania) are studying predator-prey interactions in Bale, assessing whether rodent populations are regulated by competition (with domestic livestock) or by predation (by wolves and raptors).

Gaps in knowledge

Although the behavioural ecology of the species is well known, this has been focused in the optimal habitats in the Bale Mountains. Additional information on dispersal distance and survival would be useful. Investigation into the role of the species in the epidemiology of canid-related diseases is necessary. Studies on wolf-prey relationships and prey availability in the high risk populations of northern Ethiopia are also urgently needed.

Core literature

Gottelli and Sillero-Zubiri 1992; Gottelli *et al*. 1994, 2004; Haydon *et* al. 2002; Laurenson *et al*. 1998; Marino 2003, 2004; Sillero-Zubiri 1994; Sillero-Zubiri and Gottelli 1994, 1995a,b; Sillero-Zubiri *et al*. 1996a,b, 2000, 2004a; Sillero-Zubiri and Macdonald 1997.

Reviewers: Neville Ash, M. Karen Laurenson, James R. Malcolm, Zelealam Tefera Ashenafi, Stuart Williams. **Editor:** Michael Hoffmann.

6.5 African wild dog *Lycaon pictus* (Temminck, 1820) Endangered – EN: C2a(i) (2004)

R. Woodroffe, J.W. McNutt and M.G.L. Mills

Other names

English: Cape hunting dog, painted hunting dog; **French:** lycaon, cynhyène, loup-peint; **Italian:** licaone; **German:** hyänenhund; **Spanish:** licaon; **Indigenous names:** Afrikaans: wildehond (Namibia, South Africa); Amharic: takula (Ethiopia); Ateso: apeete; isiNdebele: iganyana iketsi leKapa (South Africa); isiXhosa: ixhwili (South Africa); isiZulu: inkentshane (South Africa); Kalenjin: suyo (Kenya); Kibena: liduma; Kibungu: eminze; Kichagga: kite kya nigereni; Kihehe: ligwami; Kijita: omusege; Kikamba: nzui; Kikukuyu: muthige; Kikuyu: muthige (Kenya); Limeru: mbawa; Kiliangulu: eeyeyi; Kimarangoli: imbwa; Kinyaturu: mbughi; Kinyiha: inpumpi; Kinyiramba: mulula; Kisukuma: mhuge; Kiswahili: mbwa mwitu; Kitaita: Kikwau; Kizigua: mauzi; Lozi: liakanyani; Luo: sudhe, prude; Maasai: osuyiani (Kenya, Tanzania); Mandingue: juruto (Mali, Senegal); Nama and Damara:!Gaub (Namibia); Samburu: Suyian (Kenya); Sebei: kulwe, suyondet; Sepedi: lehlalerwa, letaya (South Africa); Sesotho: lekanyane, mokoto, tlalerwa (Lesotho, South Africa); Setswana: leteane, letlhalerwa, lekanyana (Botswana, South Africa); Shona: mhumhi (Zimbabwe); siSwati: budzatja, inkentjane (Swaziland, South Africa); Tshivenda: dalerwa; Woloof and Pulaar: saafandu (Senegal); Xitsonga: hlolwa (Mozambique, South Africa); Yei: umenzi (Botswana).

Taxonomy

Hyaena picta Temminck, 1820. Ann. Gen. Sci. Phys. 3: 54. Type locality: "à la côte de Mosambique" [coastal Mozambique].

The genus *Lycaon* is monotypic and was formerly placed in its own subfamily, the Simoncyoninae. While this subfamily division is no longer recognised (Wozencraft 1989), recent molecular studies have supported the separation of this species in its own genus (Girman *et al*. 1993). Wild dogs have been grouped with dhole (*Cuon alpinus*) and bush dogs (*Speothos venaticus*), but morphological similarities among these species are no longer considered to indicate common ancestry, and they are now considered close to the base of the wolf-like canids (Girman *et al*. 1993).

Genetic and morphological studies carried out by Girman *et al*. (1993) initially suggested the existence of separate subspecies in eastern and southern Africa. However, no geographical boundaries separated these proposed subspecies, and dogs sampled from the intermediate area showed a mixture of southern and eastern haplotypes, indication of a cline rather than distinct subspecies (Girman and Wayne 1997).

Chromosome number: 2n = 78 (Chiarelli 1975).

Description

A large, but lightly built canid, with long, slim legs and large, rounded ears (Table 6.5.1). The coloration of the pelage is distinctive but highly variable, with a combination of irregular black, yellow-brown and white blotches on the back, sides, and legs. Wild dogs in north-east Africa tend to be predominantly black with small white and yellow patches, while dogs in southern Africa are more brightly coloured with a mix of brown, black and white. Each animal's pelage coloration is unique, and this can be used to identify individual animals. Coloration of the head and tail is more consistent: almost all dogs have a yellow-brown head with a black 'mask', black ears, and a black line following the sagittal crest, and a white tip to