W.A. UNIVERSITY'S MARSUPIAL BREEDING STATION

Oblique aerial photograph of part of northern boundary of marsupial reserve. Russell Road runs obliquely across upper left hand corner. To the left (North) of Russell Road is southern edge of Thompson's Lake Reserve. Tracks shown are firebreaks and access roads. The warden's cottage, laboratories and machinery sheds can be seen in the centre of the photograph.

In Western Australia, studies of marsupials by University students have been continuing since 1948 and have been based mainly at Rottnest and Garden Islands, the Pilbara, the Wallabi Islands, Houtman's Abrolhos and the Tutanning Fauna Reserve.

Many of the field studies have been supported by laboratory experiments using wild-bred field-caught animals and, as knowledge of their biology expanded, marsupials have become extremely important for such disciplines as medical research (muscular dystrophy and immunology), physiology and ecology. The increased demand for animals rapidly exceeded the productivity of other holding centres and led to the establishment of the Jandakot Breeding Station in 1970.

The Marsupial Breeding Station consists of approximately 700 acres of bushland situated about six miles south-west of Jandakot Airport and three miles from the coast at Coogee. This land was previously part of Flora and Fauna Reserve No. 15556, which included Thompson's Lake.

The station has been surrounded by a high wire fence to enclose the animals and keep out dogs; a warden's cottage, a laboratory and an operating theatre have all been built close to the entrance on Russell Road and a large trapping pen has been constructed. To date more than $80,000 has been spent on the reserve.

At the time the reserve was fenced the fauna included a number of grey kangaroos and brush wallabies, short-nosed bandicoots, and brush-tail possums. The exotic species included house mice, black rats, rabbits, domestic cats, and foxes. No native rodents have been observed on the station, even though the habitat appears to be suitable. Many bird species have been observed in the area, but the lake does not appear to be as suitable for water birds as the neighbouring Thompson Lake. This is probably because it is overgrown and is comparatively lacking in crustacean and insect fauna needed for food.

PROJECTED STUDIES ON THE RESERVE

During the next few years it is hoped that the station will serve as a focal point for a number of studies on marsupial biology. Behavioural investigations will be initiated, especially during the critical period when animals are first being introduced to the area. Very little is known of how wallabies and kangaroos establish territories, develop complex hierarchical social systems, etc., and this will be a unique opportunity to observe these processes in action.

The marsupial station can also be treated as an experimental flora and fauna reserve. There is too little information available on the minimum acreage necessary for the long-term survival of the many different

species of marsupials now living in flora and fauna reserves, and Jandakot will furnish a practical solution to this problem. It should prove possible to increase stocking rates of selected species until signs of overgrazing of sensitive species of plants are evident, giving a rough figure for the minimum area required per animal below which irreparable damage would be inflicted upon the vegetation.

Jandakot will also prove instrumental in the testing of the many theories advanced in the last few years to explain the decline in the number of the quokkas on Rottnest Island. During the summer months there is a considerable fall-off in the condition of animals on the island due primarily, it is thought, to the unavailability of high quality vegetation replete in both protein and carbohydrates. With the availability of supplementary food for the quokkas at the Jandakot station it should prove possible to show that the seasonal mortality of animals at Rottnest in summer is due to the poor quality of the available vegetation and not due to other factors such as disease, senescence, etc.

The fact that such studies will be in progress does not mean that animals cannot be removed from the population. One of the main aims of the reserve is to "farm" marsupials, that is, to produce an annual crop of animals which can be removed and in fact, which must be removed if the area is not to become overpopulated. These animals will be used for a variety of research projects which centre on the quokka and include work on muscular dystrophy, cancer research, immunology, etc. In this way it is expected that successive generations of animals inhabiting the reserve—which will be selected for high productivity, i.e. rapid rate of growth and high fertility—will gradually change in nature until they are perhaps quite unlike quokkas living on Rottnest Island where selection is always in favour of capacities conducive to survival rather than high productivity.

Finally, the station at Jandakot will function as an invaluable teaching aid for the University. With the provision of a laboratory including living accommodation, this means that groups of students will be able to work and live on the station for short periods of time. Unparalleled facilities will thus be available for the teaching of disciplines such as fresh-water ecology, entomology, animal behaviour, population dynamics, etc. Students should gain first-hand experience in the observation and collection of animals in a near-natural situation as well as training in the development of management programmes for large tracts of land which will prove to be of great importance in the development of flora and fauna reserves in Western Australia in the future.

MANAGEMENT OF THE STATION

Grazing Pressure

As mentioned above, at the time the land was fenced the grey kangaroo, brush wallaby, short-nosed bandicoot and brushtailed possum occurred naturally in the area. These species will not be removed from the area of the reserve. When the station is fully stocked the quokka will be the predominant animal present, but some tammars will also be introduced. The reason for this is given below.

Each of the herbivorous animals has a characteristic grazing pattern and, if only one species were stocked (e.g. the quokka), grazing would be on those low herbaceous or nutritious shrubs within the reach of the quokka. With continued grazing by small animals the taller vegetation will gradually overshadow and eventually eliminate the preferred food of the quokka. Accordingly, it is proposed to exploit the different grazing patterns of the tammar, brush wallaby and grey kangaroo to graze the whole range of shrubs up to and within the reach of brush and grey kangaroo. In this manner it is hoped to facilitate the management of the vegetation for maintenance of the principal quokka population.

In order that the grazing patterns can be studied in detail, and particularly the response of the vegetation to browsing, two things have been done. Firstly, the vegetation has been surveyed by the W.A. Herbarium and the species present listed. Secondly, so that the changes induced by grazing can be documented, certain areas have been fenced as exclosures. These areas will be inaccessible to the grazing marsupials and so will show, by comparison, what grazing is doing to the areas outside the fenced areas.

It is to be expected that some plants may be so heavily grazed that they will be eliminated and, in order to document this aspect of grazing pressure. "line transects" have been set out. Along these line transects the plant species present have been documented for presence and size, and it will be possible in the future to go back to these line transects and measure the changes induced by grazing.

Part of the trapping enclosure which has been built to facilitate recapture of wallabies. The area inside has been planted with forage grasses and the animals are able to move in and out through swinging trapdoors. When animals are to be captured the access ways can be fixed and animals inside the enclosure captured by hand-held nets

Fire Control

In recent years, fire has probably burnt through the area at more frequent intervals than would normally be desired, but nevertheless it is considered necessary to burn parts of the area from time to time as a management procedure, not only to maintain the habitat, but also to reduce the risk of a bushfire burning the whole area. To facilitate these measures firebreaks and tracks have been made to divide the area into a number of

discrete sections, and the "cladium" reeds are being cleared from around the edge of the lake, as these constitute a particularly dangerous fire hazard.

Disease Control

A systematic survey has been carried out in conjunction with the Department of Public Health, to ascertain the nature and distribution of pathogenic bacteria in surface waters on the marsupial station. Water sampling of the surrounding lakes by the Department over the past two years has shown many of them to be polluted with bacteria derived from human and agricultural sources. Fortunately, Banganup Lake which is the main source of water on the reserve has proved to be surprisingly free of other than what may be regarded as indigenous bacteria and there is no evidence of any strains characteristic of urban or agricultural activity. This means that the opportunity exists of introducing native animals into an area essentially free from man-stimulated pathogens, and every effort is being made to ensure that upon introduction animals are disease free. Kangaroos and wallabies destined for the reserve are first swabbed to ascertain the nature and extent of any diseases which they may be harbouring, and only those which show negative results are passed for transfer. When they are being swabbed other valuable information is also collected which will form the basis of a card-index system on each animal released in the reserve. Vital statistics are measured, blood samples taken and ear tags attached; these records will enable a check to be kept on the well-being of each arrival introduced into the reserve.

Stocking and Recapture

When animals are introduced into the marsupial station they will be in low density and, from experience elsewhere, one would expect females to mature earlier than they would at high densities—e.g. on Rottnest. If early breeding occurs as anticipated, there is likely to be a consequent rapid growth in the population. The animals are expected to disperse throughout the reserve wherever sufficient cover and food are available. Under these circumstances trapping in the native vegetation would be difficult. However, from knowledge of quokka behaviour on Rottnest and from the known behaviour of tammars and grey kangaroos adjacent to crops, it is anticipated that animals throughout the reserve would be attracted to a highly nutritious forage (as a supplement to their natural diet).

Accordingly, fenced areas have been built where nutritious food will be grown, and which may be used to trap animals. Initially animals will be captured solely as a method of censusing the population, particularly when the population nears the carrying capacity of the land. As soon as censuses establish that the population can be cropped, as indicated by numbers and age structure, the traps will be used to catch animals for experimental purposes.