

THE SQUARE-TAILED KITE *LOPHOICTINIA ISURA* IN SOUTH AUSTRALIA

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SUMMARY

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Historical and recent records of the Square-tailed Kite *Lophoictinia isura* in South Australia were assembled, critically assessed and analysed for patterns of seasonal and distributional occurrence. Of the 50 acceptable dated records, 31 (62%) were in spring, 11 (22%) in summer, 4 (8%) in autumn and 4 (8%) in winter. The species is sparsely distributed across the southern and south-eastern coastal and subcoastal parts of the State, thence northwards through the Flinders Ranges and Channel Country of the Cooper-Stirzelecki drainage system. It appears that in wet years there is some spring southwards movement through the Cooper-Stirzelecki system, when the few recorded breeding attempts take place in the south of the State; there has been little if any successful breeding in recent years. The most important parts of the State for the species, in terms of number of records (%), $n = 54$ and breeding attempts, are Nullarbor Plain (11%), Eyre Peninsula (30%, formerly bred), Murray River (11%, breeds) and North-East (24%). It is concluded that the Square-tailed Kite is a rare, declining and probably threatened species in South Australia, requiring urgent study and active conservation.

INTRODUCTION

The Square-tailed Kite *Lophoictinia isura* has been described as "very rare" in South Australia (Condon 1969), and its status is not well understood (Ashton & Ashton 1983, Fraser 1983a). It has rarely been reported breeding (Fraser 1983a, Jolly 1989) and at least some reported sightings (particularly the early ones) may be referable to other species, notably the Black Kite *Milvus migrans* and Whistling Kite *Haliastur sphenurus*. The Square-tailed Kite also resembles the immature Swamp Harrier *Circus approximans*, particularly in the underwing pattern.

Recent work on the Square-tailed Kite's status elsewhere in southern Australia has shown it to be a spring-summer breeding migrant (see Debus & Silveira 1989 for a review); a similar tentative conclusion for South Australia was suggested by Jolly (1989). This paper critically examines all available reports of the Square-tailed Kite in South Australia, to determine its status and distribution in the State. The paper is based on a draft written by S. A. Parker, who collated most of the records. For completeness, records

submitted to the RAOU Field and Historical Atlases (Blakers *et al.* 1984), but rejected, are discussed here to obviate the necessity for future workers to search Atlas files. For the purpose of analysis, one record is taken to mean one Kite at a given locality in one month or part thereof, and nestlings were not counted.

ANNOTATED LIST OF RECORDS

Nullarbor Plain

1. Between Wigupda Tank (ca 40 km west of Nullarbor Station) and 43 km from Eucla, at least three seen on 28 October 1931; acceptable description given (McGilp 1932, 1934).
2. Near Penong, 15 October 1962, no other details (Rix 1962). In view of the lack of a description and the paucity of good field guides at the time, this record must remain unconfirmed.
3. Near Nullarbor Motel, Eyre Highway (31°26'S, 130°54'E), three over saltbush plain (*Atriplex* sp.) on 2 September 1982; acceptable description given (Ashton & Ashton 1983).

Eyre Peninsula

4. [20 September-24 October 1946, mainly Wanilla district] "One seen flying low, swiftly and straight over mallee. Short rounded tail, orange colouration below and extremely pointed wings swept back behind tail were conspicuous" (Storr 1947a). "*Lophoictinia isura* . . . this bird was recorded in my notes as the Black-breasted Buzzard (*Hamirostra melanosternon*), but following the opinion of Mr H. T. Condon was listed as above. Comparisons since made between skins of the two species and reference to my field notes lead me to think that both diagnoses are doubtful" (Storr 1947b). The Square-tailed Kite does not have a short rounded tail or pointed wings; the description suggests the Australian Hobby *Falco longipennis*, and Storr's later doubt necessitates rejection of the record.
5. Port Lincoln, specimen taken in 1964 (Condon 1969), no other details available. The specimen is not in the South Australian Museum nor in the collections of other Australian museums.

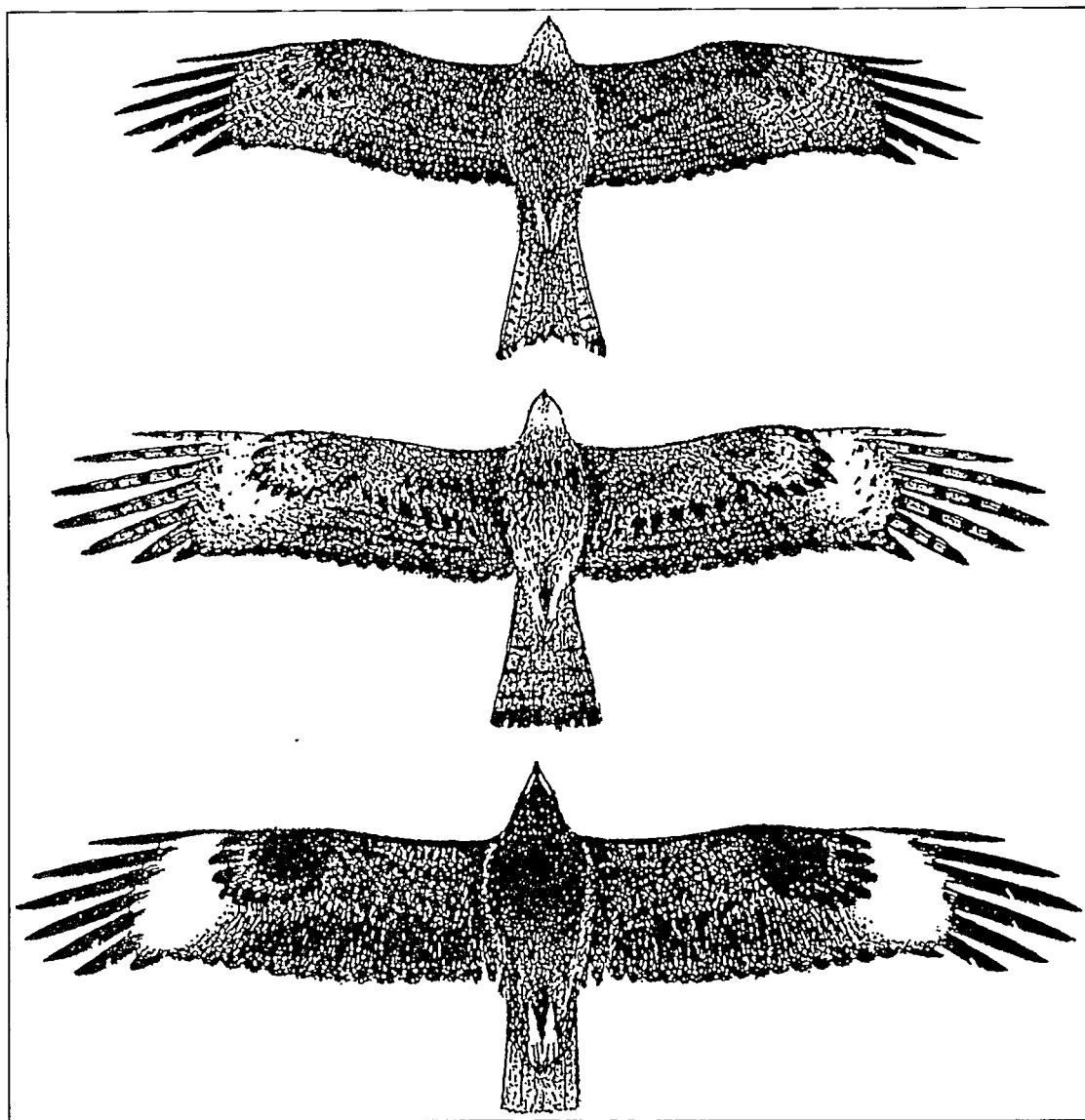


Figure 1. Overhead view of Black Kite (upper), Square-tailed Kite (middle) and Black-breasted Buzzard (lower).
Drawing: David Noakes.

6. Wanilla district: up to three pairs attempted to nest in the 1960s and early 1970s (Jolly 1989). Clutch of two addled eggs (SAM B28149) taken 20 December 1972 by J. Jolly, together with photographs of the incubating bird. Reported Wanilla Forest and Big Swamp 19 December 1975, "presumably same bird" (Cox *et al.* in Reid 1976), and 20 km west of Port Lincoln 21 November 1976 (Cox in Reid 1980). Jolly (1989)

has discussed the status and decline of the pairs that attempted to breed in the area. This population dwindled to one bird which continued to build and frequent nests in spring, but failed to find a mate (Cupper & Cupper 1981, Hollands 1984, T. Fraser *in litt.*). Latest information is that the lone bird has disappeared, presumed dead (T. Fraser pers. comm. May 1990). In Jolly's account, only those observations for the successful



Figure 2. Adult Square-tailed Kite in flight, Eyre Peninsula.
Photo: Jeff Jolly.

breeding season of 1971–1972 could be dated and included in Table 1, *i.e.* pair present from September to January inclusive plus two flying young in January. This is based on the stated nestling period of nine weeks (Jolly 1989) occupying November and December, and a projected incubation period of 5–6 weeks (Debus & Czechura 1989) occupying mid September to October.

Whyalla district

7. "One flying over saltbush country 3 km inland from Whyalla on 25 August 1972 [given as "2 km north of Whyalla" by Cox in Glover 1974]. Another was seen over mallee country near the northern shore of False Bay on 17 December 1972" (Cox 1974, acceptable descriptions given).

Kangaroo Island

8. D'Estrees Bay 6 December 1975, one bird observed by S. A. Parker and A. F. C. Lashmar. "... first seen about 200 m to the south-west, flying very low above tops of tall mallee along coast. Came slowly towards us, increasing altitude to about 15 m overhead, made a wide banking circle above us then sheared off inland at increased altitude, 30 m or more. Size of harrier, wings very long, long dark "fingers", distinct white patches at base of primaries and blackish patch distal to wrist; breast, belly and underwing coverts orange-brown; tail long,

squared-off, pale greyish beneath. Bird glided and soared only, no movement of wings while we watched" (Parker, ms). The description clearly establishes the bird as a Square-tailed Kite.

9. Sandhurst, east of Pennington Bay, one bird on 7 and 16 February 1980 (A. F. C. Lashmar in Jaensch & Joseph 1980; this is the record in Blakers *et al.* 1984). "... soaring a little above the height of scattered bushes and trees in fairly open and grassed sandhill country, not far from large areas of mallee eucalypt scrub. The first and most striking feature of this hawk was the appearance of the wings, as though each wing had a hole blasted through it just beyond the elbow . . . The bird appeared to be about the size of a Swamp Harrier and coloured reddish brown below and slightly streaked with a darker colour. It had a long square-cut tail which was fairly swivelly, and longish wings carried fairly high and ending with open fingers" (Lashmar, ms). Again, the description clearly establishes the bird as a Square-tailed Kite; it is treated as one record in Table 1.

Adelaide district

10. Blackwood, adult female (SAM B19502) collected 12 October 1913 by E. Ashby as it flew over his home, now Wittunga Botanic Gardens, Shepherds Hill Road (Anon. 1921, Sutton 1923, McGilp 1934). On the label of the specimen is written "In stomach were remains of eggshell and



Figure 3. Square-tailed Kite nestlings, showing underwing pattern of juvenile, Eyre Peninsula.
Photo: Jeff Jolly.

fledglings, probably wattletails [*Anthochaera*]. The locality is one of *Eucalyptus leucoxylon-E. odorata* woodland.

11. One over Clapham, flying towards Belair water-tower, at ca 300–500 m altitude, 11 September 1975 (Lees 1975, acceptable description given).

12. ICI Saltfields, one on 15 October 1975, “caught and ate a Silver Gull [*Larus novaehollandiae*], took it into mangrove area” (Rix 1978, no description given). ICI Saltfields, samphire area at sewer outlet channel, one on 29 June 1978, feeding on a Eurasian Coot *Fulica atra*, “tail-twisting trait clearly observed” but no other details given (Rix 1980). Both these records are doubtful because of the habitat and prey sizes (ca 300 g and 500 g respectively) — see Debus & Czechura (1989); many raptors twist their tail in flight, and confusion with juvenile or immature Swamp Harrier seems likely in this

case, therefore the records should be rejected in the absence of acceptable descriptions.

13. Sandy Creek Conservation Park near Adelaide, one adult over eucalypt woodland on 11 September 1990. Another over tall eucalypts at South Para Reservoir, 9 km away, on 28 October 1990. All field marks noted on birds in flight, full description given (Cox 1991).

South-East/Ninety-Mile Desert

14. Penola State Forest, one bird observed over *Eucalyptus baxteri* woodland on 29 November 1983 (Reid 1984). Full description given, all field marks noted on bird at rest and in flight, record considered acceptable by Parker. It is surprising that this was the first record for the South-East; further sightings may be expected.

15. The Coorong, September 1986 (a wet season), one bird reported by Adams (1986). The bird was recognised as different from the Swamp

Harrier, as shown by the relevant passage: "With the exception of Marsh Harriers raptors were not seen very often. We were surprised therefore, to see what we believed to be a Square-tailed Kite". No field notes or description were taken, but the sightings was made in mallee country (J. Adams *in litt.*). The account also mentions a sighting of the Little Eagle *Hieraaetus morphnoides*, another potentially confusing species additionally identified. Although this record must remain unconfirmed, it raises the possibility that the Square-tailed Kite occurs in the region; I have visited The Coorong, and consider that the species could occur over the mallee and other shrubland habitat there.

Murray River

16. Sunlands, Waikerie, two "confidently considered to be this species", 1 January 1967 (Cowell in Glover 1968, no description given). At that time there were no modern field guides available to assist identification; the record must remain unconfirmed because there was no reason given for considering the birds to be Square-tailed Kites.

17. Near Murray River, a few kilometres south of Swan Reach, one on 27 March 1970 (Beruldsen 1972). This is a misquote by the compiler of the relevant "Bird Notes" in *Bird Talk* 1(1). The bird was actually observed in the hilly country to the east of Sedan, probably close to Keyneton, *en route* from Swan Reach to Adelaide (G. Beruldsen *in litt.*). A description provided by the observer establishes the bird as a Square-tailed Kite: it had upswept wings with prominent "windows" and prominent black "fingers"; a long unbarred tail that was broad and fan-shaped, square at the tip with an indistinct dark subterminal band; it was gliding over habitat similar to that on Eyre Peninsula. Its colour was not clearly discernible, but it was not the grey of an adult Spotted Harrier *Circus assimilis*, nor was it a Black-breasted Buzzard, Wedge-tailed Eagle *Aquila audax* (on wing/tail shape and proportions) or a Swamp Harrier (G. Beruldsen *in litt.*). It is thought that there was actually a pair of Square-tailed Kites in the area at the time, which may have attempted to breed (T. Fraser pers. comm.).

18. Upper Murray River (exact locality suppressed), pair nesting in River Red Gum *Eucalyptus camaldulensis* late September-early

December 1982; pair sighted 30 September and 15 October, single bird in December, eggs possibly failed to hatch (Fraser 1983a, description and photograph of one bird presented in article).

Flinders Ranges/Olary Spur

19. Mt Serle Station, North Flinders Ranges, record submitted to RAOU Historical Atlas for the period 1959-1976 (block 30°/158°). No unusual record form was submitted. Information from the observer (N. Smith *in litt.*) indicates that the record is referable to the Black Kite: the birds were identified as Square-tailed Kites from Cayley's **What Bird is That?** [at that time a misleading reference on the species], and were regarded as common during the mid 1960s when they arrived with "Fork-tailed Kites" to feed on a mouse plague and on rabbits dying of myxomatosis. The supposed distinction between "square-tailed" and "fork-tailed" kites on tail shape alone was, and still is, a common error.

20. Spring Dam, south of Yunta, one bird in November 1968 (A. Tiver in Mack 1970). No description given, therefore the record must remain unconfirmed although possibly correct in view of the following.

21. A record for the Flinders Ranges in Blakers *et al.* (1984) is supported by a completed unusual record form, details of which follow. The bird was observed at Motpena Station via Parachilna on 23 November 1978 by M. R. Johnson. The description and sketches on the form mention or illustrate the "very distinctive" dark carpal patches and white windows in the wings; boldly barred primaries; long, grey, square-tipped tail with dark subterminal band; and the "very smooth gliding action" on upswept wings, with tail constantly twisting from side to side, as it quartered sandhills and swales covered in low bushes. The bird was clearly not a Black Kite, one or two of which were present for comparison, and unlike that species it was constantly mobbed by passerines. The Atlas Regional Organiser's annotation "?doubtful" notwithstanding, the unusual record form clearly establishes the bird as a Square-tailed Kite and Blakers *et al.* (1984) were correct in accepting the record. The bird was present for three days, and its "very light brown head" and brown eyes indicate an immature. The observer also submitted a record of the species to the RAOU Historical Atlas for Motpena during the period 1970-1976. The Kite stayed

around the homestead for two days in 1976 (dates not recorded); Black Kites had been very rare visitors to Motpena until the wet years of 1973–1974, after which they have been regular visitors to the present (M. Johnson *in litt.*). Solitary Square-tailed Kites have also been seen at Motpena at irregular intervals since 1978, the last record being of a bird that stayed for two days at the homestead in late March 1990; another was seen 15–20 km to the east, near Parachilna, on 18 May 1990 (M. Johnson *in litt.*). Trees around the homestead are *ca* 15 m tall, contrasting with *ca* 5–6 m for the remainder of the district.

North-East

22. Creek near Lake Callabonna, several reported nesting November 1894 by A. H. C. Zietz (in Campbell 1900: 485; see also McGilp 1932, 1934 and Boehm 1947). Regarded as referable to the Black Kite by McGilp, probably a correct assessment in view of the early confusion surrounding the two species.

23. “Shot at Killalpaninna, where it was fairly plentiful. Numbers were also seen at Kalamurina [summer of 1901–02]” (Lyons 1902). Probably Black Kites or Whistling Kites, or both.

24. Noted in list of species seen at Mungeranie and surrounding districts in May and June 1922 (Nicholls 1924: 58). Record unacceptable, in view of the lack of a description and the early confusion over the large kites.

25. “15th March, 1924 – Square-tailed Kites (*Lophoictinia isura*) I see daily” (Reese 1924). Reese’s homestead was on Appamunna Waterhole, Lake Etamunbanie. He subsequently altered this identification to Whistling Kite (Reese 1925).

26. Innamincka Station, “around which Square-tailed Kites were circling”, 18 May 1924 (Cleland 1925). Cleland’s account of the remainder of his journey, and his annotated species list, mention only Fork-tailed (Black) Kites, therefore this was either a misidentification or an inadvertent slip for “Fork-tailed Kite”.

27. In about April of 1971, south of Moolawatana, one bird observed flying along the margin of Lake Callabonna by Parks & Wildlife ranger Ian May (pers. comm.), his only record of the species in eight months’ residence there. In October 1974, after floodwaters from an exceptionally wet year had receded, a pair

observed flying up and down the margin of Lake Callabonna and occasionally landing on the ground (I. May pers. comm.). Adequate description given: the birds were obviously not Black Kites, because they had V-shaped wings in glide with prominent “fingers” and white “windows”, and a long square-tipped tail; they were more brightly marked than Square-tailed Kites seen previously in the Kimberley Division of Western Australia (I. May pers. comm.). The observer is also aware of photographs of putative Square-tailed Kites in the region which were actually of the Black-breasted Buzzard, which is moderately common and familiar to him in the area.

28. Reported to occur on the Cooper and Strzelecki Creeks in “particularly good seasons” (Fraser 1983b). Details of records are as follow (T. Dennis *in litt.*). On 26 August 1974, one bird observed *ca* 35 km south of Innamincka on the old Strzelecki Track: soaring with a deep dihedral, more pronounced than Black-breasted Buzzard (three of which were seen that morning); wings narrower, tail longer and twisting in flight; light head and generally pale; bullseyes in wings indistinct; finer bird than Buzzard. On 29 August 1974, one observed on the northern side of Callamurra Waterhole 5 km north-east of Innamincka: stood out amongst Black Kites in mid distance; finer than Black-breasted Buzzard, tail mobile; lofting in thermal, later soaring over Red Gums. At the time, waterholes were full and there was much surface water. Although the descriptions are limited, the observer was familiar with potentially confusing species and aware of differences (*e.g.* from light phase Black-breasted Buzzard), and was also aware of the significance of sightings of the Square-tailed Kite in the region. It is noteworthy that the observer (a Parks & Wildlife ranger and raptor biologist) compared the birds with the Black-breasted Buzzard, the pale phase or juvenile of which is the species most likely to be confused with a genuine Square-tailed Kite (*e.g.* Badman & Debus 1987).

29. Reported “recently” (presumably 1980) as “with Black Kites” at Kudrimitchie by Taylor (1980), who elsewhere in the same note reported the Square-tailed Kite as “numerous” at Alice Springs. The latter comment betrays these records as misidentifications of the Black Kite.

30. Cooper’s Creek near Innamincka, one bird seen (no date, but presumably 1980: Martin in

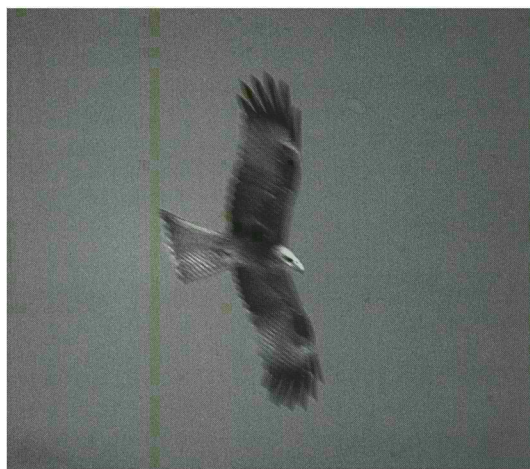
Jaensch 1980). Observed perched and briefly in flight, limited description given: wings longer than tail [at rest], whitish face, red-brown chest, pale feet and yellowish eye. Pale face and eye distinguish this bird from immature Black-breasted Buzzard, pale eye and feet distinguish it from Black Kite; the record is supported by other confirmed records for the region.

31. "Merty Merty" [*sic*, = Murtamurta] on Strzelecki Creek, one bird observed on 13 August 1983 by Hobbs (1984). Field marks noted: slightly rufous, paler than immature Black Kite (many adult and immature Black Kites present for comparison); conspicuous white forehead; narrow wings slightly raised and bent back a little, primaries widely open and barred darker with obscure white panel across bases; tail long and square with dark band near tip and other obscure barring, occasionally twisted Black Kite fashion; circled low over treetops; its shape, flight and general jizz did not fit the Black-breasted Buzzard, several of which were seen on the same day (J. Hobbs *in litt.*). Description establishes bird's identity, white forehead indicates an adult.

32. Strzelecki Crossing 28 November 1985, one photographed by A. Johnson (*in litt.*). Photographs independently seen and confirmed as Square-tailed Kite by Parker and Debus; Parker's response (*in litt.* to Johnson): "From all the other things it could have been (including

imm. Spotted Harrier, pale-phase Black-breasted Buzzard, Black Kite), it is distinguished absolutely by its black wrist-patch. The combination of whitish primaries with long blackish fingers, pale grey secondaries, rusty underwing coverts, swept-back wings and long square tail is also right". I would add that the bird's shape and proportions (e.g. length and shape of the wing tip), pale bill and dark terminal band on the tail are those of a Square-tailed Kite; one photograph shows the typical glide posture of a Square-tailed Kite, with kinked dihedral. The colour transparencies show an immature bird with pale (though not clear white) head, dark eye, barred tail, obscurely barred primaries and apparent lack of heavy breast streaking, features which heighten the similarity of juvenile/immature Square-tailed Kites to the Black Kite.

33. Cooper's Creek *ca* 10 km from the crossing at Innamincka in September 1986, one bird observed by J. Francis (pers. comm.) and other members of the N.S.W. Field Ornithologists Club. No field notes were taken, but the white cap, upswept wings and square-tipped tail were clearly seen at close range as it flew directly overhead. A photograph of the bird was taken by a member of the party, and the slide was subsequently shown at a Club meeting where the bird's identity was evident (per J. Francis). The white cap indicates an adult.



Figures 4 and 5. Immature Square-tailed Kite in flight, Strzelecki Crossing 28 November 1985. Note underwing pattern, wing shape, terminal band on tail, curved dihedral in glide. Similarity to Black Kite is heightened by the dark eye, barred tail and obscurely barred primaries.

Photos: Andrew Johnson.

34. Coongie Lakes September 1987, one bird soaring over Coolibahs *Eucalyptus microtheca* on the west side of the north-west channel into Coongie Lake, ca 15 km north of Turravarra Swamp (per T. Fraser). Observation by experienced ornithologists R. Barratt and G. Drewien (S.A. Dept. Environment & Planning), further details supplied by G. Drewien (pers. comm.): the bird was obviously different in flight pattern and behaviour from all other raptors in the area, including Black-breasted Buzzard; it showed long, distinctly patterned wings and long tail during slow and controlled harrier-like flight low over the treetops. The sighting was discussed with Ian May (NPWS), who agreed with the identification.

35. Coongie Lakes September/October 1988, one bird reported by Morrow (1988) and Hatton (1988). The sighting was submitted to the RAOU Bird of Prey Watch scheme, a condition of which is that a description must be provided for the Square-tailed Kite and other rare raptors. I have been unable to obtain that description from the scheme or the observer(s), and field notes apparently were not taken by other members of the party. However, the bird was clearly not a Black Kite and was different from familiar raptors (R. Morrow pers. comm.); Hatton correctly identified the species elsewhere in the North-East at the time. The party (mainly N.S.W. Field Ornithologists Club members, and F. T. H. Smith who is familiar with the Square-tailed Kite) also observed two Square-tailed Kites at Mundibarcooloo Waterhole on the Strzelecki on 28 September 1988 (R. Morrow, A. Hatton pers. comm.). Brief details were supplied by A. Hatton (pers. comm.): the two birds stood out as being quite different from the many Black Kites present; their faces were white [indicating adults]; their wings were upswept, very rufous underneath with barred trailing edge, and showed "fingers"; the tail was square, and did not turn into a forked tail while watched for some time. It is regrettable that members of the party on this and other occasions were not more diligent in taking field notes. This case has been assigned three September records in Table 1.

North-West

36. Marla Bore, south of Granite Downs, record submitted to RAOU Historical Atlas for 17-18 June 1976 (block 27°/133°). No unusual record

form was submitted and the observers could not be contacted for further details. However, they were from Western Australia and presumably knew the Square-tailed Kite which (unlike the Black Kite) is seen reasonably frequently in the south-west of that State. Nevertheless, in the absence of confirmatory details I follow the Atlas recommendation (on the record sheet) that the record be rejected.

DISTRIBUTION AND STATUS IN SOUTH AUSTRALIA

Acceptable records of the Square-tailed Kite in South Australia show that it occurs sparsely across the southern Nullarbor Plain, Eyre Peninsula and Adelaide district to the South-East and Murray River (including Kangaroo Island and probably The Coorong), thence northwards through the Flinders Ranges to the Lake Eyre drainage system (Cooper and Strzelecki Creeks). Some records may be of vagrants, and this distribution may partly reflect the distribution of observers. Analysis by season indicates that the Square-tailed Kite is a spring-summer breeding migrant, with 31 (62%) records in spring, 11 (22%) in summer, 4 (8%) in autumn and 4 (8%) in winter ($n = 50$, Table 1). Extreme dates are 13 August and 18 May; the few August records may represent early arrivals given that three of the four are for the North-East on a potential migration route (the Channel Country in wet and perhaps dry years). In addition to those in Table 1, the records of Cupper & Cupper (1981), Hollands (1984) and Jolly (1989) fit such a pattern but (except for Jolly's sample year of 1971-72) could not be included in the analysis of dated records. In fact these literature reports, and that of Fraser (1983a), detail the only evidence for breeding of the Square-tailed Kite in South Australia.

The most important regions of the State for the Square-tailed Kite, in terms of number of records (%), $n = 54$ including 4 undated records) and breeding attempts, are Nullarbor Plain (11%), Eyre Peninsula (30%, formerly bred), Murray River (11%, breeds) and North-East (24%). A breeding record for the Eucla Division of Western Australia (Storr 1987) suggests that it may breed on the fringes of the Nullarbor in South Australia, where there is apparently suitable tall mallee (T. Fraser pers. comm.). A record of probable breeding in coastal western

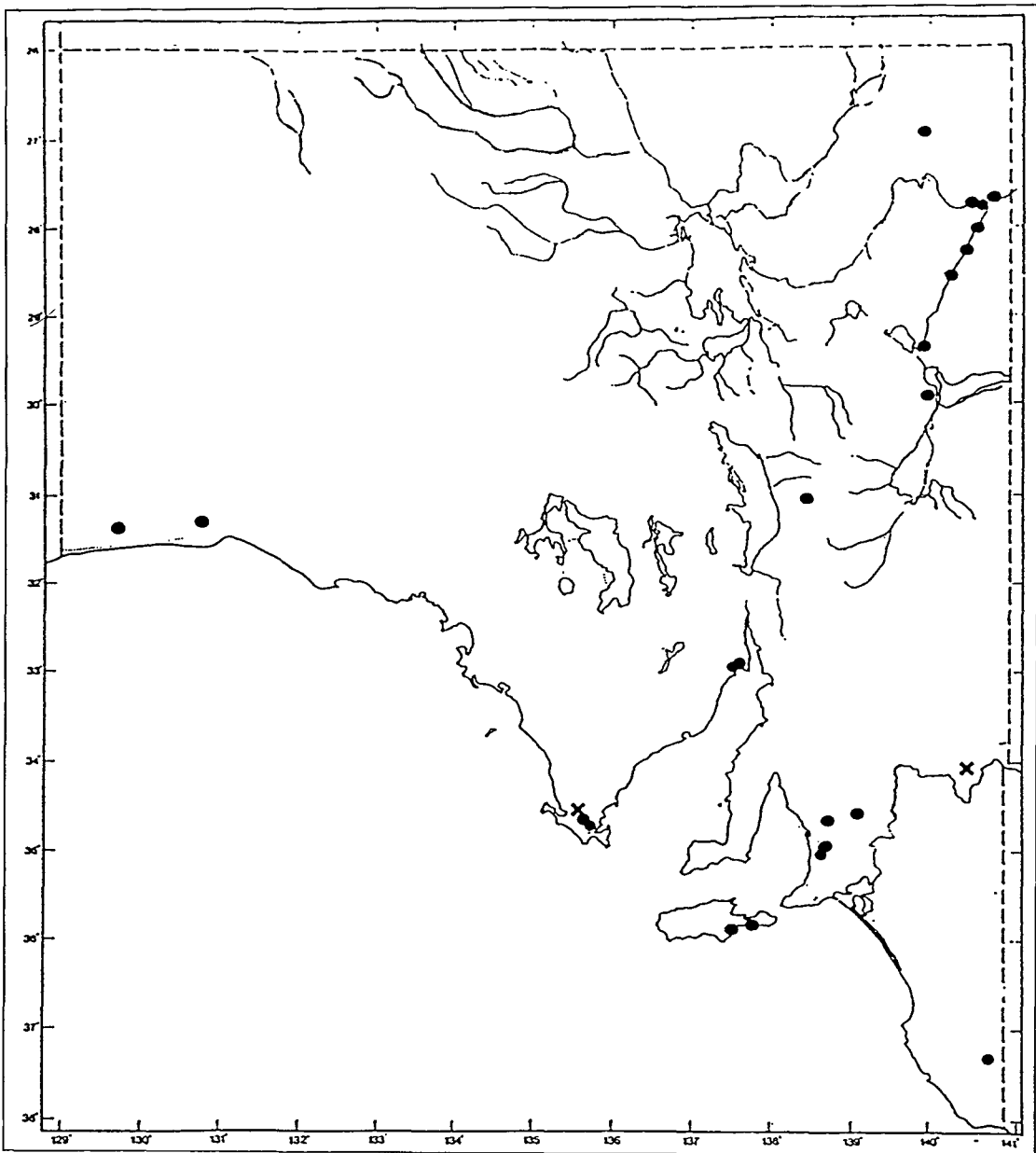


Figure 6. Map of South Australia, showing distribution of acceptable records (●) and breeding records (x) of the Square-tailed Kite; exact breeding sites not shown. Map adapted from Parker *et al.* (1979), An Annotated Checklist of the Birds of South Australia, Part 1: SAOA.

Victoria (Debus & Silveira 1989) suggests that it may breed in the South-East of South Australia. Kangaroo Island, with tall gums for nesting and extensive mallee, may be a suitable area. It may also breed in the North-East (where single adults and pairs have been seen in spring), but perhaps

only in exceptionally wet years that support large populations of nesting passerines.

There is little evidence that the Square-tailed Kite was ever a regular breeder in South Australia except on Eyre Peninsula. If it were so, there

Table 1. Acceptable records of the Square-tailed Kite in South Australia by region and month.

Region	Month												Undated	Total
	D	J	F	M	A	M	J	J	A	S	O	N		
Nullarbor Plain										3	3			6
Eyre Peninsula*	3	4								2	2	3	2	16
Whyalla district	1								1					2
Kangaroo Island	1		1											2
Adelaide district										2	2			4
South-East												1		1
Murray River	1			1						2	2			6
Flinders Ranges				1		1						1	1	4
North-East					1				3	5	2	1	1	13
Total	6	4	1	2	1	1	0	0	4	14	11	6	4	54
Seasonal Totals		11			4			4			31			

*includes Jolly's (1989) sample year of 1971-72.

should have been more early records from the Adelaide area, although it may have been present but mistaken for other species. There have been few recent breeding records of the Square-tailed Kite in South Australia, and these have been unsuccessful attempts (Fraser 1983a, Jolly 1989). After years of breeding failure and the decline of the population to one bird on Eyre Peninsula (Jolly 1989), the lone survivor there has finally disappeared (T. Fraser pers. comm.). Former breeding densities reported for Eyre Peninsula are among the highest known or inferred for the species, higher than in the eastern States and comparable to those in south-western Australia, although admittedly data are few (see Debus & Czechura 1989, Debus & Silveira 1989). It appears that the Square-tailed Kite is declining to virtual extinction as a breeding species in South Australia, concomitantly with the removal of what was probably its prime breeding habitat in the State, the eucalypt open forests and woodlands in southern regions. However, this gloomy prognosis may be tempered somewhat if searches in spring/summer locate nests or fledglings on the Nullarbor, in the Channel Country of the North-East, the major watercourses draining the Flinders Ranges, on Kangaroo Island, or in the forests and woodlands of the South-East. On present information the Kite appears to be a threatened species in South Australia, with no estimate of its population currently possible.

OTHER ASPECTS OF BIOLOGY

It is worth noting a paper by Ferguson & Bonnin (1987), overlooked by Debus & Czechura (1989), detailing the breeding of a pair of Square-tailed Kites in south-western Australia, parts of which are ecologically similar to Eyre Peninsula. Pellets at this nest contained two mammal species, a Western Rosella *Platycercus icterotis* (red feathers indicating an adult bird) and 33 insects (mainly beetles). The breeding data necessitate the recalculation of mean brood size at fledging in southern Australia as 1.7 (cf. 1.8 in Debus & Czechura 1989).

Observations communicated to S. A. Parker for the purpose of this paper include the following, both made in the Kimberley (W.A.) in July 1973: a Square-tailed Kite "attacking" a Black-faced Cuckoo-shrike *Coracina novaehollandiae* (L. A. Smith), and another which chased and almost caught a White-bellied Cuckoo-shrike *C. papuensis* (J. Dell). Hunt (1990) observed a Square-tailed Kite take a Laughing Turtle-Dove *Streptopelia senegalensis* from a tree, and Morris (1987) observed a Square-tailed Kite harrying small parrots, doves and finches around a waterhole.

Schulz (1983) did not give the age of rabbits taken as prey by breeding Square-tailed Kites in south-eastern Australia. However, in a letter to S. A. Parker (1984) he stated, "The rabbit remains found under the nest were of young that had only

recently come above ground . . . evidence for only one or two individual rabbits was found and therefore rabbits were not commonly taken. Rabbits were very common . . . and at that time . . . many young rabbits were afield."

The above observations indicate that the Square-tailed Kite is somewhat more insectivorous during the breeding season, and more likely to prey on adult-sized birds outside the breeding season, than concluded by Debus & Czechura (1989). They also confirm that the Square-tailed Kite only occasionally takes small mammals, of not more than about 200 g, and that in accordance with its morphology and hunting behaviour (and unlike many other Australian raptors) it has been unable to take advantage of the abundance of rabbits (*cf.* Debus & Czechura 1989).

DISCUSSION

The Square-tailed Kite's distribution in South Australia accords with confirmed records in adjoining parts of other States. It occurs on the Nullarbor Plain in Western Australia (Storr 1986, 1987); in western Victoria, from the coast to the Murray River (Emison *et al.* 1987, Debus & Silveira 1989); in far western New South Wales (Hobbs 1961, Wyndham 1978, Blakers *et al.* 1984, Henle 1989), with a breeding record for the lower Darling River (J. Olsen pers. comm.); and in south-west Queensland in the Channel Country of the Lake Eyre drainage system (Blakers *et al.* 1984: unusual record forms sighted; Palliser 1985, Morris 1987, Patterson 1987, Redhead 1990). The unconfirmed record for the North-West of South Australia (above), and RAOU Atlas records for the Central Ranges region of the Northern Territory (Blakers *et al.* 1984), raise the possibility that in flood years it occurs on the Finke and other rivers draining into the north-west of the Lake Eyre Basin. Storr (1977) stated that it occurs only in the northern quarter of the Northern Territory, yet unusual record forms were not submitted (nor sought, apparently) for most of the Atlas records for the south of the Northern Territory. The only two such forms are rather unsatisfactory, and two of the other seven record sheets list Square-tailed Kite but not Black Kite, which suggests misidentification. However, Julian Reid (pers. comm.) saw a Square-tailed Kite in Uluru National Park (southern N.T.) in September 1988. Further records of the Square-

tailed Kite for Central Australia and South Australia warrant publication, and existing unconfirmed records await re-publication, all with adequate details of identification.

The Square-tailed Kite's distribution in South Australia accords with knowledge of its habitat requirements elsewhere in Australia, *i.e.* coastal and subcoastal open forests and woodlands, and inland riverine woodlands (Debus & Czechura 1989). It is likely that much of southern South Australia had patches of suitable habitat for the species (*e.g.* a mosaic of mallee and woodland), before European settlement and extensive land clearance. There are fewer records for the Square-tailed Kite in South Australia than in Victoria (see Debus & Silveira 1989), although South Australia is many times larger in area. This suggests that a much smaller proportion of South Australia is suitable habitat, but it may also reflect the density of observers in remote areas.

The seasonal movements of the Square-tailed Kite in South Australia accord reasonably well with patterns in adjoining States. The species is a spring-summer breeding migrant to south-western Australia (Blakers *et al.* 1984, Storr 1987), Victoria (Debus & Silveira 1989) and New South Wales (Debus 1983), with a "minor irruption" into south-west New South Wales during the post-flood spring of 1957 (Hobbs 1961). Winter absences are more pronounced in the east than the west (Blakers *et al.* 1984, Debus & Silveira 1989). In the east, winter absences are more pronounced at higher latitudes as shown by ratios of 7 spring-summer records to 1 autumn-winter record in Victoria, 5:1 in southern New South Wales and 4:1 in northern New South Wales (data from Debus 1983, Debus & Silveira 1989). In this respect South Australia, with a ratio of 5:1, resembles southern New South Wales.

Table 2. Square-tailed Kite records for the Cairns region, northern Queensland, 1986-1989, by month (J. Squire). Records for April and May under-represented because the observer is usually absent in those months.

Summer			Autumn			Winter			Spring		
D	J	F	M	A	M	J	J	A	S	O	N
0	2	0	3	1	2	5	4	3	0	2	0

The low proportion of summer records in South Australia contrasts with other eastern States and south-western Australia, where at least some of the many summer records are of fledglings (e.g. Debus & Silveira 1989). It appears that in South Australia an annual migratory return in spring is still occurring, but that few birds stay to breed and those that do are unsuccessful. This is probably attributable to a shortage of breeding habitat and a reduced food supply and, locally, to persecution (see Jolly 1989).

The Square-tailed Kite's seasonal movements in South Australia, as elsewhere in southern Australia, complement those in the tropics (e.g. Debus & Silveira 1989). Evidence continues to accumulate that it is predominantly a dry-season non-breeding visitor to Cape York, the Kimberley (W.A.) and the Top End of the Northern Territory (Table 2; Aumann 1991; Hertog 1989, but note Hertog's January record in Buckingham 1981, overlooked by Debus & Silveira 1989). The ratio of 5 autumn-winter sightings to 1 spring-summer sighting on Cape York (Table 2), with the proviso that April-May occurrences are under-recorded, is virtually the opposite for south-eastern Australia.

Several questions remain to be answered: the origin of birds wintering in different parts of the tropics, any age-related differences in movements, and whether there is a resident breeding population in the band of tropical woodland across northern Australia. The evidence for all of these is somewhat equivocal.

Some Square-tailed Kites winter in south-western Australia and there are few records for the area between the south-west and the Kimberley (Blakers *et al.* 1984, S. Nevill pers. comm.), therefore Square-tailed Kite movements in the south-west may be largely internalised as predicted by Nix (1976) for birds in general. The corollary of this is that many of the Square-tailed Kites wintering in the Kimberley may originate in south-eastern Australia, as is the case with some Brown Falcons *Falco berigora* (Mathews 1987). However, it is possible that western Square-tailed Kites cross unsuitable habitat by flying unseen at high altitude *en route* to the Kimberley.

Adult Square-tailed Kites observed in the North-East of South Australia were more brightly marked than birds of this species observed in the Kimberley (I. May pers. comm.). This suggests

that many of the Square-tailed Kites wintering in the tropics may be immature, with the corollary that the birds wintering in the south are adults. However, adults certainly occur in the tropics (e.g. Plate 27 in Debus & Czechura 1989). If western Square-tailed Kites are duller than eastern birds (as in some other species), then May's observation could be evidence that south-western birds winter in the Kimberley.

There is no conclusive evidence of Square-tailed Kites breeding in the Kimberley, Northern Territory or Cape York. Storr (1977) did not mention alleged breeding records for the Northern Territory, which implies that he rejected Le Souef's (1902-03) claim of eggs taken near Darwin (repeated in Frith & Davies 1961). Le Souef's comments suggest that he was encountering Black Kites. Storr (1980) did not report breeding of the Square-tailed Kite in the Kimberley, any historical records of which he would surely have been aware. Adult Square-tailed Kites there in the dry season sometimes occur in pairs (G. Chapman pers. comm.), but mates may maintain association away from breeding areas. Aumann (1991) spent seven months from April to November 1989 specifically searching for raptor nests in the Kimberley but found no Square-tailed Kite nests, and in fact after an average of one sighting per week from mid June to mid August he obtained no further sightings. This suggests that Square-tailed Kites had left the Kimberley by the breeding season. If the Square-tailed Kite does not breed in the tropics, then there is no reservoir of northern breeding birds to offset losses in the south.

Possible reasons for Square-tailed Kites being unable to breed in the tropics have been discussed elsewhere (Debus & Silveira 1989); these relate to food supply at climatically suitable times of the year for an aerial hunter such as the Square-tailed Kite. Wintering Kites may be able to subsist on prey that would be insufficient to sustain breeding efforts, the success of which seems to depend on vertebrates in the diet (Debus & Czechura 1989); when suitable vertebrates (nestling passerines) are available in the tropics it may be too wet for the Kites to forage. Another possibility is that tropical northern Australia is occupied by the resident, breeding Black-breasted Buzzard, a larger, closely related and ecologically similar species that may be dominant in competition for breeding territories.

This paper and other recent evidence suggest a revised migration hypothesis, which needs testing: that Square-tailed Kites breeding in the highest latitudes are the most likely to move, movements being mainly by juveniles and immatures; that movements in south-western Australia are partly local in extent, many of the birds wintering across the north to the Kimberley originating in south-eastern Australia; and that returning migrants (first-time breeders?) show some flexibility in being able to find and exploit locally favourable conditions such as flooding of rivers in inland south-eastern Australia. The answers will be provided by marking of birds, co-operative surveys such as the RAOU Bird of Prey Watch scheme, and specific surveys of the Square-tailed Kite over the seasons in various regions. Square-tailed Kites are not readily detected by the road transect method in forested regions, but can be observed from vantage points over the forest canopy such as fire lookout towers (Debus in prep.).

The evidence suggests that the Square-tailed Kite is a rare, declining and probably threatened species in South Australia, with a low population recruitment rate (as in Australia generally) and a potentially vulnerable food supply owing to loss of habitat. As it is partly insectivorous, it may also be susceptible to pesticides. If its main breeding grounds are in southern and eastern Australia, and there is no reservoir of northern breeding birds, then it may indeed be in trouble. South Australia may therefore vie with New South Wales for the title of the first Australian State to lose an endemic raptor species and genus as a breeding bird (Red Goshawk *Erythrorhynchus radiatus* in the case of New South Wales: Debus in press). Not only has much of its forest and woodland habitat been cleared, the river systems (an important habitat for breeding raptors and other fauna) have been seriously affected as well. Many watercourses in rural south-eastern Australia are in a deplorable condition – trees have been removed, banks eroded, there is unlimited access by domestic stock, with the result that stream beds have silted up, the water is turbid and polluted with chemicals, and there are alternating cycles of flooding and drying up instead of a moderate and reasonably continuous water supply. Relatively undegraded river systems such as the Cooper/Strzelecki in South Australia may therefore be important to the Square-tailed

Kite; the North-East appears to be its present stronghold (if it could be called that) in South Australia. The prospect of increased development in the North-East, including a levee system which may devastate the Strzelecki floodplain (e.g. Cupper & Cupper 1981, Baker-Gabb 1986), is of concern as the area supports other uncommon breeding raptors including the Black-breasted Buzzard, Letter-winged Kite *Elanus scriptus* and Grey Falcon *Falco hypoleucos*. This river system should not be allowed to go the way of many others in more heavily settled areas.

The Square-tailed Kite is currently classified Australia-wide as “insufficiently known” (Brouwer & Garnett 1990). According to the other categories defined by Brouwer & Garnett, its status in South Australia is “indeterminate” but probably “vulnerable” or “endangered”. As it is probably “vulnerable” in Victoria, its conservation status in south-eastern Australia is of concern.

A survey is urgently required to determine the Square-tailed Kite's true distribution and abundance in South Australia, and to locate breeding sites (including potential sites identified above). A biological study is also required, in order to determine its nesting chronology, breeding success and ecological requirements (diet, habitat use and home-range size). In the interim, it seems reasonable to conclude that it would benefit from protection of inland riverine habitat, rehabilitation of watercourses, a moratorium on further habitat clearance, reforestation of suitable areas with the original tree species, and active protection of known nests.

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REFERENCES

- Adams, J. 1986. A visit to South Australia. *N.S.W. Field Ornithol. Club Newsl.* 97: 9-10.
- Anon. 1921. [Bird Notes]. *S. Aust. Orn.* 6: 56.
- Ashton, C. B. & Ashton, E. M. 1983. A sighting of Square-tailed Kites at Nullarbor, South Australia. *S. Aust. Orn.* 29: 54.
- Aumann, T. 1991. Notes on the birds of the upper and middle reaches of Kimberley rivers during the dry season, 1989. *Aust. Bird. Watcher* 14: in press.
- Baker-Gabb, D. J. 1986. The Strzelecki Creek: a positive view and a code of practice. *Australasian Raptor Assoc. News* 7: 1-3.
- Beruldsen, G. 1972. [Bird notes]. *Bird Talk* 1(1): 10.
- Blakers, M., Davies, S. J. F. & Reilly, P. N. 1984. *The Atlas of Australian Birds*. Melbourne University Press: Melbourne.
- Boehm, E. F. 1947. Oologic desiderata in South Australia. *S. Aust. Orn.* 18: 68-70.
- Brouwer, J. & Garnett, S. (Eds). 1990. Threatened birds of Australia - an annotated list. *RAOU Report* 68.
- Buckingham, R. 1981. Unusual sighting reports series 26. *Bird Observer* 592: 36.
- Campbell, A. J. 1900. *Nests and Eggs of Australian Birds*. Pawson & Brailsford: Sheffield.
- Cleland, J. B. 1925. Birds seen between Beltana, Farina, and Cordillo Downs Station. *S. Aust. Orn.* 8: 50-60.
- Condon, H. T. 1969. *A Handlist of the Birds of South Australia*. South Australian Ornithological Association: Adelaide.
- Cox, J. B. 1974. Some birds of north-eastern Eyre Peninsula, S.A. *S. Aust. Orn.* 26: 142-144.
- Cox, J. B. 1991. Sightings of the Square-tailed Kite near Adelaide. *S. Aust. Orn.* 31: 19.
- Cupper, J. & Cupper, L. 1981. *Hawks in Focus*. Jaclyn: Mildura.
- Debus, S. J. S. 1983. The Square-tailed Kite as a migrant in south-eastern Australia. *Aust. Birds* 17: 56-58.
- Debus, S. J. S., in press. The status of the Red Goshawk *Erythrorhynchus radiatus* in New South Wales. In: Olsen, P. D. (Ed.), *Proc. Australasian Raptor Assoc. 10th Anniversary Conference, September 1989*: Canberra.
- Debus, S. J. S. & Czechura, G. V. 1989. The Square-tailed Kite *Lophoictinia isura*: a review. *Aust. Bird Watcher* 13: 81-97.
- Debus, S. J. S. & Silveira, C. E. 1989. The Square-tailed Kite *Lophoictinia isura* in Victoria. *Aust. Bird Watcher* 13: 118-123.
- Emison, W. B., Beardsell, C. M., Norman, F. I. & Loyn, R. H. 1987. *Atlas of Victorian Birds*. Dept Conservation, Forests & Lands and RAOU: Melbourne.
- Ferguson, S. & Bonnin, J. M. 1987. Square-tailed Kite nesting at Kojonup. *West. Aust. Bird Notes* 43: 5-6.
- Fraser, T. 1983a. Square-tailed Kites nesting on the upper Murray River in South Australia. *S. Aust. Orn.* 29: 55.
- Fraser, T. 1983b. Square-tailed Kites nesting in South Australia. *Australasian Raptor Assoc. News* 4(2): 12.
- Frith, H. J. & Davies, S. J. F. 1961. Breeding seasons of birds in subcoastal Northern Territory. *Emu* 61: 97-111.
- Glover, B. 1968. Bird report, 1966-67. *S. Aust. Orn.* 25: 27-45.
- Glover, B. 1974. Bird report, 1972-73. *S. Aust. Orn.* 25: 175-180.
- Hatton, A. 1988. Coongie 3: bird of prey watch 24/9/88-9/10/88. *N.S.W. Field Ornithol. Club Newsl.* 110: 8.
- Henle, K. 1989. A two-year avifaunistic survey in Kinchega National Park, western New South Wales. *Aust. Birds* 22: 53-68.
- Hertog, T. 1989. Northern Territory Area Co-ordinator's report for 1987/88. *Australasian Raptor Assoc. News* 10: 63.
- Hobbs, J. 1961. The birds of south-west New South Wales. *Emu* 61: 21-55.
- Hobbs, J. 1984. Raptor road count. *Australasian Raptor Assoc. News* 5(1): 9.
- Hollands, D. 1984. *Eagles, Hawks and Falcons of Australia*. Nelson: Melbourne.
- Hunt, J. 1990. Square-tailed Kite in suburbs. *West. Aust. Bird Notes* 53: 1.
- Jaensch, R. 1980. Bird notes. *S. Aust. Ornithol. Assoc. Newsl.* 96: 8-13.
- Jaensch, R. & Joseph, L. 1980. Bird notes. *S. Aust. Ornithol. Assoc. Newsl.* 94: 13-16.
- Jolly, J. 1989. Square-tailed Kites breeding in South Australia. *S. Aust. Orn.* 30: 213-214.
- Lees, A. F. 1975. Square-tailed Kite near Adelaide. *S. Aust. Orn.* 27: 23.
- Le'Souef, W. H. D. 1902-03. Description of birds' eggs from Port Darwin district, northern Australia. *Emu* 2: 85-96, 139-159.
- Lyons, C. M. 1902. Some notes on the birds of the Lake Eyre district. *Emu* 1: 133-138.
- McGilp, J. N. 1932. Birds of the Nullarbor Plain and far west coast of South Australia. *S. Aust. Orn.* 11: 146-151.
- McGilp, J. N., 1934. The hawks of South Australia, part 2. *S. Aust. Orn.* 12: 261-292.
- Mack, K. J. 1970. Birds of the North-East of South Australia. *S. Aust. Orn.* 25: 126-141.
- Mathews, A. P. 1987. Recovery round-up. *Corella* 11: 32-35.
- Morris, A. K. 1987. Trip to the west Kimberleys, July/August 1987. *N.S.W. Field Ornithol. Club Newsl.* 103: 10.
- Morrow, R. 1988. Coongie 1: Coongie Lakes with Outback Track Tours 24/9-9/10/88. *N.S.W. Field Ornithol. Club Newsl.* 110: 7.
- Nicholls, B. 1924. A trip to Mungeranie, Central Australia. *Emu* 24: 45-59.
- Nix, H. A. 1976. Environmental control of breeding, post-breeding dispersal and migration of birds in the Australian region. *Proc. XVI Int. Ornithol. Congr. Canberra*: 272-305.
- Palliser, T. 1985. The Queensland Ornithological Society bird report, 1984. *Sunbird* 15: 45-70.
- Patterson, P. 1987. Cooper's Creek and beyond. *Qld. Ornithol. Soc. Newsl.* 18(9): 4-5.
- Redhead, D. 1990. The Queensland Ornithological Society bird report, 1987. *Sunbird* 20: 1-15.
- Reese, L. 1924. Bird notes. *S. Aust. Orn.* 7: 229-230.
- Reese, L. 1925. Bird notes. *S. Aust. Orn.* 8: 32-33.
- Reid, J. 1980. Bird report, 1976. *S. Aust. Orn.* 28: 127-137.
- Reid, J. 1984. First record of the Square-tailed Kite in the South-East of South Australia. *S. Aust. Orn.* 29: 118.
- Reid, N. C. H. 1976. Bird report, 1975. *S. Aust. Orn.* 27: 147-158.
- Rix, C. E. 1972. [Bird notes]. *Bird Talk* 1(1): 5.
- Rix, C. E. 1978. [Bird notes]. *Bird Talk* 1(7-8): 72.
- Rix, C. E. 1980. [Bird notes]. *Bird Talk* 2(1-2): 7.
- Schulz, M. 1983. Nesting of the Square-tailed Kite in south-eastern New South Wales. *Aust. Birds* 18: 6-8.

- Storr, G. M. 1947a. Some birds observed on southern Eyre Peninsula. *S. Aust. Orn.* 18: 31-36.
- Storr, G. M. 1947b. Southern Eyre Peninsula birds. *S. Aust. Orn.* 18: 54.
- Storr, G. M. 1977. Birds of the Northern Territory. *Spec. Publs West. Aust. Museum* 7.
- Storr, G. M. 1980. Birds of the Kimberley Division, Western Australia. *Spec. Publs West. Aust. Museum* 11.
- Storr, G. M. 1986. Birds of the south-eastern interior of Western Australia. *Rec. West. Aust. Mus. Suppl.* 26.
- Storr, G. M. 1987. Birds of the Eucla Division of Western Australia. *Rec. West. Aust. Mus. Suppl.* 27.
- Sutton, J. 1923. Birds of South Australia. *S. Aust. Orn.* 7: 92-107.
- Taylor, P. 1980. Records of raptors. *Australasian Raptor Assoc. News* 1(2): 10-11.
- Wyndham, E. 1978. Birds of the Milparinka district and Cooper Creek basin. *Emu* 78: 179-187.
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