THE DIET OF THE POWERFUL OWL NINOX STRENUA IN WESTERN VICTORIA

J. H. SEEBECK

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SUMMARY

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Analysis of pellets shows that the most common item of prey is the Ringtailed Possum. The Sugar Glider is taken less commonly and other vertebrates and invertebrates only occasionally. A possible instance of scavenging is reported. The relation between the Owl's dietary needs and its conservation is discussed.

INTRODUCTION

This paper documents the diet of the Powerful Owl *Ninox strenua* at three sites in western Victoria — Naringal East, Linton and Aireys Inlet. The initial investigation, at Naringal East, formed part of a study of predation during an ecological investigation of a population of the small macropod marsupial *Potorous apicalis*. Powerful Owls regularly regurgitate pellets composed of the indigestible portions of the food items and by analysis of these remains it is possible to determine the bird's diet. This procedure was adopted in this investigation.

STUDY-AREAS

Naringal East

Edge (1960) recorded a breeding pair of Powerful Owls at Naringal East, thirty kilometres east of Warrnambool, on the property 'Bimbimbi', formerly owned by the late Mr R. Illidge and now administered by the Victoria Conservation Trust, Ministry for Conservation. The property is an area of some fifty hectares of mixed eucalypt forest bisected by the Brucknell Creek. Along the creek is a well-developed stand of Manna Gum *Eucalyptus viminalis*, which with numerous Blackwoods *Acacia melanoxylon* overtop a tall dense riparian shrublayer composed predominantly of Woolly Teatree *Leptospermum lanigerum*. Other tall shrubs are Musk Daisy-bush *Olearia argophylla*, Mock Olive *Notelaea ligustrina* and Austral Mulberry *Hedycarya angustifolia*. From October 1972 to November 1974 I visited the property monthly, searched for Owls along the creek and made note of them calling at night. Table I shows the months when the birds were seen or heard. I found several semi-permanent roosts, which with one exception were in Blackwood trees, at heights of seven to twenty metres. The exception was in a tall Woolly Teatree, which was blown down during the very wet spring of 1974. One roost was discovered in a Blackwood some distance from the creek along a lead (impermanent water course) but after the clearing by Mr Illidge of an access track across the lead nearby the roost was abandoned. Each roost was checked for presence of birds, pellets or both and all pellets or remains were collected, labelled and stored until examined. I was unable to locate any nest sites but several overmature Manna Gums were present and these probably provided suitable nesting hollows.

Linton

In July and September 1973 Mr S. Morton, Zoology Department, University of Melbourne, collected a small number of pellets during two visits to a site some four kilometres north-west of Linton. I visited the place in July 1975 but saw no Powerful Owls or pellets. The vegetation was open regrowth of mixed box and stringybark forest with only a few older trees offering shelter for either Owl or prey. The forest was a typical 'goldfields' type on gravelly soil with no medium or tall shrub layer and only a low field layer of wattles, bush peas, tussock grass and some bracken.

Aireys Inlet

During August 1970 I observed a single Powerful Owl roosting in a Swamp Gum *Eucalyptus ovata* along Distillery Creek, some two kilometres north of Aireys Inlet. I collected the small accumulation of pellets from beneath the roost. Distillery Creek is included in Angahook Forest Park and the vegetation of the gullies is mixed, being generally an open forest of *Eucalyptus viminalis*, Mountain Grey Gum *E. cypellocarpa*, *E. ovata* and *E. obliqua* and a fairly dense understorey of

TABLE I

Occurrence of Powerful Owls and pellets 1972-74.

	Occurrence			
	1973		1974	
January	S	P		P
February			S	P
March	S	P	S	P
April			S	P
May		P	S	
June	S	P	S	
July		P		P
October	S*			
November			S	P

S Owls seen or heard; P pellets collected.
*1972.

TABLE II

Items of prey of Powerful Owl, Naringal East.

Date	Contents of Pellets	Minimum number
1973		
Jan.	*Pseudocheirus peregrinus*	3
	Petaurus breviceps	1
	Gymnorhina sp	1
	Coleoptera	
	Scarabaeidae *Anoplognathus viriditarsis*	
	Heteroptera	
	Pentatomidae *Eumecopus armatus*	
Mar.	*Pseudocheirus peregrinus*	1
	Rattus fuscipes	1
May	*Pseudocheirus peregrinus*	1
July	*Pseudocheirus peregrinus*	1
1974		
Jan.	*Pseudocheirus peregrinus*	4
Feb.	*Pseudocheirus peregrinus*	2
	Petaurus breviceps	1
	Coleoptera, Cerambycidae*	
Mar.	*Pseudocheirus peregrinus*	8
	Coleoptera	
	Scarabaeidae *Anoplognathus viriditarsus*	
	A. olivieri	
	Phaenognatha sp.	
	Cerambycidae*	
	Orthoptera	
	Gryllocridoidea*	
Apr.	*Pseudocherus peregrinus*	1
	Insect remains*	
July	*Pseudocheirus peregrinus*	2
	Bird remains*	1
Nov.	*Pseudocheirus peregrinus*	1

*Species unidentified.

Prickly Teatree *Leptospermum juniperinum* and various species of *Acacia*. It is estimated that possibly only four pairs of Powerful Owls inhabit the Park (Forests Commission, Victoria 1970).

EXAMINATION OF PELLETS

The pellets were soaked in water, mechanically separated and washed in a 355-μ mesh sieve. The washed mixture was than transferred to a dish and flooded with water. Floating impurities (leaves and twigs) were removed and pieces of insect exoskeleton were collected. The bones were separated from the hair by differential floatation, the hair being concentrated in the sieve. Limb-bones, pelvic girdles, scapulae and cranial fragments were separated from the smaller bones, air dried and stored. The bones were subsequently examined and the species preyed upon identified by comparison with known skeletal material. The most useful bones were cranial remains but, when these did not occur, limb-bones, scapulae and pelvic bones were used. Insect remains were examined by Mr J. L. Alderson (Fisheries and Wildlife Division, Victoria), avian remains by Mr A. R. McEvey (National Museum of Victoria) and the hair by Mr H. Brunner (Keith Turnbull Institute) who used the methods described by Coman and Brunner (1971).

TABLE III

Items of prey of Powerful Owl, Linton

Date	Contents of Pellets	Minimum number
July 1973	*Pseudocheirus peregrinus*	5
	Petaurus breviceps	4
	Oryctolagus cuniculus	1
	Gymnorhina sp	1
Sept. 1973	*Antechinus stuartii*	1
	Trichosurus vulpecula	1

RESULTS

Naringal East

Because most pellets had disintegrated when found, I could not count pellets collected at a site during a period; the results presented are only qualitative. The prey is shown in Table II; in addition, one Owl was twice seen (April and November 1974) with the remains of a Ringtailed Possum *Pseudocheirus peregrinus*. Adult and juvenile Ringtailed Possums were represented in the pellets but most were adult; the Sugar Gliders *Petaurus breviceps* were adult and the single Bush Rat *Rattus fuscipes* was very old.

Linton

The prey is shown in Table III. In addition, remains of beetles (species not determined) were found in one pellet collected in September. One pellet (July 1973) was composed entirely of wool. Clarke (1963) reported two Powerful Owls at 'Linton Park', near Linton, with Ringtailed Possums as prey.

Aireys Inlet

The pellets contained the remains of at least four Ringtailed Possums. No other details of their contents were recorded, Bound (1964) reported a Powerful Owl 'behind Aireys Inlet . . . (in) a heavily timbered valley with a permanent creek . . .'. On that occasion the remains of the prey were recovered and identified as the Yellow-bellied Glider *Petaurus australis*.

DISCUSSION

It is hardly surprising that at all sites most of the diet of Powerful Owls consisted of Ringtailed Possums; at Naringal East and at Aireys Inlet this is by far the most abundant possum. Many observers, e.g. Clarke (1963), Cooper (1964a, b), Fleay (1944), Favaloro (1946), Learmonth (1948), 1950), Tregellas (1919), have recorded *Pseudocheirus* as a favoured prey in Victoria, although Fleay (1968) considered that the Greater Glider *Schoinobates volans* was the preferred diet over most of

the Powerful Owl's range. However, the Greater Glider does not occur in the Otway Range area or in south-western Victoria. It is curious that the Powerful Owl should choose these two marsupials: closely related taxonomically and vegetarians but quite different in behaviour, *Pseudocheirus* preferring a lower denser stratum of the forest than *Schoinobates*.

The Sugar Glider is generally much less common than *Pseudocheirus* throughout Victoria. Certainly at Naringal East it is uncommon and seems to be confined to the drier forest areas away from the creek. The Powerful Owls appear to take this species when available but prefer the slower, less agile *Pseudocheirus*.

At Linton, the July sample suggests that the major item of diet was *Pseudocheirus* but *Petaurus* was often taken. Fleay has reported (1968) that *Trichosurus* does not often constitute a part of the Powerful Owl's diet. Probably this is because the bird cannot carry adult *Trichosurus;* the specimen in the Linton pellets was immature. In June 1975 a Powerful Owl holding the remains of a juvenile *Trichosurus vulpecula* was photographed (I. McCann pers. comm.) in a Peppercorn tree on the Concongella Creek near Stawell.

Despite an earlier suggestion by Fleay (1944) that the Yellow-bellied Glider is not taken, several instances of predation of this species are documented (Fleay 1968, Bound 1964). Few opportunities probably occur for Powerful Owls to capture Yellow-bellied Gliders because they are uncommon throughout most of their range.

The other small mammals, *Antechinus stuartii, Rattus fuscipes* and *Oryctolagus cuniculus,* recorded as prey in this study merely serve to emphasize the opportunistic nature of the Powerful Owl's predation. *Antechinus stuartii* is partly arboreal and it is not surprising to find it forming portion of the diet. The examples of predation on birds recorded in the literature and in this study fall into the same category.

Of particular interest is the occurrence of wool in one pellet from Linton. This may have been the result of scavenging, a practice virtually unknown among the Strigiformes, although Smith (1974) reported a Great Horned Owl *Bubo virginianus* feeding on carrion in Canada.

Insects are apparently taken mainly when they are most abundant in late summer and early autumn and those reported were mostly large nocturnal beetles.

Assuming Ringtailed Possums to be the staple diet of Powerful Owls in western Victoria, it is interesting to speculate on their food requirements. There seems to be no reliable data on the Powerful Owl's frequency of feeding, although during the period when young are dependent on their parents (about twelve weeks) probably at least one item of prey is taken each night. The Great Horned Owl of North America, a bird similar to the Powerful Owl in size and weight, has been found to eat about 7—7.5 per cent of its body weight per day in summer (Craighead and Craighead 1956); requirements in winter are probably higher. On this basis the Powerful Owl would need about 0.15 kilograms per day. Ringtailed Possums weigh about 0.7 kg on average (Thompson and Owen 1964). Hence an Owl might need to catch prey once or twice a week — a total of 80—100 Possums per year per owl. If the young's requirements during rearing and dependence are 100 per cent of the parents' requirements for about three months of the year a breeding pair of Powerful Owls would need about 250 Possums (or their equivalent) each year.

Thompson and Owen (1964) found that in an optimum habitat (of subclimax inland scrubs of *Leptospermum*) the population density of *Pseudocheirus* was about 3.2 animals per hectare.

Hence, if a pair of breeding Powerful Owls took 10 per cent of the Possums available (probably a high estimate), they would need a feeding range of about 800 hectares of optimum habitat.

Fleay (1968) estimated that a pair of Owls needs at least 1,000 hectares, a figure probably derived from observations in the forests of the Great Dividing Range, where Possums are more abundant.

In the district of Naringal East only about 10 per cent (800 ha) of the total area within a radius of about five kilometres from 'Bimbimbi' remains as bushland and, because much of that is far from optimum for Possums, the Owls may have to hunt over an area several times larger.

Therefore, the long-term survival of the Powerful Owls, both locally and throughout their range, requires the reservation of large tracts of bushland managed primarily for wildlife.

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J. H. SEEBECK, *Fisheries and Wildlife Division, Arthur Rylah Institute for Environmental Research, 123 Brown Street, Heidelberg, Vic. 3084.*