

Roost counts of harriers *Circus* spanning seven winters in Andhra Pradesh, India

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A roost of four species of wintering harriers (Eurasian Marsh *Circus aeruginosus*, Montagu *C. pygargus*, Pallid *C. macrourus* and Hen Harrier *C. cyaneus*) was monitored for a period of seven years from 1986 to 1994 at a grassland site near Secunderabad, India. Eurasian Marsh Harriers accounted for more than 30% of harriers at the roost, followed by ringtails and juveniles of Montagu's, Pallid and Hen Harriers. A peak roost of over 200 harriers occurred in 1988–1989. Counts were not highly variable between years but a perceptible fall in numbers was noticed over the years. Peak numbers occurred in October and there was no significant increase later in the winter. Local factors such as grass cutting probably affected roost numbers. A survey of a network of sites is proposed to better ascertain regional trends in numbers.

INTRODUCTION

Long-term monitoring of bird numbers in India has been carried out for waterfowl species (Perennou *et al.* 1994), and for grassland birds such as the Great Indian Bustard (Rahmani and Manakadan 1988) and floricans (Narayan *et al.* 1989). Other migrants such as raptors have not been regularly monitored. Being at the pinnacle of the food chain, raptors deserve more attention on their wintering grounds (Newton 1979). The migrant raptors which winter throughout the Indian subcontinent include several species of harriers *Circus* (Ali and Ripley 1983), which congregate in large numbers at grasslands for roosting (Rahmani and Manakadan 1986, Clarke 1996a, Kanniah and Ganesh in press).

Study Area

Counts of harriers were made at a grassland roost site located in a mosaic of agricultural, semi-urban and scrub forest habitat near Alwal, 10 km north of Secunderabad, Andhra Pradesh, India (17°25'N 78°15'E). The area is about 550 m asl and receives about 800 mm of rainfall annually. The grassland near Alwal is approximately 1 km² in size, with complete grass cover, and is maintained as a military dairy farm with periodic fodder harvesting. Though developed along the fringes, this area remains relatively isolated and free from any major interference. Counts were made each winter 1986/1987 to 1993/1994, except for 1991/1992.

METHODS

Roost counts

Counts were made in the evenings. Two strategic points at opposite ends of the grassland were chosen from which harriers were counted by each author independently. It was possible to keep track of incoming individuals because the grassland was on a slope with a shallow depression in the middle and could be watched from either end. Harriers approached largely from one direction. Observations began about 2 hours before actual settling of the birds and each incoming individual

was recorded. Birds already in the area before counting started and those in an adjacent pre-roost site were taken account of. Complete counts of birds milling before roosting were also made and were compared with the arrival counts. Both the counts tallied well and so counts during milling were not analysed.

Counts were generally made at intervals of ten days. Weekly observations were made early in the season because the variability in numbers was high over a short period then, and the chances of missing the maxima at intervals of ten days was high. Later in the season variability was very low. Peak numbers of birds sighted per month were used as data for analysis.

The sex of individuals was noted where possible. However, birds often could not be sexed due to distance or poor light conditions. Ringtails and juveniles of Montagu's, Pallid and Hen Harriers were pooled into a single category, as they look similar in the field. These are referred to as 'ringtails and juveniles' in this paper. Grass cutting was evaluated by the time taken to harvest the grass.

RESULTS

Species composition

Five species of harriers: Eurasian Marsh *Circus aeruginosus*, Montagu's Harrier *C. pygargus*, Pallid Harrier *C. macrourus*, Hen Harrier *C. cyaneus* and Pied Harrier *C. melanoleucos* were recorded. The last two occurred irregularly and the Pied Harrier, in particular, was rare. Confirmed roosting of Hen Harriers was recorded only from 1989–1990 onwards. The other three harrier species occurred in all seven winters of observations. By far the most frequently recorded species was the Eurasian Marsh Harrier, which contributed more than 30% of the summed counts (7,822 birds), followed by 'ringtails and juveniles' of Montagu's, Pallid and Hen Harriers (24%).

Fluctuations in numbers

Harriers were present from early September to mid April. The mean monthly peak numbers of harriers counted during each winter are shown in Table 1. Maxima

Table 1. Peak counts of each category of harrier *Circus* counted at their roost site near Alwal, Andhra Pradesh, India

Winters	Total (males, females and juveniles)	Montagu's (males)	Marsh (males)	Pallid (males)	Hen (males)	Montagu's, Pallid and Hen 'ringtails and juveniles'
1986 – 1987	102	10	7	4	0	13
1987 – 1988	90	20	15	4	0	20
1988 – 1989	217	102	11	4	0	64
1989 – 1990	105	42	13	5	0	70
1990 – 1991	86	25	7	3	4	23
1992 – 1993	71	35	4	3	3	31
1993 – 1994	65	39	4	3	2	27

occurred during October, but by January the numbers began to gradually diminish. Male and female Eurasian Marsh Harriers tended to peak in November or December, while many juveniles were present in September. In contrast, adult male Montagu's peaked earlier in the season, while Pallid and Hen Harriers, though few, remained steady from September to March. The numbers of 'ringtails and juveniles' were high initially and declined rapidly thereafter.

Adult males seemed to leave on spring migration earlier. Birds lingering in April were more often either brown Eurasian Marsh Harriers or 'ringtails and juveniles'. However, in 1987, 1993 and 1994 male Eurasian Marsh, Montagu's and Pallid Harriers remained until mid April. In 1988, the last male Pallid Harrier was seen on 22 March, whilst Eurasian Marsh and 'ringtails and juveniles' were present until early April. Similarly, in 1989 Eurasian Marsh Harriers and 'ringtails and juveniles' were present as late as 19 April, whilst male Pallid and Montagu's Harriers were seen until end of March. In 1990, no harriers were observed roosting after 19 February.

Grass harvest

Grass is harvested at Alwal between September and February depending on growth. In 1988/1989 and 1989/1990 the harvest lasted for five months while in 1991/1992 and 1986/1987 it was over in two months due to poor grass growth. In 1988/1989 and 1989/1990 when harrier numbers were highest, grass growth was vigorous. Harriers prefer tall grass for roosting and at Alwal they roosted at specific spots in the grassland where the grass was tall. When the grass was cut, the harriers dispersed and roosted in open and less favourable places.

DISCUSSION

The mix of harriers at Alwal was biased towards Eurasian Marsh Harriers. In contrast, Rahmani and Manakadan (1986) noted almost 90% of all adult males roosting at Rollapadu in Andhra Pradesh, India, to be Montagu's Harriers, followed by Pallid and Eurasian Marsh. At Alwal, marshes and rice fields, favoured foraging habitat of the Eurasian Marsh Harrier, were located within a radius of 5 km of the roost. In contrast, the area around Rollapadu is arid and is preferred by dry habitat species

such as Montagu's. During his study of rainforest raptors in the Western Ghats, India, Thiollay (1993) recorded almost equal proportions of all three harriers in a grassland-forest landscape where all habitat types were common. Similar habitat preferences have been demonstrated for Montagu's and Marsh Harriers wintering in Senegal (Arroyo *et al.* 1995). Local habitat is clearly important to harrier composition in an area.

Variability in the numbers of Eurasian Marsh Harriers could be largely due to fluctuation in the availability of small tanks and rice fields, which are dependent on the monsoons. It is harder to say what could cause similar variability in 'ringtails and juveniles' as they include three species. The interpretation of trends in numbers of migratory species is complicated because adverse conditions can be encountered at any point in the migratory circuit (Morse 1980, Winstanley *et al.* 1974). Harriers in India, as in other areas, may largely depend on Orthoptera (Satheesan and Rao 1990, Satheesan *et al.* 1990, Clarke and Prakash 1997), although other species of invertebrates and some vertebrate species also feature in the diet (Clarke 1996b).

Grasshopper numbers fluctuate, and the presence or absence of harrier roosts could be directly due to their numbers, as seen in Senegal (Cormier and Baillon 1991). At Alwal, grasshoppers are also important and high numbers seem to coincide with peak harrier numbers. During such times, at every few steps in the grass many hoppers were flushed out. Most of the harriers also tended to stay longer in the same roost area during this period. A few pellets that were examined contained mandibles and femurs of grasshoppers. The overall number of harriers at Alwal is a reflection of changes in the number of Eurasian Marsh Harriers and not to the other species in the area. This is expected as Eurasian Marsh Harriers account for 30% of the individuals and showed marked changes in their numbers over the season, unlike other species, which were more stable.

Conservation and Monitoring

The local grasslands, called 'kanchas', have all but disappeared, either due to conversion or the process of natural succession in the Telengana region of Andhra Pradesh. A few are maintained and protected. Conversion to monoculture plantations of *Acacia* and dry land farms threatens even the present site. These

'kanchas' are small (<1-2 km²) but support important numbers of roosting harriers. Hence the conservation of these remaining sites is essential as they may be used as stopping-off points by harriers on migration.

To ascertain trends in the population of wintering harriers, we suggest that a network of roost sites be selected, which should be monitored for five years to establish the status of the birds. Harriers feed primarily on insects, such as grasshoppers, and on small rodents and birds mostly from agricultural areas (Ali and Ripley 1983, Arroyo *et al.* 1995). Hence, they can be exposed to pesticide accumulation over time which could be evident only from long-term population monitoring (Newton 1979).

Unlike others species of migratory birds very little is known in terms of ringing recoveries of the wintering population of Indian harriers. A large-scale ringing/tagging programme is necessary to trace their migration route and breeding areas.

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