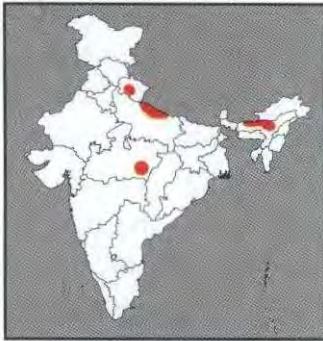


SWAMP DEER OR BARASINGHA

(*Cervus duvauceli* Cuvier, 1823)

Q. Qureshi, V.B. Sawarkar, A.R. Rahmani and P.K. Mathur



Order	: Artiodactyla
Family	: Cervidae
Sub-Family	: Cervinae
Tribe	: Cervini
Genus	: <i>Cervus</i>
Species	: <i>C. duvauceli</i>
Common name	: Barasingha

Conservation Status

WPA (1972)	: Schedule I
IUCN RED DATA BOOK	: Vulnerable (VU C1)
CITES	: Appendix I

INTRODUCTION

The Barasingha or swamp deer (*Cervus duvauceli*) were once abundant throughout the tall wet grasslands of the North Indian Terai, the Brahmaputra flood plain, and the Central Indian grasslands bordering sal (*Shorea robusta*) forests. The barasingha has declined over the years, as a result of loss of habitat and biotic pressures over much of its former range. The species is reported extinct from Pakistan and Bangladesh and restricted to few isolated localities in India and Nepal.

The swamp deer or barasingha is endemic to the Indian subcontinent. Three sub species of swamp deer has been identified, *Cervus duvauceli duvauceli*, *Cervus duvauceli branderi* (Pocock 1946, Ellerman and Morrison Scott 1951) and *Cervus duvauceli ranjitsinhii* (Groves 1981). The Barasingha was split into two species *duvauceli* (*northern*) and *branderi* (*central*) on the basis of splayed hooves in case of former inhabiting swampy habitat while later have well knit and hard hooves as an





adaptation for hard ground (Dunbar-Brander 1927, Pocock 1946 and Ellerman and Morrison Scott 1951). In 1982, Grooves further split the northern sub species in to two *duvauceli* (*north-western*) and *ranjitsinhii* (*north-eastern*) sub species on the basis of more palmate antlers and pelage colour in north-eastern population of barasingha. The barasingha measure 180 cm in length, shoulder height 119-135 cm, stags weigh 170-280 kg and hinds weigh 130-145 kg (Schaller 1967, Prater 1972, Gopal 1995). The heaviest stag weighing 256 and 267 kg were reported by Maharaja of Cooch, Bihar (1908). The coat is generally brown in colour, with males being darker than females. During winter the thick brownish coat is developed which is shed on the onset of summer. The summer pelage is reddish brown in colour. The underparts, including the underside of the tail, are whitish. There is a dark dorsal stripe, on each side of which may be a row of faint spots (Dunbar-Brander 1927, Prater 1971). The antlers are worn only by males, and have twelve or more points thus the name Barasingha. The antler grows up to one meter in length, the largest measured was 41 inch along (Schaller 1967).

GEOGRAPHICAL AND ECOLOGICAL DISTRIBUTION

The northern sub species, *duvauceli* occurred in tall wet grasslands throughout Indus and Gangetic river basins, the eastern sub species *ranjitsinhii* is distributed along tall wet grasslands of Brahmaputra flood plains and central sub species *branderi* is distributed along the grasslands bordering Sal forest and rivers of central Indian highlands (Lydekker 1898, Brander 1923, Burton 1952, Gee 1964, Spillet 1966, Schaller 1967). The species suffered major losses during 1930's to 1960's owing to major change in agriculture practice, as large tracts of grasslands were cleared for raising crop and unregulated hunting. Since the time of Schaller's estimate (1967) the areas have undergone considerable spatial and legal changes. For the convenience of comparison we considered localities as given by Schaller (1967). Schaller had reported barasingha from 15 localities in India of which 11 were in Uttar Pradesh, three in Assam and one in West Bengal. At present the swamp deer exist in only 6 localities in Uttar Pradesh, 2 in Assam and none in West Bengal. In Nepal, out of four localities reported by Schaller (1967) only two localities now have swamp deer. Holloway (1973) had reported one more locality, the Katerniaghat Sanctuary in Bahraich district of Uttar Pradesh.

At present *duvaceli* is restricted to Jhilmil tal Wildlife Conservation Reserve (Uttaranchal) (Sinha, S.P., pers. com.), Hastinapur Sanctuary (Khan A., pers. com.), Bijnor Forest Divison, Pilibhit Forest Divison, Kishanpur

Sanctuary, Dudhwa National Park, Katerniaghat Sanctuary (Uttar Pradesh) in India (Table 1), Sukla Phanta Wildlife Reserve and Karnali Bardia Reserve in Nepal. The *ranjitsinhii* at present is only found in Assam, good population survive in Kaziranga National Park though status in Manas Tiger Reserve is uncertain (Table 1). The *branderi* at present is found only in Kanha Tiger Reserve (Madhya Pradesh) (Table 1).

Table 1. Status of Barasingha in 1965 (Schaller 1967) and present (based on Qureshi *et al.* 1995).

Location	1965	Present (Based on Qureshi <i>et al.</i> 1995)
Nepal		
Sukla Phanta Sanctuary and Kanchanpur	1000	1600
Bardia Division	200	50-100
Banke Division	A few	-
Chitawan Division	A few	Extinct
India		
Uttar Pradesh		
Jaulasal Sanctuary	Fewer than 100	Extinct
Lalkua Sanctuary	Very few, if any	Extinct
Maldhan Sanctuary	Very few, if any	Extinct
Along Ganges River, West of Bijnor	Probably some	-
Along Ganges River, West of handpur	100(+)(-)	-
Between Hardwar and Luksor	1 doe shot in 1963	-
Dudhwa Tiger Reserve	~1200	1200 - 1400
Sonaripur Sanctuary	Fewer than 50	-
South Kheri Forest Division	Fewer than 200	-
Bahdi Tal, 6 miles west of Bellerain	A few	-
Ghola and surrounding tracts	800-900	-
Kishanpur Sanctuary	-	-
Katerniaghat Sanctuary	-	-
Mirchia, bordering Nepal	A few	Extinct





Location	1965	Present (Based on Qureshi <i>et al.</i> 1995)
West Bengal		
Jaldapara Sanctuary and surrounding forest	A few	Extinct
Assam		
Manas Sanctuary	Perhaps a few	Status Indeterminate
Darang Division along Bhutan border	A few	Extinct
Kaziranga Sanctuary	200-250	450 - 500
Madhya Pradesh		
Kanha National Park	~50	300 - 350
Motinala and Karanjia ranges, Mandla District	A few seen	Extinct
Balaghat District between Baihar and Lamba	Several seen in 1960	Extinct
Near Amarkantak, Bilaspur District	A few	Extinct
Near Kota, Bilaspur District	1 stag shot in 1960	Extinct
Madhya pradesh-Orissa border Raipur District	100(+)(-)	Extinct
West Bastar Division near Tekemeta	4 seen in 1963	Extinct
West Bastar Division near Kutru in Toynar and Bhairamgarh Range	Rare	Extinct

Localities in italics are part of Dudhwa Tiger Reserve

POPULATION

Schaller (1967) in 1965 estimated the *duvauceli* population to be between 1400 and 1800 in India and approximately 1600 in Nepal. Sinha (1986) had estimated the number of *duvauceli* in 1972 between 2400 and 2600 in India and around 1200 in Suklaphanta (Nepal). Ellenberg and Baur's (1987) estimates for Suklaphanta (Nepal) ranged between

1300 and 1500. Qureshi et al. (1995) estimated 1500 -2000 *duvauceli* individuals in 1991 for India and 1500-1900 for Nepal (Table 1). At present, the population in India is 1800-2400 and 1600-1700 in Nepal (Buddhi pers. com.).

The *ranjitsinhi* ranged between 200 and 250 in 1965 (Schaller, 1967) which increased to 520 in 1972 (Lahan and Sonowal, 1973). In 1978 there were 700 individuals of *ranjitsinhii* (Kusvaha and Unni 1986). In 1992 around 500 animals were surviving (Muley P., pers. com.), Manas had approximately 50 individuals (Sharma L., pers. com.) and rest were in Kaziranga. The current estimate is 400-500 barasingha in Kaziranga National Park (Kaziranga Forest Deptt. records).

The *branderi* survives only in Kanha. Schaller (1967) in 1965 observed fewer than 100 barasingha in Kanha which increased to 200 in 1974 (Martin 1977) and reached a maximum of 500 in 1988 (Kotwal 1987, Gopal 1995). The *branderi* reported to be present in Moti Nala Range, Karangia Range (Mandla District), Balaghat District, Bilaspur District and West Bastar Forest Division (Schaller 1967). In 1974, swamp deer were extinct from all these places except Kanha. Schaller (1967) estimated 400-500 animals surviving in all these localities. The present estimate of population is 300 - 350 barasingha in Kanha (Nayak A., pers. com). In 1992 there were approximately 50 individuals in five Indian Zoos and 300 in various Zoos in North America and Europe

ECOLOGY

The Barasingha group size shows marked seasonal changes in response to breeding and food availability. The smallest groups (5-15) were formed during winter, followed by monsoon (10-25) and summer (10-50) (Martin 1977, Schaff 1978, Singh 1984, Sankaran 1989, Qureshi *et al.* 1995). The single individuals were observed largely during rutting season (winter and late monsoon) and large groups (mean 32, range 2-250) were found more common during summer, which is largely a congregations in response to new flush in burnt flood plain grasslands (Schaff 1978, Qureshi *et al.* 1995). The all male group is largely seen during summer and late winter, while mixed groups are seen through out the year with highest proportion in summer. The group sizes were smaller in *branderi* in comparison to *duvauceli* and *ranjitsinhii* due to small population and difference in grassland composition, structure and habitat management regime.





Barasingha is monoestrous and monotochus in nature, females reproduce at the age of 2 to 3 years and males of age greater than 4 years contribute to breeding (Schaller 1967, Martin 1977, Schaff 1978, Qureshi *et al.* 1995). The gestation period in barasingha is 240 to 250 days (Asdell 1964). The sex ratio in all three sub species ranged from 40 to 80 stags per 100 hinds (Schaller 1967, Martin 1977, Schaff 1978, Singh 1984, Sankaran 1989, Qureshi *et al.* 1995). The low male:female ratio is attributed to selective predation and poaching. Barasingha female including the two year aged female observed to have reproductive rate of 20 to 45 fawn per 100 hinds (Schaller 1967, Martin 1977, Schaff 1978, Singh 1984, Sankaran 1989, Qureshi *et al.* 1995). The barasingha mortality is largely by predation, flooding (*duvauceli* and *ranjitsinhii*), and poaching. Tiger is a major predator of barasingha, there are anecdotal information and reports of kills by leopards and wild dogs. Jackal predation on fawns and yearlings has been reported by Singh (1985) and Schaff (1978). The frequency of barasingha kills range 25 to 50 percent in different populations (Schaller 1967, Martin 1977, Schaff 1978, Singh 1984, Qureshi *et al.* 1995). Predation by tigers was observed to be major cause of decline of *branderi* population in Kanha National Park. After Kanha management has taken steps to stock part of population in enclosure and stopped tiger shows with aid of baits which caused unnatural concentration of tigers in grassland, the barasingha population has increased (Panwar 1973). Flood is reported to be a major catastrophe for *ranjitsinhii* population in Kaziranga and *duvauceli* populations lose few individuals during every heavy flood (Qureshi *et al.* 1995). Deaths in barasingha due to disease are not recorded. Schaller (1967) did mention of abortion of fetus due to brucellosis. The barasingha population occur in areas where rinderpest, foot and mouth disease, brucellosis, haemorrhagic septicemia and anthrax were reported in wild as well as livestock populations. The ectoparasites like house flies, ticks and lice and endoparasites like flukes, lungworms *Eucheria coli* and Mange are reported to occur in barasingha population but no death due to any of these is observed (Schaller 1967, Schaff 1978, Arora 1990, Qureshi *et al.* 1995).

Barasingha utilize variety of habitat types including open forest where grasses are present, maximum abundance was observed in marshy and sandy grasslands (Schaller 1967, Martin 1977, Schaff 1978, Singh 1984, Gopal 1995, Qureshi *et al.* 1995). Barasingha were seen moving through forested habitats when they shift to different habitats as per their seasonal needs (Martin 1977, Schaff 1978, Qureshi *et al.* 1995). The composite home range of herds range from 10 to 30 km², annually

(Qureshi *et al.* 1995). Barasingha on an average move 2-3 km (straight line) daily and known to move distances of 5-7 km during seasonal shifts of habitat (Martin 1977, Schaff 1978, Singh 1985, Sankaran 1989, Qureshi *et al.* 1995). Barasingha is primarily a grazer and largely feed on grasses and aquatic plants. Some of the most utilized species were *Sacharum spp*, *Imperata cylindrica*, *Narenga porphyrocoma*, *Phragmites karka*, *Oryza rufipogon*, *Hygroryza spp* and *Hydrilla spp* (Schaller 1967, Martin 1977, Schaff 1978 and Singh 1984, Moe 1994, Qureshi *et al.* 1995). The drinking of water varies with season, twice in winter and monsoon to thrice or more in summer. The feeding happens throughout the day which peaks during 5 to 11 hrs and 15 to 20 hrs. The timing varies between seasons, during summer morning feeding ends early and evening bout start late (Martin 1977, Schaff 1978, Singh 1984, Qureshi *et al.* 1995). During summer animal do rest under trees shades and it is quite common to see them sitting in open. Habitat use is largely influenced by food quality. Grassland burning significantly affects the movement and choice of food species. Most of the grass species within 15 days of burning produce succulent and palatable shoots, thus barasingha is less choosy during this time (mid winter burning period) (Martin 1977, Schaff 1978, Qureshi *et al.* 1995). The specific habitat requirement for rutting is shallow wetland surrounded by tall grasses and for fawning the tall upland grasslands (Martin 1977, Qureshi *et al.* 1995). Barasingha avoids using areas grazed by livestock. The habitat use is largely influenced by food quality.

BEHAVIOUR

Barasingha is polygynous, males and females have linear hierarchy and during rut males tend to defend females in estrous (Schaller 1967, Martin 1977, Schaff 1978, Singh 1985, Qureshi *et al.* 1995). Stags settle dominance by sparring and body size displays amongst them while hinds exhibit dominance by pushing other hinds from preferred resting or feeding sites, by butting, kicking by foreleg and thumping ground (Singh 1984, Qureshi *et al.* 1995). Mating in *duvauceli* and *branderi* occurs during winter, most of the stags are in hard antler by September and they start bugling by then. Bugling peaks during mid October to November with earliest call in mid August to as late as mid April and as season progresses the evening bugling peak shifts to morning (Schaller 1967, Martin 1977, Schaff 1978, Singh 1984, Qureshi *et al.* 1995). The rutting starts for *duvauceli* in August – September, early December for *branderi* and April for *ranjitsinhii*; while antler shedding begins by mid January, late April and beginning of October respectively for three sub





species (Brander 1923, Finn 1929, Champion 1933, Schaller 1967, Prater 1971, Martin 1977, Schaff 1978, Singh 1984, Gopal 1995, Qureshi *et al.* 1995).

Barasingha are highly fidel in use of rutting grounds, so much so that in Kanha and Dudhwa they visit rutting grounds in the midst of agricultural fields (Schaller 1967, Martin 1977, Schaff 1978, Qureshi *et al.* 1995). Adult stags generally create wallows by digging soil by antler and fore feet, these wallows are churned regularly, stag rolls and urinate in it to leave scent secreted by inter digital glands (Schaller 1967, Martin 1977, Singh 1984, Qureshi *et al.* 1995). The stags rub their body and neck against tall grasses for marking (Singh 1984). The fight for dominance around wallow sites are common (Singh 1984, Qureshi *et al.* 1995). The grass thrasing and carriage of vegetative material on antlers is demonstrated to enhance the size profile by barasingha stags (Schaller 1967, Martin 1977, Singh 1984, Qureshi *et al.* 1995). The stag sniff the genital of hinds, or urine and do flehmen to asses estrous condition in hinds (Schaller 1967, Martin 1977, Singh 1984, Qureshi *et al.* 1995). The female behaviour is very subtle and seems to keep track of male dominance as they allow largely dominant or other high ranking stags to copulate. Barasingha stag approach females with submissive posture, outstretched neck with antlers held parallel to ground and ears held laterally. The head up display, prancing, calling and chasing happens depending upon the response of hinds (Singh 1984, Qureshi *et al.* 1995). Receptive hind generally makes no attempt to escape from dominant stag and at times seen following and encircling stag (Singh 1984, Qureshi *et al.* 1995). Hinds have been observed to chase males, avoid mount by males and even kick by forelegs, probably the ones not in estrous (Singh 1984, Qureshi *et al.* 1995).

The fawning peak occurs in July to August in *duvaceli*, September-October in *branderi*, and March-April in *ranjitsinhii* (Schaller 1967, Martin 1977, Schaff 1978, Singh 1984, Gopal 1995, Qureshi *et al.* 1995). Hinds segregate from herd to give birth in selected tall grass areas and fawn remain in this surrounding for approximately 7 to 15 days, fawn is introduced to herd as soon as it is able to follow mother (Schaller 1967, Martin 1977, Schaff 1978, Singh 1984, Qureshi *et al.* 1995). Hinds visit the hiding sites and make soft moaning calls for fawns to suckle (Singh 1984, Qureshi *et al.* 1995).

Barasingha have keen sense of hearing and smell. Barasingha behaviour to detect and communicate danger are, the alert posture with and without

tail being raised, thumping ground by foreleg, scanning for danger, alarm call, and forming tightly bunched group (Schaller 1967, Martin 1975, Schaff 1978, Singh 1984, Qureshi *et al.* 1995).

CONSERVATION

Barasingha population in their current distribution range are largely present in protected areas, with exception of Bijnor and Pilibhit populations and some populations like that of Dudhwa and Kaziranga seasonally move out of protected areas. The habitat of barasingha is more threatened being flood plain grassland, change in river dynamics due to human developmental activities, increase in siltation and reduced flow of water during critical periods of summer. The management earlier treated these grasslands as useless (termed blanks) and extensively planted and destroyed large areas of habitat. The wetlands used by barasingha should be modified by management only after appropriate scientific study. The current practice of grassland burning to control woody succession need to be done in form of a mosaic. Harrowing should be discouraged as it seems to deteriorate grassland condition and promote occupation by unpalatable grass species like *Cymbopogon spp.* (Qureshi *et al.* 1995). Many grasslands and woodland are having a problem of weed infestation (like *Sesbania spp.*) which need to be controlled by manual removal. The manual weed removal in Dudhwa and Kaziranga yielded good results as it has improved the habitat of barasingha.

Barasingha meat was not considered a delicacy but they were hunted and still poached for antler and meat. The populations outside protected areas as well as seasonally migrating population need to be protected. Barasingha population recovered in most of its range in North and Central India once grazing was controlled (Schaller 1967, Martin 1977, Schaff 1978, Singh 1984, Qureshi *et al.* 1995). Serious efforts are needed to control grazing in Hastinapur, Jhilmil tal and Katerniaghat. There is a need to adopt wildlife management aspects in forest working plans to address needs of protection and management especially for barasingha population in Bijnor and Pilibhit division. Pilibhit division has good barasingha population and can be upgraded to a conservation reserve category. The new relocation sites need to be identified for barasingha population of *branderi* (Kanha) and *ranjitsinhii* (Kaziranga) to establish one or few more sites of these subspecies for long term conservation. Barasingha population of Sathiana and some herds of Kakraha move out to their traditional breeding grounds, these areas need to be secured.





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