

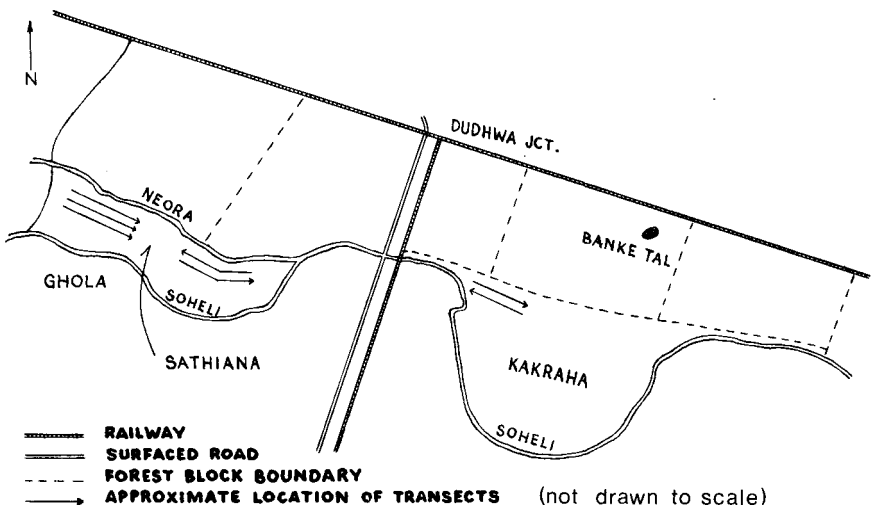
Barasingha in the Dudhwa Sanctuary

Dietrich Schaaf and Arjan Singh

The largest remaining and probably the best protected population of the endangered northern barasingha or swamp deer *Cervus duvauceli duvauceli* occurs in the Dudhwa Sanctuary of Kheri District, in the north Indian state of Uttar Pradesh. In April 1975 the authors made a count of the deer in this sanctuary, following up Dr Colin Holloway's 1972 survey. Their estimate of the population as a result is 1200–1600, compared with 'about' 1200 in 1972. This article presents the results of their survey along with a description of the habitat.

The Dudhwa Sanctuary, covering 212 sq km of grassland and woodland, consists mainly of sal forest *Shorea robusta*. The Neora river and the bed of the Soheli which is dry before the confluence run along the southern edge, between which and the sal forest to the north lie the grasslands that are the barasingha's preferred habitat. By far the largest numbers occur in the Sathiana and Kakraha blocks, in the south-west and south-east sectors respectively, which together comprise some 4500 hectares. Sathiana is the wetter area, much of it being inundated for at least short periods during the monsoon season. Grasses are generally tall and coarse, sometimes forming dense thickets that are difficult to penetrate even by elephant. Several swampy depressions, which contain water for all or most of the year, cross the land from north to south, and numerous jamun trees *Syzygium cuminii* attest to the wetness of the habitat; the high-water mark on trees close to the Neora river may be up to two metres, and in some years more. The western end of Sathiana is better drained than the east; the grasses appear to be shorter, and we saw large stands of *Imperata cylindrica* in seed, but the various-aged plantings of sisam trees *Dalbergia sissoo* obscure the animals.

Sathiana is a difficult area to survey, with trees and coppices interspersed in tall dense grass that is burned annually in January or February. In 1975 the grass was burned early but incompletely, leaving a mosaic of open country and thickets which still obstructed vision.



Each year in the monsoon the Sathiana barasingha gradually move south-west to Ghola, outside the sanctuary; they do not return until the grasses have been burned and new growth is coming. This movement may be partly caused by the annual floods on the grassland, mainly from the Neora river southwards. A wedge of non-reserved land reaching north through the grassland to the forest separates Sathiana block from Kakraha. This wedge is partly cultivated and heavily grazed by domestic stock, and also contains a raised road and railway line; combined with fairly heavy use by humans, the result is probably effectively to separate the barasingha of Sathiana and Kakraha. The north-south orientation of the road and railway interrupts the eastward drainage of the flood water from Sathiana, and the resultant silting on grass stems and leaves from the still water retards burning and contributes to the mosaic of burned and unburned patches we observed. Flood waters slowed by the road and railway probably also influence the rapidity and extent of deer migrations out of the Sathiana area. When the floods are sudden or excessive, as they were after June 22 in the 1975 monsoon season, they almost certainly affect the survival of newly dropped young between June and August.

The Kakraha block however, though periodically flooded, appears to be better drained. At the time of our survey the barasingha were using only a small part of the north-west corner, and the grassland vegetation there was shorter and more open than in Sathiana. 1974 was the first year livestock grazing was eliminated from the Kakraha area, and in the hot season, April-June, the barasingha population there was estimated by the junior author at 150-200 animals. In the 1973 hot season, he had counted only 16.

The Survey

After the annual grass fires, barasingha tend to congregate in large herds on the newly sprouting grass. We selected the survey areas on the basis of previous experience as those most likely to contain maximum numbers of barasingha. Three counts were conducted on April 2, 3 and 7, 1975. Observers mounted on elephants moved along predetermined transect lines and recorded all animals seen within an estimated 200 metres to either side. The first count was made in the Kakraha block using one domestic elephant. Counts 2 and 3 were in the eastern and western portions of the Sathiana block, and involved one and three elephants respectively, the animals in the latter moving forward together along roughly parallel transects. An estimated 930 hectares were covered in this fashion, approximately 21 per cent of the combined areas of Sathiana and Kakraha. Survey results are summarised in the table.

On a reconnaissance trip to Banke Tal, north of Kakraha, a pocket of grassland around a shallow seasonal lake surrounded by sal forest, where for some years past a herd of 40 barasingha has been reported, we counted eighteen animals; others could not be counted in the thick vegetation.

At Nagra Tal outside the Sanctuary, where in 1973 Holloway estimated the barasingha population at 20 animals, there was plentiful evidence of livestock grazing, but no sign of barasingha. Since Holloway's visit extensive teak *Tectonas grandis* plantations had been made immediately adjacent to the tal (lake), and we saw grass cutters harvesting thatching material around the lake. If barasingha are still here their future seems at best precarious.

Summary of Results of Dudhwa Sanctuary Barasingha Count

	<i>Approx. length of transect(s) (metres)</i>	<i>Approx. total area covered (hectares)</i>	<i>Time of coverage</i>	<i>Total counted</i>
Kakraha	3,750	150·0	0730–0930	276
East Sathiana	4,500	360·0	0730–1130	470
West Sathiana	3,500	420·0	0730–0930	480
Banke Tal	–	–	–	18
Totals	11,750	930·0	–	1,244

Our total of barasingha counted in the Dudhwa Sanctuary, including Banke Tal, was 1224. Some animals may have been counted more than once, but at the time of the survey the barasinghas' movements were highly local, and since each of the areas surveyed was covered only once, and that in the space of a few hours, it seems unlikely that a significant number of deer moved from one area to another. Moreover the country that separated the eastern and western Sathiana herds contained very few deer, so it is unlikely that a large number of animals moved from the east to the west despite a three-day gap between the two surveys. On the other hand, a number of deer were certainly missed in the dense vegetation, and a partially hidden herd of at least 50 animals seen well outside the 200-metre-wide transect in the East Sathiana count is not included in our figures. Altogether we believe that the 1244 animals counted represent an approximate minimum population, and we estimate the sanctuary's total population at 1200–1600 animals.

Conclusions and Recommendations

There are only two other herds of northern barasingha living in reserves and therefore reasonably secure: one in the Royal Sukla Phanta Wildlife Reserve in south-west Nepal, where, after ground and aerial survey, the population has been estimated at 1000, and one in the Kaziranga National Park in Assam, where in 1967 Schaller estimated about 250 animals survived;³ in 1972, Lahan and Sonowal estimated this population at 520 head on the basis of data gathered on a wildlife census.² The Dudhwa population is the largest, of the three, which together undoubtedly comprise the great majority of wild barasingha today. The evidence suggests that, given the present rate of attrition outside these reserves, the various remnant populations are gradually disappearing due to habitat degradation, if not actual harassment. Holloway notes that, of eleven localities in Uttar Pradesh mentioned by Schaller in 1967 as containing known or believed extant barasingha populations, eight could be struck from the list for all practical purposes in 1973. Our observations at Nagra Tal tend to confirm that this process of attrition is continuing. The populations in reserved areas therefore assume an added significance in the conservation of the species.

The Dudhwa Sanctuary population poses several interesting problems. Over the past two years there has been a phenomenal increase in the visible Kakraha population from 16 to 276 animals. This cannot be accounted for by breeding alone. In part it is due to scattered groups of animals congregating in the absence of stock grazing. We agree with Holloway's suggestion that barasingha, if not actively harassed, are quite tolerant of man and his livestock,

but it is possible that where there is room for them to retreat they do so, as they did in Kakraha before livestock were excluded. Deer were then seen only in isolated pockets in the sal forest north of the block, and a few occasionally on the open grassland.

Holloway also suggested that the Sathiana population is at or near the capacity of the available habitat to support it.¹ Similarly, the Kakraha population may be in an expansion phase in order to utilise fully the resources that have become available. More than half of one herd of 172 animals on the Kakraha block consisted of fawns and immature animals, this at the time of year when there is apparently free intermingling of sex and age groups in the large herds. Unfortunately we did not obtain comparative figures from Sathiana, but similar counts of the Sukla Phanta herds yielded figures about half as large as those for Kakraha, although the factors influencing the proportion of young animals may not be the same. A comparison of population growth rates (or lack of them) and habitat utilisation between Kakraha and Sathiana deer would provide useful information for future conservation and management, and the effects of flooding on new-born fawns should be investigated. The Kakraha deer can retreat into sal forest north of the block, even though this habitat may be less than optimal, while those of Sathiana are cut off from higher ground by the rising Neora river and move into Ghola, itself a seasonally flooded area.

In July 1976 Dudhwa Sanctuary became a national park, and its area may be considerably increased. This not only secures the area, but is valuable in preserving the endangered species there, notably tiger and marsh crocodile *Crocodylus palustris*, as well as barasingha. We would like to see at least a portion of the Ghola area, which is outside the sanctuary, included in the national park, since the Sathiana barasingha may spend up to seven months of each year there, but a detailed investigation of the area they use is needed before the boundaries can be proposed.

Acknowledgments

We wish to thank Messrs Y. C. Rai, Divisional Forest Officer, and A. A. Rizvi, Range Officer, Dudhwa, for their assistance and cooperation in conducting the survey. We gratefully acknowledge the financial support of the World Wildlife Fund (United States and International Appeals), the New York Zoological Society, the Zoological Society of San Diego, the San Francisco Zoological Society and the Fauna Preservation Society, all of which have generously contributed to the study of barasingha ecology. We are also grateful to Dr Colin W. Holloway for his review of this article.

References

1. HOLLOWAY, C. W. 1973. Swamp deer in Uttar Pradesh. *Oryx* 12 41-48.
2. LAHAN, P. and R. N. SONOWAL, 1973. Kaziranga Wildlife Sanctuary, Assam. A brief description and report on the census of large animals (March 1972). *J. Bombay Nat. Hist. Soc.* 70(2) 245-278.
3. SCHALLER, G. B. 1967. The deer and the tiger. Chicago Univ. Press.

Dietrich Schaaf, Dept of Fisheries and Wildlife, Michigan State University, East Lansing, Michigan 48824, USA. Arjan Singh, PO Pallia, Dist. Kheri, U.P., India.