

CHANGES IN THE ABUNDANCE AND DISTRIBUTION OF RAPTORS DURING A HOUSE MOUSE PLAGUE

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Changes in raptor numbers between Canberra, A.C.T. (35°17'S., 149°7'E.) and Booligal, NSW (33°51'S., 144°50'E.) were recorded using road counts. The limitations of this survey method have been discussed by Fuller and Mosher (1981).

Nine return trips were made by road between Canberra and 20 km west of Booligal during a 13-month period from December, 1979. The trip of 516 km takes about 7½ hours with the route passing through various towns and agricultural practices (Figure 1b). The return trip was approximately 10 days after departure from Canberra with times of departure usually in the morning. The same vehicle and same two observers made each trip whilst the travel speed was similar each time. The only seasonal changes in vegetation were grass and cereal height; neither of which influenced the visibility of raptors. Periods of darkness, rainy and windy weather and fog have been eliminated from the analysis. A trip has been taken to be the mean number of raptors seen on the back and forth journey.

During the survey period a major House Mouse *Mus musculus* plague occurred in South Australia, Victoria and New South Wales. The upsurge was first observed in May, 1979, with the peak of the plague being reached about a year later (Figure 2). The geographical extent of the outbreak along the survey route is shown in Figure 1b.

RESULTS

Of the 689 raptors observed the most common was the Australian Kestrel *Falco cenchroides* (53%), followed by the Brown Falcon *F.*

berigora (21%) and then the Black-shouldered Kite *Elanus notatus* (12%). The numbers of other raptors seen, in order of abundance, were the Whistling Kite *Haliastur sphenurus* (25), Marsh Harrier *Circus aeruginosus* (18), Black Kite *Milvus migrans* (16), Wedge-tailed Eagle *Aquila audax* (12), Spotted Harrier *C. assimilis* (8), Little Eagle *Hieraetus morphnoides* (5), Australian Hobby *F. longipennis* (5), Brown Goshawk *Accipiter fasciatus* (3) and Peregrine Falcon *F. peregrinus* (1).

The average number of raptors seen abruptly increased 260 km from Canberra (Figure 1a). This coincides with the township of Ardlethan. The number then decreased slightly through the irrigation area around Griffith and there appeared to be extremely low numbers of raptors for 20 km west of Gunbar, an area of unusually high tree density. A large increase in raptor numbers was then seen across the saltbush plains.

During the 13 month period from December, 1979, there was an increase in the number of raptors reaching a peak in early June, 1980. Raptor abundance started to decrease by late July and by December, 1980, the numbers were similar to those seen 13 month previously — see Table 1.

An exception to this general trend was the very large number of Australian Kestrels seen in February, 1980, when 56 were seen within a 30 km radius of Booligal.

From February, 1980, until late May and early June not only did raptor numbers increase, but the increase occurred first in the west (Figure 3). From late July not only was there a reduction in the number of raptors but this decrease occurred first in the east.

Brown Falcons and Australian Kestrels were observed on every trip (Table 1) and their proportion of the total number of raptors seen did not vary greatly. Black-shouldered Kites were only seen between February and September, 1980, with the majority (76%) between Ardlethan and Gunbar.

Of the other species, 70% of Whistling Kites were seen within 20 km of Booligal, no Black Kites were seen within 420 km of Canberra, no Wedge-tailed Eagles were seen within 380 km of Canberra, whilst 90% of Marsh Harriers were seen within 30 km of Griffith. All Marsh Harriers were seen during the winter, between the end of May and the middle of September.

DISCUSSION

Without more information on the seasonal movement and distribution of raptors it is difficult to assess the effect that the 1979-1980 mouse plague had on the abundance and distribution of raptors. Even so, there appears to be a similarity between the numbers and distribution of some raptors and those of the mice. However the outbreak erupted simultaneously over a very wide area (Redhead, 1982), whilst the raptors seem to have spread from west to east and then retracted.

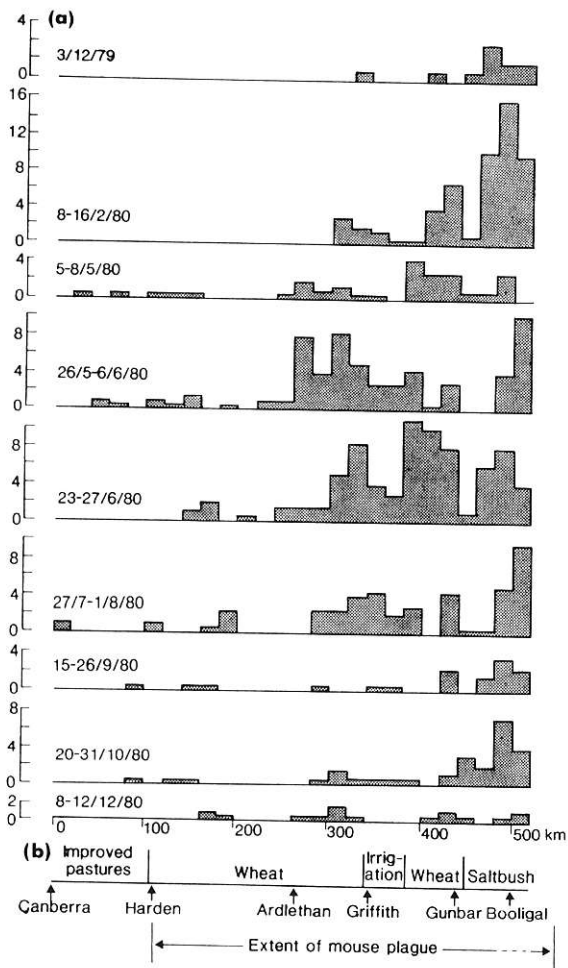


Figure 1a. Average number of raptors seen each 20 km between Canberra and Booligal. December, 1979 to December, 1980.

Figure 1b. Schematic representation of the transect between Canberra and Booligal showing extent of mouse plague, agricultural practices and towns mentioned in text.

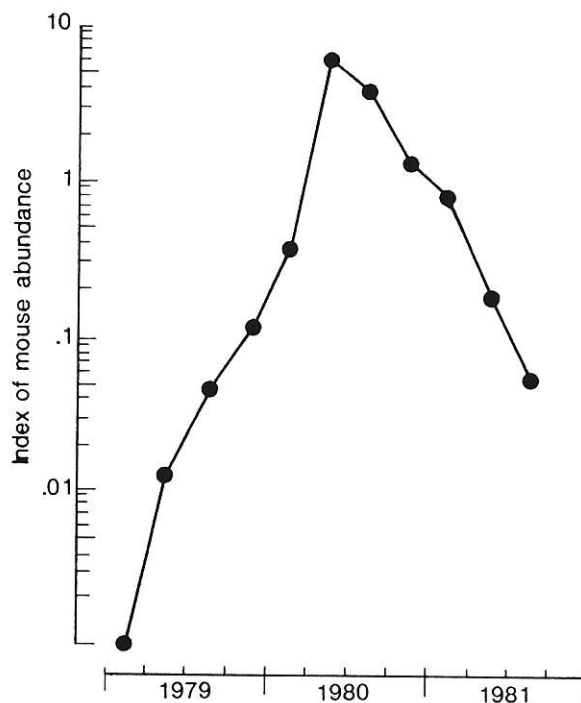


Figure 2. The duration of the 1979-80 mouse plague in southern Australia as shown by an index of Mouse abundance monitored by wheat industry personnel. (From Redhead (1982).)

TABLE 1

Average number of raptors seen for nine trips between December, 1979 and December, 1980.

	3 Dec	8-16 Feb	5-8 May	26-6 June	23-27 July	21-1 Aug.	15-26 Sept	20-31 Oct	8-12 Dec
Black-shouldered Kite	0	4.0	4.5	8.0	8.0	9.5	2.0	0	0.5
Brown Falcon	3.0	7.5	6.0	12.5	12.0	8.0	2.5	6.0	3.0
Australian Kestrel	7.0	40.0	9.0	37.5	51.0	17.0	5.0	9.0	2.5
Others	1.0	4.5	4.5	3.0	5.0	6.0	3.5	7.5	2.0
Total	11.0	56.0	24.0	61.0	76.0	40.5	13.0	22.5	8.0

Although the mouse outbreak spread as far as Harden no large increase in raptor numbers was seen until Ardlethan, 140 km further west.

The Brown Falcon, Australian Kestrel and the Black-shouldered Kite appear to be the only raptors that responded to the changes in abundance of mice (Table 1) and furthermore, the Black-shouldered Kite was only seen during the period of maximum mouse numbers.

Similar responses of raptors to a more plague in 1969-70 have been reported by Hobbs (1971) and Hayward and MacFarlane (1971).

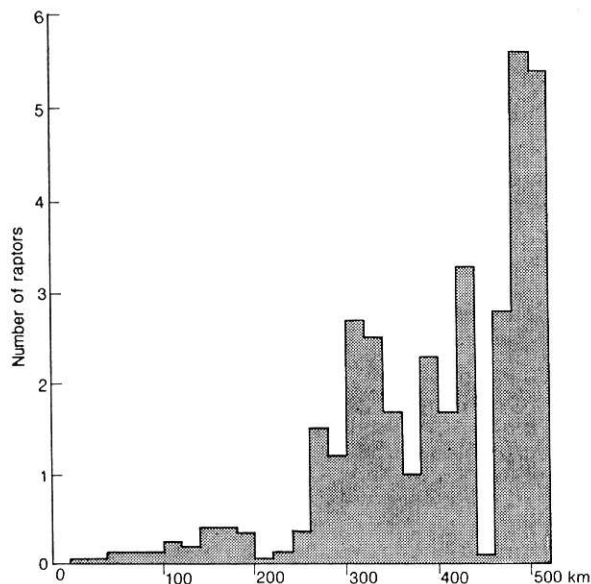


Figure 3. Average number of raptors seen for each of nine trips between Canberra and Booligal, December, 1979 to December, 1980.

Our observations agree with those of Hayward and MacFarlane in that the plague appeared to be responsible for the high numbers of Brown Falcons, Black-shouldered Kites and Australian Kestrels; the three species that eat large numbers of mice. Unlike the observations of Hobbs our data suggests that the abundance of other raptors was not necessarily influenced by the mouse plague.

Due to the different methods of data collection the reports of Hobbs and Hayward and MacFarlane were unable to relate the distribution of raptors with that of mice.

The data presented here, only cover a 13-month period so no allowances can be made for seasonal factors such as movement patterns (see Baker-Gabb 1984). However, useful information can be obtained on the changes in abundance and distribution of raptors by regular road count surveys and that in our example the numbers of raptors along a survey route seemed to be influenced by the rise and subsequent decline in mouse numbers.

REFERENCES

- Baker-Gabb, D. J. (1984). The breeding ecology of 12 species of diurnal raptor in north-western Victoria. *Aust. Wildl. Res.* 11: 145-160.
- Fuller, M. R. and Mosher, J. A. (1981). Methods of detecting and counting raptors: A review. *Studies in Avian Biology* No. 6: 235-246.
- Hayward J. L. and MacFarlane, N. (1971). Bird predators and a mouse plague. *Aust. Bird Watcher* 4: 62-66.
- Hobbs, J. N. (1971). A plague of Mice at Warren. *Aust. Bird Watcher* 4: 43-46.
- Redhead, T. (1982). Reproduction, growth and population dynamics of House mice in irrigated and non-irrigated cereal farms in New South Wales. A.N.U. PhD thesis.