on other Kestrels, at least for the first few weeks, gauged from the quantity of Kestrel legs in the nest and thereabouts. This peculiar behaviour by this pair of Buzzards could have been triggered by the loss of its own eggs or its failure to produce eggs. If the loss of its eggs was to an egg collector I would be very grateful to have it confirmed in the interest of our studies.

Naturally we will endeavour to monitor this particular nest again next season should it be used. Buzzards have been attributed with using stones to break open Emu eggs. I was inclined to scoff at that idea, as others might scoff at this article, if I didn't have it authenticated by our cameras and the observations of several independent observers.

Field Observations on the Letter-winged Kite, Eastern Simpson Desert, 1974-1976

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Observations are presented from several nesting colonies of Letter-winged Kites *Elanus scriptus* in inland Australia during the years 1974 to 1976. These cover the formation, growth and eventual abandonment of the colonies. In an adaption to desert life it seems certain that they breed continuously during times of abundant food supply and likely that young birds may breed when only a few months old. Hunting was completely nocturnal. Observations on dispersal after breeding. Notes on cere and leg colour, which differed from those given in most works of reference, and on some aspects of plumage.

The Letter-winged Kite *Elanus scriptus* is one of Australia's rarest birds of prey. A bird of the dry interior, it leads a nomadic existence, its whereabouts and numbers very largely dependent on the abundance of its principal prey, the Long-haired Rat *Rattus villosissimus*.

In 1973 much of the inland of Australia was inundated by record rains. In particular, so far as this paper is concerned, soaking rains fell in and around the Simpson Desert, resulting in a greater growth of vegetation than had occurred for many years. In the wake of this, the population of small mammals increased and that of the Long-haired Rat built up rapidly to huge numbers.

From August 1974 to August 1976 I was fortunate enough to be able to make five visits to the country bordering the Eastern side of the Simpson Desert. The area covered ranged from Marree in the south to parts of Sandringham Station, three hundred kilometres north of Birdsville, in the north. Such a large expanse clearly provided a wide variety of habitats but the most typical were sandhill desert, gibber plain and creeks. Trees were few, apart from along the creeks where the dominant species was

Coolibah *Eucalyptus microtheca* together with various Acacia and a Hakea, probably *Hakea multilineata* (suggested by Charles McCubbin, pers. comm.).

In 1974 much of the area carried a luxuriant growth of flowering plants. This was particularly thick in the flood plains of the creeks and on the sandhills, many of which had vegetation right across their crests. Even the normally barren gibber plains had plants growing between their stones. Many of the creeks were flowing.

In 1974 all of this vegetation was green. By 1975, with little further rain, most of the plants had died and there was hardly any extra growth. However, there was still an abundance of dry feed and, although most creeks had stopped flowing, there was water in almost all waterholes.

In 1976 the position had altered again. Heavy rain in Northern Queensland had put fresh water in Cooper's Creek and the Diamantina but, even though there had been some rain along the borders of the desert, vegetation was dry and sparser and fresh growth was confined largely to the creek beds which, apart from the Cooper and Diamantina were now dry or reduced to a series of waterholes.

It is difficult to have anything more than a vague impression of the numbers of rats in the area. They occurred in greatest density along the watercourses where the clay soil best enabled them to burrow. In 1974 and 1975 they were present in huge numbers at most places where I camped. The ground was densely honeycombed with burrows and there were many parts where the surface broke through at almost every step. By June 1976 the numbers had fallen dramatically. Many areas appeared to have been deserted completely and everywhere the population had been greatly reduced. In August this trend had clearly continued and I saw very few rats at all.

Until 1976, all the Letter-winged Kites that I saw were breeding. All the nesting was in colonies which varied in size from two pairs up to one of nearly fifty. All of the nine colonies were close to waterholes or creek beds, the favoured sites being those with fairly widely scattered Acacias or small Coolibahs. The denser groves of Coolibahs were avoided. Nests were built in Acacias or Coolibahs but, in sites where there was a choice of both trees, Acacias were always preferred.

Although several of the colonies were visited only once, there were two which I was able to go to in all three years and five more in which I was able to add secondhand observations to my own. The picture was very similar throughout, with small colonies in 1974, a dramatic increase by 1975 and then smaller or abandoned colonies in 1976. One colony had three nests in August 1974, thirteen in June 1975 and was abandoned in June 1976.

Letter-winged Kite on nest, Birdsville Track, South Australia, June 1975.
Plate 13 Photo from a transparency by David Hollands.

Another one had had about six nests in August 1974, had increased to about fifty by 1975 and was also abandoned in 1976. The very large area of Acacias at this colony made accurate counting difficult. The rat plague appeared to move from north to south and it was the more northerly colonies which were abandoned first. Two of the most southern colonies were not discovered until 1975 and it may be that they did not exist in the previous year. I strongly suspect that there was no nesting season in the usually accepted sense. From August 1974 through to November 1975 all the colonies visited were in a state of high activity with nests at all stages from eggs to flying young. There is a five month period from December 1974 to May 1975 about which I have no direct information, but December's eggs would not have produced flying young until February, and May's flying young would have been still in eggs in March, leaving very little of the year unaccounted for. I believe that breeding went on continuously in the colonies from their formation until they were abandoned.

The nests were of small sticks thickly lined with rat fur, usually only one active nest to a tree, although some trees also held one or two old nests. Clutches were from three to five, tending to be smaller in 1976 than in the previous two years. In 1975, when activity was at its' height, some strange clutches were noted. One nest when found held a newly hatched eyass and three eggs. Four days later the eyass had disappeared, there were two more newly hatched ones and still three eggs. Another nest had four eggs when found and then, four days later, held three eyass and still two eggs. Whether this represents continued laying by one adult or is due to two females using the same nest, is hard to say.

A Letter-winged Kite colony in daytime is a place of peace and inactivity. Typically one bird, probably the female, broods the eggs or young while the other adult perches nearby, often in the nesting tree and usually high up where it can both see and be seen. The young are often brooded until close to being fledged but may be left in the last few days when both parents will then perch close by. Unless disturbed, there is very little movement and the sentinel bird may stay on the same perch throughout the day. If they are disturbed the reaction is almost always the same as the birds climb at once with deep, buoyant wing-beats and then turn into the wind to soar high over the head of the intruder. When one bird is disturbed this is frequently a signal for the whole colony to go up so that every adult may appear, hanging on the breeze, several hundred feet up.

The flight of the Letter-winged Kite is quite characteristic and differs clearly from that of the Black-shouldered Kite *Elanus notatus* in several respects. The wings are long; noticeably longer than the Black-shouldered Kite's and have a remarkable translucency when seen against the light. The flight is very light and buoyant with much less wing work than the Black-shouldered Kite. They glide and soar well with a marked dihedral to the wings and will stoop quite fast, usually at a shallow angle. When I started to write this paper, I wrote that I had never seen one hover as Kestrels and the Black-shouldered Kite do although they will frequently soar into the wind and remain motionless on still wings for some time. Certainly hovering is not a feature of daytime flight in the nesting colonies but, in the last week, I have watched several birds hovering at dusk at Werribee in Southern Victoria. They hovered well, predictably with a much slower and deeper wing action than the Black-shouldered Kite, a comparison which could be made particularly well as both species were hovering over the same paddock.

One common display flight over the breeding ground is a short vertical descent with the body almost horizontal and quivering wings held straight up over the back. This takes place with the other bird of the pair flying a little way below so that, after the descent, both birds are flying close together. A variation of this is used when the colony settles down after a disturbance and the birds, flying above their nests, raise their wings and, with talons extended, fall from the sky and straight into their trees.

There are three quite different calls, all used frequently on the nesting ground. The alarm call, given when perched and in flight, is a high clear whistle. I heard this whenever I intruded on a colony but it is used when bringing food to the nest at night. I suspect that this call is given by the male only. At night the characteristic call is a harsh rasping jarr lasting about half a second and repeated six or seven times. This call, coming out of the darkness from all round the colony can give an air of great activity. This call is probably given only by the female. The third call, a conversational chattering, is given only during the quivering display flight.

It is not the intention of this paper to go into detailed and well known plumage descriptions but there are one or two points which, I believe, are worth mentioning. Most works of reference in the past have recorded the cere and legs as yellow and have regarded the bird as virtually indistinguishable from the Black-shouldered Kite except in flight. This is a fallacy. In the many Letter-winged Kites seen in the field, the cere, which is small, has always been of a very dark horn colour. The legs are usually a pale flesh, sometimes with the very faintest suggestion of yellow, and quite unlike the bright yellow colour of the Black-shouldered Kite. There is also a difference in the head colour which I believe is constant enough to be a reliable field character. The Letter-winged Kite has a narrow band of white on the forehead and there is then a sharp line of demarcation to the grey feathering of the rest of the forehead, crown and nape, giving a distinct grey-capped appearance to the bird. In the Black-shouldered Kite the white of the forehead does not give place to grey until the crown and there is a graduation from white to grey without the abrupt colour change of the other bird, the overall effect being of a considerably whiter head. Seen side by side, and particularly face on, the Letter-winged Kite has noticeably bigger eyes and a more owlish face than the Black-shouldered Kite but I would not regard this character alone as being sufficiently distinctive to be used as a means of identification. One other plumage feature of the breeding Letter-winged Kites was that many of them had traces of brown on the forehead and upper wing coverts. I believe that this represents birds breeding while still not fully moulted from immature plumage and will return to this topic later.

For a long time the Letter-winged Kite was thought to be crepuscular, but several observers recently have indicated that it is nocturnal, and this was certainly so at the colonies which I studied where it was as nocturnal as any owl. Watches at the nest over several nights revealed that the males stayed on their daytime perches until about an hour after sunset, leaving when it was almost too dark for the human eye to see them. Hunting commenced at once and must have been close to the nest for it was often only minutes before the first prey was brought in. The male usually called as he came and was answered by the female, who flew off the nest and took the food from him, but sometimes he brought the food to the nest himself when both birds would stay

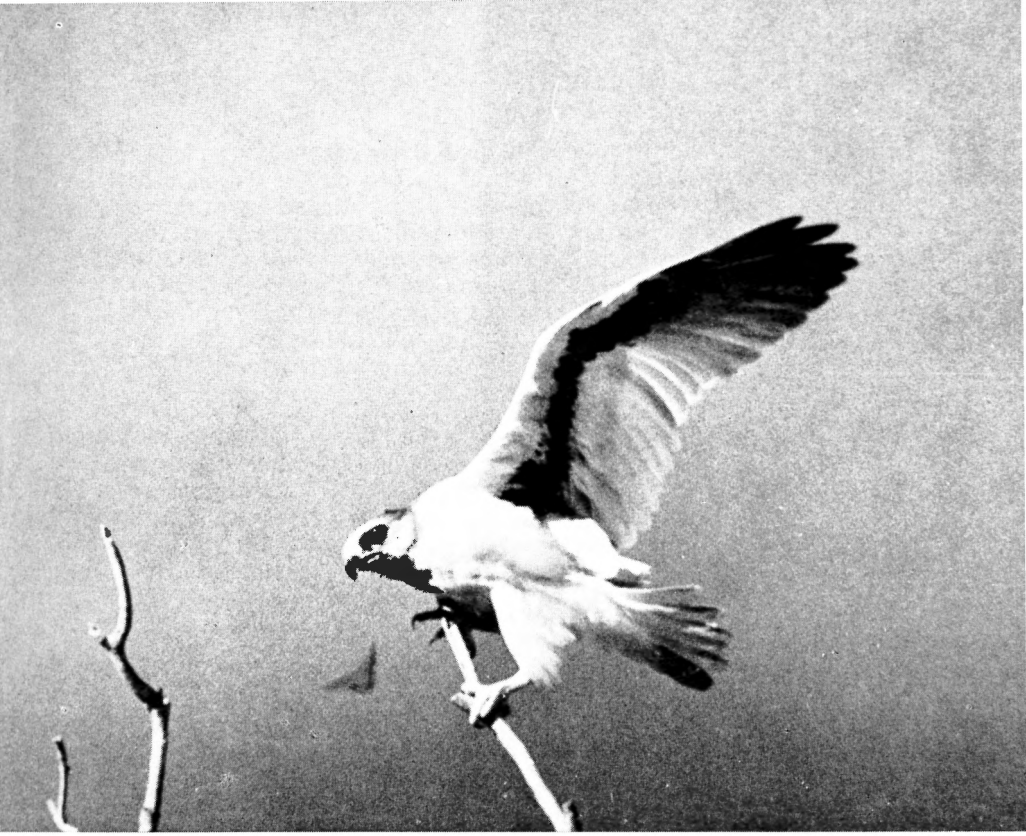
Letter-winged Kite feeding four chicks, Birdsville Track, June 1975.

Plate 14 Photo by David Hollands

there together. I never saw the male feed the young. Proof, to me, that the bird is a true nocturnal hunter came when, in a night long vigil on a moonless night, food was brought in at approximately two hour intervals until dawn, the only light being the light from the stars. This is of great interest for, although there are several hawks which are crepuscular, I believe that this is the only raptor in the World which is known to be a true bird of the night.

Prey at the breeding colonies seemed to consist entirely of rats. I saw no other food brought to the nest and examination of many pellets produced only rat remains. I was unable to see how they were caught and the mode of hunting remains one of the many unsolved questions. The knowledge, gained recently at Werribee, that they do hover is, of course, a very strong pointer.

Although I have a lot of observations, spread over three years, none of my visits was for more than a few days and my information on incubation and fledging is far from complete. In 1974 and



Immature Letter-winged Kite, Birdsville Track, June 1975.
The nape and collar of this bird were pale buff-brown.

Plate 15 Photo from a transparency by David Hollands.

1976 all the young in a brood appeared to be within about twenty-four hours of each other in age and I suspect that a clutch is normally laid quickly; within forty-eight hours at the most. In 1975, however, at the peak of activity, laying was, as previously mentioned, quite bizarre with eggs still being laid in nests which already held young. Growth appeared to be very rapid for, in all the nests examined, the numbers of young with early feathering was very small and it seemed that there was an unusually quick transition from down to full feathering. As might have been expected, there was very little activity from the young by day.

First flights took place when the tail was still noticeably short and most colonies had a number of these weakly flying young, still protected and fed by their parents. However, at no stage did I see more mature young in any of the colonies and it is an intriguing question to know what became of them. Despite my widespread travelling through the area, I never saw young birds away from the colonies and suspect that a more or less adult

plumage is attained very quickly and that, in times of plenty, these birds may be capable of breeding when only a few months old. The presence of traces of immature plumage in breeding birds would support this and it would explain the absence of immatures away from the colonies. Further, only in this way does it seem possible to explain the extraordinary increase in the size of the colonies. Six pairs to aproximately fifty, and three pairs to thirteen, both within nine months, are two examples and other colonies showed similar increases. With no known reservoir of adults, the only way that this remarkable build-up could have taken place is by early breeding of their own young.

By 1976 the rat plague was waning fast and the peak of Letter-winged Kite breeding was over. By June most of the northern colonies were deserted, even the nests having disappeared. Further south most of the nests were well advanced and these colonies too were abandoned by August. During these months was the only time that I found birds away from the breeding colonies and I met three parties of between twenty and fifty, all in timbered areas where I knew that there had been no nesting. They moved as a group, often all perching in the same tree and were clearly on the move, always having gone elsewhere by the next day. It seems likely that, when a colony is abandoned, all the birds move out at once and that they then stay together in their subsequent movements. This would fit in with the arrival in southern parts of Australia, as has happened in recent months, of parties of Letter-winged Kites, still living as a compact unit. It would be interesting to know the fate of these birds and if they ever return to the interior. In southern Australia they have never been known to breed and, in the areas where they have appeared, they have been noticed to have a high death rate, there being numerous reports of dead or moribund birds being found. I also have a reliable report that, after good rains, a single pair of birds is breeding in a previously abandoned colony near Birdsville. Possibly these nomads never make the return migration and the continuance of the species depends on a small residual population which never moves far from its birthplace.

This paper raises almost more questions that it answers and is so incomplete that I hesitate to publish it. Many of my theories require much more evidence and, as well as these, such questions as the prey taken when there are no rats, how and where the residual population survives, whether they can go for years without breeding at all and many others, all need to be answered. Far more detailed work is required on this extraordinary bird but, if this paper even provides some sort of stimulus for this, it will have been worthwhile.

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