

INTRODUCTION TO A STUDY OF THE
ECOLOGY OF THE KANGAROO ISLAND WALLABY,
PROTEMNODON EUGENII (DESMAREST)
WITHIN FLINDERS CHASE, KANGAROO ISLAND, SOUTH AUSTRALIA

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SUMMARY

In 1919 a Fauna and Flora Reserve was established at the western end of Kangaroo Island by the South Australian Government. The area offers good opportunities for research on native mammals but it has not been used for that purpose until recently. In 1964 study on the Kangaroo Island wallaby living within the Reserve was commenced and is continuing. Despite the fact that the Kangaroo Island wallaby is a particularly fecund species and has no serious natural predators, the natural population appears to remain at a moderate density. Research into this aspect is continuing.

In October 1919 an Act "To establish a Reserve on Kangaroo Island for the protection, preservation, and propagation of Australasian Fauna and Flora, and to provide for the control of such Reserve, and for other Purposes" became law in South Australia. This was the culmination of the efforts made by the Royal Society of South Australia, commencing in the 1890's, to have the western end of Kangaroo Island declared a Fauna and Flora Reserve. A summary of the events leading up to the passage of the Bill is given by Dixon (1920). Surprisingly, until the 1960's Flinders Chase had not been extensively used "for other purposes", namely for the scientific study of the Fauna and Flora it contained, even though for reasons to be discussed, it is an ideal locality for the study of some of the native vertebrates. A little work had been done in the 1920's however, and check-lists of the animals known to occur there had been published (Waite, 1927; Waite and Wood Jones, 1927).

The Flinders Chase Reserve

There is no recent scientific account of the physiography of Flinders Chase but a great deal of information is available in an unpublished thesis of F. H. Bauer (1960) on the regional geography of Kangaroo Island. Although the annual rainfall at the Rocky River station is 29 inches, the vegetation of the area is best described as dry sclerophyll woodland. The Rocky River station area was first included in a grazing lease in 1900. The area was taken over as an agricultural lease in 1909. In 1922 the area was reclaimed by the Crown and since then farming activities have virtually ceased. At the present time less than 100 acres remain cleared and fenced in the area surrounding the Ranger's establishment. Since the reserve was established the animals that live there have not been molested by men. Most species of animals are tame, particularly the kangaroos and the wallabies. So Flinders Chase is an ideal place for studying these animals.

Mammals

Waite and Wood Jones (1927) listed the names and status of the indigenous and introduced mammals known to occur in Flinders Chase. Both members of the

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Monotremata occur. *Tachyglossus aculeatus*, the echidna, is indigenous and abundant. The platypus, *Ornithorhynchus anatinus*, was successfully introduced into the Rocky River and is now common there and in several of the other streams. Of the three Australian superfamilies of the Marsupialia, there is no specimen record of a living Dasyurid although *Sminthopsis* sp. has been seen just outside of Flinders Chase by one of us (S.B.) and it is possible that members of both *Dasyurus* and *Antechinus* occur there. Of the Peramelioidea, *Isodon obesulus*, the short-nosed bandicoot is common. In the Phalangerioidea, both the brush-tailed possum, *Trichosurus vulpecula*, and the ring-tailed possum, *Pseudocheirus peregrinus* occur. The former is abundant and widespread. The ring-tailed possum was not recorded from the island prior to the introduction mentioned by Waite and Wood Jones (1927) so its status is uncertain. It still occurs, as a single specimen was captured, examined and released in December 1968 by one of us (S.B.). *Cercartetus nanus*, the pygmy possum occurs but because of its small size and secretive habits it is not often seen. *Cercartetus lepidus*, the Tasmanian pygmy possum, has also been collected on the Island (Aitken, 1967). *Phascogalea cinereus*, the Koala, was introduced into Flinders Chase in 1923 and is now widespread and abundant to the point of overbrowsing and killing some of the stands of manna gum, *Eucalyptus viminalis*, its preferred food tree. The Kangaroo Island kangaroo, *Macropus fuliginosus*, is common in Flinders Chase but is now quite rare on the eastern end of the island. The Kangaroo Island wallaby, *Protemnodon eugenii*, is abundant in Flinders Chase and elsewhere on the island. No other marsupial is known to occur on the island. Of the Eutheria, very little is known of the Microchiroptera which occur on the island. Of the Rodentia, *Rattus fuscipes greyi* occurs in varying numbers depending on the season. It is most abundant after the breeding season at the end of summer. The only other rat recorded recently is the dusky-footed swamp rat, *Rattus lutreolus*, and only isolated specimens have been captured (Horner and Taylor, 1965).

The study on the Kangaroo Island Wallaby

Because of its occurrence in great numbers the Kangaroo Island wallaby (Plate 1) presents a unique opportunity for study, as no other wallaby occurs in such numbers in South Australia. The distribution of *P. eugenii* is interesting. In historic times this wallaby occurred in large numbers on mainland South Australia (Finlayson, 1927) and it still occurs in isolated pockets on mainland Western Australia (Kelsall, 1965) although it used to be more widespread (Shortridge, 1909). Island populations still exist on East and West Wallabi Island in the Abrolhos group, Garden Island, Middle and North Twin Peaks Islands, Recherche Archipelago, all off the coast of Western Australia (Main, 1964). They were captured by Flinders in 1802 on the islands of St. Francis, St. Peter (= île Eugène of Peron), Thistle Island and Kangaroo Island, all of which lie off the coast of South Australia (Flinders, 1814). Flinders also captured a closely allied species on Flinders Island, South Australia and the species still occurs on the island in very small numbers. In South Australia *P. eugenii* now occurs abundantly only on Kangaroo Island. It is extinct on all of the other islands, and is likely to be extinct or occurring only in small colonies, on isolated parts of the mainland, such as those mentioned by Eyre (1847), towards the head of the Great Australian Bight. Mitchell and Behndt (1949) recorded its introduction onto Greenly Island by fishermen. *P. eugenii* was also introduced onto Kawaii Island, New Zealand, by Sir George Grey in 1870 and into the Rotorua district at an unknown date (Wodzicki and Flux, 1967). It seems possible that the animals liberated by Grey were captured on the mainland of South Australia, as at that time they were very common close to Adelaide. Wodzicki and Flux (1967) have also reported that the

Kawau animals weigh less than the Rotorua animals which are of a similar weight to the larger Kangaroo Island race. Differences between these two stocks could be determined by modern taxonomic techniques such as those reported by Martin and Hayman (1965) and Kirsch (1967). The existing colonies of *P. eugenii* present a unique opportunity for study of the evolution of macropod species.

A population study of the wallaby was commenced in Flinders Chase in November 1963. In 1964 finance was obtained to establish a field station* within Flinders Chase to be used by members of the Zoology Department. From that time periodic visits have been made to the island and as a result of these, a pool of individually marked animals has been built up.

Method of capture

On the first trip to the island it was found that individual capture of free animals with hand nets, which has been successful with the Rottnest Island quokka, *Setonix brachyurus*, could not be used because *P. eugenii* is too wary to be netted easily and can run much faster than a man pursuing it with a hand net. Accordingly a natural feature of the Rocky River station area was utilised to construct a fence-trap. The trap was built in the south-east corner of the station paddock where there is a clear demarcation between the *Acacia* scrub and a cleared grassy area. It was known that large numbers of wallabies emerge from the scrub in this area after sunset when they commence to graze. A mesh fence was built from the eastern boundary fence to the Cape de Couedic road just outside the line of *Acacia* trees. In two places swinging trap gates were fitted to the fence so that when they were set the wallabies could pass into the cleared area but couldn't pass back into the scrub. Between visits to the island the gates were left open so that the resident animals became accustomed to passing through them freely. At two corner positions on the fence short wings were built out at an oblique angle to the fence. At the end of each of these wings another wing was extended back towards the fence, and this end was made so that it could be temporarily closed off with a wire gate. At the corner point enclosed within the wings a small trap was built with an inswinging gate.

The catching procedure is to wait until at least one hour after dusk, by which time many wallabies have emerged from the scrub to feed. The operators then drive the animals slowly down the fence line and into the enclosed wing and trap area. The temporary gates are closed and the animals inside the wings and in the traps are caught with aluminium shafted hand nets, and they are then put individually into sacks. The operators who net the animals wear head torches so that both hands are free. Temporary wings, made of arc mesh, have also been used at the corners of existing fences. In one place a semi-permanent structure made from old gates is also used in a corner as a wallaby trap. At optimum times of the year, up to twenty wallabies have been captured in one night. As only smaller numbers are required, the maximum that can be caught in a single night has not been established. Up to 83 animals have been captured on a two-week trip. At the end of each trip it is noticeable that in certain areas the wallabies are much more wary than at the start of the trip and there is a fall off in nightly catching returns.

On capture each animal is marked with a monel metal ear tag (Dunnet, 1956). The animals are weighed, their foot length is measured and their teeth are

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examined for stage of eruption. The pouch young of females are sexed and measured. In August 1966 regular sampling was commenced. Ten adult males and 30 adult females have been captured on each trip for 24-hour urine and faecal collection in metabolism cages. Blood samples have also been taken for cell counts and urea and total protein analysis. The results of this work are to be published in due course.

Behaviour

Very little is known of the social behaviour, territoriality, movements or food preferences of the wallaby. To date only one tag has been recovered outside of the study area and this came from a single female which was snared on a property about ten miles north-east of Flinders Chase less than one year after it was tagged. The wallabies which frequent the cleared area surrounding the Rocky River station commence feeding at sunset and retire into dense scrub before sunrise. They make squats in the undergrowth to sleep in, but as yet it is not known how far they move from the feeding area to a resting place, or whether they always return to the same place to sleep. Water is freely available at all times of the year from the Rocky River and from artificial watering points in the Rocky River station area. The water requirements of free living wallabies are unknown. One marked behavioural change has been noticed at different times of the year. During the early winter until green feed becomes scarce in the cleared areas, female wallabies are more abundant than males. During the summer months, males outnumber females and fewer wallabies come into the cleared areas at night. At this time of the year many animals forage under the stands of *Acacia retinodes* for seed. The numbers foraging vary according to the crop, which was heavy in 1968 and light in 1969. In the field, breeding activities are not obvious and copulation has never been observed, although males have been seen following females on several occasions in the same way as the larger male kangaroos follow the females just prior to copulation (Sharman and Pilton, 1959). The only obvious social grouping is between females and their newly emerged pouch young, which continue to follow their mothers for as long as the mothers are lactating.

There are no natural mammalian predators of wallabies on the island. Tiger cats used to occur on the island as skulls have been found in cave deposits, but they are unknown in historic times. The single instance of predation seen was the killing of a young animal that had run into a fence-trap of its own accord and was caught by a pair of wedge-tailed eagles. So far the life span is unknown. However, we have records of females that were tagged as adults in 1964 and were recaptured in the first half of 1969. These wallabies would be at least 8 years of age.

Reproduction

Some of the first observations on reproduction in this species were made by Gould (1863). His conclusions were based on data obtained by his collector, John Gilbert, from animals taken on the Abrolhos Islands in January 1843. Gould inferred that there was no regular breeding season but nevertheless gave evidence which clearly shows that there is a definite breeding season. Sharman (1955) first recorded the occurrence of delayed implantation in the Carden Island race of *P. eugenii* and this was confirmed by Sadleir and Shield (1960). In the Kangaroo Island race Berger (1966) recorded that the delayed blastocyst produced by a post partum mating in one year is held over for 11 months and is eventually born as the next season's offspring. Since the reported project commenced, measurements have been made on all pouch young examined. The birth date of each animal has been estimated from the foot and/or head measurements referred to

a standard growth curve constructed from domesticated wallabies of known birth date (C. Murphy and J. Edwards, pers. comm.). The details are presented in Figure 1. The earliest estimated birth in the field is 7th January and the latest is August 12. Most births occur from the middle of January until the middle of February. As the known gestation period is 28 days (Berger, 1966) reproductive cycles must recommence from mid-December. Field observations suggest that most females have ceased to lactate just prior to this time. However, Berger (1966) has suggested that the delay is controlled at first by lactation and later by some unknown factor.



Fig. 1. Estimated birth dates of 246 pouch young Kangaroo Island wallabies measured in Flinders Chase between 1964-1969.

The Kangaroo Island wallaby is extremely fecund. The quokka, a wallaby of comparable size, breeds in its second year at the earliest, and normally does not breed until its third year. Female Kangaroo Island wallabies can produce young when less than one year of age. The youngest known animal (domesticated) was 9 months of age at her first fertile mating. Of 282 females capable of having young, which we examined in the field between 1964 and 1969 (including 1st year and aged animals) only 15 did not have young. The sex ratio of pouch young is very close to unity. Of the 246 pouch young old enough to be sexed externally, 128 were males and 118 females.

The main purpose of this investigation is to find out what controls population size. It is apparent from the length of life of some animals and from their fecundity that the potential exists for a very large population build-up. That this does not happen and in the absence of predators suggests that a high death-rate occurs at least occasionally. There is some evidence indicating that a "die-off" took place during the winter of 1968, which was wetter than average, and which followed a very dry summer. A number of dead animals were found in the study area in July 1968, an unusual occurrence as they are not usually seen. Serum protein data indicates that some infective agent may have been present in the population during 1968 (C. Murphy, pers. comm.). Work on this aspect of the problem is continuing.

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