

SAMBAR

(*Cervus unicolor* Kerr, 1792)

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Order	: Artiodactyla
Family	: Cervidae
Sub-Family	: Cervinae
Genus	: <i>Cervus</i>
Species	: <i>C. unicolor</i>
Common name	: Sambar

Conservation Status

WPA (1972)	: Schedule III
IUCN RED DATA BOOK	: Lower Risk
CITES	: Not listed

INTRODUCTION

Sambar (*Cervus unicolor*) is the largest deer species native to South and South-East Asia. Adult sambar stags weigh between 225 and 320 kg. Sambar hinds are smaller and weigh between 135 and 225 kg (Lydekker 1916, Crandall 1964, Downes 1983). It is closely related to the red deer (*C. elaphus elephus*) of Asia and Europe, the Rusa deer (*C. timorensis*) of Asia, and the Rocky Mountain elk (*C.e. nelsoni*) of North America (Whitehead 1972).

GEOGRAPHICAL AND ECOLOGICAL DISTRIBUTION

No Indian ungulate has adapted itself to a wider variety of forest types and environmental conditions than the sambar (Schaller 1967). It has an exceedingly wide geographical distribution that includes India, Myanmar, Sri Lanka, extending through the Malay countries, and eastward to the Philippines and beyond (Prater 1971). The Indian sub-species *C.u.niger*





is confined to India. Within India sambar occur in the thorn forests of Gujarat and Rajasthan, in the moist deciduous forests throughout peninsular India, in the pine and oak forests at the Himalayan foothills, and in the evergreen and semi-evergreen forests of north-eastern India.

POPULATION

Although sambar are encountered in widespread locations and habitat types, nowhere are they abundant. By nature, they are difficult animals to locate or observe, making their enumeration all the more difficult. Sambar have been recorded to occur in 208 Protected Areas of India. (Source: National Wildlife Database, WII). The strongholds of sambar where they have been adequately studied are: Kanha (Schaller 1967), Bandipur (Johnsingh 1983), Nagarahole (Karanth and Sunquist 1992), Sariska (Sankar 1994), Gir (Khan *et al.* 1995), Pench (Biswas and Sankar 2002), and Ranthambore (Bagchi *et al.* 2003) in India, and Karnali-Bardia (Dinerstein 1979), in Nepal. Sambar have been successfully introduced to numerous locations outside their native range e.g into San Luis Obispo Country, California, into the Gulf Prairies and Edwards Plateau regions of Texas (Ables and Ramsey 1974), into the St. Vincent Islands, Franklin Country, Florida (Lewis *et al.* 1990), into Australia (Slee 1984), into New Zealand (Kelton and Skipworth 1987), and also into Western Cape Province, South Africa (Lever 1985).

ECOLOGY

Group size and composition

Sambar are essentially a non-social species. In sambar the typical group is small, numbering fewer than six individuals (Schaller 1967). The characteristic social unit is one hind and one fawn or one hind, one yearling and one fawn (Schaller 1967, Kelton 1981, Downes 1983). Family groups usually travel in a single file led by the adult female (Kelton 1981). During the rut, dominant stags are frequently seen with hinds and occasionally with other stags who may challenge the dominant stag for breeding opportunities (Lewis *et al.* 1990).

Average group size of sambar is reported to be 4 to 5 individuals (Jerdon 1874 and Prater 1971). Khan *et al.* (1995) observed sambar group sizes ranging from one to five individuals in Gir. In Nagarahole more than 95 % of sambar sightings were that of solitary individuals, pairs, or family associations, and a mean group size of 1.7 was recorded (Karanth and

Sunquist 1992). In Sariska the average group size of sambar was about four individuals (Sankar 1994). More than 85 percent of the sambar groups were observed with 1 to 5 individuals. Mean group size of sambar in Pench, in central India, was 1.7 (Biswas and Sankar 2002) and in Ranthambore, the mean group size was 3.7 (Bagchi *et al.* 2004).

Antler condition and breeding season


The period of breeding (rut) of sambar is determined by the annual antler cycle of antler development, the frequency of sexual behaviour, and, in a way, the time of fawning. Sambar stags exhibited a distinct antler cycle in Sariska (Sankar 1994). Hard antlers were shed during the summer, followed by emerging and velvet antlers during monsoon months. During the remaining part of the year, sambar remained in hard antler stage. In Bandipur sambar stags in hard antlers were observed largely between November and April and most males had shed their antlers by May (Johnsingh 1983). In St. Vincent Islands, Florida, during July and August 98 to 100 % of all sambar stags were in velvet antlers and most stags shed their antlers between April and June (Shea *et al.* 1990).

In India the peak rut of sambar occurs between October and December (Lydekker 1916, Schaller 1967). Schaller (1967) reported that in Kanha the rut spreads over a period of at least seven months with a peak in November-December. In Sariska the peak rutting season was in winter when almost all stags were carrying hard antlers (Sankar 1994). The main rut of sambar in New Zealand was in June and July with a small peak occurring in November (Kelton 1981).

Sex ratios

Schaller (1967) estimated a sex ratio of 0.2 males : 1 female in Kanha. In Bandipur the average male : female ratio was 0.3 : 1, and the female : fawn ratio was 1 : 0.3 (Johnsingh 1983). The male : female ratio in Nagarhole (Karanth and Sunquist 1992) was 0.4 : 1. In Sariska the estimated average male: female ratio was 0.1 : 1 and the average female: fawn ratio was 1 : 0.2 (Sankar 1994). In Gir, the average male : female ratio was 0.5 : 1, and the female : young ratio was 1 : 0.1 (Khan *et al.* 1995). Flynn *et al.* (1990) recorded the male : female : fawn ratio as 0.7 : 1 : 0.2 in Florida, USA. Richardson (1972) recorded a 1 : 1 male-female ratio, and 1 : 0.2 female-fawn ratio in Texas, USA. The relatively low male numbers may be either due to selective predation, or sambar stags may be more vulnerable to stress conditions.





In Kanha, sambar fawns were seen from April to December and the peak fawning period was in May and June (Schaller 1967). However, in Sariska most of the sambar fawns were dropped between November and January (Sankar 1994).

Food habits

Sambar have been observed to feed on more than 139 species of plants (Schaller 1967, Johnsingh and Sankar 1991). The food requirements of sambar are less specialised than those of other deer (Schaller 1967). Sambar would graze or browse depending upon the forage available at any given point of time (Bentley 1978, Kelton 1981, Ngampongsai 1987). Young green grasses are the preferred forage of sambar in Kanha, but browse is often important during seasons when green grasses are scarce (Schaller 1967). Analysis of faecal pellets of sambar in Kanha National Park revealed that browse was a dominant dietary component (Martin 1977). In Sariska sambar were observed grazing as long as the green grasses are available, but switched over to browse and fallen leaves, flowers and fruits in winter and summer (Sankar 1994). Dinerstein (1979) confirmed that browse is important for sambar in Nepal. Richardson (1972) reported that the diet of sambar greatly varied from large amount of browse in the dry season to an almost complete dependence on grass and herbaceous plants in the wet season in Texas. This flexibility of sambar diet from graze to browse has enabled the wide distribution of this species.

Home range

In Sariska (Sankar 1994), the mean home range of sambar stags was around 4 km² and for sambar hinds was 1.7 km². The estimated annual home range of sambar stags was nearly 15 km², whereas that of hinds was nearly 3 km². In Florida the estimated mean home range of sambar stags was around 11 km² and sambar hinds nearly 6 km² (Shea *et al* 1990). The mean annual home range was estimated to be around 46 km² for sambar stags and around 20 km² for sambar hinds. Richardson (1972) reported a mean home range of about 10 km² for sambar stags in Texas, with almost 5 km² for the hinds.

The preference of sambar for heavy cover has already been recorded (Schaller 1967, Johnsingh 1983). This might probably the reason why sambar hinds, largely browsers, had smaller home ranges. Sambar stags were in rut during winter, characterized by increased movements in search of receptive hinds, and hence had larger home ranges for that

season. These stags ranged very less in summer, probably due to rise in temperature and water dependency. By covering a greater area, a male of a polygynous species increases his chances of finding receptive females (Lewis *et al.* 1990).

Predation and Mortality

Predation (mainly by tiger, leopard and dholes) is the main cause of mortality in sambar, though sambar are also a favourite with hunters and poachers. In Kanha, sambar remains were found in nearly 11% of tiger scats and 9% of leopard scats analysed (Schaller 1967). In Bandipur remains of sambar were found in about 30% tiger scats, 14% leopard scats, and 14% dhole scats (Johnsingh 1983). In adjoining Nagarahole remains of sambar were found in about 25% tiger scats, 13% leopard scats, and 10% dhole scats (Karanth and Sunquist 1995). In Sariska, around 51% of the scats of tiger and around 20% of leopard scats contained sambar remains (Sankar 1994). Sambar remains were found in nearly 14% of tiger scats in Pench (Biswas and Sankar 2002) and 50% of tiger scats in Ranthambore (Bagchi *et al.* 2003).

Mortality of sambar stags is usually high relative to their representation in the population (Johnsingh 1983, Karanth and Sunquist 1995). Males are said to be more susceptible to predation. Weakened condition after rut (Hornocker 1970) and territorial contests (Estes and Goddard 1967, Schaller 1967) make males vulnerable to predation.

Water Use

Water is an important component of the sambar's summer home range, especially when the temperature is hot. Being an animal of hilly terrain, sambar cannot travel long distance to drink water. Unusually large aggregations (> 10 individuals) were in the vicinity of sprouting grass (monsoon) and around water holes (summer), as in Bandipur, where sambar formed large groups only at water holes and feeding sites (Johnsingh 1983). Eisenberg and Lockhart (1972) commented that water holes are sites where most sambar in a given area come together at dusk to aggregate temporarily, before eventually dispersing for food.

BEHAVIOUR

Sambar are predominantly forest-dwellers, favouring the cover of trees, venturing out into the open mainly at night, and late at dusk or early dawn. They usually rest the whole of the daylight hours (Schaller 1967).





CONSERVATION

Sambar constitute one of the largest, and in turn, the most favoured prey species of large carnivores such as the tiger, leopard and dhole as reported from Kanha (Schaller 1967), Bandipur (Johnsingh 1983) Rajaji National Park (Johnsingh *et al.* 1993), and Sariska (Sankar 1994). Next only to chital, sambar are numerically the second most important prey species of the large carnivores of India. In large tracts of forests not inhabited by chital, sambar are the mainstay of the prey biomass available to carnivores. Taking into consideration sambar's preference for cover and avoidance of disturbance, the abundance of sambar would be a reliable indication of the health of a forested area, and it's potential to host adequate carnivore numbers.

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