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RED KANGAROO MANAGEMENT IN WESTERN AUSTRALIA

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ABSTRACT: The Red Kangaroo is the dominant native grazing herbivore over much of the arid rangeland area of Western Australia, where the species exists side by side with introduced livestock. The numbers are such that Red Kangaroos can be utilized as the basis for a commercial harvesting industry provided the population is managed on a sustained yield basis. The WA Management Programme is designed to take account of the need for conservation of the species and for protection of the livestock industry and the rangelands on which both kangaroos and the livestock industry depend.

In Australia, the niches filled on other continents by the eutherian mammals are filled generally by the marsupials. The main native grazing herbivores are the large kangaroos of which the most important economically (on the mainland) are the -

* Red Kangaroo (Macropus rufus)
* Eastern Grey Kangaroo (Macropus giganteus)
* Western Grey Kangaroo (Macropus fuliginosus)
* Euro (or Wallaroo) (Macropus robustus)
* Agile Wallaby (Macropus agilis)

All are subject to commercial exploitation and all are considered by some sections of the community to be 'pests'. They are considered by the majority of city dwellers who lack direct contact with a rural community to be items of interest and subjects for conservation. However, I hope in this paper to discuss the Western Australian Red Kangaroo Management Programme and to show how the conflicting requirements for -

* conservation of the species, and
* protection of the rangelands on which both the kangaroos and the rural industries depend,

have been met and integrated in Western Australia. This species is the most abundant and is the one on which most of the 'trade' in kangaroo products in Western Australia is based.

THE RED KANGAROO ENVIRONMENT AND THE PASTORAL INDUSTRY

The Red Kangaroo utilizes the same basic resources as the pastoral industry, namely water and the native vegetation. Introduced animals such as feral domestic goats and feral donkeys also compete for the same resources. Encouragement is given to reduce the numbers of these feral species by unrestricted commercial exploitation.

There is little 'improved' pasture in the arid pastoral areas of Western Australia. Some species, notably Buffel grass (Cenchrus ciliaris L.), Birdwood grass (Cenchrus setigerus) and Kapok bush (Aerva javanica) have been introduced but they cover only a very small percentage of the total grazing area and are confined mostly to the coast and to the river systems.

The annual rainfall of 8"-9" in this arid area is unpredictable and evaporation rates are very high. It is not realistic to talk in terms of seasonal averages in this country since the rain falls at any time of the year. In winter it results from occasional southerly cold fronts which stray well to the north. If they happen to converge with a moist intrusion from the tropics, then rain results.

Tropical cyclones develop during the summer and early autumn months to the north or north west of the State and sometimes turn in their course and cut across this area, bringing fierce winds and heavy rain. They vary in number from year to year; in 1979-80 there have been four cyclones of importance up to 20.2.80 whilst none were recorded in 1978-79.

A large percentage of the Red Kangaroo area has been in drought now for varying periods up to four years. Drought is a regular feature of this arid area. History shows several major drought periods, one of the most severe extending for up to six years in the late 1930's. Because of the size of the area, it is possible to have prolonged droughts in some areas while other areas may be enjoying a run of good seasons.

The winter rains which generally are more effective in promoting pasture growth in the range of the Red Kangaroo comprise approximately 70 percent of the total annual rainfall in the southern areas but only 40 percent in the north.

The pastures of the area consist of the indigenous flora comprising grasses (predominantly Eragrostis, Aristida and Triodia) and shrubs and small trees (predominantly Acacia, Atriplex and Maireana) with the introduced species previously mentioned being important in limited areas.

Because of lack of a thorough understanding by the early settlers of the problems associated with grazing these pastures, or because of a lack of concern for the future, much of the vegetation has been degraded. Palatable species have in many cases been replaced by unpalatable species, top soil has been eroded and it is only in the last decade or two that the problem has really been appreciated. Up until then the pastoralists had been able to maintain stock numbers by fencing and developing wells and bores on hitherto ungrazed land.

In the last decade the Western Australian Government has taken steps to endeavor to reverse the trend towards further degradation of the vegetation by imposing stocking limits on some of the worst affected areas. Eventually we may see enforced reductions in stocking rates over most of the area, supported by efforts to eliminate uncontrolled grazing by feral domestic stock (goats, donkeys and camels) and by reduction in kangaroo numbers in some areas.

The recovery of the pastures after drought and the subsequent management of grazing pressure on newly emerging pastures is of major importance in the success of a pastoral enterprise and in the regeneration of the degraded vegetation. The same situation applies and is equally important every year when cyclonic or winter rains fall and new pastures germinate.

Stocking rates in the Red Kangaroo area are very low by most world standards. Sheep are carried on the better country at a rate of one sheep to 15 acres. This country carries one cow/calf unit on 100-200 acres. Cattle are not run on the poorer country where sheep stocking rates may be as low as one sheep to 70 acres.

By 1921 sheep numbers in pastoral areas (excluding Kimberley) totalled 3.0 million. By 1935 this figure had risen to 5.4 million. Following the major drought, the figure had fallen to 2.7 million in 1941. With less 'new' country available for development, but following a series of good seasons, the figure had built up to 3.8 million in 1971 and since then, due to a succession of droughts in different areas, combined with a general deterioration of the pastures, has again fallen to 2.1 million in 1978.

Because of changes which have occurred in the pastures caused by overgrazing, each succeeding drought causes further deterioration.

The current position of the pastoral industry has been greatly affected by -

* degradation of the soils and pastures;
* inflation and soaring costs of production;
* drought

This means it is doubtful if any further development can occur within the industry. In many cases improvements are running down and some of the poorer properties have already been semi-abandoned.

HISTORY OF RED KANGAROO NUMBERS

White man started to move into the Red Kangaroo area in the mid 1800's, taking his sheep and cattle with him. As far as can be ascertained from the early explorers' diaries, kangaroo numbers were very much smaller then than they were to become in the following years. The observing of a kangaroo was usually worth noting in the diary.

It is generally believed that as a result of the provision of artificial 'waters' in the pastoral areas from about 1880 onwards, the number of Red Kangaroos increased many fold. As early as 1891 prominent citizens were drawing attention to the very large numbers of kangaroos in some of the pastoral areas. It is not knwon how large the increase may have been but it is reasonable to suggest that there was a many-fold increase in numbers. Droughts have an effect upon kangaroo populations, mainly through cessation of breeding, but it would appear to be much less than the effect upon the livestock population. Kangaroos evolved in this environment and so are better adapted than are the livestock.

It can be argued that the factors which promote livestock numbers also promote kangaroos, but the factors which reduce livestock numbers do not have as much effect on reducing kangaroo numbers.

HARVESTING OF KANGAROOS PRIOR TO THE PRESENT MANAGEMENT PROGRAMME

Shooting for skins was the main man-imposed population reduction factor prior to 1950. The only restraints on the 'take' were economic. From about 1915, royalties were payable to the State on all skins sold and the figures produced from these payments are very interesting.

Annual peaks as high has 600,000 skins were achieved with troughs as low as 40,000 (Fig. 1). It is thought that the numbers of skins produced fairly accurately reflected the population levels and their accessibility, modified in some cases by variations in hunting pressure.

We see peaks in 1919, 1925, 1930 and 1936. There were signs in 1940 of a build up towards another peak.

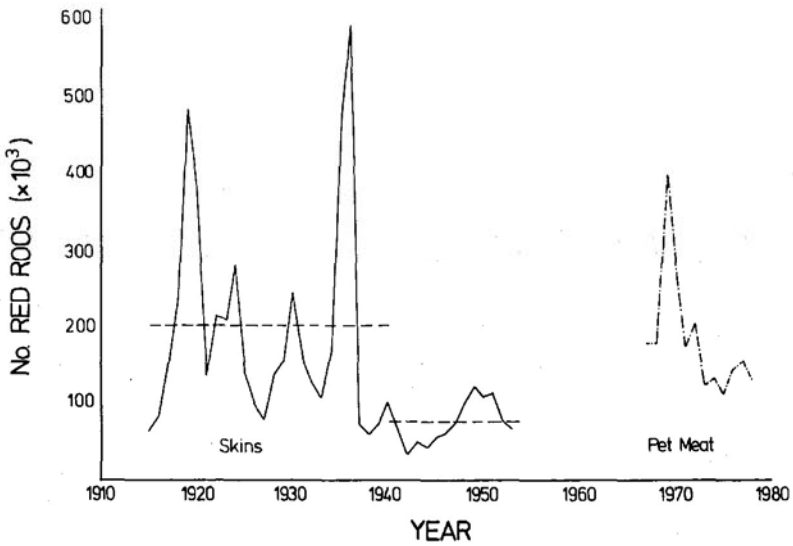

Fig. 1. The number of Red Kangaroo skins on which royalty payments were made are shown for years 1915 through 1954. The more recent years (1971-1978) of the figure indicate the number of animals taken in management programmes (pet meat). Unpublished data, R.I.T. Prince, Department Fisheries and Wildlife, Western Australia.

Although the figures varied widely from year to year, it may be inferred that during the period 1915-1940 the take (averaging almost 200,000 per annum), represented something approximately a sustainable yield. In the period of World War II the number of skins taken was low and the industry finally came to an abrupt end when skin prices fell dramatically in the early 1950's.

Shooting for pet meat became established as an industry in its own right in the early 1960's and although limited figures are available, it is thought the annual 'take' in the period up to 1968 averaged about 175,000 - 200,000. As a response to tighter controls being exerted over shooting in the eastern states of Australia (notably in Queensland and New South Wales) and a decline in kangaroo numbers in New South Wales, many shooters moved to WA in late 1968 and early 1969. In the absence of any controls the 'take' shot up to approximately 400,000 in 1969. Interim controls were imposed in 1970 whilst the Government drew all the interested parties together. As a consequence a Red Kangaroo Advisory Committee was set up and charged with preparing a Red Kangaroo Management Programme which was to attempt to -

* serve the interests of conservation of the species by permitting harvesting only on a sustained yield basis;
* protect the rangelands and the pastoral livestock industry;
* allow for utilization of those kangaroos which needed to be removed.

NEED FOR A MANAGEMENT PROGRAMME

There is obviously a need for a Management Programme wherever a multiple interest animal exists. Conservation of the species is of prime importance but in addition, the current level of population of the Red Kangaroos is such as can sustain a commercial harvesting industry.

In addition, the rangelands on which Red Kangaroos graze are also needed to support a livestock industry so in the interests of multiple use of the rangelands a management programme is necessary. It is of even greater importance because Government is enforcing maximum levels of livestock grazing on the rangelands. Such restrictions would not be acceptable, nor enforceable unless some controls are placed on the total grazing biomass (including kangaroos and feral domestic livestock). It is in the interests of all concerned, the pastoralist, the conservationist, the shooter and the processor to have a management programme.

KANGAROO MANAGEMENT

Previous attempts at kangaroo 'management' were really responses based solely on the economic considerations of those wishing to exploit the kangaroo. It was only with the setting up of the Red Kangaroo Advisory Committee that all the interested groups, including the conservation authorities, became involved.

The Advisory Committee comprises representatives of -

* Conservation authority (2, including Chairman)
* Vertebrate Pest Control authority (1)

* Shooters (2)
* Processors (2)
* Pastoralists (2)
* Local Government authorities (2)
* Biologists (3, representing conservation, rangeland management, vertebrate pest control).

The basic function of the Advisory Committee is to advise the Minister for Conservation on policy matters concerning the management programme. The following basic policies have been adopted:

* Pastoral leaseholders have the right to take kangaroos to protect their livelihood. Very few kangaroos are taken under this provision.
* Kangaroos taken may only be commercialized by persons holding appropriate shooting and processing licenses from the State conservation authority.
* Franchised (licensed) shooters have first option to 'take' kangaroos.
* Each shooter is allocated a number of kangaroos he can take in any one year.
* Each shooter is allocated an area and may only move to another area with the approval of the conservation authority. This is enforced by condition endorsed on the shooter's license.
* Each shooter pays a royalty fee of 20 cents on each tag issued. A tag must be affixed to each carcass.
* In the event of a sudden large concentration of kangaroos in an area and the full-time licensed shooters being unable to cope with the increase, temporary shooters are licensed, or the pastoralist permitted to take kangaroos within the total annual quota.
* In special cases where enforced destocking programmes under Government direction are undertaken in the interests of rangeland regeneration, 'takes' in excess of the sustainable yield may be permitted. Only one such area exists at present. Here an additional 30,000 tags are available each year.

The Committee is serviced by two permanent working groups -

The Biological Working Group comprises the three biologists who also sit on the Advisory Committee with the addition of an officer of the Commonwealth Scientific and Industrial Research Organization. He is a senior researcher on kangaroos employed by that organization in their Division of Wildlife Research. Between them these four biologists have a total in excess of 70 years' working experience with kangaroo biology or rangeland management.

It is the function of the Biological Working Group to advise the Committee on the -

* effect the programme is having on the population;
* total annual take recommended for the next year;
* areas where the 'take' should be increased or decreased, and by what extent.

It is also the function of the Working Group to monitor the effect of the programme on the kangaroo population and to incorporate the results of the monitoring in succeeding years' recommendations.

The Administrative Working Group receives these recommendations and acts upon them within the framework of the policy decisions taken by the Advisory Committee. This working group comprises representatives of the -

* fauna conservation authority (2, the Chairman and Executive Officer)
* vertebrate pest authority (1)
* pastoralists (1)

The Biological Working Group recommends different takes in each of the eleven management areas, and it falls to the Administrative Working Group to adjust these recommendations if necessary, to take account of factors other than biological factors, such as the personal problems of shooters and pastoralists or difficulties which arise between adjoining shooters or between a shooter and his processor.

These adjusted 'takes' which do not vary significantly from the Biological Working Group recommendations are then allocated to the licensed shooters on the basis of their previous performance, also taking into account the needs of the area which they service. Some tags are held in reserve for emergency situations which arise and any shortfall from the previous year is available for reallocation to emergency problem areas or to those shooters who have already used all their tags before the end of the year, provided the total quota is not exceeded.

The first allocation of tags in 1971 was based on a total annual take of approximately 200,000, the licensing of 51 professional shooters, roughly the number in the industry prior to the influx from the eastern states in 1968-69, and an allocation of approximately 4,000 tags to each shooter. (This

was considered enough to provide a good living wage). This system remained virtually unchanged for three years while data were being gathered from shooter returns.

In the Gascoyne River Catchment area, the rangelands have been degraded to the point where soil erosion is now a major problem and productivity has fallen dramatically. Leaseholders (Pastoralists) are obliged to de-stock portions of their holding and reduce total livestock numbers to a point where it is considered that partial regeneration of the rangeland will take place. There is now some evidence that although kangaroos evolved in conjunction with this vegetation, there is some indication that they could have an effect on suppressing regeneration, when present at their current population levels. During good seasons range regeneration can occur despite quite high numbers of grazing kangaroos; however, kangaroo grazing may affect the recovery rate of some species even during good seasons. Kangaroo grazing leads to a more rapid disappearance of ephemeral plant production. To assist regeneration in this area, it was decided to issue an additional 30,000 tags direct to pastoralists, for use by licensed shooters (if available) on those portions of the property which are subject to stock reductions (Table 1).

Table 1. Total number tags allocated and used 1971-1979 inclusive.

Year	Number Allocated	Number Used
1971	202,000	173,000
1972	202,000	198,000
1973	196,000	118,000
1974	138,000	128,000
1975	140,000	110,000
1976	157,000	143,000
1977	157,000	151,000
1978	152,000	130,000
1979	176,000	147,000

Monitoring of the effect of the programme on the population is the responsibility of the Biological Working Group. When the programme commenced the only information available was some limited data from the 1960's when the unregulated pet meat industry was operating.

From the start of the programme a system of monitoring used in fisheries research was used. Shooters were obliged to provide data on -

* number of kangaroos taken daily, listed by species and sex;
* total bulk weight of daily take for each of these categories;
* record of hours spent hunting;
* areas where kangaroos were taken.

Animals above approximately two years, of age are usually taken, with shooters tending to take the biggest animals available. This leads to preferential shooting of males, since males continue to grow well into adult life, whereas growth of females declines appreciably after sexual maturity.

Hunted populations generally contain more adult females than males, although numbers of each are similar prior to their recruitment to the adult stock. Shooters usually take slightly more than 50 percent of males from these populations.

Three basic statistics are calculated from shooters' returns, viz the number of carcasses shot per hour of hunting, the average weight of the animals shot, and the fraction of males taken in the total harvest.

Appraisal of these three statistics provides the initial guide to the possible status of the hunted populations. Interpretation of this picture depends on further knowledge of the responses of individual kangaroos to drought and the effect of drought on reproduction. Body condition of individual kangaroos varies in response to changing nutrition, as well as age and sex. Reproduction is also depressed as the result of drought, and may cease. Red Kangaroos also become easier to shoot in times of either seasonal or general drought. These monitoring data are therefore unsuited as short term indicators of the possible trends in abundance of the field populations, but consistency of pattern and direction of change in these statistics over periods of two to three years or more, is a valuable guide to the status of the hunted populations. These interpretations can also be checked directly as necessary.

EFFECT OF MANAGEMENT PROGRAMME ON THE SURVIVAL OF THE RED KANGAROO

Of those in Australia who have informed knowledge of the Red Kangaroo, none believe that it is an 'endangered or threatened species'. In WA some of the reasons are:

* its present numbers are believed to be many times greater than when white men settled the area;
* there are very big areas of rocky country or 'crab-hole' country in its range where water has been provided for livestock but where hunting from vehicles is not possible. In some management areas this constitutes 25 to 35 percent of the total;
* the tendency of the species to disperse during good seasons (when breeding is more successful) takes the bulk of the population out of the range of the shooter who is limited in his travel by the boggy condition of the ground.
* the kangaroo industry in WA is based on utilization of kangaroo carcasses for pet meat and skins. As a pet food this product must compete with other meats for the market. The margins for both shooter and processor are small. It is a free-enterprise industry with no subsidies, so unless it can compete economically it will fold. It is generally accepted that kangaroos become commercially unavailable long before any threat to the species becomes imminent.