# EXPLOITATION OF KANGAROOS

# AND WALLABIES

# IN WESTERN AUSTRALIA

II. Exploitation and Management of the Red Kangaroo: 1970-1979.

BY

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# EXPLOITATION OF KANGAROOS AND WALLABIES
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## II. Exploitation and Management of the Red Kangaroo : 1970 - 1979

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## ABSTRACT

This paper gives an account of the development of a formal wildlife management policy for Red Kangaroos in Western Australia, and documents the pattern of continued exploitation of this kangaroo in Western Australia under cover of the management programme to the end of 1979.

Commercial exploitation of the State's rangeland Red Kangaroo populations continued throughout the 1970-1979 decade, and remains the major feature of the management programme. The programme itself aims at maintenance of widespread viable Red Kangaroo populations throughout the species' range while permitting control of the numbers of kangaroos on the pastoral rangelands in accord with the need for sound rangeland management.

Commercial exploitation fell from a short-term average harvest level of near 300 000 carcases per annum in 1970 to < 150 000 carcases per annum by the end of 1979, and it is thought that the Red Kangaroo stocks in Western Australia were then at their lowest point for some considerable time (probably in excess of 15-20 years). The pattern of exploitation occurring during the 1970-1979 decade has however been shown to be consistent with the harvest pattern sustained during the previous 70-80 years.

The observed changes in the harvest levels and the apparent changes in stock abundance which occurred during the 1970-1979 decade primarily reflect changes in environmental productivity mediated by changing rainfall patterns and their consequent effects on stock recruitment and the subsequently available harvests.

The Red Kangaroo Management Programme that has been in force in Western Australia since 1971 has a demonstrated capacity to effectively direct and, if necessary, constrain the pattern of harvest of the rangeland kangaroo stocks, and thus contributes to necessary regulation of rangeland grazing pressure while conserving the nucleus of this important sector of the State's Red Kangaroo population. The coincidence of the major concentrations of kangaroos with the better quality pastoral lands and the concentration of hunting activity in these areas of continuing land-use conflict ensures that the programme will remain relevant to future management of the Red Kangaroo in Western Australia.

Monitoring of the harvest distribution and its impact on local kangaroo populations using the data gathered via the detailed shooter's returns does reflect the changing status and productivity of the exploited kangaroo stocks and is still the most effective routine monitoring method available for use in Western Australia. Intermittent aerial census of the stocks can however make a useful contribution to management decisions and should therefore be utilized on this account in the future, but annual census is not necessary. Aerial census at intervals of 3 - 5 or 6 years will provide adequate back-up for the routine harvest monitoring incorporated within the present Management Programme.

The apparently critical factors, that is, a relatively low but usually profitable real market price for kangaroos, coupled with the usual pattern of widely dispersed and generally intermittent hunting of the different local kangaroo populations, that have apparently contributed so far to the fine balance achieved between average annual productivity and commercial exploitation of the pastoral rangeland stocks of Red Kangaroos in Western Australia have been identified.

## 1   INTRODUCTION

Following the amendment of the Fauna Conservation Act in 1969, the next action in the process leading to establishment of formal supervision of exploitation and management of Red Kangaroos (Macropus rufus; see Kirsch and Calaby 1977) in Western Australia by the Department of Fisheries and Wildlife (formerly Fisheries and Fauna) was taken during April 1970. By notice published in the Government Gazette of April 17, 1970, and simultaneous press releases throughout Australia, the Western Australian Government advised interested parties of requirements for licensing for further participation in the State's kangaroo trade, and the criteria to be used in determining eligibility for the issue of licenses. Meanwhile, the existing trade continued operations in accordance with the Regulations published on June 13, 1952, pursuant to the Fauna Protection Act, 1950, and further information was sought from persons then operating within the kangaroo trade, so as to determine their eligibility for future issue of necessary licenses.

This action by the Western Australian Government during 1970 followed the onset of a severe drought in the pastoral areas of the State in 1969, and coincident heavy exploitation of the Red Kangaroo commencing in 1969 and continuing into 1970 (see II C. and Table 1). Knowledge of strong public concern regarding the impact of uncontrolled commercial exploitation of these kangaroos and the possibility of mass transfers of kangaroo trade operations from eastern Australia into Western Australia at this time provided the further incentive for reassessment of the role of the State fauna authority in regulating the activities of the kangaroo trade in Western Australia.

The preliminary action restricting the available shooting effort then involved in the State's kangaroo trade became effective from the beginning of August 1970, and publication of new Regulations pursuant to the Fauna Conservation Act, 1950-1969 on November 18, 1970 permitted the final action necessary for full implementation of the formal Management Programme to be taken.

The management controls which became effective from February 7, 1971 were based on an investigation into the scope and structure of the State's kangaroo trade, while the initial harvest limit that was set was based on a preliminary assessment of the annual average Red Kangaroo harvest that could be produced by the kangaroo stocks that could then reasonably be expected to be present on pastoral rangelands in the State. No more reliable population statistics were available. The management controls were also backed-up by a harvest monitoring system based on detailed returns from shooters. These returns provided data on the numbers of kangaroos taken, their sex and average weight, the distribution of the hunting activities, and an index of the effort actually expended in hunting.

Commercial harvesting of Red Kangaroos in Western Australia continued through the 1970-1979 decade, but the annual harvests taken varied during this period, and the immediate prospects for future harvests at the end of 1979 were less favourable than in 1970. The observed changes in annual harvests and the changed status of the exploited kangaroo stocks in 1979 were essentially reflections of changes in rangeland productivity and the abundance of kangaroos. Changing rainfall patterns were the primary determinant of these changes. The 1970-1979 decade was however a time of change in the marketing of kangaroo products. The most important of the changes affecting the kangaroo trade in Western Australia was the closure in 1973 of the American market for kangaroo skins.

In this paper I provide a brief review of the position of the kangaroo trade and its role in exploitation of kangaroos in Western Australia in the late 1960s, and the development and operation of a management programme for the State's Red Kangaroos during the decade 1970-1979. Detailed summaries of harvest data compiled from shooter's harvest returns are presented and changes in patterns discussed. The observed patterns of variation in the harvest rate (catch/effort = C/f) indices calculated from the harvest data are analysed in terms of changes in rangeland productivity and the process of commercial exploitation as determined by changing rainfall patterns, and their relationship to past patterns of exploitation and continuing management supervision is also discussed.

## II  BACKGROUND

### A.  THE RED KANGAROO

The Red Kangaroo is widely distributed throughout the arid and semi-arid interior of Australia, but the main populations are concentrated on the better quality rangelands that are occupied by the pastoral industry. Its dietary preference is for the more nutritious components of the rangeland pastures. A semi-nomadic behaviour pattern admirably fits the species to exploit the locally changing patterns of plant production, but also heightens the perceived conflict with the pastoral industry. Because the rangelands have only a limited capacity to support grazing stock, management is needed to resolve the land-use conflict and so allow the continued coexistence of these kangaroos and domestic livestock. Formal kangaroo management programmes similar to that operating in Western Australia are aimed at alleviating problems arising from this conflict.

Comprehensive details of the biology and ecology of Red Kangaroos relevant to management of the rangeland kangaroo populations can be found in the reviews by Frith and Calaby (1969) and Newsome (1971, 1975, 1977). The important features of the life history and reproductive capacity of the Red Kangaroo which have a bearing on exploitation-based management are nevertheless summarized below for convenience.

Female Red Kangaroos can reach sexual maturity at 18 months to 2 years of age and are capable of continuous breeding, but first reproduction is commonly retarded in the wild, and the pattern of extended and recurrent droughts expected in the arid to semi-arid environment they inhabit in inland Australia also generally leads to intermittent recruitment in all but the most favourable circumstances. Thus, while it is theoretically possible for a healthy adult female Red Kangaroo to produce three young every two and a half years, the average productivity of field populations is likely to be much lower. Exploitation-based management of the rangeland Red Kangaroo populations must take this factor into account if harvesting is to be sustained.

### B.  THE KANGAROO INDUSTRY IN WESTERN AUSTRALIA IN THE 1960s

Commercial exploitation of the kangaroos and wallabies in Western Australia prior to 1970 has been reviewed by Prince (1984); but exploitation during this earlier period was based solely on an export trade in dry skins, and existing overseas markets for skins collapsed in 1953. The dry skin trade did not recover subsequently, and the kangaroo industry changed direction in the mid-1950s. At this time the Western Australian

kangaroo industry shifted emphasis to trade in kangaroo meat, initially towards export of processed and fresh game-meat for human consumption, and later to local usage for pet-food.

Large numbers of fresh skins from the carcases used by pet-meat processors were discarded as waste at first, but with renewed trade interest in kangaroo skins in the 1960s and changes in the handling methods being adopted by local skin buyers, this waste of skins had practically ceased by 1969. Only small numbers of dry skins were then being forwarded to Western Australian buyers, and the fresh skins from locally processed kangaroo carcases comprised the bulk of the skin trade. The meat produced was sold mainly as pet-food, due to the earlier loss of the main game-meat export markets as a consequence of poor hygiene in carcase handling and lack of adequate product quality control. In addition to meeting the requirements of the local pet-food market, large quantities of pet-meat were also being exported to interstate and overseas markets in 1969.

Thus, the kangaroo trade existing in Western Australia at the beginning of 1970 was continuing the previously established pattern of commercial exploitation of the State's kangaroos, with the major segment being export orientated (see Prince 1984). Red Kangaroos provided the majority of the carcases then being utilized, and the kangaroo industry itself had been reorganized to cater for full utilization of all carcases taken. The kangaroo industry also continued to exert the major external source of pressure on the numbers of rangeland kangaroos.

## C. DEVELOPMENT OF THE FORMAL MANAGEMENT PROGRAMME FOR RED KANGAROOS IN WESTERN AUSTRALIA

Amendments made to the Fauna Protection Act, 1950 during 1967 paved the way for the further involvement of the then Department of Fisheries and Fauna (now Fisheries and Wildlife) in control of management and exploitation of Red Kangaroos in Western Australia, but it was the rapid expansion of the State's kangaroo trade in 1969 that sparked the major change. Prior to this point the jurisdiction of the Department was restricted to partial control over the exploitation of the Western Grey Kangaroo (Prince 1984, Section III B.).

My investigations into the scope and structure of the Western Australian kangaroo trade during the period March 1969 to early 1970 showed that the trade was dependent largely on exploitation of the Red Kangaroo, and that its operations were essentially organized into four functional levels, i.e. shooters, chiller operators, carcase buyers and processors, and skin buyers and traders. The important contribution being made by full-time professional shooters to the overall harvest effort was apparent, although there were also numerous itinerant shooters. I also noted a rapid expansion of the total monthly harvests being taken through 1969, and the total State harvest taken rose to c. 400 000 Red Kangaroos during this year.

The acknowledged interdependence of the Red Kangaroos and the pastoral industry on maintenance of the productive capacity of the rangeland pastures, the need for grazing management in this situation, and the effective and economically beneficial contribution of the commercial kangaroo trade in controlling kangaroo numbers on rangelands pointed to the desirability of a formal programme for supervision of Red Kangaroo management being based on these points. The required controls would therefore have to be adapted to fit in with the structural organization of the kangaroo trade.

Thus, the formal Red Kangaroo Management Programme devised for Western Australia was founded on the principle that the kangaroos constituted a living natural resource and a problem in land management, as well as being unique fauna, and that resolution of this conflict could best be achieved by management to ensure perpetuation of the species, coupled with local population control based on the continued harvesting of a commercial crop by professional shooters. Similar bases for management of kangaroo populations were endorsed by the Australian Conservation Foundation in a paper first published in 1967, and reprinted with an additional supplement early in 1970 (Anon. 1967, 1970). Final decisions on the proposed Western Australian Red Kangaroo Management Programme were being made at this point.

The action foreshadowed by the April 1970 notice was progressively implemented from August 1970. Overall control over the total commercial Red Kangaroo harvests taken in Western Australia since February 1971 has been effected by limiting the numbers of current shooter's licenses on issue and placing further limits on the maximum allowable annual harvests. General policy is implemented in the field via statutory requirements for self-locking, numbered, royalty tags to be affixed to carcases at the time of taking, backed-up by:

i) further constraints placed on the activities that may be carried out by (a) the different licensees, and (b) on the different classes of premises involved in the trade;

ii) restrictions on the location of chiller units; and

iii) requirements for detailed returns documenting the activities of licensees (see Regulations), augmented by ongoing surveillance by enforcement staff (Wildlife Officers).

Shooters' returns also provide basic research data on hunting areas, harvest composition, and shooting effort (see IV B., IV C.).

Details of the proposed Management Programme were also discussed and defended before the House of Representatives Select Committee on Wildlife Conservation at a public hearing in Perth on June 4, 1970. The recommendations published by this Committee on conclusion of their enquiries were consistent with the programme adopted in Western Australia (Australia. Parliament. 1971).

The relationship between the general functional organization of the Western Australian kangaroo trade and the system of regulatory controls imposed from 1971 onwards is shown in Figure 1.
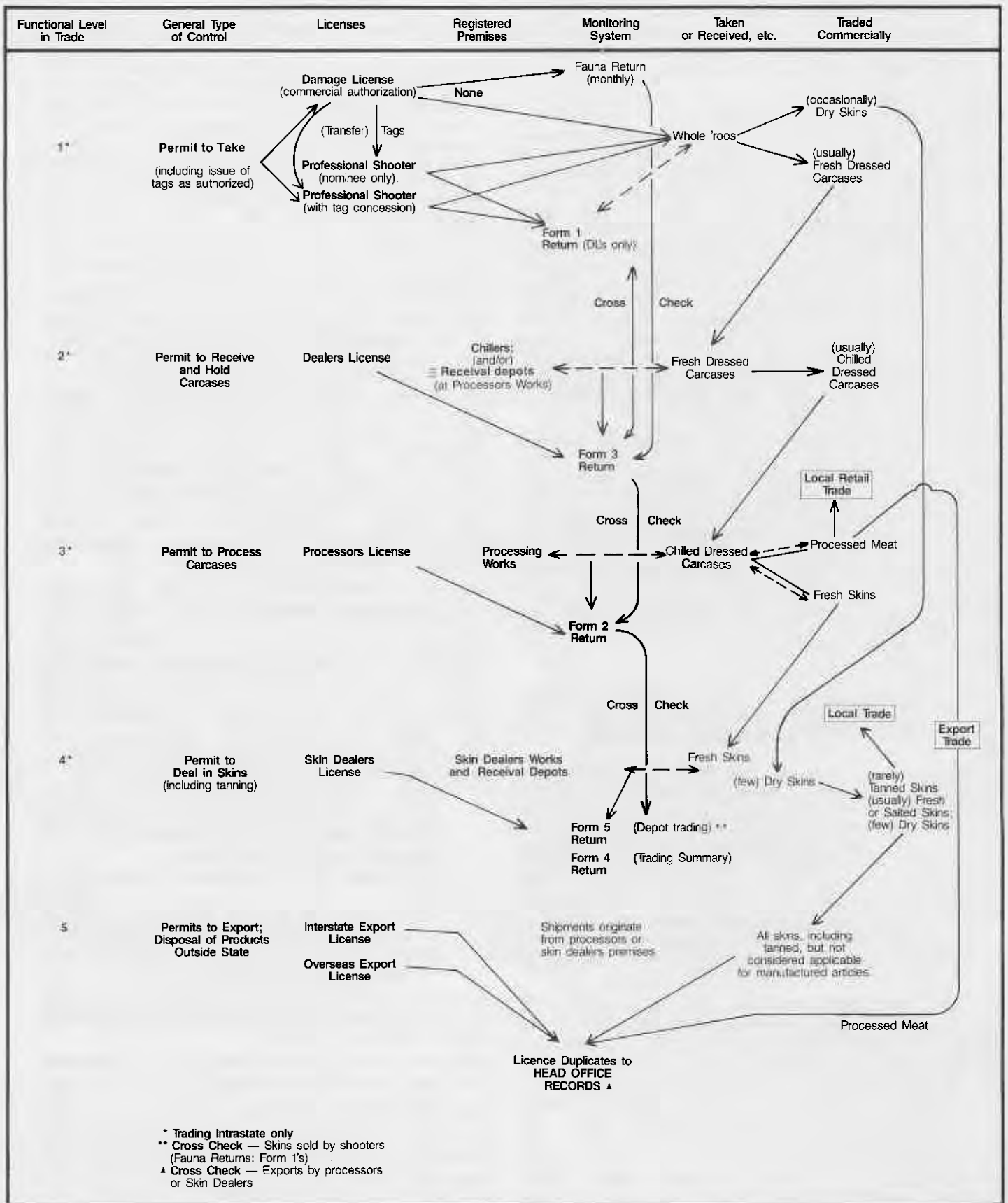
**Figure 1.** Diagram showing the relationship between functional organization of the Western Australian Kangaroo trade and the imposed system of regulatory controls.

## A.    INTRODUCTION

The formal Red Kangaroo Management Programme being developed and adopted in 1970-71 was considered an ecologically sound and practical approach to management of the State's Red Kangaroo populations.    This programme was based on the concept of sustained yield (SY) harvesting of the pastoral rangeland stocks of Red Kangaroos by a commercially viable kangaroo industry, and general protection of the kangaroos living outside the pastoral rangelands.    It was considered that this approach would allow the continuation of the economically productive kangaroo trade which would at the same time perform the useful service role of constraining the numbers of Red Kangaroos in the pastoral areas, and hence contribute to management of total grazing pressure without jeopardizing essential wildlife conservation needs.

There was good reason to believe that the existing Red Kangaroo stocks were under some pressure in 1970, but the species was still abundant.    The objective of management at that point was therefore to constrain the activities of the kangaroo industry so as to eliminate the possibility of excessive exploitation and to encourage future stability within the industry.

## B.    OPERATION OF THE PROGRAMME

Restriction of the potential harvest effort, backed up by a biologically realistic maximum harvest limit was seen to provide a good starting point for the formal management of the exploited Red Kangaroo stocks in Western Australia in accordance with the general objectives stated above.

For the first year of operation of the Management Programme in 1971, fifty-seven professional shooters licenses were allotted and an interim harvest limit of 225 000 Red Kangaroos was adopted, with a limit of just over 200 000 of these kangaroos being directly allocated to the professional shooters.    The number of Red Kangaroos taken during the first twelve months from February 7, 1971 to February 6, 1972 was approximately 173 000 (see Table 1).

Management during 1971 was primarily a holding operation.    From this point annual maximum harvest limits were set using a tracking strategy (Caughley 1977, p. 197), with decisions being founded on an assessment of the current status of the exploited kangaroo stocks and further consideration of needs for rangeland grazing management.

The year to year changes in the maximum harvest limits, etc. from 1971 through 1979 are listed in Table 1.    The notable features relative to the 1971-1979 harvest data are:

i)    the slight increase in the harvest taken in 1972 relative to 1971;

ii)    the comparatively low annual harvests taken during 1973, 1974 and 1975;

iii)    the further elevated annual average harvest levels generally sustained from 1976 through 1979;    and

iv)    the increase in the numbers of shooter's licenses issued in 1979.

The observed change in actual harvest levels attained in 1971 and 1972 can be related to renewal of drought in 1972 relative to the rainfall in 1971, but it should be noted that the 1972 harvest was held well below that taken in 1970 when the Management Programme had not been fully implemented and rainfall was marginally better than that received in 1972.

Marketing of Western Australian kangaroo products was affected from the beginning of 1973, firstly by the announced intention of the United States Federal Government to bar further access of kangaroo skins and skin products to the formerly lucrative US market in accordance with the provisions of their Endangered Species Conservation Act of 1969, and then implementation of this decision.    The Australian Federal Government also took complementary action by barring further exports of kangaroo products from Australia at this point (see Poole 1978).    Even so, the observed changes in the annual Red Kangaroo harvests taken within Western Australia from 1973 through 1979 can readily be related in the main to changing rainfall patterns in the field and the expected impact of these changes on environmental productivity and the real need for regulation of rangeland grazing pressure.    These factors also exert a direct influence on the kangaroo stocks and their pattern of exploitation.

Thus, uncertainty generated within the Western Australian kangaroo industry in early 1973 by the proposed trade bans was responsible for reduced monthly Red Kangaroo harvests being taken in February and March 1973, and this harvest trend continued in the following months (see Appendix II).    However, heavy rains fell throughout the pastoral areas of the State during winter 1973, dispersing the kangaroo populations in all areas, and severely limiting the mobility of shooters.    In formerly drought affected areas such as the Leonora district (Leonora-Eastern Goldfields Management Area, Fig. 4) this dispersal of the remaining kangaroos was sufficient to effectively bring commercial shooting to a halt.    Elsewhere in the State, shooting success was reduced to a relatively low level.    These factors alone would have been capable of inducing a substantial reduction in the total harvest.

Continued, reduced hunting pressure on the depleted and dispersed Red Kangaroo stocks through 1974 was considered desirable in terms of the management objectives, and was achieved.    A further relatively low harvest target was also adopted as an interim measure at the beginning of 1975, so that allocations to professional shooters could be advised.    The final decision on the formal harvest limit for the year was deferred at this point, pending a proposed review of the status of the exploited stocks later in the year, or some

**Table  1.**

Statistical Summary – Red Kangaroo Harvesting in Western Australia : 1970-1979.

| Year | Maximum Harvest Limit(s)[1] | Harvest Allotment[2] | Number of Shooter Licensees | Actual Harvest | Annual Rainfall Index[3] |
|---|---|---|---|---|---|
| 1970 | NA [4] | NA | NA | 275 000 | 4.0 |
| 1971 | 225 000 | 201 500[5] 23 500[6] | 57 | 173 000[12] | 7.0 |
| 1972 | 260 000 | 202 000[5] 58 000[6] | 54 *[8] | 198 000[9] (14 000) | 3.0 |
| 1973 | 200 000 plus | 200 000[5] plus[6] | 54 | 118 000 | 8.0 |
| 1974 | 150 000 | 133 500[5] 16 500[6] | 49[10] | 129 000 | 7.0 |
| 1975 | 140 000 | not specified | 51 | 110 000 | 10.0 |
| 1976 | 150 250 | not specified | 48[10] | 144 000 | 1.5 |
| 1977 | 150 000 | 144 000[5] 6 000[6] | 49 | 151 000 | 2.0 |
| 1978 | 180 000 | 120 000[5] 60 000[7] | 49 +10[11] | 131 000[9] (13 000) | 7.0 |
| 1979 | 180 000 | 120 000[5] 30 000[7] | 49 +30[11] | 150 000[9] (29 000) | 2.0 |

[1] Maximum total Red Kangaroo harvest limit specified for year. [2] Harvest limits controlled by limiting the number of royalty tags to be issued during the year. Entitlements of different licensees to draw (or have issued) tags within this limit are commonly apportioned at the time of deciding the harvest limit. [3] Annual Rainfall Index Scores (RNI) applicable to the whole of the Red Kangaroo harvesting area within Western Australia (defined by Prince 1984, Appendix I); low RNI scores = low rainfall, high scores = high rainfall (Maximum RNI = 10.0; RNI < 4.0 = Rainfall deficiency). [4] NA = not applicable. [5] Maximum tag entitlement initially allotted to established professional kangaroo shooters. [6] Allotment of royalty tags reserved for discretionary issue if necessary during the year. [7] Allotment specifically reserved for possible use within the Gascoyne Catchment Management Area (see III  B., this paper). [8] Shooting authorized directly by licenses issued pursuant to Fauna Conservation Regulation 5. [9] Numbers within the annual total harvest actually taken by other than the established professional kangaroo shooters. [10] Some professional shooters' licenses allowed to lapse, but reissued in following year. [11] Number of additional temporary shooters' licenses issued. [12] Total for 12 months from February 7, 1971  to February 6, 1972.

prior evidence that would suggest an improvement in comparison with the preceding two years. No such evidence was obtained, and recurrent wet weather throughout the major hunting areas of the State during 1975 effectively pre-empted the proposed review. The total harvest for the year fell to 110 000 carcases.

The reduced harvest levels taken during 1973-1975 were considered sufficient to have relieved the earlier pressure on the kangaroo stocks by 1976, and these three years had also coincided with a rainfall pattern extremely favourable to renewed recruitment to the existing kangaroo stocks. An increase in the annual harvest of approximately 30 per cent over the 1975 harvest was therefore recommended for 1976.

The onset of drought due to failure of winter rains was instrumental in shooters generally being able to maintain a high harvest success rate during the second half of 1976, and the total Red Kangaroo harvest for the year rose to around 144 000 carcases.

Drought continued into 1977, so the projected harvest limit for this year was set at 150 000. With the drought also continuing through 1977 shooters were able to improve their harvest efficiency and the total Red Kangaroo harvest for 1977 rose slightly, in comparison with 1976.

Nearly two years of State-wide drought to the beginning of 1978 would clearly have resulted in widespread failure of reproduction in the field populations, but the existing kangaroo stocks could also have been expected to continue to put pressure on the rangeland vegetation with continuation of drought into 1978. The necessity for continued harvesting of kangaroos in these circumstances was indicated. Maintenance of shooting efficiency to this point (Figs. 13 and 14) also suggested that substantial reduction in kangaroo numbers had not then occurred.

Consideration of the projected harvest limit for 1978 was further influenced by the acceptance by the State Government of a programme aimed at rehabilitation of degraded rangelands within the Gascoyne Catchment (see Wilcox and McKinnon 1972). A policy favouring a greater reduction in Red Kangaroo numbers in this Management Area (Fig. 4) was accepted. A non-sustainable maximum of 60 000 kangaroos was predicted to be available, but the economically practicable harvest limit for the Gascoyne Catchment Management Area for 1978 was considered to be about 40 000. Taking these factors into account, the projected State harvest limit for 1978 was increased to 180 000 carcases.

Widespread rains early in 1978 gave temporary relief from the drought, and the dispersal of the kangaroo stocks in response to these rains restricted shooter success. Further light rains later in 1978 maintained this shooting pattern, and also promoted increased reproductive success in the residual kangaroo populations, but the coincidence of dispersal of the kangaroo stocks with increasing operating costs for shooters during the year apparently restricted shooting activities in some areas. These factors were sufficient to cause the 1978 Red Kangaroo harvest to drop to near 130 000 carcases. Less than 27 000 carcases were taken within the Gascoyne Catchment Management Area (Appendix II, Table A II. 3).

The temporary respite gained from the prevailing drought following the rains received in the first half of 1978 did not herald general relief of the drought later in the year however, and drought conditions re-intensified during the spring-summer period of 1978-79. At this point, the expected impact of recruitment failure in 1979 flowing from reduced breeding success in 1977 pointed to a reduction in the harvest available through 1979. On the other hand, a fourth year of drought promised more serious consequences for the rangeland resource base.

The harvest monitoring data available to the end of 1978 could not provide direct information on the magnitude of the overall reduction in numbers of rangeland Red Kangaroos that would have been expected by the end of this third year of drought, but did suggest that appreciable changes had occurred in some Management Areas, e.g. changes in sex ratios in the harvest in favour of females, and apparent reductions in harvest efficiency (catch/unit effort; refer Figs. 13 - 36). In view of these considerations, and the continuing drought, a maximum projected harvest limit of 150 000 was proposed and accepted as the basis for administration of the programme during 1979. The commercial quota remained at 180 000.

The increase in the numbers of kangaroos actually taken during 1979 in comparison with 1978 was due entirely to an increase in shooting of females (Appendix II). Thirty temporary shooter's licenses were also issued during this year in addition to those issued to the established professional shooters, and these temporary shooter licensees accounted for approximately 20% of the total 1979 harvest. The changes noted in the harvest composition and in shooting certainly reflected a further reduction in numbers of adult Red Kangaroos in the field at the end of 1979.

## IV MONITORING OF THE HARVEST IMPACT ON THE RANGELAND RED KANGAROOS IN WESTERN AUSTRALIA : 1971 - 1979

### A. INTRODUCTION

The soundness of the general Red Kangaroo Management policy adopted in 1971 was not in doubt, but responsible management following implementation of this policy demanded knowledge of the continuing harvest impact. The need was recognised for additional information on the status and productivity of the exploited kangaroo stocks in regulating future harvests, and also in refining further estimates of the available annual harvests.

FORM 3.
Wildlife Conservation Act
REGULATION 8A

# Return of Kangaroo Carcasses Placed in Chiller Unit

RETURN FOR MONTH OF ............................................ 19..............

A. Shooter's Name ........................................................................................Shooter's Number ...............................

Field Location ...................................................Block No.*................................Damage License No. ..........................
(if applicable)
* Use separate form for shooting activities for different blocks.

B. Chiller Owner's Name ...........................................................................................Chiller No. ...............................

Address .................................................................................................................................................

C. Name of Person in Charge ..................................................................................Registration No. ..........................
(if applicable)

Chiller Location ............................................................................................................................

OFFICE USE ONLY

| TC | Month | Year | Dealer's Registration No | Shooter's Registration No. | Block No. | Number of Days Shooting |
|----|-------|------|--------------------------|----------------------------|-----------|-------------------------|
| 30 | | | | | | |

D.— ANALYSIS OF KANGAROO CARCASSES HELD

| TC | Day of Month | Hrs. of Hunting | Red or Marloo | | | | Euro or Biggada | | | | Grey | | | | Total | |
|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | | | Male (buck) | | Female (doe) | | Male (buck) | | Female (doe) | | Male (buck) | | Female (doe) | | | |
| | | | No. | Wt | No. | Wt. | No. | Wt | No | Wt | No | Wt | No | Wt | No | Wt |
| 31 | 1 | | | | | | | | | | | | | | | |
| 31 | 2 | | | | | | | | | | | | | | | |
| 31 | 3 | | | | | | | | | | | | | | | |
| 31 | 4 | | | | | | | | | | | | | | | |
| 31 | 5 | | | | | | | | | | | | | | | |
| 31 | 6 | | | | | | | | | | | | | | | |
| 31 | 7 | | | | | | | | | | | | | | | |
| 31 | 8 | | | | | | | | | | | | | | | |
| 31 | 9 | | | | | | | | | | | | | | | |
| 31 | 10 | | | | | | | | | | | | | | | |
| 31 | 11 | | | | | | | | | | | | | | | |
| 31 | 12 | | | | | | | | | | | | | | | |
| 31 | 13 | | | | | | | | | | | | | | | |
| 31 | 14 | | | | | | | | | | | | | | | |
| 31 | 15 | | | | | | | | | | | | | | | |
| 31 | 16 | | | | | | | | | | | | | | | |
| 31 | 17 | | | | | | | | | | | | | | | |
| 31 | 18 | | | | | | | | | | | | | | | |
| 31 | 19 | | | | | | | | | | | | | | | |
| 31 | 20 | | | | | | | | | | | | | | | |
| 31 | 21 | | | | | | | | | | | | | | | |
| 31 | 22 | | | | | | | | | | | | | | | |
| 31 | 23 | | | | | | | | | | | | | | | |
| 31 | 24 | | | | | | | | | | | | | | | |
| 31 | 25 | | | | | | | | | | | | | | | |
| 31 | 26 | | | | | | | | | | | | | | | |
| 31 | 27 | | | | | | | | | | | | | | | |
| 31 | 28 | | | | | | | | | | | | | | | |
| 31 | 29 | | | | | | | | | | | | | | | |
| 31 | 30 | | | | | | | | | | | | | | | |
| 31 | 31 | | | | | | | | | | | | | | | |
| 31 | Totals | | | | | | | | | | | | | | | |

The shooter named above must complete the declaration on the reverse of the original (white) form.

Signature of Person in Charge

**Figure 2.** Return Form 3 used for daily reporting of results of hunting trips undertaken by shooters.

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## B. THE HARVEST MONITORING SYSTEM

Ideally, harvest regulation is based on knowledge of numbers of the target species, and the net productivity of the harvested populations. This direct approach was not possible in Western Australia due to the size of the area involved, the limited staff and funds available to service such a programme, and the state of the art of broad-scale population census techniques applicable to the State's Red Kangaroo population at the inception of the formal Management Programme. Monitoring of the status of the harvested stocks via documentation of the ongoing harvest was therefore the main practical course of action open for collection of needed research data.

Detailed documentation of the harvest taken by the shooters in fact offered the best indirect means of checking the apparent status of the harvested sector of the kangaroo population, and of picking out specific problems needing further investigation. Data collection at this level could also be tied in with other administrative and enforcement requirements, so was adopted. The report form proposed for collecting the harvest monitoring data was tested in a field trial conducted during 1970, and subsequently incorporated in the Fauna (now Wildlife) Conservation Regulations following the success of this trial. The Return Form 3 in current use (Fig. 2) is similar to that first tested.

Additional information on population composition, reproductive status of the female kangaroos, and shooter activity was obtained by direct enquiry and/or investigation as required, subject to the practical limits on this work as previously described.

Ground transect and aerial survey counting techniques have also occasionally been used to provide further direct measures of local kangaroo abundance.

## C. BASIS FOR THE CHOICE OF THE HARVEST MONITORING DATA COLLECTED

### 1. Harvest Origin and Dispersion

One of the simpler pointers to the possible stability of exploitation of a particular species is provided by examination of the pattern of origin of harvests taken. Stable exploitation systems should show a greater consistency of pattern of offtake. Detailed documentation of the origin of harvests taken was therefore included to provide this basic information.

### 2. Other Harvest Parameters

The fact that the data pertaining to the commercially harvested kangaroos would provide a biased sample of the hunted population(s) was recognized at the outset when choosing to implement a harvest-based monitoring system in Western Australia. However, it was also considered that statistics calculated from the harvest data could provide a window through which the interaction between the shooters and the hunted kangaroos could be viewed and possible problem areas identified.

The difference in growth patterns of adult kangaroos which results in marked sexual dimorphism between adult male and female kangaroos (Frith and Calaby 1969, p. 145) provided the basis for selection of two different harvest parameters to be obtained.

Professional kangaroo carcase shooters are paid by weight of carcases harvested, and so prefer to take the larger animals available wherever possible when a choice is open to them. Consequently, this selection results in preferential harvest of male kangaroos, and generally the larger, and presumably older individuals of each sex. The percentage maleness of the harvest and the average weights of the carcases taken are both therefore likely to provide information on selectivity exercised by the shooters.

Average carcase weights can also provide a possible guide to the average age of the animals being harvested. Of course the body-weight : age relationship may vary within populations in response to seasonal and other changes in nutrition, and also between local populations if there are differences in genetic growth potential, or if conditions affecting the growth of the animals in the different groups are dissimilar. However, the general difference in growth patterns suggests that variations in female carcase weight should provide the most useful index related to the changing nutritional status of the population in the short-term, while the male carcase weight should provide the better indication of average age of the most heavily exploited sector of the population.

The catch/unit effort (= C/f) statistic can provide an index of abundance of shootable kangaroos relative to the shooter, and may also reflect changes in abundance of the kangaroo stocks because, in general terms, C (catch) = q f S, and if q, the catchability coefficient remains constant, then

$$C/f \text{ (effort)} \quad \propto \quad S \text{ (stock).}$$

However, C/f ratios can also be expected in this instance to vary independently of the numbers in the hunted population (stock, S), in the short-term at least, because of changes in the behaviour of the kangaroos and kangaroo shooters in response to changing weather patterns. Still, such changes in behaviour may not be of overriding importance in the longer term if the total harvest (C), and total effort (f), data accumulated monthly within each year represent different approximations to potentially stable harvest:effort combinations. In this case, the patterns of variation observed may be analyzed with respect to variables affecting the different factors in the equation.

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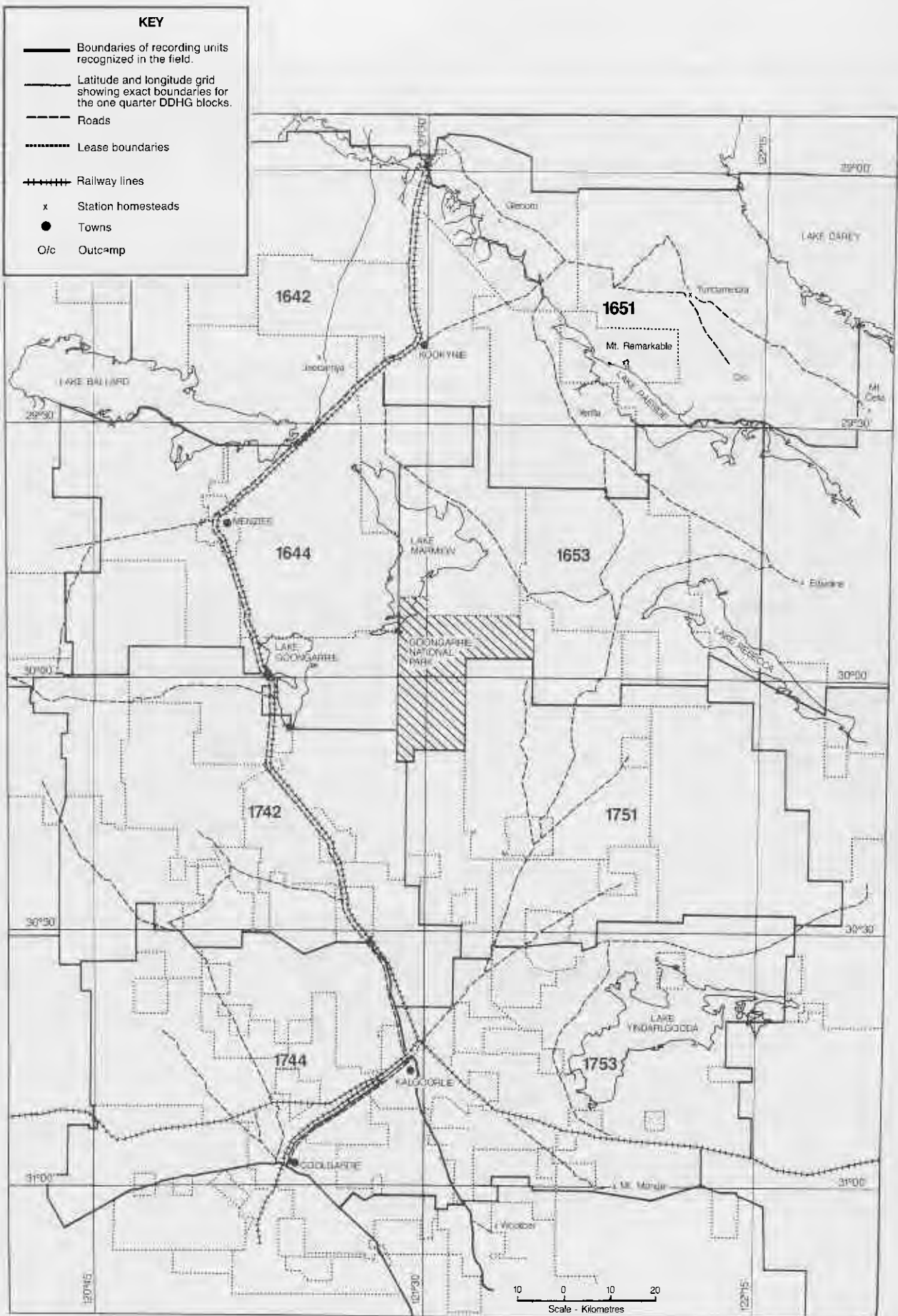
**Figure 3.** An example of the relationship between the practically recognizable field boundaries of the quarter-DDHG (Brook 1976) units used in reporting the origin of kangaroos harvested in Western Australia and the actual latitude x longitude grid on which these units are based.

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## D. THE HARVEST DATA

### 1. Data Collection and Processing

Kangaroo harvest data summarizing the activities of each licensed shooter are first recorded in the field on a daily basis, and then entered on the Return Form 3 supplied by the Department of Fisheries and Wildlife (Fig. 2). The separate Returns required are completed at the end of each month (including 'Nil' records) and forwarded to the Department.

The "Hrs. of Hunting" column on this form was added at the beginning of 1972, having been omitted during 1970-1971. 'Hours of hunting' is defined as the time spent in actually searching for and shooting the kangaroos taken during each hunting day, and is recorded to the nearest half hour. The 'dead' time that may be spent by some shooters in choosing to travel long distances to and from the hunting area(s) being used is specifically excluded. Some confusion on this latter point possibly did arise in 1972 (cf. average Hrs/Hunting day in 1972 and other years, Appendix II), but this possible problem was overcome by issue of more explicit instructions to shooters from 1973.

The minimum geographic recording unit utilized in compilation of these Red Kangaroo harvest data is one-quarter of the standard 1° Lat. x 1½° Long. (DDHG; Brook 1976) blocks of the 1:250 000 Australian National Mapping grid. These one-quarter DDHG blocks were chosen as the basal recording unit because they were readily defined, and also encompassed a similar total area as was generally being utilized by the individual professional kangaroo shooters in Western Australia. The actual units defined for practical reference by the shooters in compiling their Returns had to be mapped in terms of recognizable features on the ground as shown for example in Fig. 3. The effects of the specific block boundary variations required for practical recording of data in the field are taken into account as necessary in data interpretation.

On receipt in the Department, the shooters' hunting Returns are first checked by administration and enforcement staff before being forwarded to the research branch for further action. After coding of these returns as required, the new data are transferred to a permanent computer file data-base. All new data are routinely checked for logical and arithmetic errors on accession to the data-base and any necessary corrections are made. The valid records retained in this data-base are then used to produce harvest summaries and statistics, and other statistics relating to the interaction between the shooters and the hunted kangaroos.

### 2. The Harvest Statistics

The major indices of harvest impact and population abundance and status calculated from the harvest data-base are:

i)   Rate of offtake : units = carcases/km$^2$/annum.

Calculated as (Total numbers of Red Kangaroos taken annually per quarter-DDHG block/area within the designated quarter-block).

ii)   Catch/unit hunting effort, (C/f) : units = carcases taken/hunting hour.

Calculated as (Total numbers of carcases taken/total effective hunting effort).

These indices are calculated separately for each sex without reference to the proportion of time possibly expended exclusively on hunting animals of the other sex. Where kangaroos are taken and the effort expended is not reported, it is assumed that the catch rate (= C/f) is similar to the pooled average calculated from all other records within the specified sample-set where effort has been reported.

iii)   Average carcase weight : units = kg/trade carcase.

Calculated as (Total weight of the specified carcases/total numbers taken within the class).

The 'full' trade carcase referred to here is the eviscerated body of the kangaroo with the skin attached minus the head, hands, and feet, and with the tail severed approximately 10-20 cm from the base.

iv)   Percentage maleness of harvest : units = %.

Calculated as (100 x Male carcases/total carcases within the specified group).

The statistics specified in (ii), (iii) and (iv) above are calculated for each of the designated State Management Areas (Fig. 4) and for the whole-of-State data also. The separate Management Areas were first formally defined in 1974, and include larger sample sets of the basal quarter-DDHG blocks.

### 3. Harvest Data Summaries

Density distributions of the annual rates of harvest offtake of Red Kangaroos in Western Australia during the eight years 1972 through 1979 are mapped in Figs. 5 - 12. These maps were produced using SYMAP (Version 5.20, Harvard University Laboratory for Computer Graphics and Spatial Analysis 1977). Digitized coordinates for the Western Australian coastline were provided by the Department of Lands and Surveys, Western Australia, and mapped as an Alber's equal area projection with standard parallels at 17°30'S and 31°30'S and central meridian at 121°00'E on the IUGG 1967 spheroid using MAPROJ (Version 1.2, Hutchinson 1981). Full data for 1971 are not available because of incomplete harvest reporting during the first half of this first year of operation of the Management Programme.

The patterns of variation in the other harvest statistics listed in IV D. 2. (above), e.g. catch/unit effort, average carcase weights and percentage maleness in the harvests taken over the whole-of-State, and within the main State Management Areas from 1972 through 1979 are

MANAGEMENT AREAS

MU    Murchison
GC    Gascoyne
CN    Carnarvon
AW    Ashburton West
PB    Pilbara
AE    Ashburton East
NEP  North East Pastoral
MA    Magnet
SS    Sandstone
LEG  Leonora—Eastern
         Goldfields
NU    Nullarbor
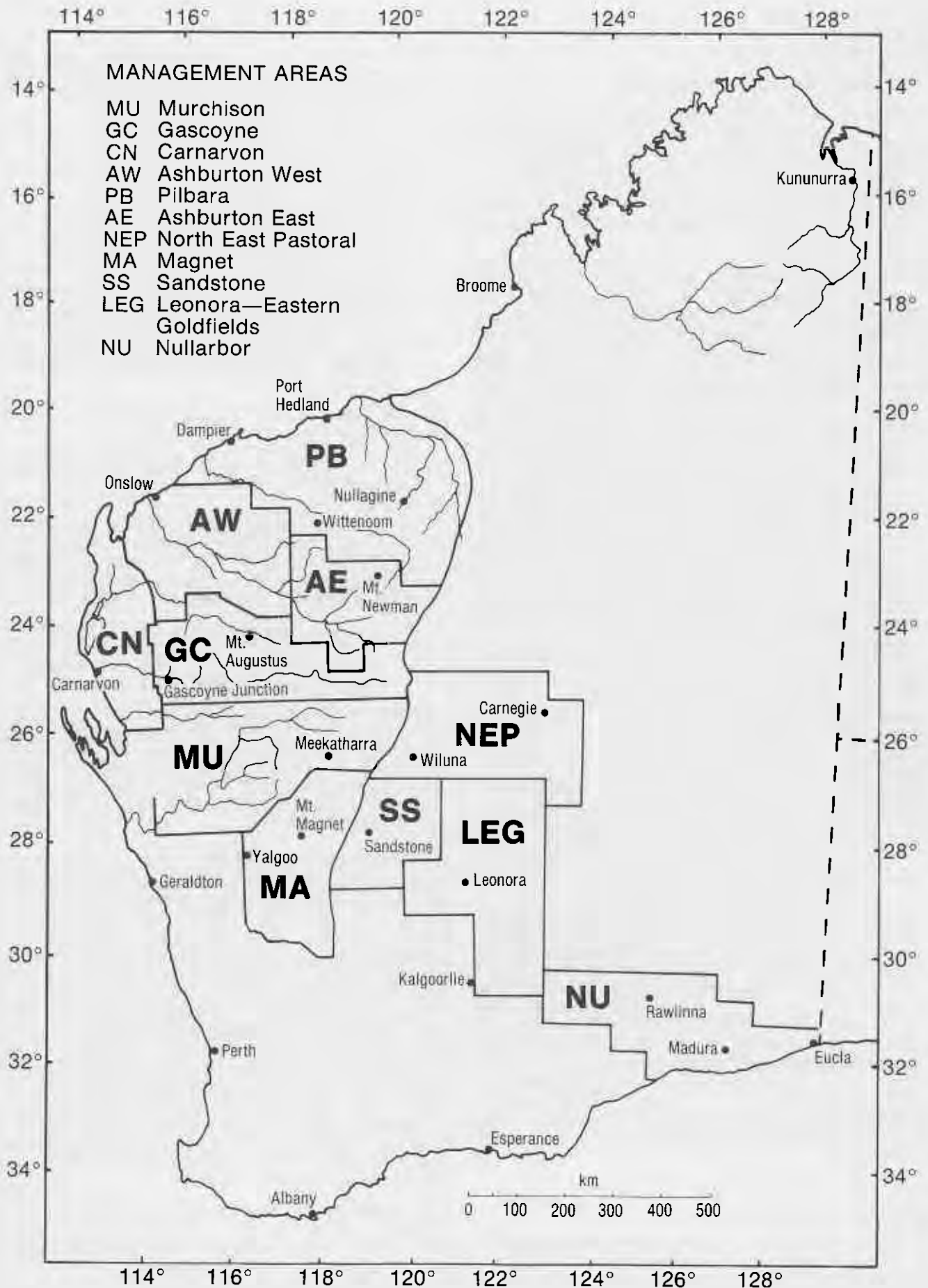
**Figure 4.** Location of the Western Australian Management Areas used in compiling summaries of State Red Kangaroo harvests.

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**Figures 5 - 12.**

Maps showing the distribution of Red Kangaroo harvest
offtake rates within Western Australia :
1972 through 1979.


(Note that the area included within the harvest
offtake Class 1 shown on these maps largely
defines areas open to commercial exploitation of
Red Kangaroos from which reports received
indicate no commercial harvesting has occurred
during the past 10 years.)
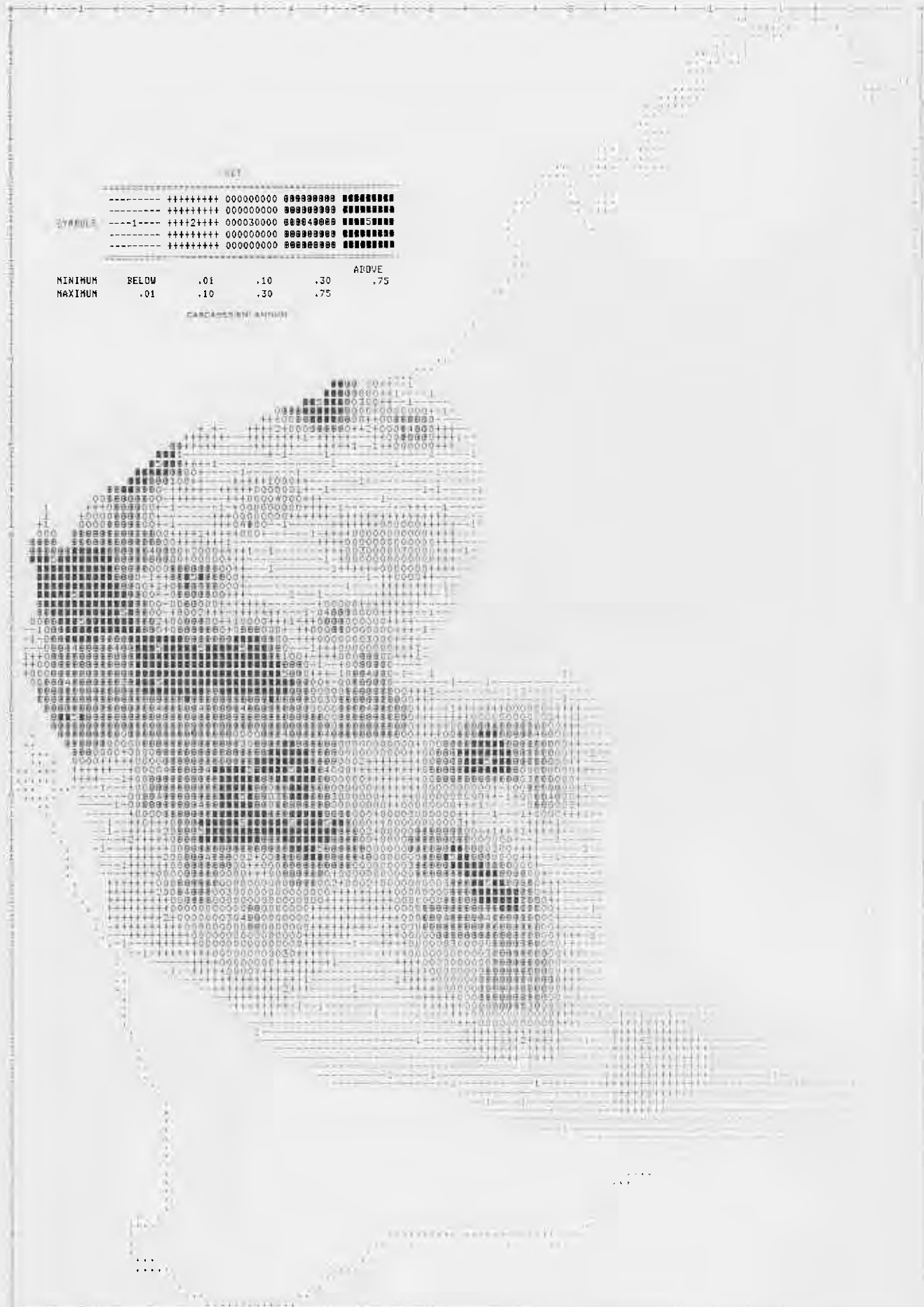
**Figure 5.** Distribution of the Red Kangaroo Harvest Offtake Rates in Western Australia : 1972.

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**Figure 6.** Distribution of the Red Kangaroo Harvest Offtake Rates in Western Australia : 1973.

**Figure 7.** Distribution of the Red Kangaroo Harvest Offtake Rates in Western Australia : 1974.

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**Figure 8.** Distribution of the Red Kangaroo Harvest Offtake Rates in Western Australia : 1975.
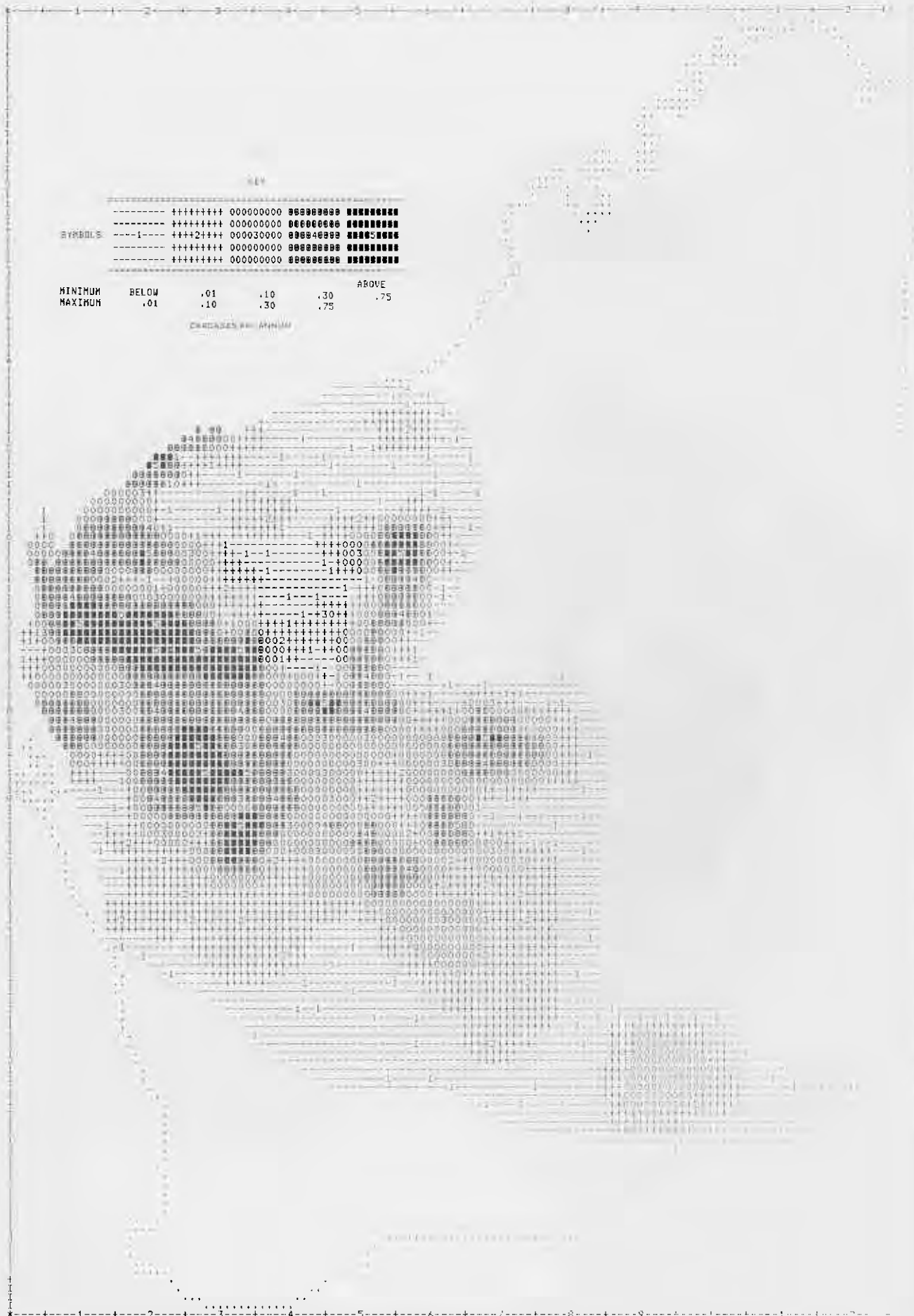
**Figure 9.** Distribution of the Red Kangaroo Harvest Offtake Rates in Western Australia : 1976.
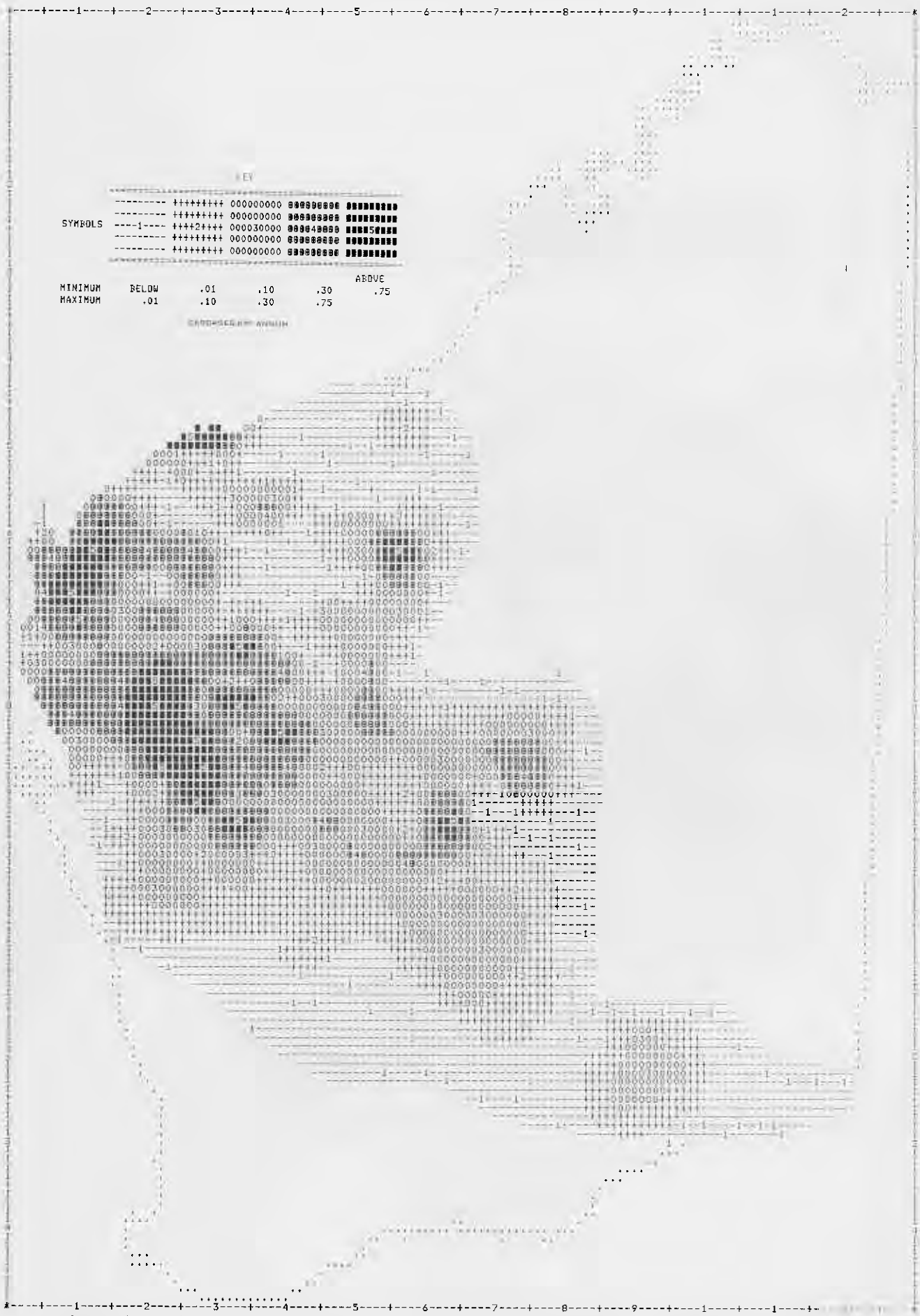
**Figure 10.** Distribution of the Red Kangaroo Harvest Offtake Rates in Western Australia : 1977.
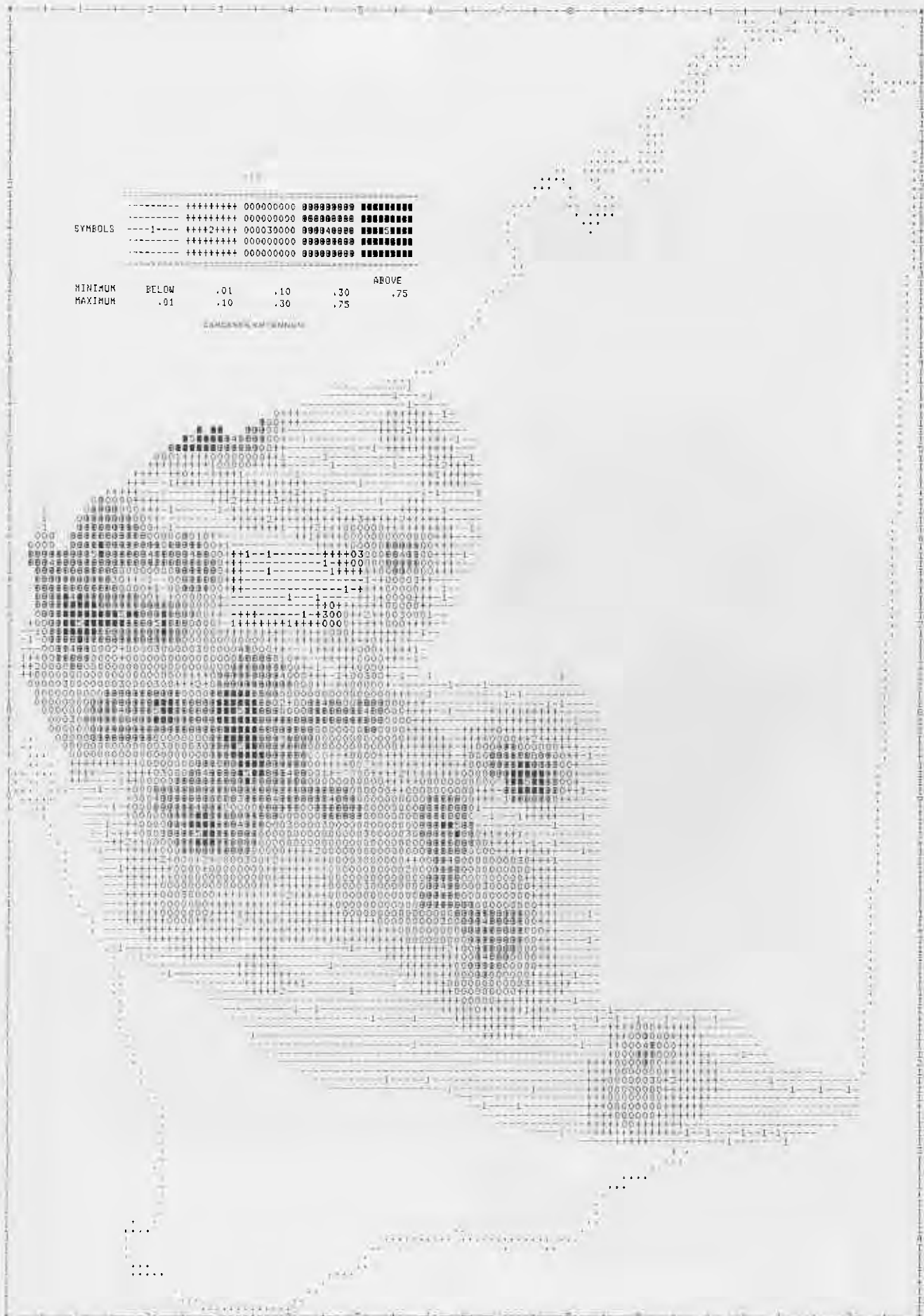
**Figure 11.** Distribution of the Red Kangaroo Harvest Offtake Rates in Western Australia : 1978.
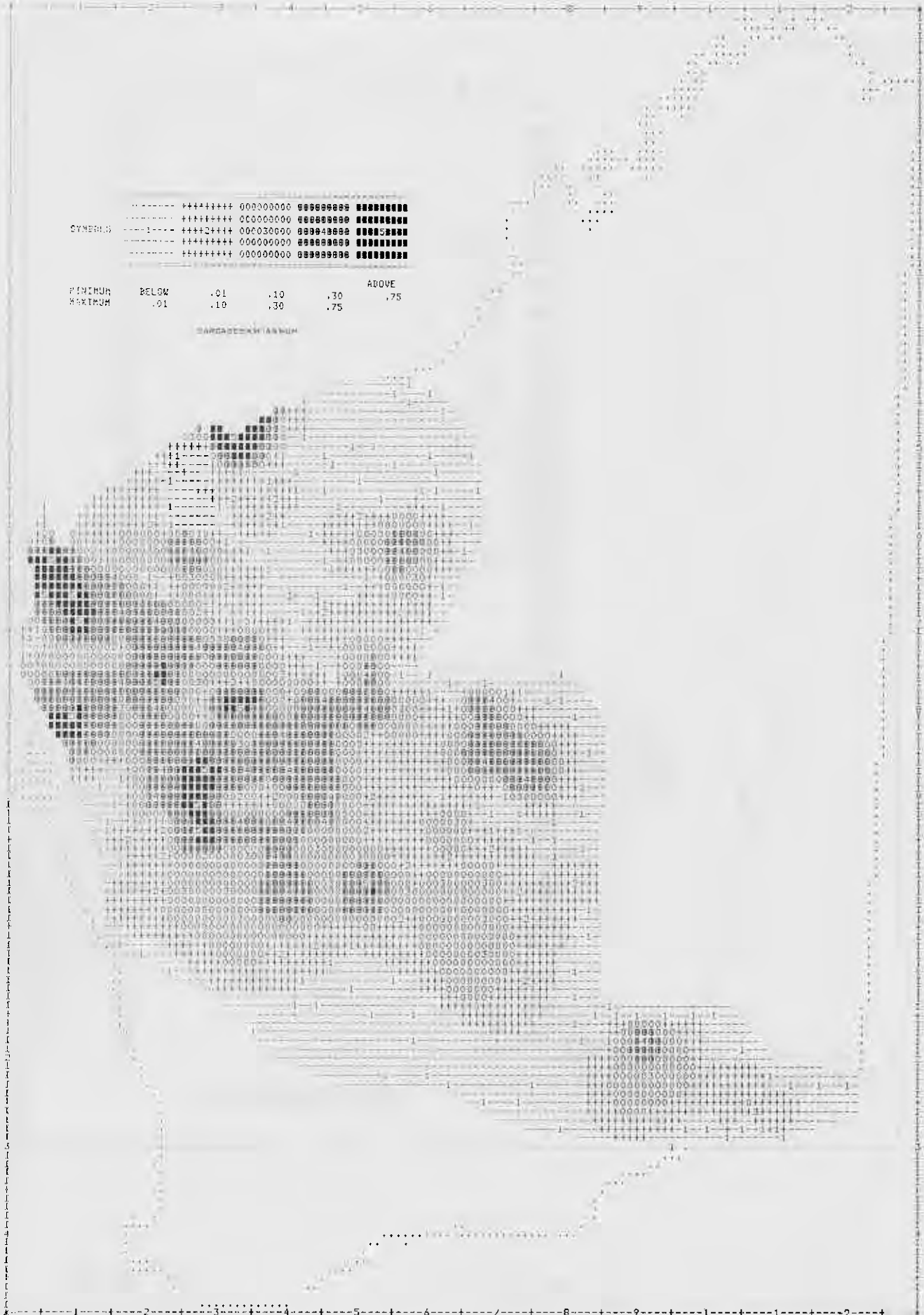
**Figure 12.** Distribution of the Red Kangaroo Harvest Offtake Rates in Western Australia : 1979.
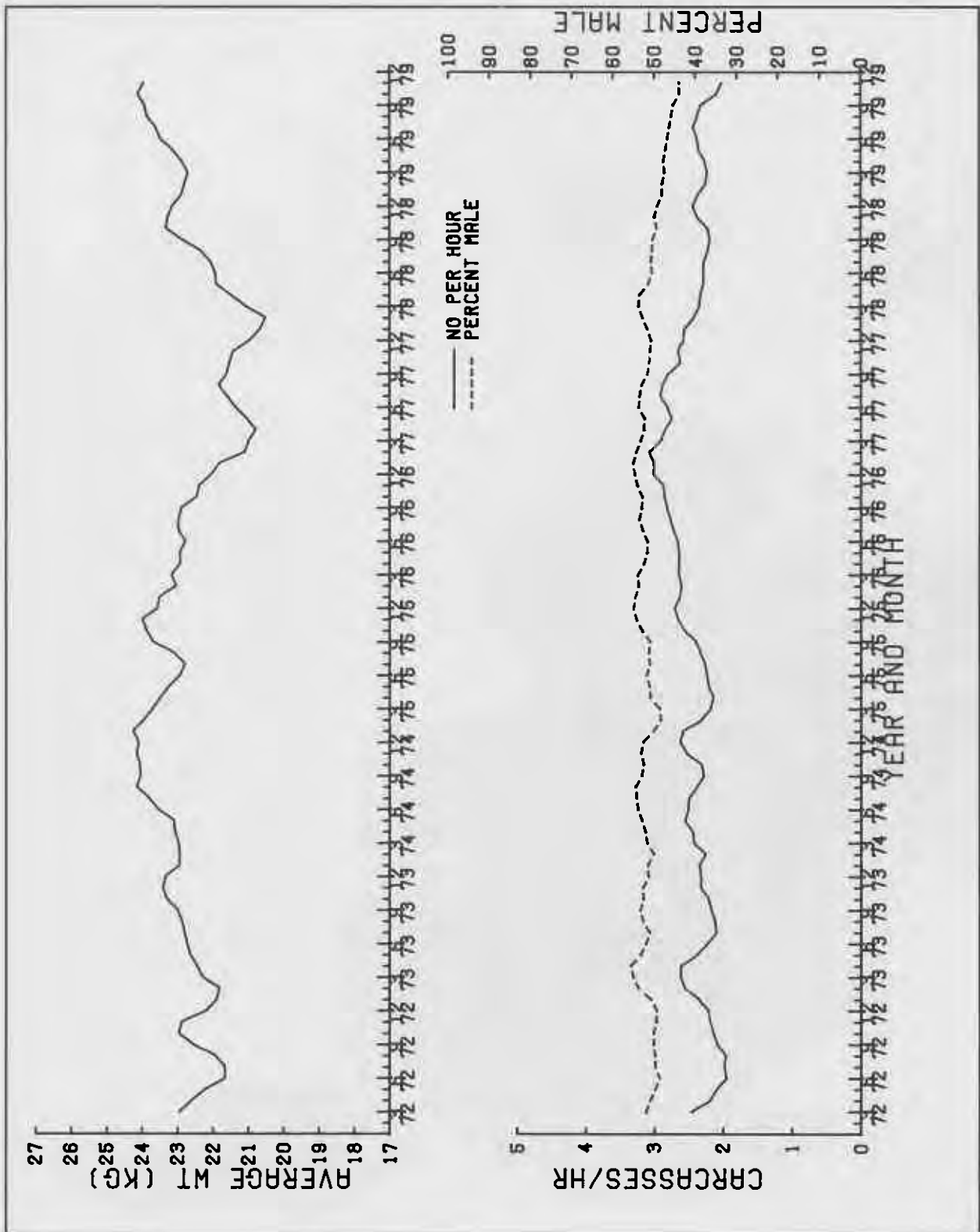
**Figure 13.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total whole of State harvest - Western Australia : 1972 - 1979.
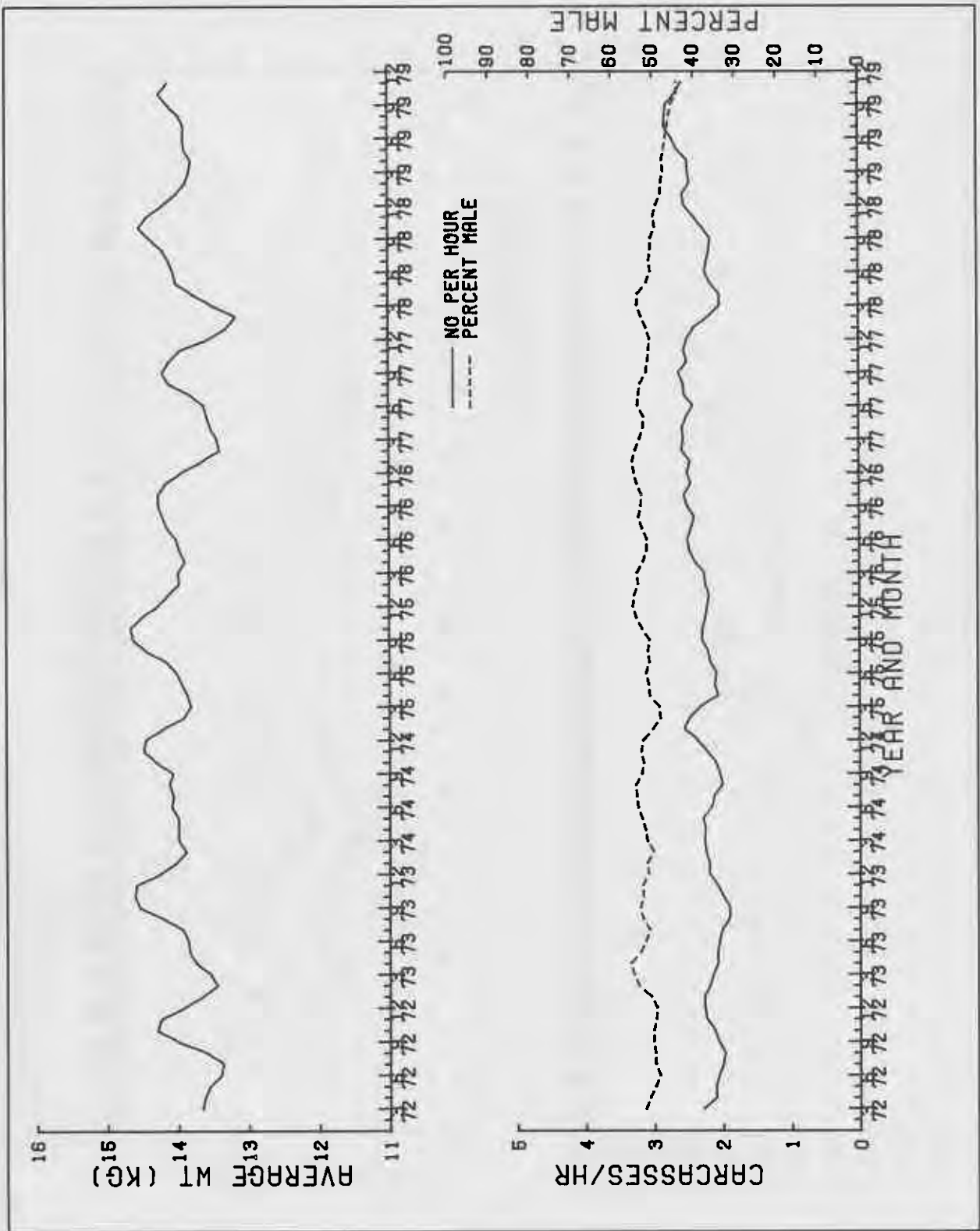
**Figure 14.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total whole of State harvest - Western Australia : 1972 - 1979.
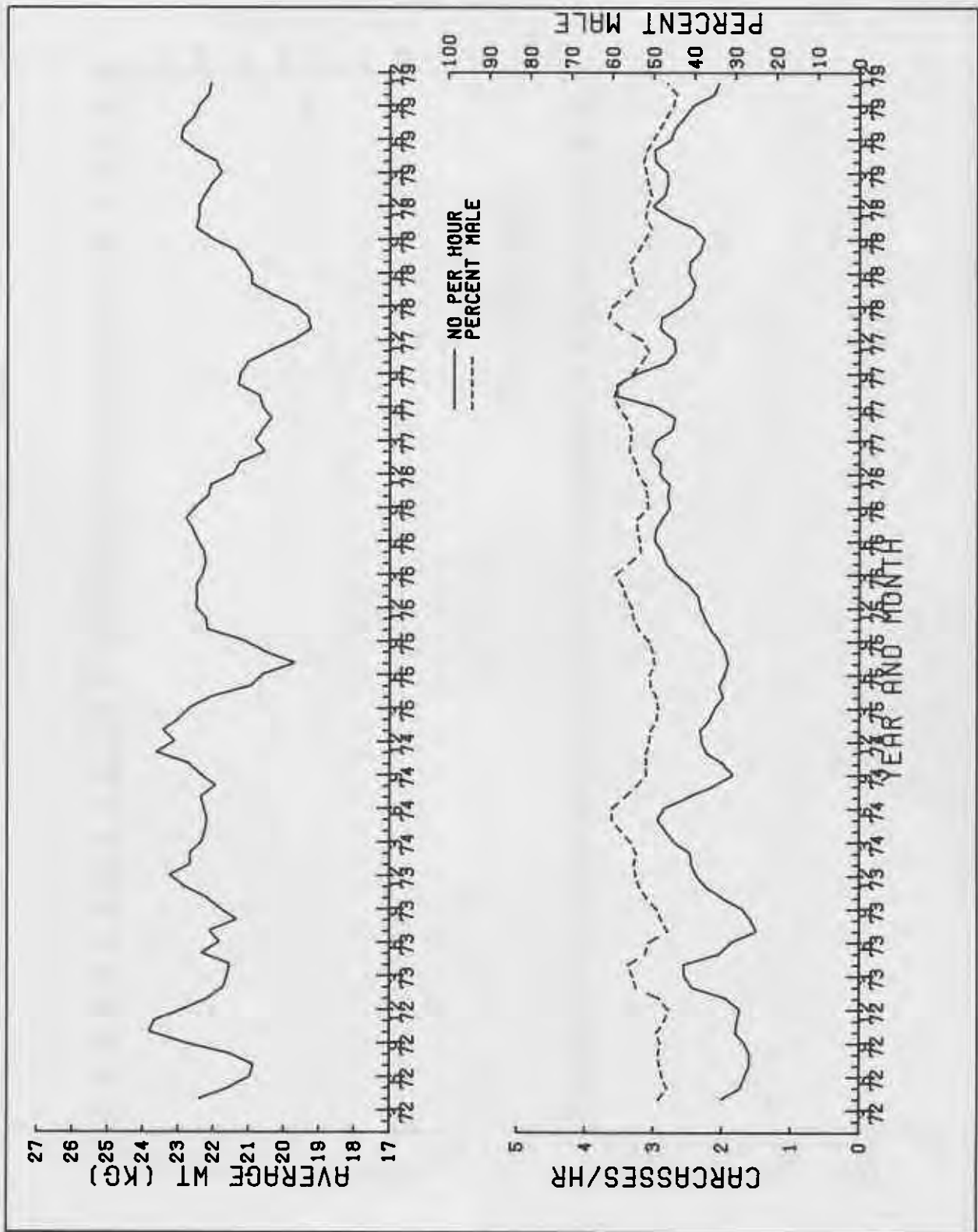
**Figure 15.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total Murchison Management Area harvest - Western Australia : 1972 - 1979.
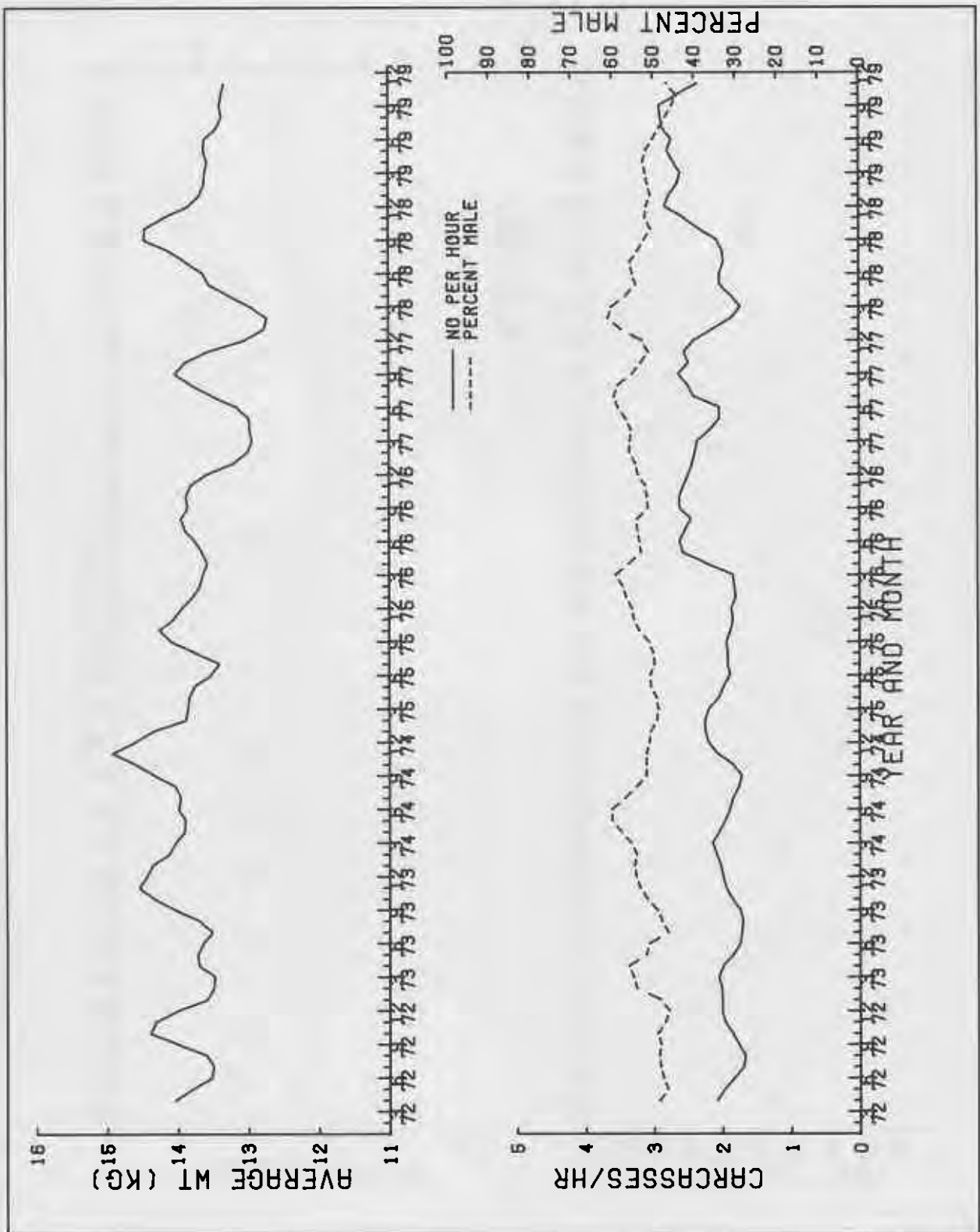
**Figure 16.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total Murchison Management Area harvest - Western Australia : 1972 - 1979.
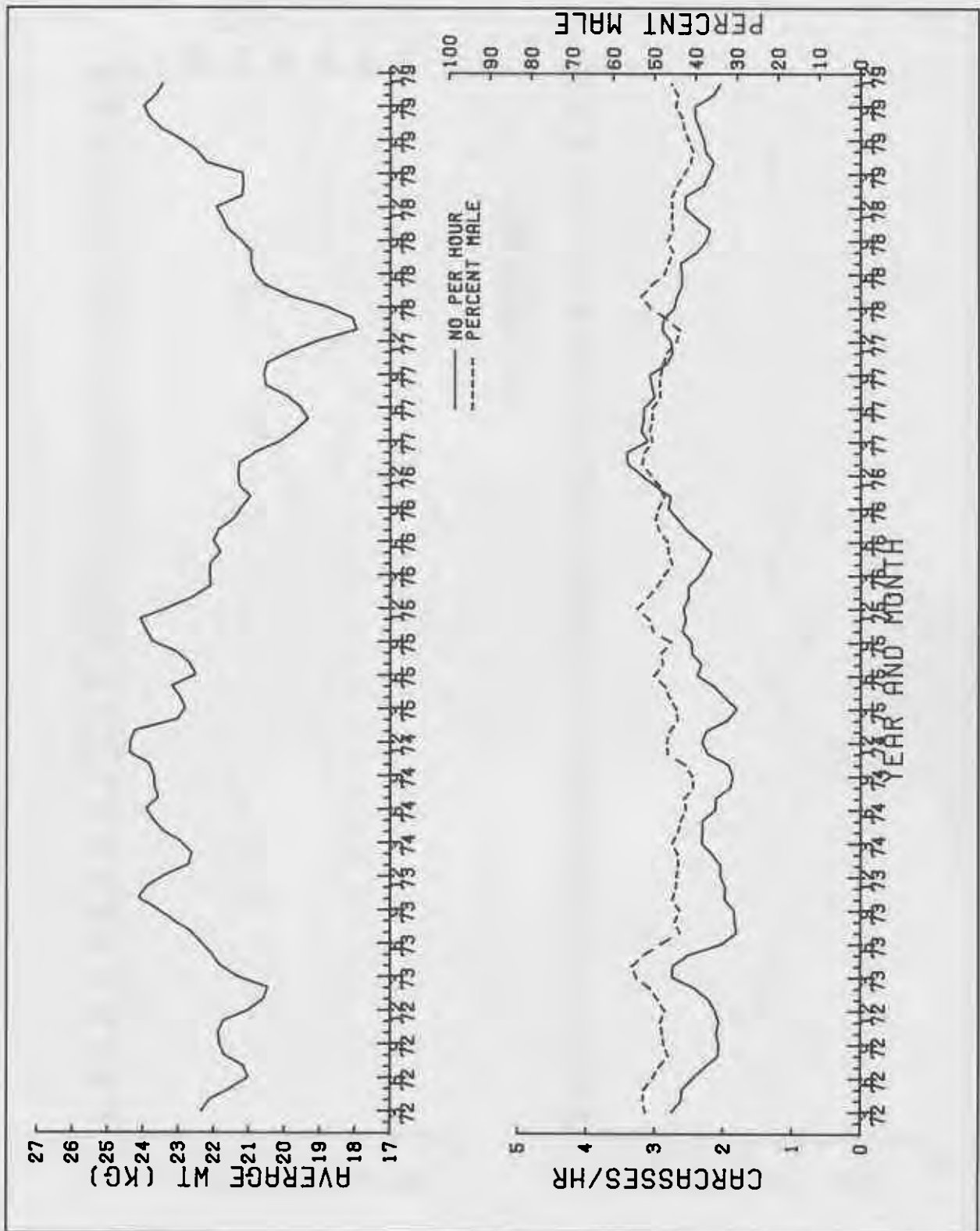
**Figure 17.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total Gascoyne Catchment Management Area harvest - Western Australia : 1972 - 1979.
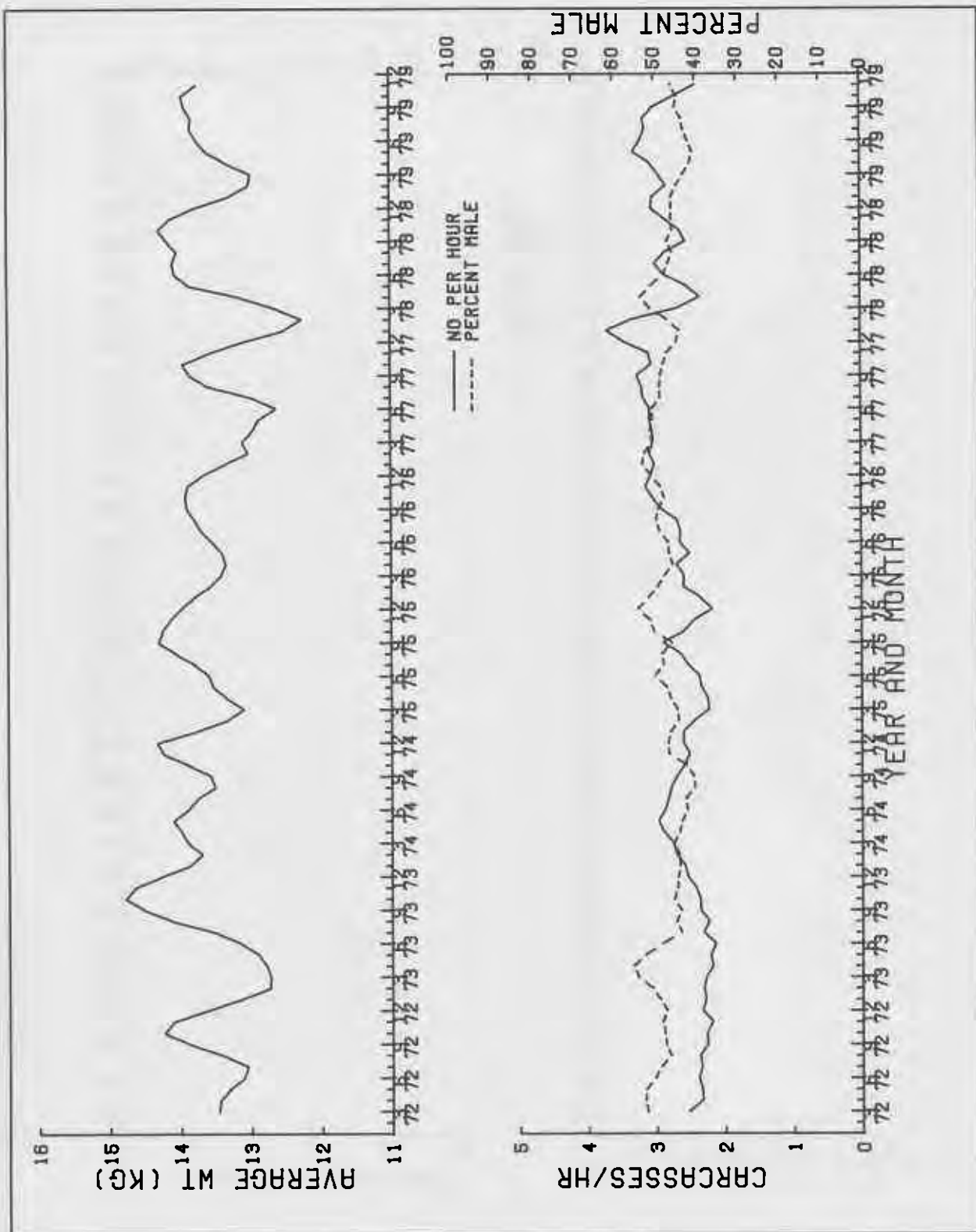
**Figure 18.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total Gascoyne Catchment Management Area harvest - Western Australia : 1972 - 1979.
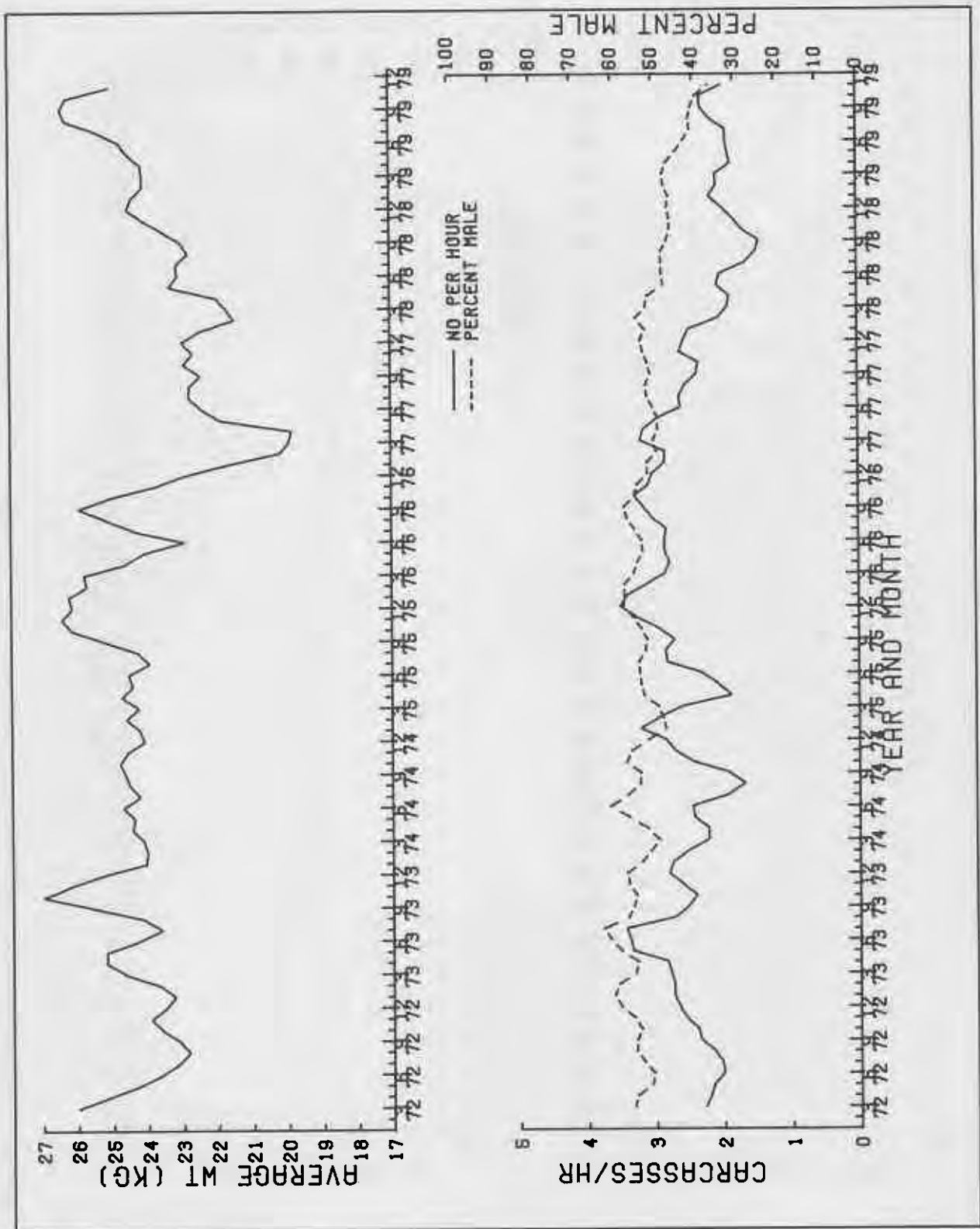
**Figure 19.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total Carnarvon Management Area harvest - Western Australia : 1972 - 1979.
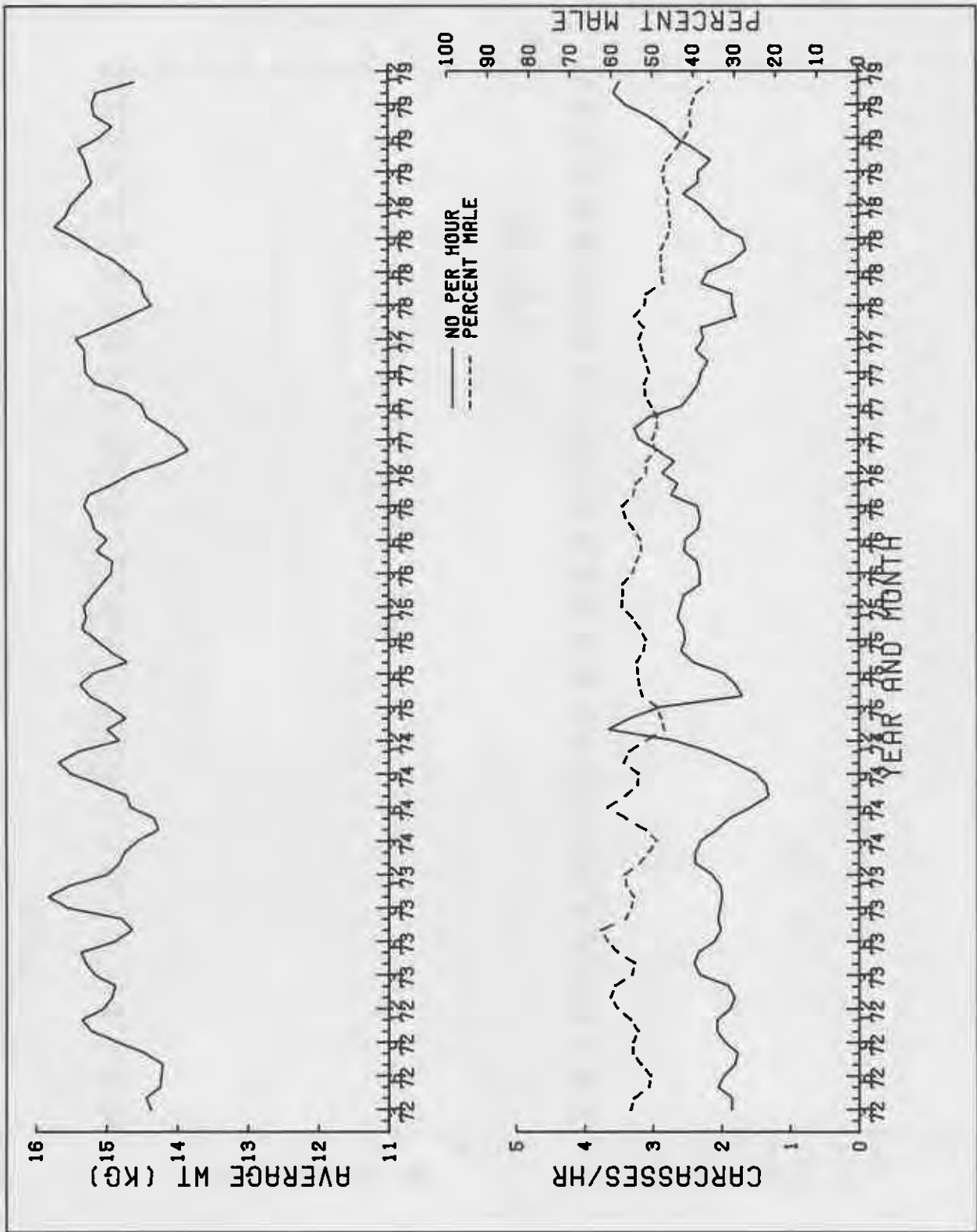
**Figure 20.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total Carnarvon Management Area harvest - Western Australia : 1972 - 1979.
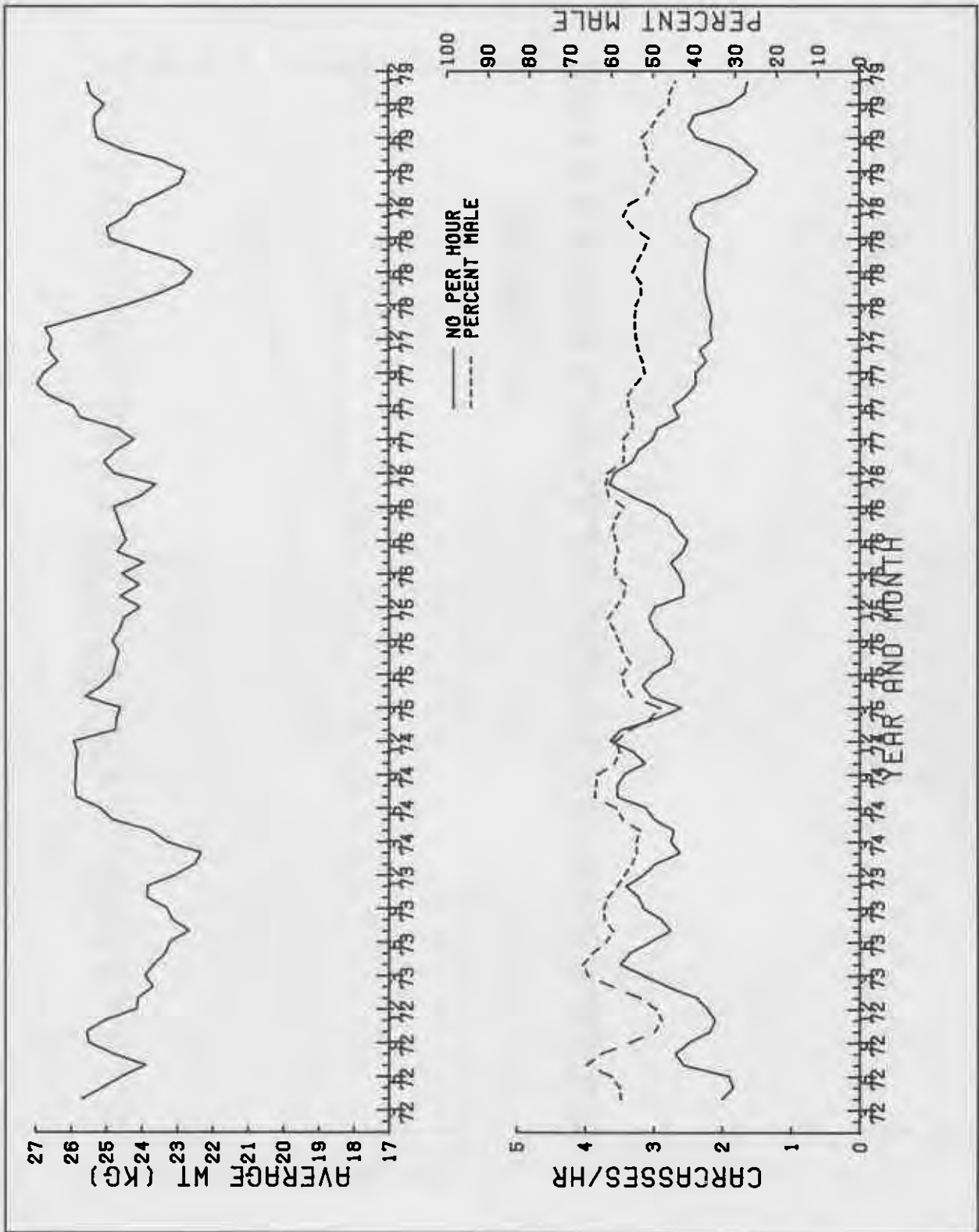
**Figure 21.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total Ashburton (West) Management Area harvest - Western Australia : 1972 - 1979.
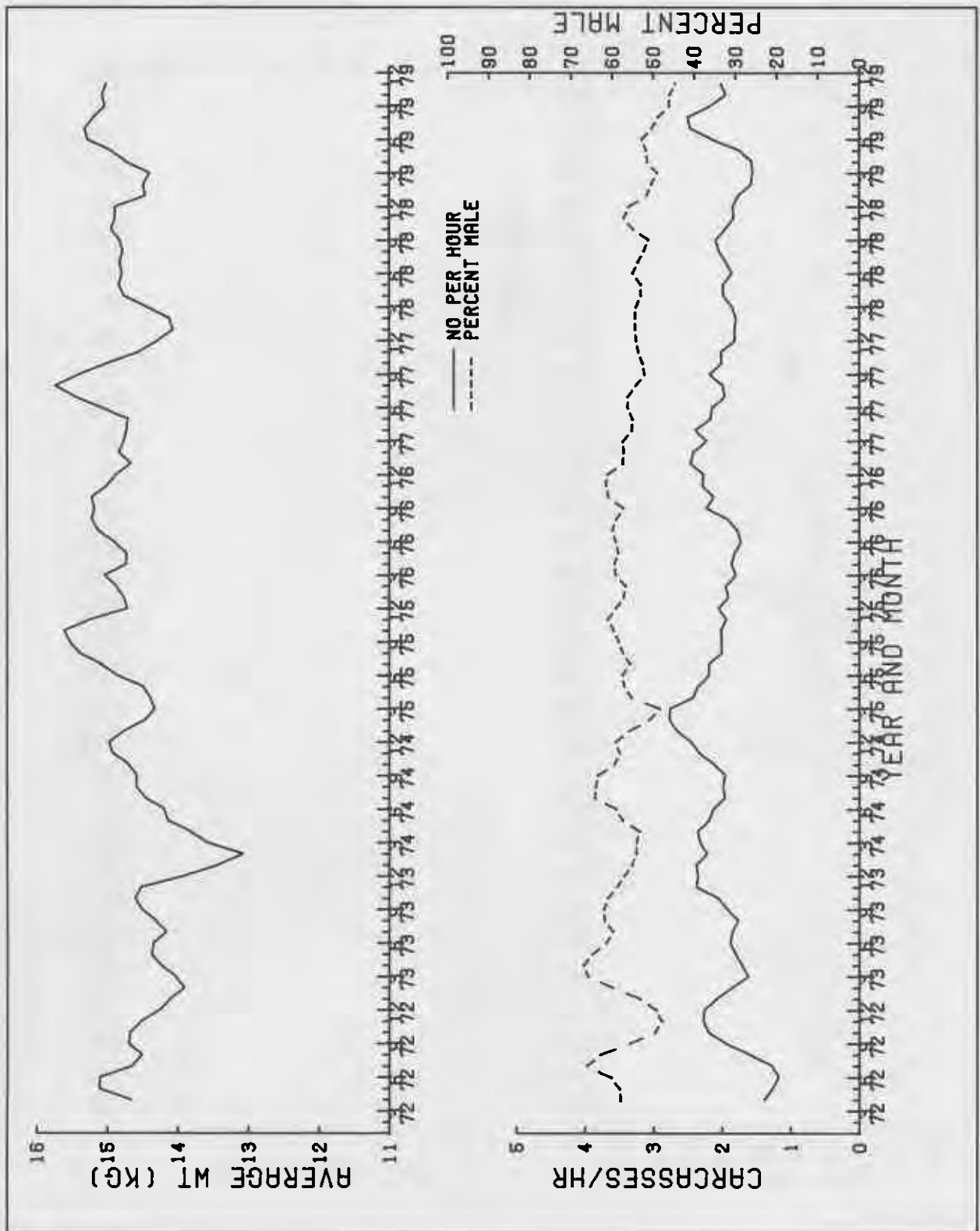
**Figure 22.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total Ashburton (West) Management Area harvest - Western Australia : 1972 - 1979.

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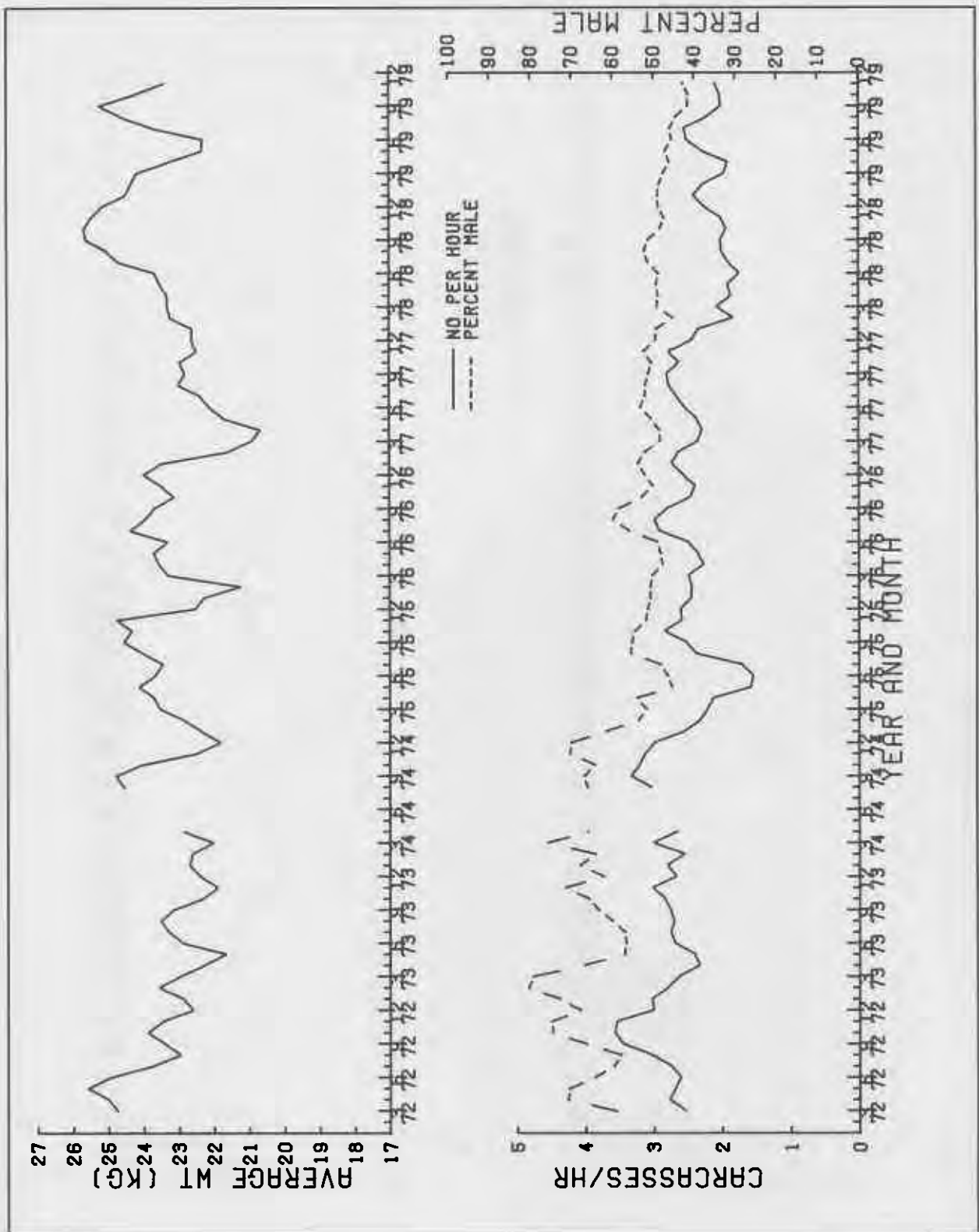
**Figure 23.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total Pilbara Management Area harvest - Western Australia : 1972 - 1979.
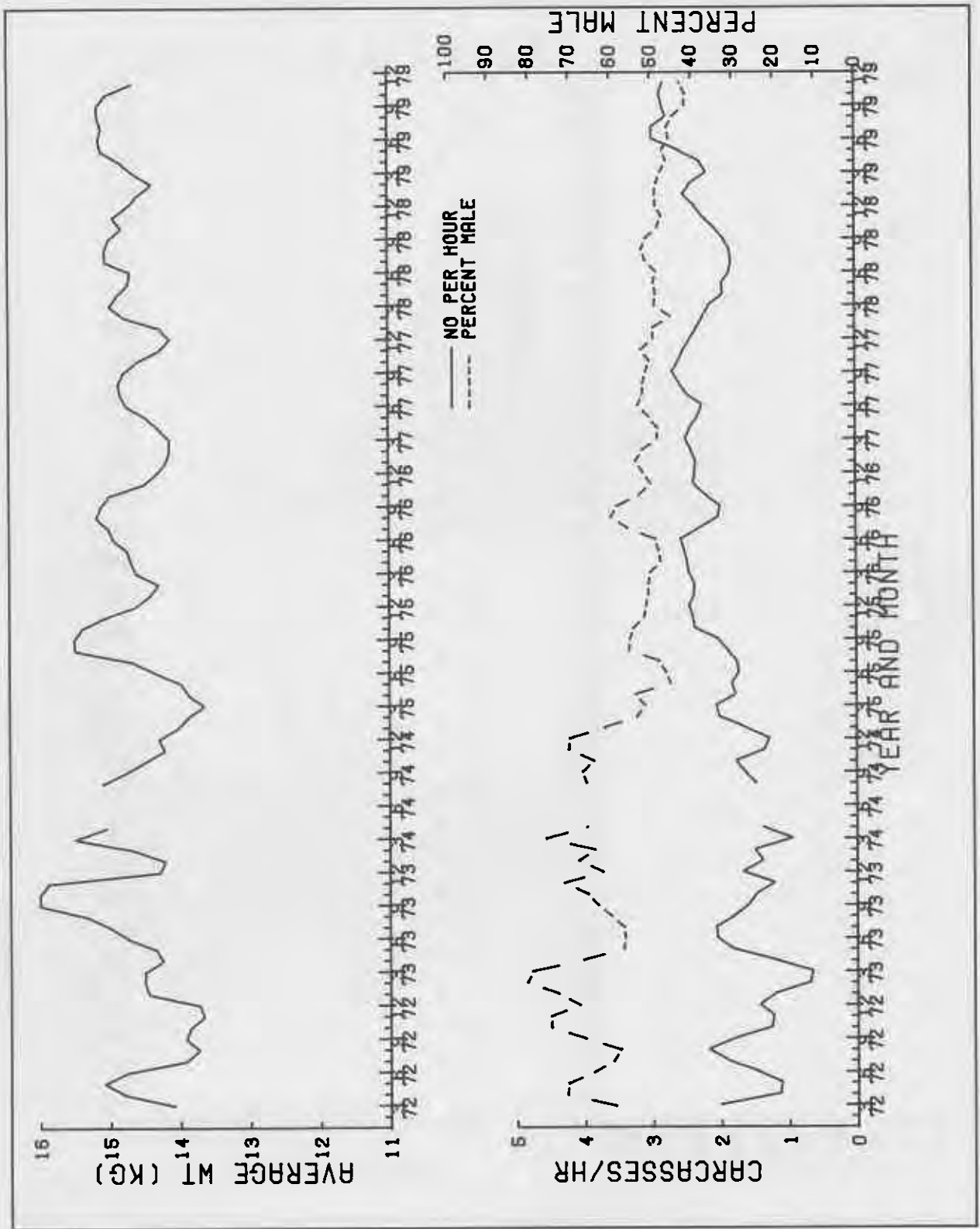
**Figure 24.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total Pilbara Management Area harvest – Western Australia : 1972 – 1979.
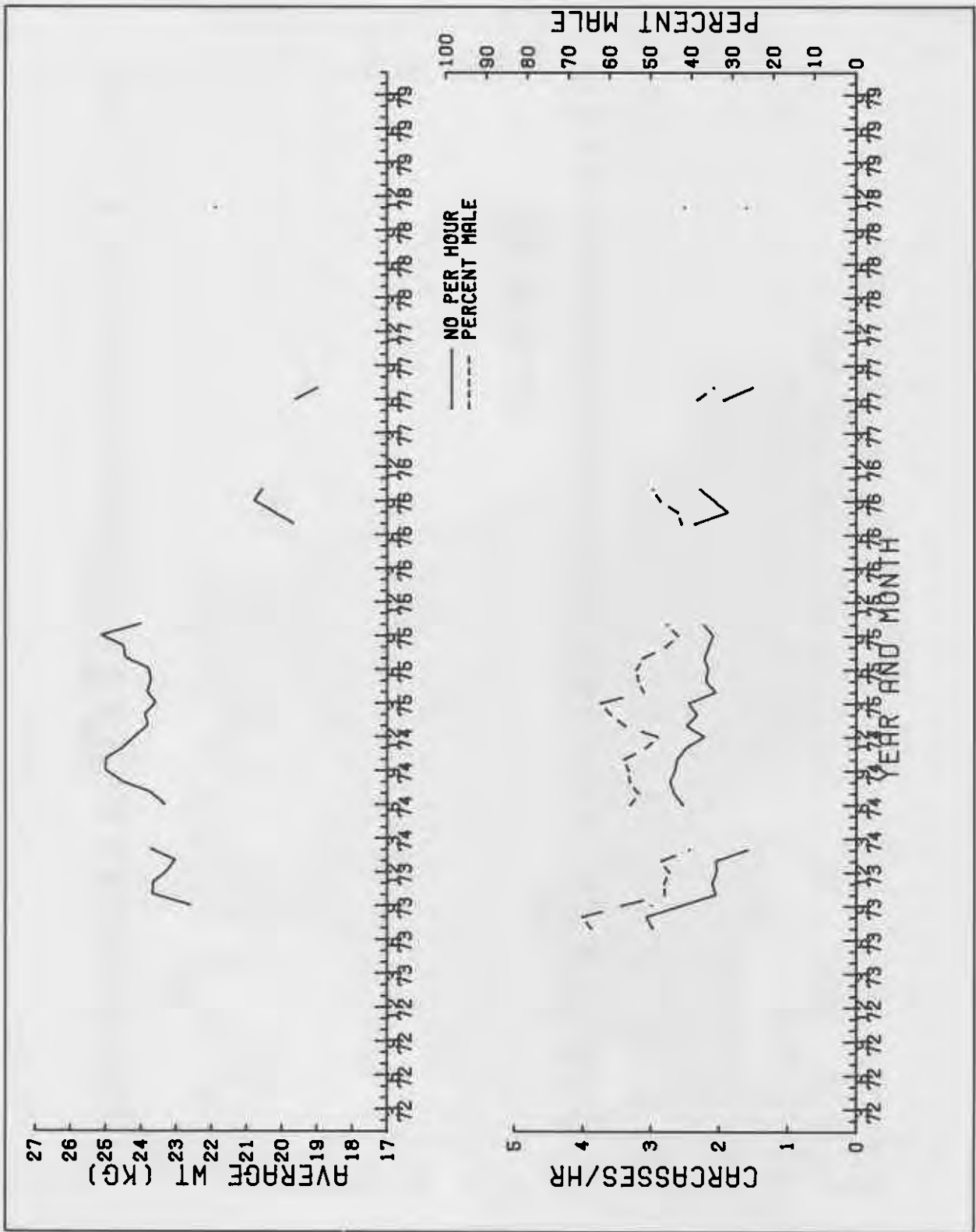
**Figure 25.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total Ashburton (East) Management Area harvest - Western Australia : 1972 - 1979.
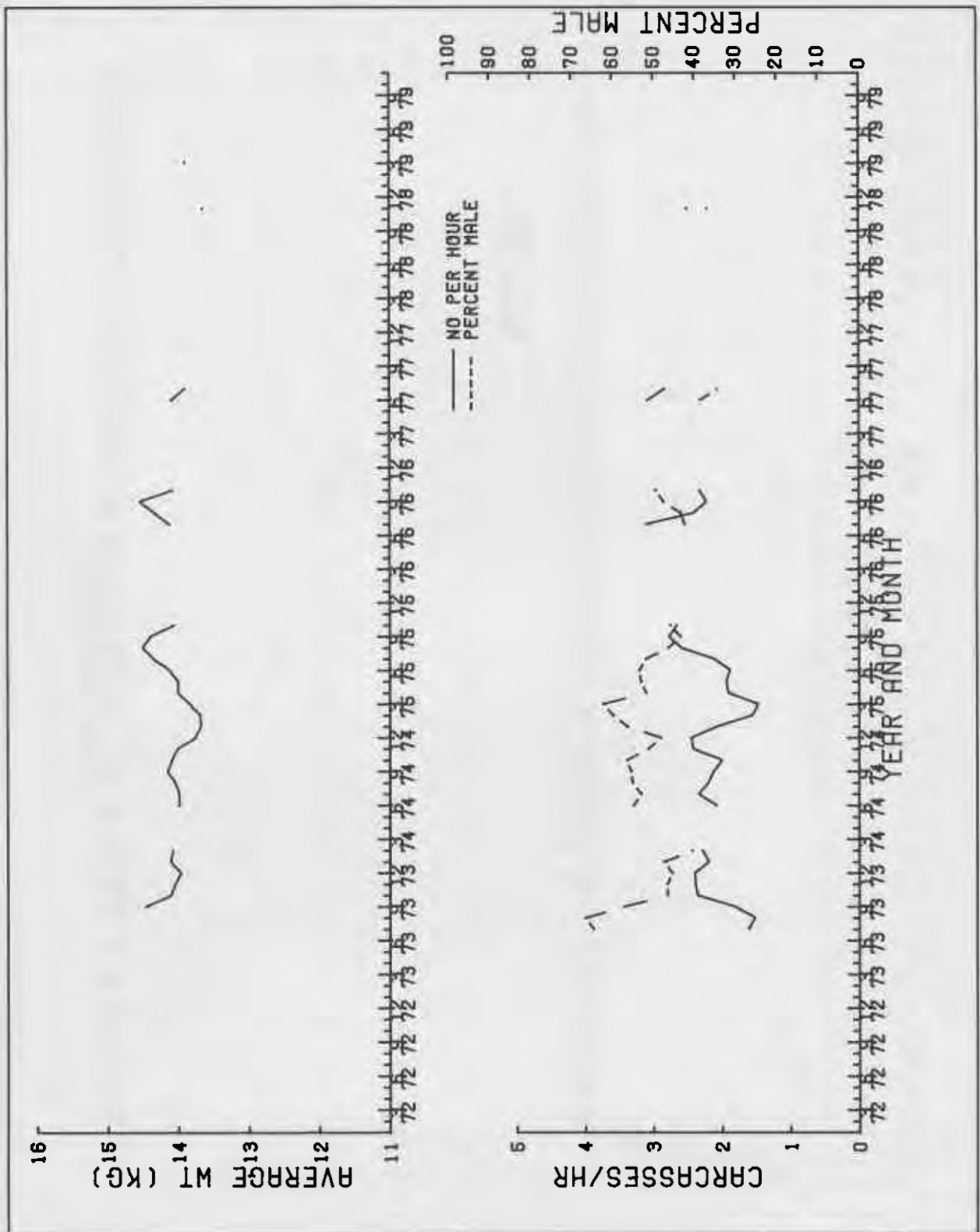
**Figure 26.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total Ashburton (East) Management Area harvest - Western Australia : 1972 - 1979.
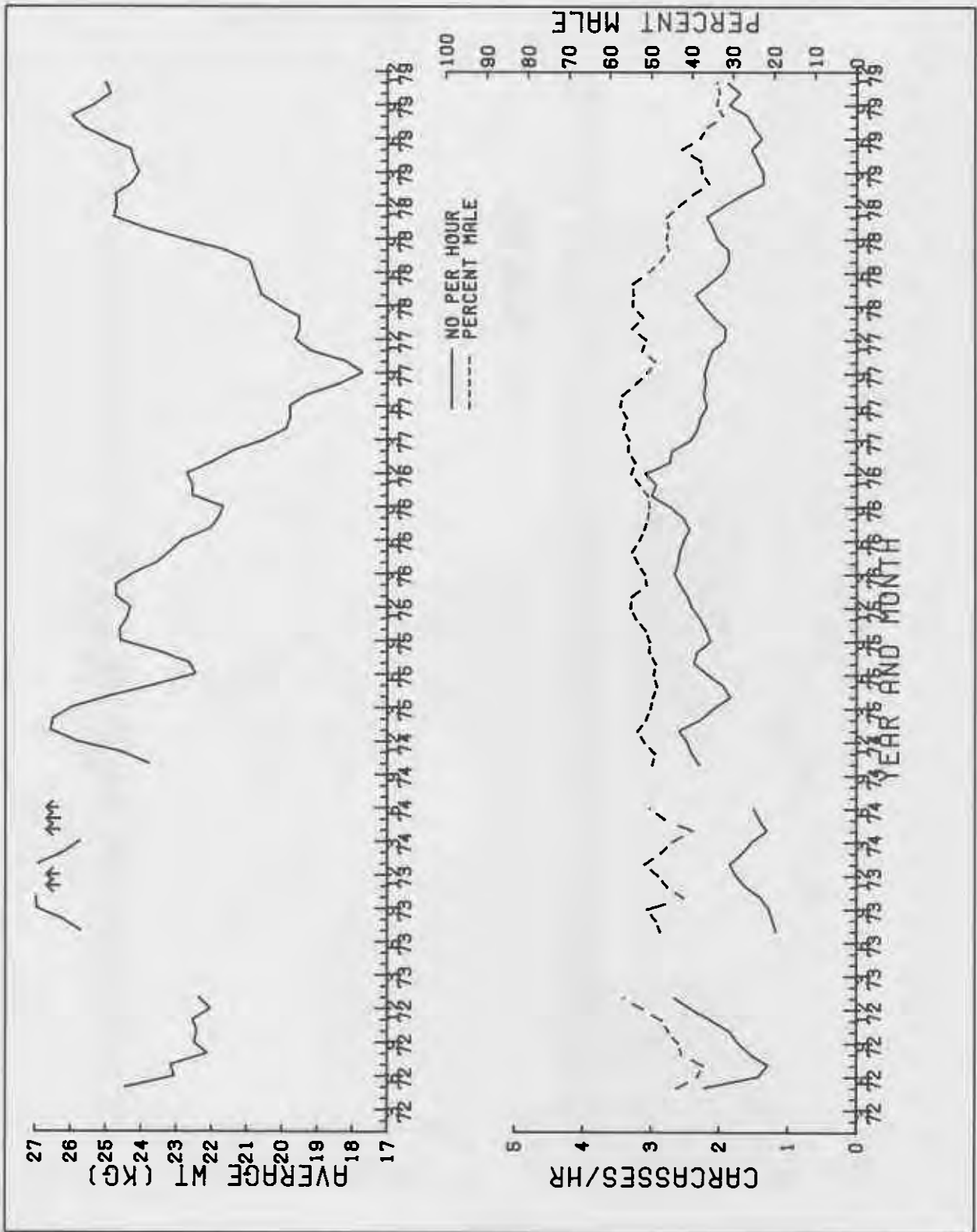
**Figure 27.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total North Eastern Pastoral Management Area - Western Australia : 1972 - 1979.

Note. Figure 27. Carcase weight values offscale indicated by ⸓ are:

| Month & Year | Weight | Month & Year | Weight |
|---|---|---|---|
| 1173 | 27.8 | 0574 | 29.3 |
| 1273 | 27.6 | 0674 | 30.8 |
| 0474 | 27.2 | | |
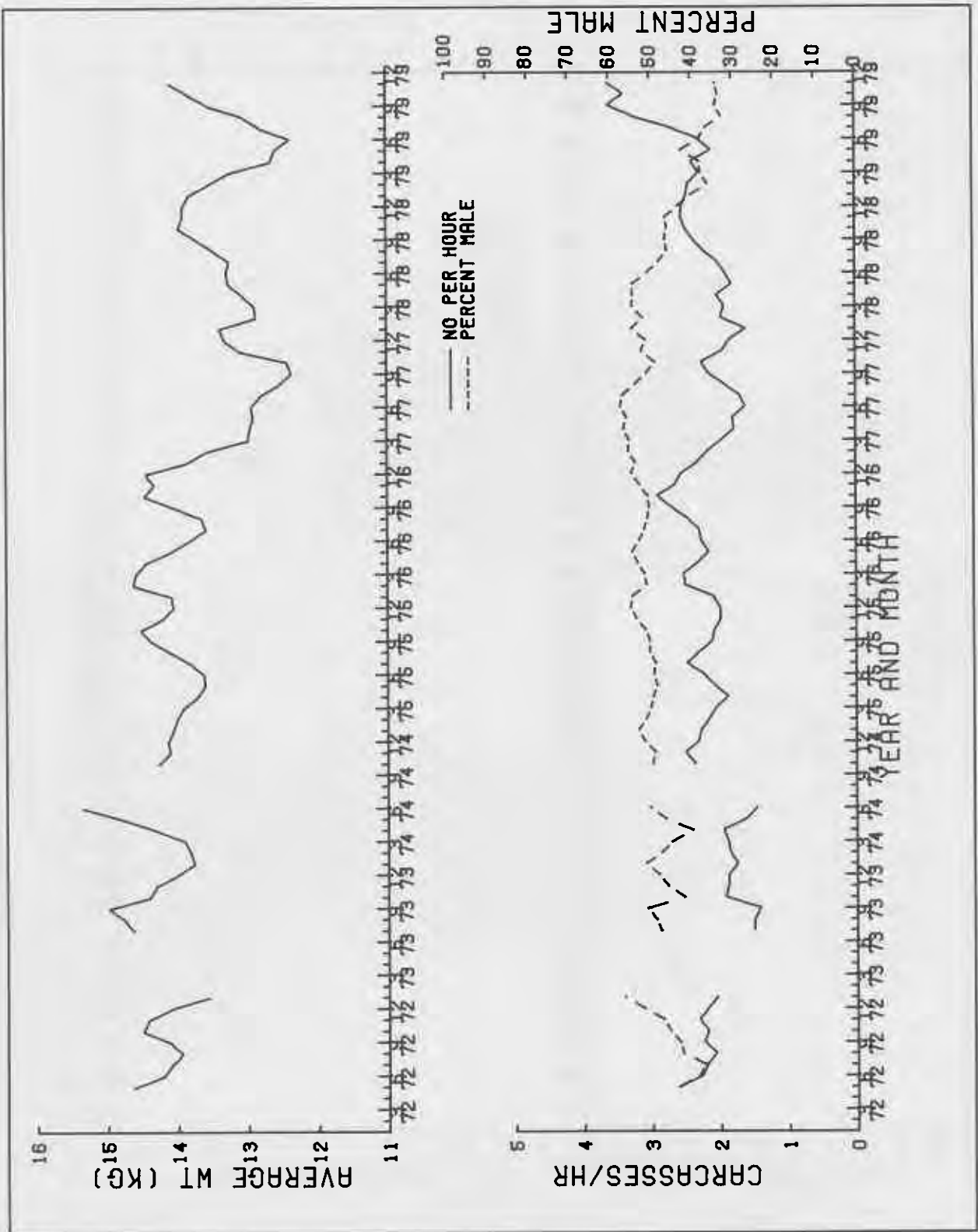
**Figure 28.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total North Eastern Pastoral Management Area harvest - Western Australia : 1972 - 1979.
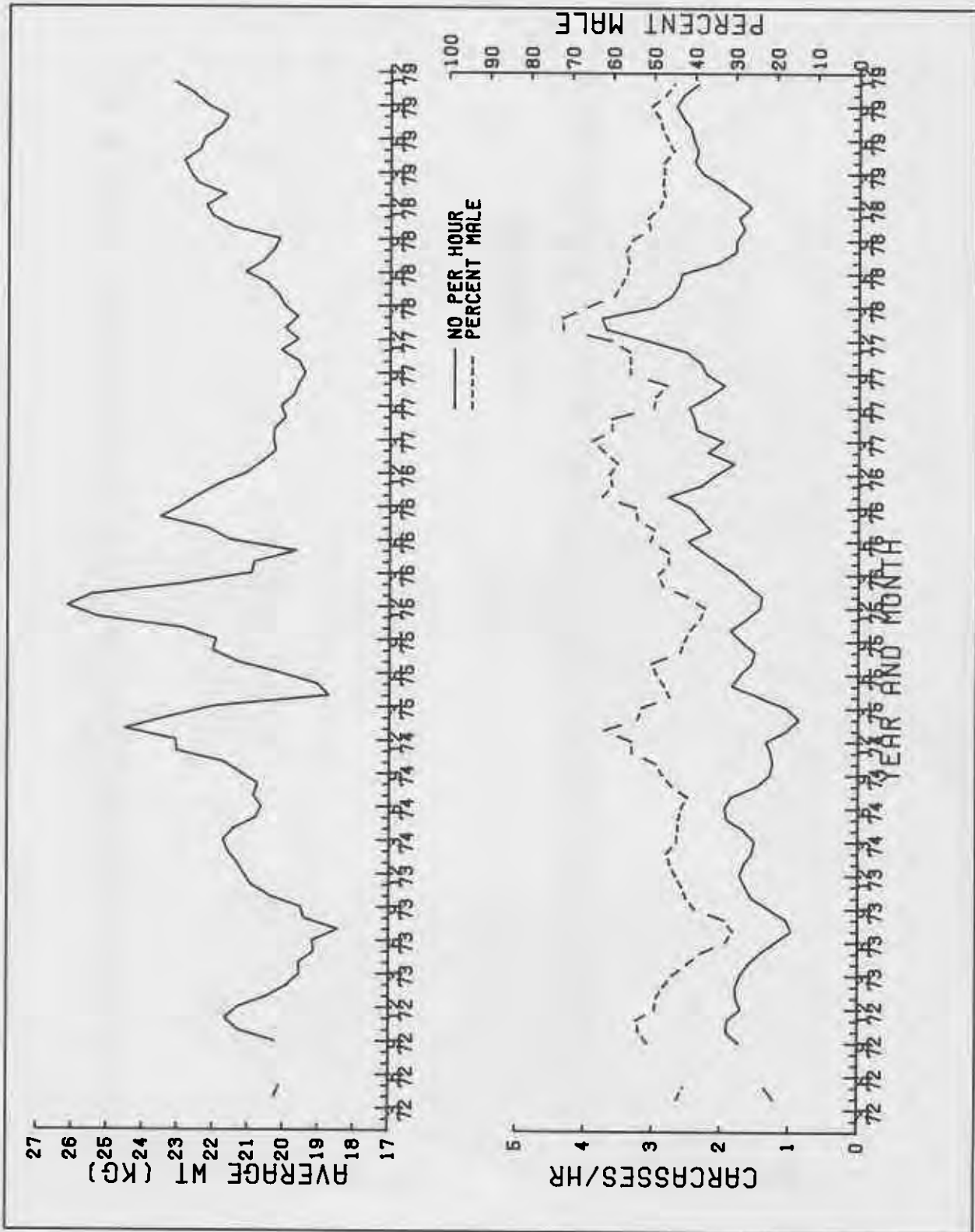
**Figure 29.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total Magnet Management Area harvest - Western Australia : 1972 - 1979.

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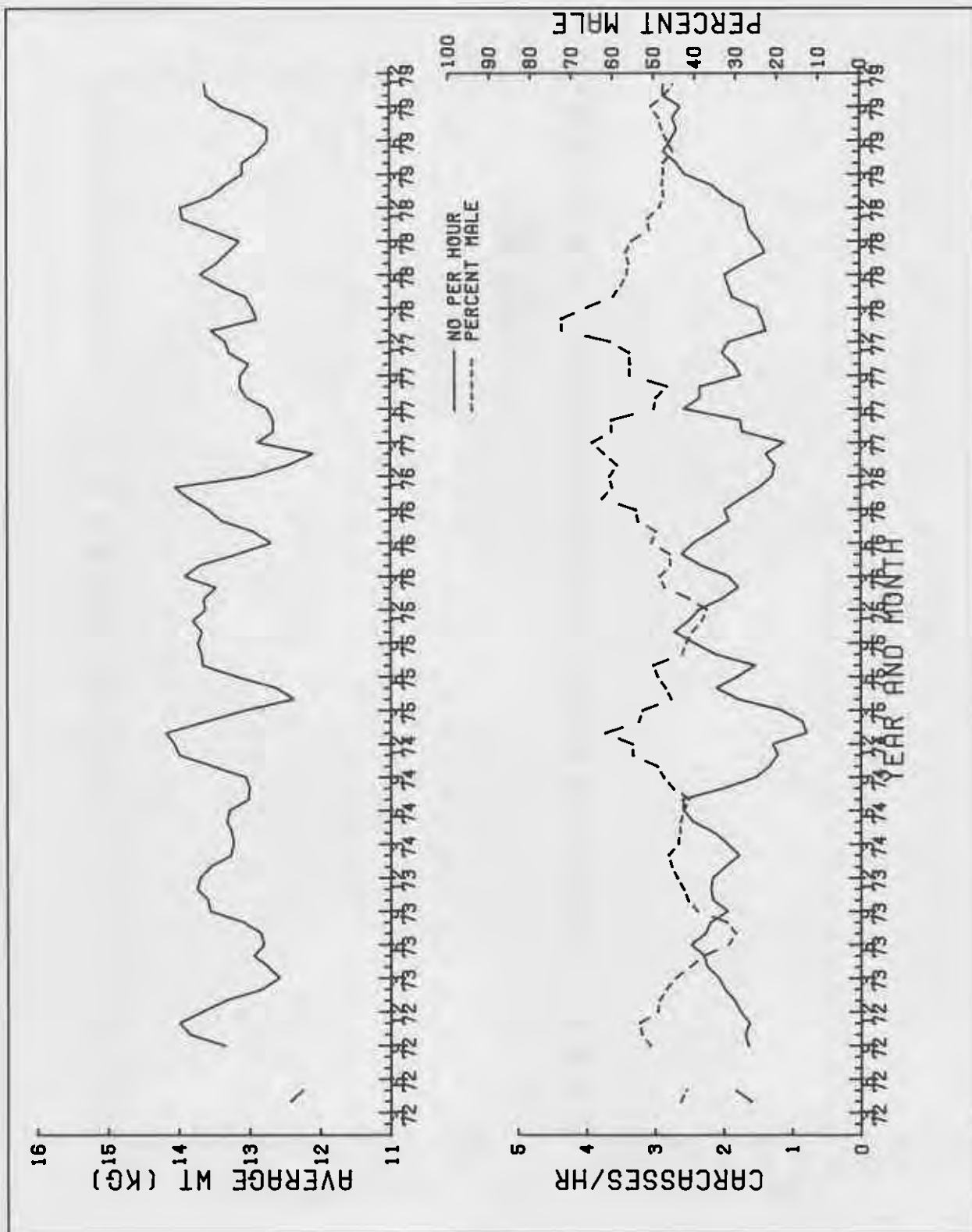
**Figure 30.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total Magnet Management Area harvest - Western Australia : 1972 - 1979.
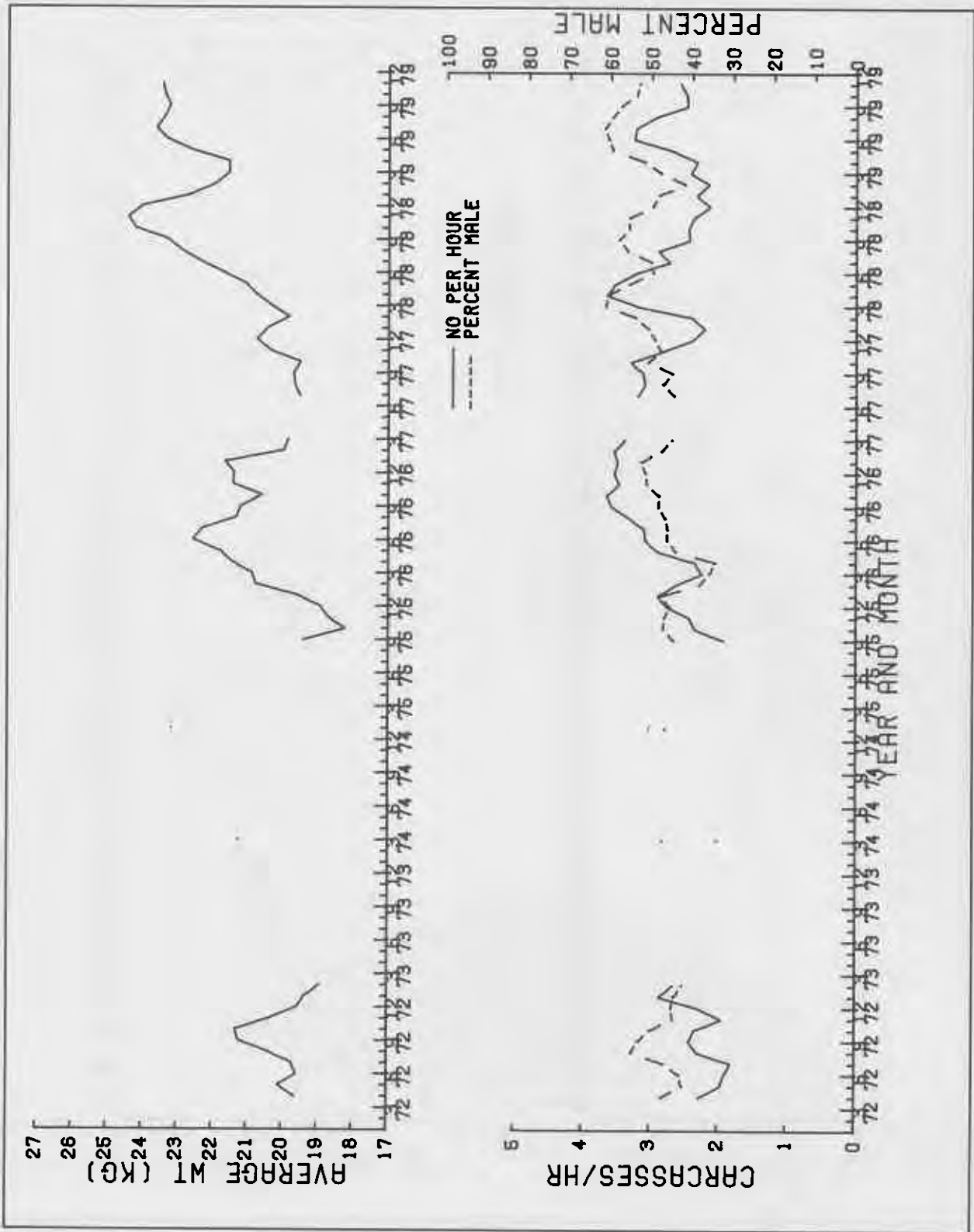
**Figure 31.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total Sandstone Management Area harvest - Western Australia : 1972 - 1979.
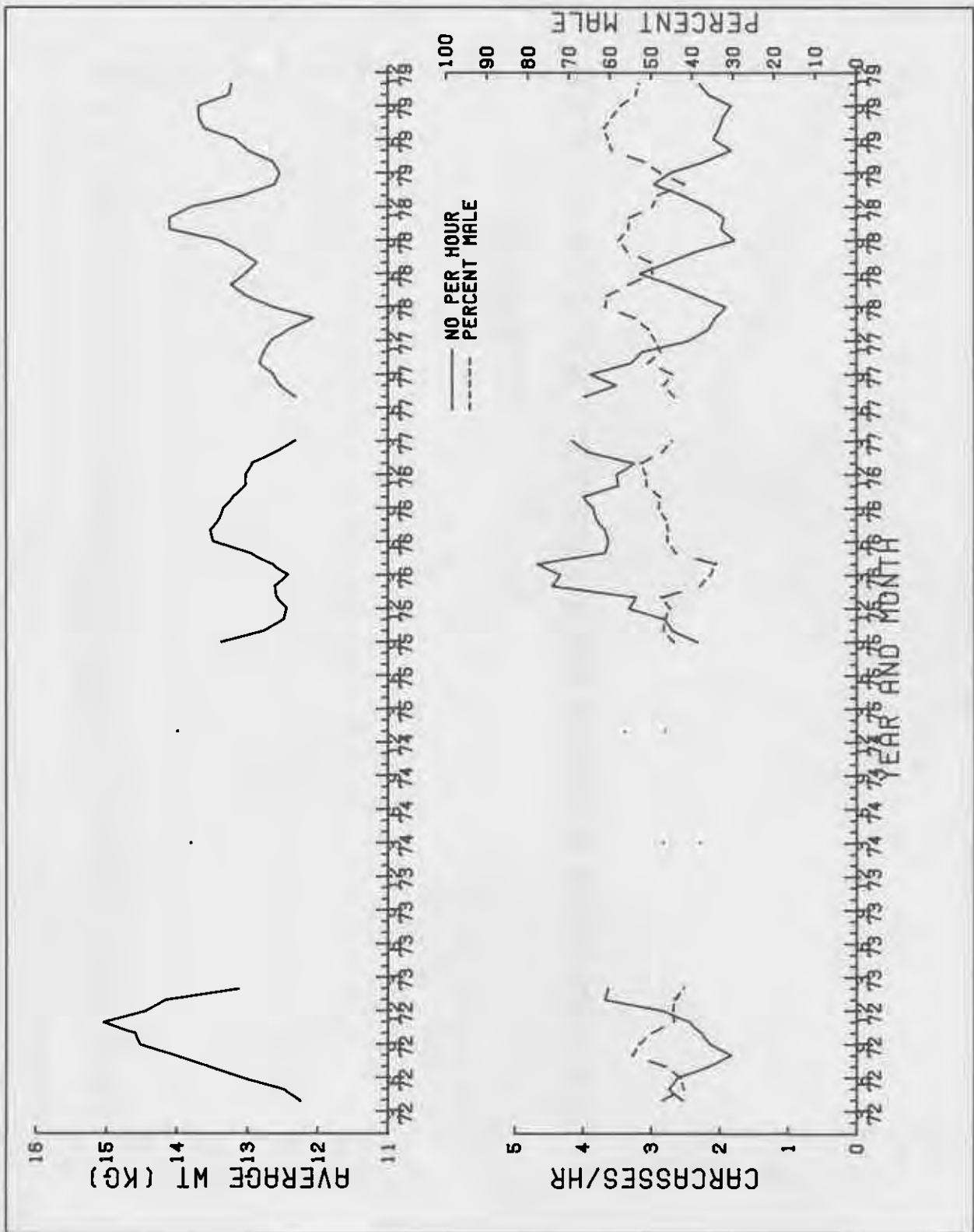
**Figure 32.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total Sandstone Management Area harvest - Western Australia : 1972 - 1979.
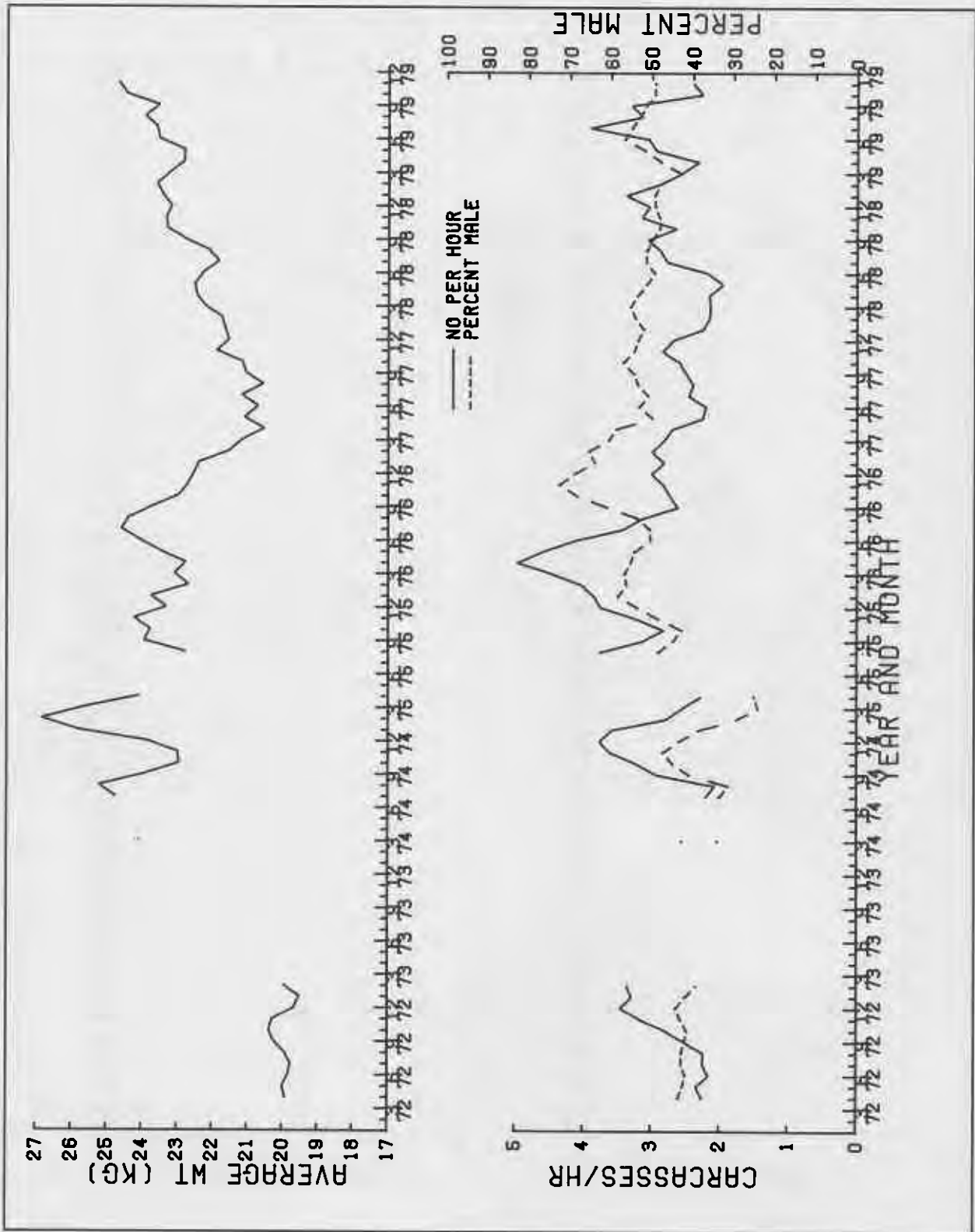
**Figure 33.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total Leonora-Eastern Goldfields Management Area harvest - Western Australia : 1972 - 1979.
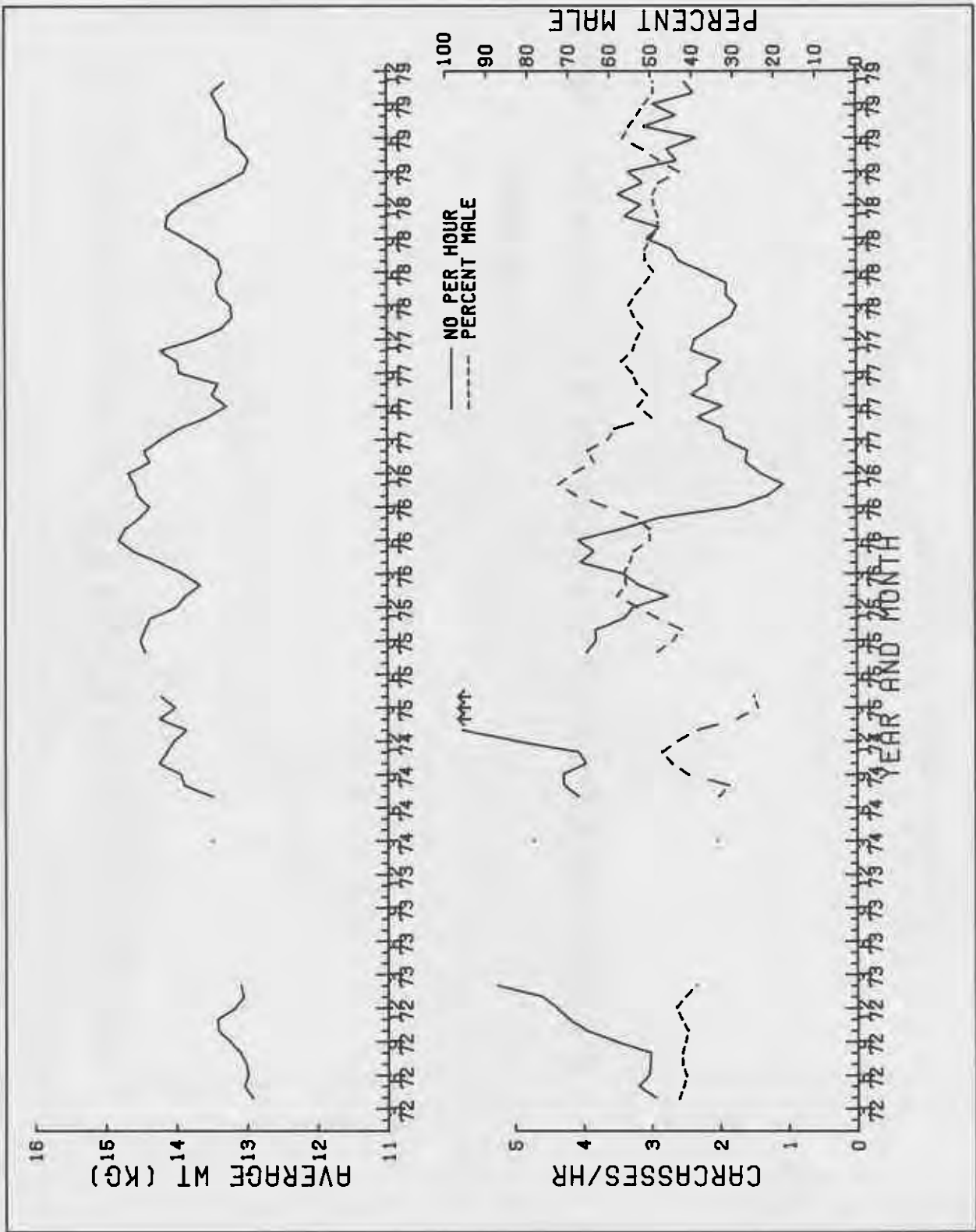
**Figure 34.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total Leonora-Eastern Goldfields Management Area harvest - Western Australia : 1972 - 1979.

Note: Figure 34. Harvest rate values offscale
indicated by ╁ are:

| Month & Year | Rate | Month & Year | Rate |
|---|---|---|---|
| 0275 | 6.50 | 0475 | 7.18 |
| 0375 | 7.93 | | |

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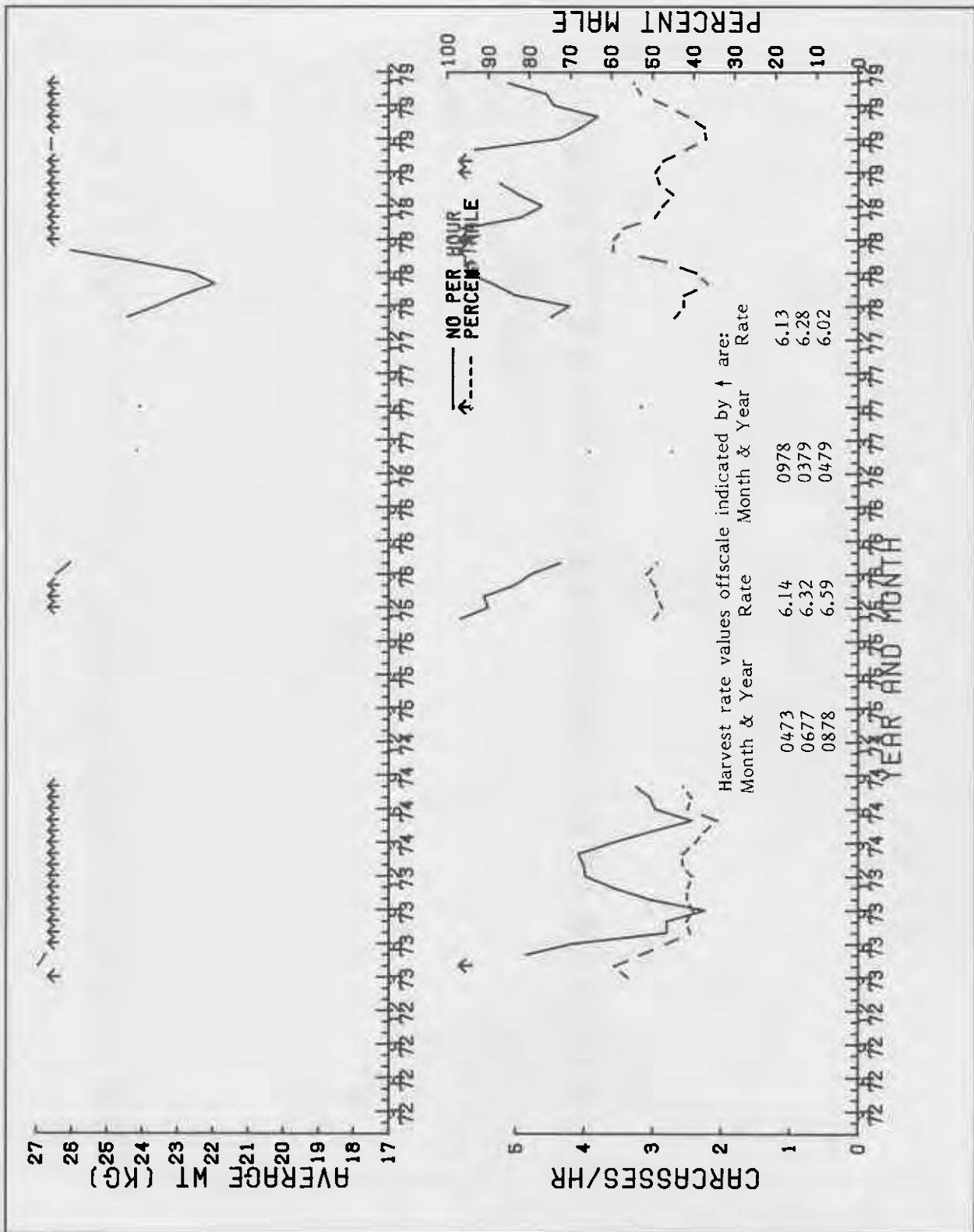
**Figure 35.** Patterns of variation in the three month running averages of carcase weight and harvest rate for male Red Kangaroos, and the proportion of males included in the total Nullarbor Management Area harvest - Western Australia : 1972 - 1979.

Note. Figure 35. Carcase weight values offscale indicated by ↑ are:

| Month & Year | Weight | Month & Year | Weight | Month & Year | Weight | Month & Year | Weight |
|---|---|---|---|---|---|---|---|
| 0373 | 27.7 | 1275 | 27.5 | 1173 | 29.3 | 1278 | 28.9 |
| 0673 | 27.6 | 0176 | 28.0 | 1273 | 28.4 | 0179 | 28.6 |
| 0773 | 28.7 | 0276 | 27.1 | 0174 | 28.5 | 0279 | 28.1 |
| 0873 | 30.8 | 0978 | 27.2 | 0274 | 28.7 | 0379 | 27.8 |
| 0973 | 31.4 | 1078 | 27.7 | 0374 | 28.1 | 0479 | 27.4 |
| 1073 | 30.7 | 1178 | 28.7 | 0474 | 28.0 | 0779 | 27.2 |
| | | | | 0574 | 27.8 | 0879 | 27.9 |
| | | | | 0674 | 28.7 | 0979 | 27.7 |
| | | | | 0774 | 29.5 | 1079 | 28.5 |
| | | | | 0874 | 28.4 | 1179 | 29.1 |

Harvest rate values offscale indicated by ↑ are:

| Month & Year | Rate | Month & Year | Rate |
|---|---|---|---|
| 0473 | 6.14 | 0978 | 6.13 |
| 0677 | 6.32 | 0379 | 6.28 |
| 0878 | 6.59 | 0479 | 6.02 |
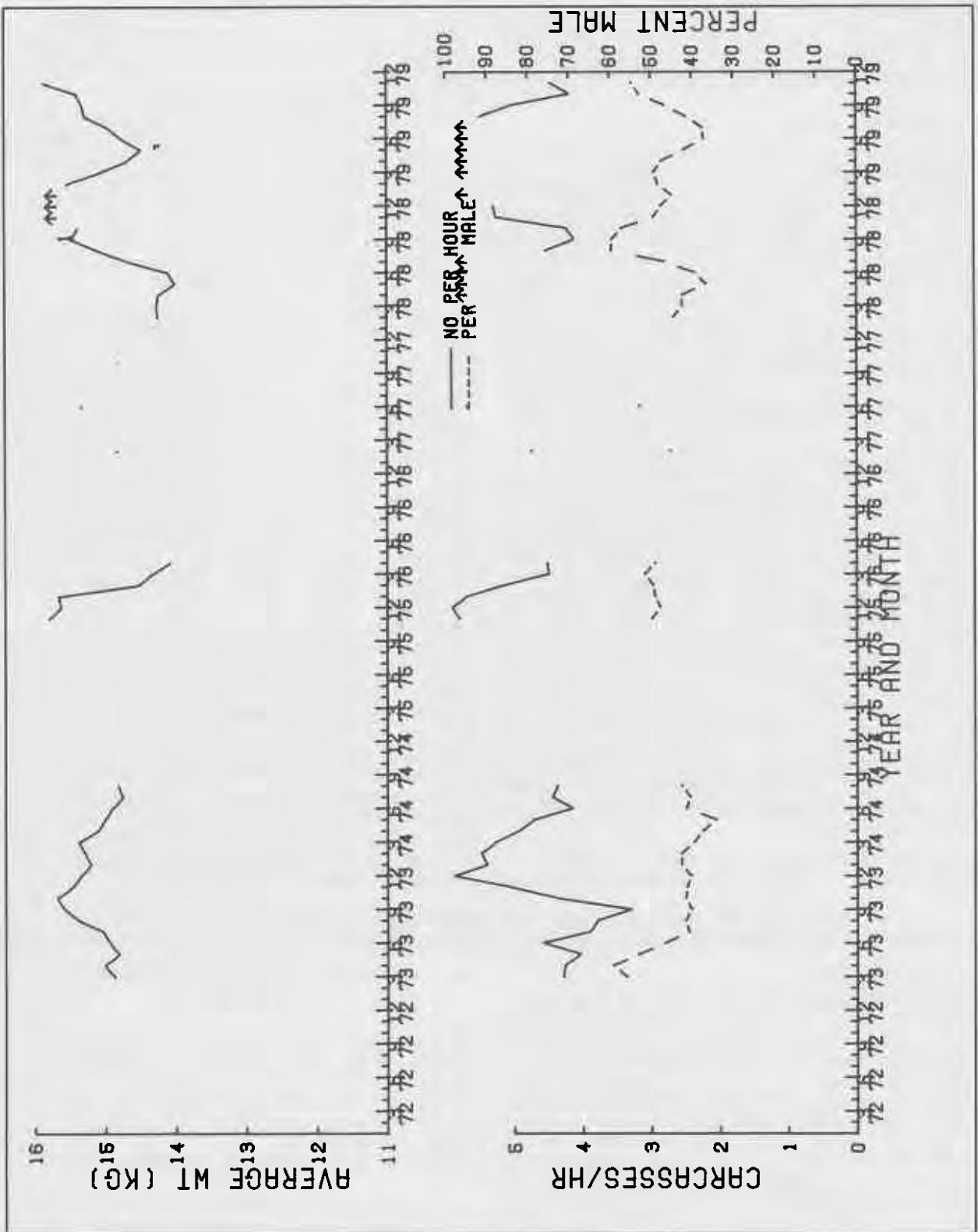
**Figure 36.** Patterns of variation in the three month running averages of carcase weight and harvest rate for female Red Kangaroos, and the proportion of males included in the total Nullarbor Management Area harvest - Western Australia : 1972 - 1979.

Note: Figure 36. Carcase weight values offscale indicated by † are:

| Month & Year | Weight | Month & Year | Weight |
|---|---|---|---|
| 1178 | 16.3 | 0179 | 16.5 |
| 1278 | 16.3 | | |

Harvest rate values offscale indicated by † are:

| Month & Year | Rate | Month & Year | Rate |
|---|---|---|---|
| 0478 | 6.86 | 0379 | 6.52 |
| 0578 | 9.89 | 0479 | 6.69 |
| 0678 | 9.62 | 0579 | 7.69 |
| 0778 | 7.89 | 0679 | 7.40 |
| 0179 | 6.09 | 0779 | 6.91 |

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shown in Figs. 13 - 36. The complete monthly harvest summary data relevant to these Figures are listed in Appendix II, Tables A II. 1 - A II.12. These Appendix tables also include the available 1971 data.

## 4. Quality of the Data

Documentation and monitoring of the operations of the kangaroo trade in Western Australia via the statutory returns required since commencement of the formal Red Kangaroo Management Programme have been facilitated by an extremely high rate of compliance, but reliability of data supplied via this type of system is a known source of general concern to critics of such programmes. In this instance, the separate accounting of numbers taken that is required by the carcase royalty tag system provides an independent check which can also be efficiently policed. The records obtained cover > 95% of the known total Red Kangaroo harvests taken over the 1971-79 period.

The accuracy of the sex and weight data is less readily verifiable. Direct sampling and comparison of the observed data with those provided on other occasions is the only practical check that can be applied here, but is also most time-consuming, and cannot therefore be used routinely. My personal experience in this regard suggests that minor mistakes due to mis-sorting of carcases can occur, but the effects of these mistakes are of little consequence overall. Arithmetic errors are also likely to occur in compiling the composite harvest data that are entered onto the Returns, and errors in data transcription are always possible at this point. Some of the more obvious of these possible errors are able to be readily detected and corrected in transferring records to the data-base (see IV D. 1.). Further safeguard is also provided by the ability to compare harvest data provided by neighbouring shooters.

Two further points are worth remembering in the context above. Firstly, the Western Australian Red Kangaroo Management Programme was designed to allow licensed professional shooters a continuing interest, and hence responsibility, in their trade commensurate with their primary role in rangeland kangaroo management. A major reason for irresponsibility was therefore eliminated at the start. Secondly, the scope for fabrication of truly misleading data is limited, and considerable ingenuity would be required to produce a consistent, non-systematic input of false data that could confuse analysis. Apart from this, real ability to check the veracity of data entered on Returns does exist. The commercial incentive to cheat in this situation is also low.

In conclusion, the major portion of these records has in fact been of most acceptable quality, and the evidence available suggests that assertedly misleading reports would comprise a small minority of those supplied. The consistency of the general patterning in the pooled harvest data presented in this paper (Figs. 13 - 36), and the results of the analyses attempted using the data provided (Section V and Appendix I) also suggest that false data have not been a source of any real problems. It would however be extremely naive to dismiss the possibility of deliberate data fabrication having occurred from time to time, and of some such unreliable data being incorporated into the data-base.

Problems in obtaining full supporting detail along with the basic numbers and weight data on Returns have nevertheless persisted. Omission of specific 'origin of harvest' location data has been a continuing problem, and exclusion of 'Hrs. of Hunting' information has also detracted from the value of many of the records. The fact that the problems mentioned above appear to be accentuated when turnover of shooter licensees is involved suggests that this loss of information could largely be avoided in the future by better briefing and instruction of new shooters prior to their commencing work in the field.

## V PATTERNS IN THE HARVEST DATA AND MONITORING STATISTICS, 1970 - 1979, AND MAINTENANCE OF COMMERCIAL EXPLOITATION OF THE RED KANGAROO IN WESTERN AUSTRALIA

### A. INTRODUCTION

Kangaroo management controls being introduced in Western Australia in 1970 were based on the premise that continued commercial exploitation of the rangeland stocks of Red Kangaroos could be sustained and that this option provided the best management strategy available for conservation of the kangaroos living in this most important part of the species' range. The need seen was not to prohibit exploitation, but to ensure stability in management at a time of major change in the pattern of exploitation.

Harvesting of Red Kangaroos was continued in Western Australia throughout the 1970-1979 decade and has since been continued through 1980 - 1983 (Prince, unpublished data). The pattern of ongoing commercial exploitation of this species which probably dates back to a beginning before the end of the 19th Century (Prince 1984) has thus apparently been maintained. The question that arises now is whether this established pattern can be regarded as sustainable in the future.

### B. HARVEST DISPERSION PATTERNS

### 1. General Consideration

The source data used to produce the harvest offtake maps (Figs. 5-12) are affected to some extent by deficiencies in reporting of the correct locations from which some of the kangaroos taken during each of the years under consideration have been obtained (IV D. 4., above). The data displayed are nevertheless sufficient to show:

i)  the general importance of that part of the State which corresponds roughly with the Murchison, Gascoyne Catchment, Carnarvon and the western coastal sector of the Ashburton (West) Management Areas (cf. Fig. 4) in making a major consistent contribution to the total State Red Kangaroo harvests; and

ii) the changes in dispersion of hunting pressure in different parts of the State from year to year.

The intermittent hunting pattern evident in some parts of the Pilbara Management Area and in other parts of the State which are outside the core area comprising the Murchison - Gascoyne Catchment - Carnarvon Management Areas also points to the importance of the reserve kangaroo stocks held in such places in permitting annual harvests to be maintained at higher levels than would otherwise be possible at times when stocks have previously been depleted in the more favoured hunting areas.

## 2. Harvest Patterns and the Red Kangaroo Stocks

As explained before, 1971 harvest offtake data have not been mapped because of the incomplete source records. However, hunting increased in the Pilbara Management Area during 1972 in comparison with 1971 (cf. Appendix II, Table A II. 6) and apparently substituted in part for the declining harvest levels then observed in the Magnet, Sandstone and Leonora-Eastern Goldfields Management Areas, as did the additional expansion of hunting on the Nullarbor in 1973-1974 (Figs. 6 & 7). The coincident contraction of hunting within the Leonora-Eastern Goldfields and Sandstone Management Areas from 1972 through 1974 is particularly striking. This did in fact reflect the reduction in kangaroo numbers in these areas resulting from the combination of recruitment failure and continued hunting during the period of extended drought in this part of Western Australia from 1968 to early 1973.

The relatively uniform distribution of harvest pressure dispersion along a north-west to south-east clinal axis from about the northern coastal sector of the Carnarvon Management Area and extending towards the Leonora district as shown in Fig. 8 deserves further comment. Red Kangaroo stocks in Western Australia would have been widely dispersed during the last three quarters of 1975 as a consequence of widespread heavy rains. The harvest pattern shown in Fig. 8 should therefore reflect more accurately the natural pattern of abundance of the harvested Red Kangaroo stocks within the area being hunted in comparison with the harvest patterns shown in most of the other similar maps. The pattern suggested in Fig. 8 is in fact similar to that revealed by aerial census of the Western Australian Red Kangaroo populations in April-June 1981 (Caughley, in litt.; Short et al. 1983).

The post-1975 harvest patterns (Figs. 9 - 12) show firstly the general increase in hunting pressure which coincided with the onset of drought during 1976 (and its eventual persistence into 1980), but harvest pressure being maintained within the core hunting areas (e.g. Murchison, Gascoyne Catchment) had already declined by 1979 (Fig. 12). The relatively more patchy dispersion of the decreased harvest pressure maintained during 1979 in comparison with 1975 (Fig. 8) is consistent with the view that the Red Kangaroo stocks present at the end of 1979 were less abundant than those present in 1975 (e.g. Frith and Calaby 1969, Fig. 11). The bulk of the evidence available also suggests that the stocks present in 1975 were less abundant than in 1972.

## C. PATTERNS OF VARIATION IN THE HARVEST MONITORING STATISTICS

### 1. Preface

Preliminary analyses of the sources of variation in the observed harvest rate (= C/f) patterns in three of the main State Management Areas are presented and discussed in Appendix I. Prince (1984, Appendix I) also presents an analysis of the factors explaining the major part of the observed pattern of variation in the annual commercial Red Kangaroo harvests taken in Western Australia before 1970.

Results of the above mentioned analyses of the patterns in the modern C/f data (Appendix I) were generally consistent with the initial assumptions made regarding the dynamics of the exploited kangaroo stocks and the interaction between these stocks and the professional shooters. The main factors found to affect the patterns of variation examined in each of the two series of analyses noted above were also generally consistent, i.e. immediate short-term rainfall patterns affecting the harvesting of surplus kangaroos, with the available surplus being related to longer-term prior rainfall patterns, so it seems probable that commercial exploitation of the Red Kangaroo in Western Australia at present can be considered as an extension of a long established pattern. The proposition that hunting during the past decade has conformed to the historic harvest pattern is further explored below. Some implications for future management are also discussed.

### 2. Basis for Comparison of Harvest Patterns

The best pastoral rangeland habitat coincides with the usual areas of greatest abundance of the Red Kangaroo and the kangaroo trade is dependent on exploitation of these stocks. It follows that if the commercial harvests documented in the historic harvest record (Prince 1984, Table 1) did generally reflect the changing abundance and productivity of the Red Kangaroo stocks, and that the modern (1970-1979) harvests have also conformed to this same pattern, then two cross-relationships between harvest data pertaining to these separate parts of the harvest record should be demonstrable. Firstly, it should be possible to show a close relationship between the historic harvests and the calculated average annual harvest rates which could have been obtained by shooters in those years if operating similarly to modern shooters. Secondly, there should be a reasonable correspondence between the harvests taken during the 1970-1979 decade and those predicted to be available over this same period by equations derived from the analysis of the historic harvest pattern.

The hypotheses above can be tested because, in the case of the C/f indices, the major patterns can generally be described by a combination of rainfall variables alone (Appendix I), and only one further assumption concerning the sex-ratio in the harvests taken is required for calculating the C/f indices applicable to the total harvests when considering the harvest rates possibly attainable
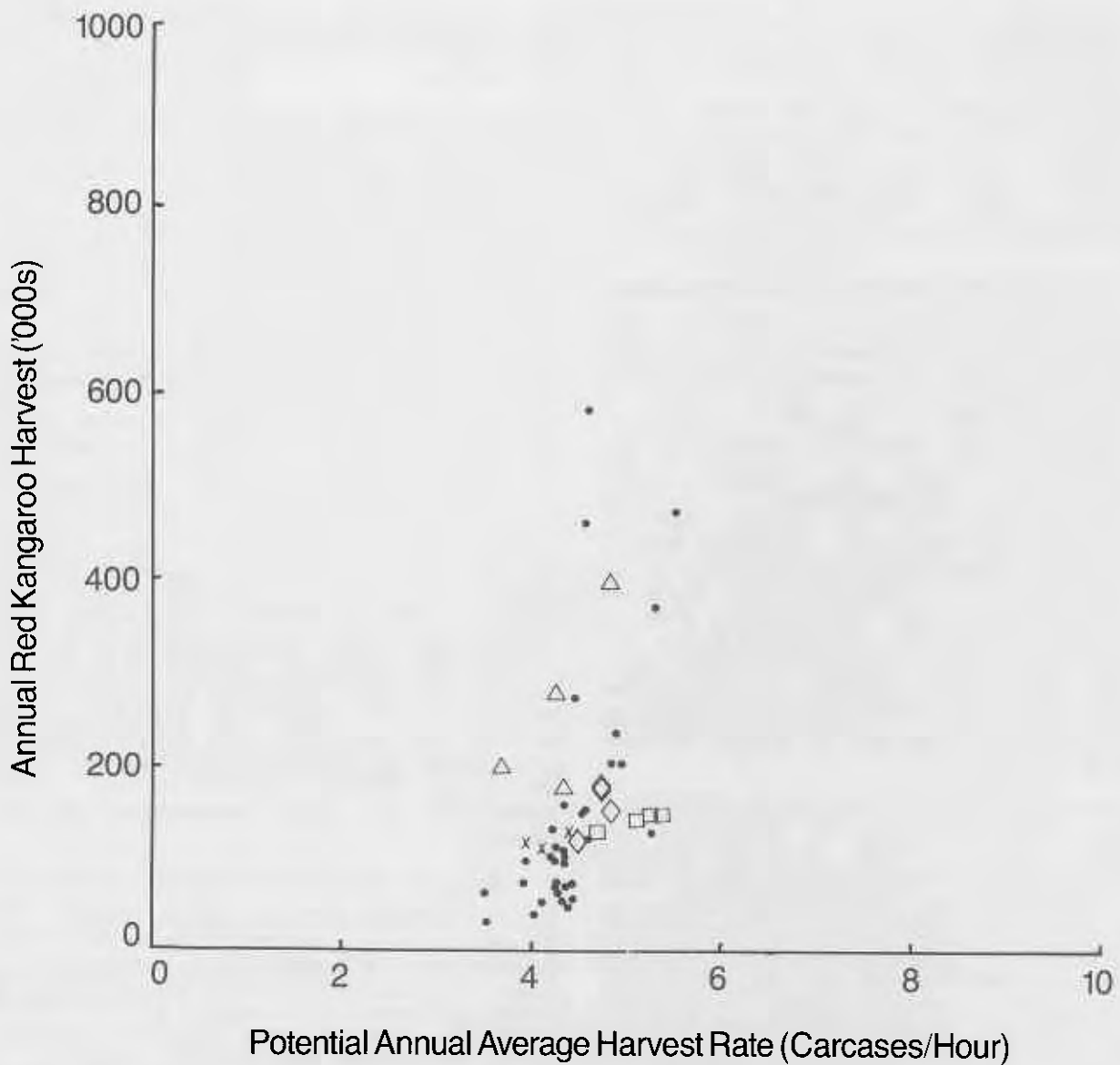
**Figure 37.** Relationship between the annual Red Kangaroo harvests taken in Western Australia from 1919 through 1953 and the potentially attainable annual average harvest rates in the corresponding years within the present Murchison State Management Area, and comparisons with similar data for the period 1965 through 1979.
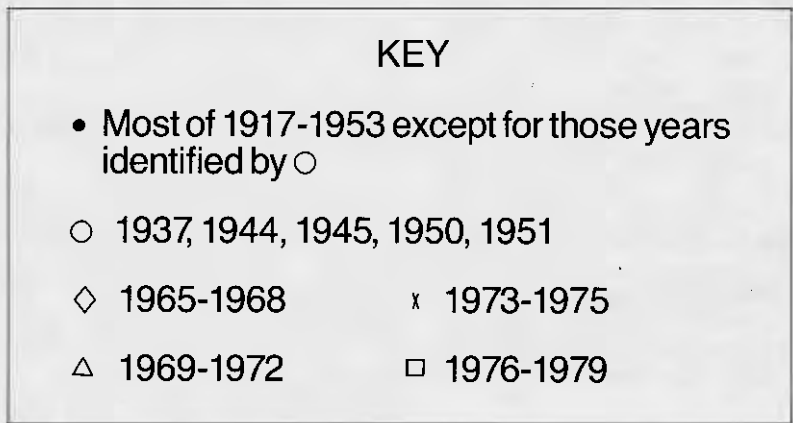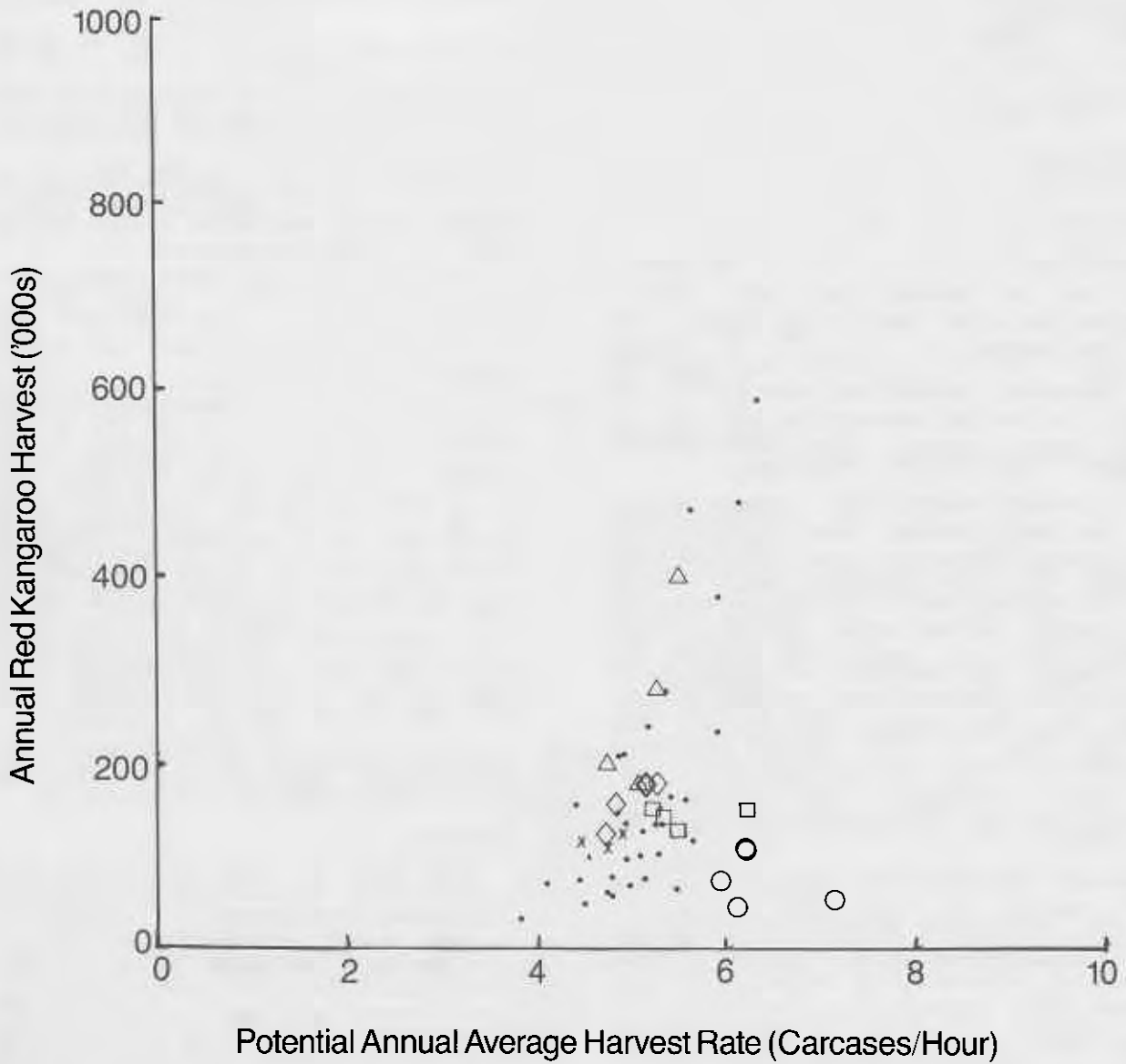
**Figure 38.** Relationship between the annual Red Kangaroo harvests taken in Western Australia from 1917 through 1953 and the potentially attainable annual average harvest rates in the corresponding years within the present Gascoyne Catchment State Management area and comparisons with similar data for the period 1965 through 1979.

within the Murchison Management Area. The input variables required for predicting the possible pattern of available harvests within the period covered by the modern harvest record are also independent of any knowledge of these harvests (Prince 1984, Appendix I).

In making a test of the hypothesis that potentially attainable annual average harvest rates should be related to the recorded historic harvest levels it was necessary to further assume that the harvests taken before 1970 within the presently defined Murchison and Gascoyne Catchment Management Areas (Fig. 4) retained their same relative importance, one to the other and in relation to the total State harvests, as in the 1970-1979 decade (see Figs. 5 - 12 and Appendix II) when these two areas consistently provided the major part of the harvest. The lack of information on the origin of all the animals included in the former harvests precluded any more detailed comparisons.

Expected monthly average male + female harvest rates that could formerly have been attainable within the two Management Areas mentioned were calculated from the appropriate rainfall records using the equations derived in Appendix I, and a simple average of the twelve separate monthly estimates within each calendar year provided the annual average C/f estimates. It was assumed in calculating the Murchison Area estimates that the harvests taken there before 1970 included 50% males (cf. Fig. 15). The relevant correlation coefficients for testing the association between the two variables considered in these analyses were calculated using the SPSS programme package (Nie et al. 1975).

Two different estimates of the potentially available annual harvests for each year within the 1970-1979 decade were calculated for comparison with the actual harvests taken. The first of these estimates was calculated from the equation fitted by Prince (1984, Appendix I) to the harvest data block including the 1915-1953 plus 1965-1972 harvests, and the second from the similar equation fitted to the 1915-1953 harvest data alone (ibid.).

## 3.    Results
The relationships between the historic annual Red Kangaroo harvests taken in Western Australia (from 1917 onwards, Prince 1984, Table 2) and the potentially attainable annual average male + female harvest rates calculated for each of the presently defined Gascoyne Catchment and Murchison Management Areas (see Fig. 4) are shown in Figs. 37 and 38. The correlation between the Murchison Management Area annual harvest rate estimates and the observed total State Red Kangaroo harvests obviously provides the better fit, but the discrepancy in goodness of fit in regard to the early Gascoyne Catchment harvest rate estimates is associated with the cluster of c. five points located towards the lower right hand sector of the data in Fig. 38.

Figures 37 and 38 also include comparisons relating to harvests during the 1965 - 1979 period during which the Western Australian kangaroo trade was based on carcases in contrast with the pre-1954 trade in dry skins only. The general similarity of

the patterns in the data displayed in each figure is evident.

The important points to note from Figs. 37 and 38 are:

i)    the relative scarcity of annual harvest totals much in excess of 200 000 Red Kangaroos per annum;

ii)    the absence of any recorded harvests at potential or observed annual average male + female harvest rates below a lower limit of about 3.5 carcases/hunting hour;

iii)    the distribution of the major proportion of the data points around the apparent point of inflection of a curve with lower and upper asymptotes tending to zero and infinity respectively; and,

iv)    the distribution of different nominated sub-sets of data relative to the general distribution of the data displayed. The majority of the 1965 through 1975 points tend to lie along or near the upper left boundary of the data set, i.e. annual harvests taken during this period were relatively high in comparison with the harvest rates, whereas data for the four drought years 1976 through 1979 tend to lie towards the lower right, i.e. harvests taken during this period tended to be lower than might otherwise have been expected, particularly with respect to the Murchison data set (Fig. 37).

The comparison between the predicted harvests and the actual harvests taken during the 1970-1979 period is detailed in Table 2.

## 4.    Discussion
It is clear that the total numbers of Red Kangaroos taken in Western Australia during the 1970-1979 decade were greater than the combined total average harvests predicted by either of the equations describing variability in the historic harvests, and that the total discrepancy between the actual harvests taken and the sums of either of the separate estimates of the annual average harvests is not inconsequential, particularly in regard to the estimates based on the equation fitted to the 1915-1953 harvest data alone (Table 2). To put these results in perspective, the apparent average annual excess harvest during the 1970-1979 decade was between 27 650 and 44 400 carcases per annum. The inferences to be drawn from these comparisons are consistent with those suggested by the data included in Figs. 37 and 38.

The harvest discrepancies noted above raise two important questions. Firstly, does the apparent pattern of accumulation of the putative excess harvest tell us anything about the impact of decisions taken pursuant to the Management Programme on the course of commercial harvesting of Red Kangaroos in Western Australia, and secondly, what proportional change in the total Red Kangaroo stocks might have resulted from this apparent excess harvest?

If we concentrate our attention on the comparison between the actual harvests taken and the estimates of available harvests based on the 1915-1953 plus 1965-1972 predictive equation, it

# Table 2.

Comparison of the Annual Red Kangaroo Harvests Taken in Western Australia from 1970 through 1979 with Predicted Annual Harvests for these Years Based on an Analysis of the Historic State Harvest Record for this Species (from Prince 1984).

| YEAR | HARVEST TOTAL (Nearest 500) | HARVEST PREDICTIONS (mean with 95% Confidence Limits) | | | |
|---|---|---|---|---|---|
| | | 1915-53 + 1965-72 Equation | | 1915-53 Equation | |
| 1970 | 275 000 | 151 500 | 192 500 / 119 000 | 132 500 | 166 000 / 105 500 |
| 1971 | 173 000 | 141 000 | 182 000 / 109 000 | 127 000 | 162 000 / 99 500 |
| 1972 | 198 000 | 142 500 | 189 500 / 107 000 | 134 000 | 177 000 / 102 000 |
| 1973 | 118 500 | 110 000 | 152 000 / 79 500 | 104 000 | 142 000 / 76 000 |
| 1974 | 129 000 | 105 000 | 130 000 / 84 500 | 92 000 | 114 000 / 74 500 |
| 1975 | 110 000 | 94 000 | 121 000 / 73 500 | 83 000 | 107 000 / 64 500 |
| 1976 | 144 000 | 204 000 | 288 000 / 144 500 | 174 000 | 247 000 / 122 500 |
| 1977 | 151 500 | 179 000 | 236 500 / 135 500 | 146 000 | 191 500 / 111 500 |
| 1978 | 131 000 | 80 000 | 112 000 / 57 000 | 65 000 | 92 000 / 46 000 |
| 1979 | 150 500 | 94 000 | 138 000 / 64 500 | 76 000 | 111 500 / 51 500 |
| TOTALS | 1 580 500 | 1 301 000 | 1 741 500 / 974 000 | 1 133 500 | 1 510 000 / 853 500 |

is clear that the major part of the apparent excess harvest was accumulated during the first three years of the decade. In contrast, the total harvest taken during the four drought years 1976 through 1979 at the end of the decade was closer to that predicted to be available, although the harvest pattern achieved obviously differed from that predicted. The apparent limitation on the harvests taken during the first two years 1976 and 1977 may be attributed to effective constraint of the total harvest effort consequent upon conscious management decisions (see III B.), but the harvest effort available during 1978 and 1979 was nevertheless sufficient apparently to account for all the remaining kangaroos that might otherwise have been taken in 1976 and 1977. In this context, management decisions apparently influenced the harvest pattern but not the possible total harvest.

The comparison between the pattern of actual harvests and the harvest pattern predicted from the 1915-1953 harvest variation equation is similar to that described above, except for the fact that a consistent pattern of excess harvest is suggested. If this latter comparison was the more correct (of the two made in this instance) then the excess harvest indicated is approximately 30% of the minimum numbers considered to have comprised the exploited Red Kangaroo stocks within Western Australia during the 1970-1979 decade. The question now is whether we can discriminate further between the two harvest patterns suggested in regard to the actual impact of harvesting on kangaroo abundance.

An appreciable reduction in Red Kangaroo numbers on the Western Australian rangelands was certainly effected by increased commercial exploitation through 1969 to the end of 1972, and the apparent harvest excess during this four year period was equivalent to $\underline{c}$. 40-45% of the total harvest taken, e.g. the total commercial Red Kangaroo harvest over this period was approximately 1.05 million, and the predicted excess was between 395 000 ('1915-53 + 1965-72' predictions compared) and 480 000 ('1915-53' predictions) animals. There is little practical difference between these two comparisons, so we are not assisted in making a choice between the two predictive equations, but we can say that the total reduction in the Red Kangaroo stocks in Western Australia between 1969 and 1972 relative to the pattern of assumed average sustainable variations in numbers following droughts on past evidence could at least have been within the range between 400 000 and one million kangaroos.

Drought in 1976 through 1979 was apparently more intense than that experienced during the 1969-1972 period (cf. Table 1, Annual Rainfall Indices) so the relative impact of this drought on the existing kangaroo stocks could have been expected to be greater than that occurring in 1969-1972. The total harvest taken from 1976 through 1979 did not however amount to any more than 55% of that taken through 1969-1972, and the annual harvests taken during the four years 1976 - 1979 tend also to be less than might generally have been expected from the

comparison between the annual average male + female harvest rates and the historic correlation between total harvests and potential male + female harvest rates calculated for the Gascoyne Catchment and Murchison Management Areas (Figs. 37 and 38). This result suggests that the reduction in Red Kangaroo numbers achieved in the early 1970s had not been reversed by the beginning of 1976. Continued exploitation in the following four drought years would have further depleted the numbers. The total reduction occurring in this latter period could have been as much as 600 000 kangaroos relative to the pre-1976 stocks, and would be expected to have had a proportionately greater impact on these stocks than the apparent excess harvests of the early 1970s.

Further support for the latter conclusion is provided by the fact that the combined efforts of a group of 30 additional temporary shooter licensees were required to assist in holding the 1979 harvest to 150 000 carcases (Table 1), and that during 1980 (Prince, unpublished data) the average male harvest rate continued to decline relative to 1976-1977, the average female harvest rate also dropped, and a much wider dispersal of the available shooting effort achieved a total harvest of only 100 000 carcases.

The harvest data discussed above clearly suggest that continued harvesting during the 1970-1979 decade was associated with an attrition of the total Red Kangaroo stocks in Western Australia, and that the numbers present at the end of 1979 were at the lowest point for at least ten years. The most recent extended drought was not broken until mid- 1980, so with a minimum of two years from resumption of breeding to recruitment of additional animals to the harvested stocks following the break of the drought, the continued harvesting during 1980-1981 would be expected to have further depleted kangaroo numbers. Aerial census of the Western Australian Red Kangaroos during April-June 1981 suggested that the total State population then numbered approximately one million animals (Caughley, pers. comm.; Short et al. 1983). The exploited pastoral rangeland sector of this population numbered about 750 000 kangaroos.

Having considered the likely impact of harvesting on the stocks, we can now return to the problem of choice between the two harvest prediction equations as the most reasonable predictors of future available harvests. In total, the sums of the available annual harvests suggested for the 1970-1979 decade really differ very little relative to the expected numbers in the total Red Kangaroo stocks in Western Australia, e.g. the maximum difference between the two annual estimates made is 30-33 thousand carcases in 1976 and 1977 (Table 2), so with the annual average sustainable offtake ratio probably being close to 10% of the exploited stocks, the higher excess harvest estimate would represent a maximum over harvest of less than 5% of the total stocks within any single year and would usually be expected to be much less ($\underline{c}$. 1%). There is no practically justifiable value in attempting to attain more precise annual harvest regulation than this in

Western Australia. Persistent marginal over-harvesting of an exploited species does however generate long term problems.

Because the predicted annual harvest discrepancies were increased through the latter half of the 1970-1979 record (Table 2) and the decline in the Red Kangaroo stocks would be expected to continue into the early 1980s, it is therefore prudent to consider that the harvest prediction equation providing the lower available harvest estimates, i.e the equation based on the '1915-1953' harvest pattern analysis (Prince 1984, Appendix I), will provide the better estimates of the annual available harvests in the near future. The data in Figs. 37 and 38 suggest the same.

# VI GENERAL DISCUSSION

The 1970-1979 decade saw the Western Australian Department of Fisheries and Wildlife (formerly Fisheries and Fauna) assume a primary role in relation to conservation of the State's kangaroo populations and, for the first time, impose effective controls over the course of commercial exploitation. The change in emphasis of official policy on management of the State's kangaroo populations which occurred over the period from 1965 through 1970 resulted from increasing concern over the possible impact of a revitalized commercial kangaroo trade on existing kangaroo populations. The lack of any real knowledge of the total impact of this trade posed a special problem at this time.

By 1969 it was clear however that the State's Red Kangaroos were bearing the brunt of a substantial but poorly documented exploitation pressure. Earlier strong public concern regarding the impact of similar developments in eastern Australia and persistent rumours of impending expansion of the impact of this exploitation in Western Australia were sufficient reasons to induce a change in the former largely laissez faire approach to kangaroo exploitation and management by the State fauna authorities (Prince 1984).

Management of Red Kangaroos on the arid and semi-arid rangelands of the North West and Murchison and associated areas of the State being utilized by the pastoral industry provided a most interesting challenge. Existing knowledge of the biology of the Red Kangaroo, and of its distribution in Western Australia, suggested that the major concentrations of this species were coincident with the best pastoral lands, and that management objectives could best be considered in the context of the wider problem of achieving sustainable use of these rangelands.

Because the Red Kangaroo populations living outside the areas of potential land-use conflict posed no real problems in land management, the greater legal protection available under the Fauna Conservation Act, 1950-1969 could be extended to them. On the other hand, controlled commercial harvesting of the natural increase produced by those kangaroo stocks coexisting with the domestic livestock of the pastoral industry on the better quality rangelands supplemented by additional water points was seen to provide the most productive and useful management compromise by taking into account the needs of both wildlife conservation and the pastoral industry in this potential conflict situation. The kangaroo industry could therefore be accommodated in a management service role while being permitted to pursue its own particular goals within the limits set by variations in the biological productivity of the exploited kangaroo stocks.

Commercial trade in kangaroos in Western Australia since 1970 has therefore been involved only in those situations where the potential for land-use conflict has existed, and in these instances harvest impact has generally been regulated in accordance with management need and biological indicators. Commercial factors have been assigned a secondary role only, relative to implementation of basic management decisions.

The functional organization of the State's kangaroo trade in Western Australia in 1970 was readily amenable to imposition of effective legal constraints providing the means for control and adequate documentation of the trade itself, and this was done. However, the move by the Western Australian Department of Fisheries and Fauna to assume formal control of exploitation of the Red Kangaroo at this time caused considerable misapprehension among those who considered themselves most likely to be directly affected by any changes that might ensue. The opportunities for basic misunderstanding of the objects of the formal management policy that was being implemented were removed with the establishment of a representative Ministerial Advisory Committee during 1971, which has since continued to provide a forum for review of the programme and discussion of problems between the interested parties, and a source of advice to the Minister for Fisheries and Wildlife on ongoing management.

Necessary recognition of the need for adequate control of rangeland grazing pressure as a component of kangaroo management policy was further emphasized during 1974 with implementation of a rangeland rehabilitation programme for degraded rangeland within the Gascoyne Catchment (see Wilcox and McKinnon 1972).

The generalised frequency distributions of the specific local average yearly rates of harvest offtake for Red Kangaroos recorded in Western Australia since 1971 and plotted in Figs. 5 - 12 were similar in pattern to that apparently found by Sinclair (1977) in his examination of the 1975 harvest data for New South Wales, although a greater range of values and a higher frequency of relatively high rates of offtake appears to have applied within Western Australia. In part, this apparent difference may be attributable to differences in the methods of calculating the respective offtake data. Deficiencies in reporting of the areas of origin of some sectors of the Western Australian harvests as mentioned previously (e.g. IV D. 4.) could also have distorted some of the calculated offtake figures for this State. Nevertheless, the general similarity in the offtake figures noted above is supportive of the view that the recent harvest impact on the Western Australian Red Kangaroo stocks has been

greater than in New South Wales. Primary reasons for this difference may be ascribed to the generally greater vulnerability to exploitation of the Western Australian Red Kangaroos (see Newsome 1971, Fig. 7), and the lower intrinsic productivity of the Western Australian rangelands (Fitzpatrick and Nix 1970; Moore 1970, pp. 96-7).

The Red Kangaroo harvests taken in Western Australia since 1915 (Prince 1984, Fig. 6; and Figs. 37 and 38, this paper) have usually been < 200 000 per annum. In the few instances in the past where the annual harvests have exceeded 200 000 in consecutive years, such cumulative harvests appear to have been associated with appreciable reductions in the numbers of kangaroos remaining on the rangelands in succeeding years. The pattern of harvests and apparent kangaroo population responses observed through the 1970-1979 decade is consistent with this established pattern, so the operation of the Western Australian Red Kangaroo Management Programme in controlling and directing the course of commercial exploitation of the State's rangeland Red Kangaroo stocks during 1971-1979 has ensured continuity, rather than having imposed any major changes in exploitation. The programme has however demonstrated its capacity to limit the actual harvest levels achieved where this action has been considered necessary, e.g. 1976, 1977, and has protected part of the Red Kangaroo population from exploitation. The objectives set for the programme have therefore been satisfied. Nevertheless, the numbers of Red Kangaroos remaining on the State's pastoral rangelands at the end of 1979 were apparently much lower than ten years previously, and we know that the total State Red Kangaroo population numbered about one million in mid- 1981 (Caughley, pers. comm.). The question that arises now is therefore, where do we go in the future?

Species survival is not presently in contention because the persistence of protected populations off the pastoral rangelands has been an integral part of the management strategy adopted, and reasonable numbers of Red Kangaroos remain on the pastoral rangelands. However, continuity of exploitation and the persistence of the Red Kangaroo on the State's rangelands is inextricably linked to the issue of development of an ecologically sensitive and sustainable environmental management strategy for these arid areas. Newsome (1975) has considered the possible risks to the larger kangaroos that could flow from continued degradation of Australia's arid lands.

Declining productivity of important areas of rangelands currently being exploited by the State's pastoral industry poses special problems in land management, and also threatens the long-term commercial viability of some of the established pastoral enterprises. These problems were exacerbated by the further decline in productivity of the dependent livestock populations during the extended 1976-1980 drought and the co-incident adverse changes in general economic factors affecting the pastoral industry. Implementation of restorative rangeland management programmes in the affected areas is the first line of attack in attempting solution of the problems mentioned, but this action cannot be considered in isolation.

Joint use of the pastoral rangelands by the Red Kangaroo and domestic livestock populations could lead to changes in emphasis of the established Red Kangaroo Management Programme in the future. Even so, it is most important to remember here that the most consistent Red Kangaroo harvests during the 1970-79 decade were obtained from the general area of the Murchison, Gascoyne Catchment and Carnarvon Management Areas, and that these areas appear historically to have also been major contributors to earlier State harvests.

Apart from the protected sector of the State's Red Kangaroo population, the most abundant residual managed stocks are still found in the above mentioned parts of the State (Caughley, pers. comm.; Short et al. 1983), and the distribution of these kangaroos generally co-incides with the acknowledged best rangeland areas. These areas are also those identified by Jennings et al. (1979) as the areas most likely to support profitable pastoral enterprises in the future. Kangaroo management similar to that in recent times will therefore be a continuing requirement. The available harvests in the immediate future can however be expected to be lower than those taken during the past decade.

Because recent harvesting operations of the kangaroo carcase trade have differed only in degree from those sustained in the past, the possibility of continued commercial exploitation triggering a population collapse in the near future is considered most unlikely, particularly in view of the protective cover provided by constraints imposed by the existing Management Policy. This judgement should not however be taken to mean that management oversight of commercial exploitation is unnecessary, or that problems requiring harder management choices being made than hitherto will not arise in the future. Closer scrutiny of the situation is needed to put these matters in their proper perspective.

The questions being addressed at this point are:

i)    how apparently did the fortuitous balance between productivity and exploitation of the Western Australian Red Kangaroo stocks arise; and,

ii)   how has this balance been maintained during the past decade?

In over-view, the two factors seeming to have most relevance in appreciation of the seemingly lucky balance achieved between exploitation and productivity of the Red Kangaroo stocks in Western Australia are the relatively low market values of kangaroos that have generally prevailed for most of the period during which this species has been exploited within the State, and the apparently patchy dispersion and often intermittent impact of hunting with respect to local kangaroo stocks.

Historically, the dry-skin trade apparently favoured a much stronger seasonal bias in hunting effort than the modern carcase trade, so while relative unit values for kangaroo skins were sometimes much higher than those available during the past decade (see Prince 1984, Appendix I, Fig. A I. 1),

the net impact of harvest on the kangaroo stocks probably was not then generally as great as it might now be with consistent hunting at similar price levels. Thus, in the past, probable gear and hunting saturation problems and other difficulties encountered by shooters during the shortened major hunting period apparently substituted for the lack of formal constraints on the available harvest effort, the imposition of which became necessary in the early 1970s after observing the increased modern hunting impact occasioned by rising prices and drought in the late 1960s (Prince 1984). Changes affecting the volume of the kangaroo trade from the mid- 1960s to the present are therefore of more direct relevance to discussion of future management needs.

The real market values on offer to professional skin shooters were at rock bottom commencing 1952 and followed through to 1966 when the growing kangaroo meat trade turned towards increased dependence on exploitation of the Red Kangaroo. The prices for kangaroos being offered by the carcase trade before 1966 were apparently little different from those available from the sale of dry skins and are matched only by the minimum prices of the early 1930s (Prince 1984, Appendix I, Fig A I. 1). The standardized average unit values on offer during each of these two periods were equivalent to < 2% of the alternative wage rates potentially obtainable by persons who might at the time have considered becoming professional kangaroo shooters. The relatively low economic returns available from kangaroo harvesting during the 1952 - 1966 period obviously provided no great incentive for exploitation because the commercial harvests taken through 1952 - 1966 were practically of little consequence, even though there was no formal limitation on hunting. From 1966, however, market values commenced a rise which was sustained through to the end of 1972, being terminated in early 1973 only on loss of the United States skin market. During this last short period the market prices on offer for kangaroos were similar to those commonly available in earlier times (c. 4% of alternative wages). With this increased economic incentive and the aid of drought in 1969 and 1970, the harvest offtake was dramatically increased.

Management controls introduced through 1970-1971 quelled this increase in harvest pressure, and with the aid of improved rainfall in 1971 the harvest was substantially reduced. Even so, another dry year in 1972 combined with the continued buoyant market demand led to an appreciable rise in the harvest, and this harvest was substantially greater than any of the harvests later taken (1973 through 1979, Table 1). Reductions in the stocks of Red Kangaroos available for harvest from the end of 1972 clearly would have affected the size of the later harvests, but despite this fact and the effective limitations on the harvest effort during 1976 and 1977, the first two years of the most recent four year State-wide drought, the total harvests taken to the end of 1979 were apparently sufficient to account for all the harvestable kangaroos available. This result was achieved despite the prevailing market prices on offer during the 1973-1979 period being about

30% lower on average than those available from 1968 through 1972, and therefore lower also than the historic average prices for skins. Modern harvest technology clearly appears to have provided a more efficient means of harvesting these kangaroos than in the past, with a predominantly professional operation now seemingly able to function at lower profit margins per kangaroo taken.

The fully commercial operations of the professional kangaroo shooters do nevertheless promote stability in exploitation because of their dependence on the availability of sufficiently numerous kangaroo stocks needed to sustain their operations. Any future substitution of the limited and concentrated potential effort of the truly professional shooters on which the Western Australian Red Kangaroo Management Programme has been based during most of the past decade with a more diffused pattern of distribution of effort based on increased numbers of non-professional shooters, i.e. part-time licensees servicing the same kangaroo trade, could de-stabilise the existing harvest pattern. An increase in the commercial value of kangaroos could also have the same effect. These possibilities are sufficient reasons for the Department of Fisheries and Wildlife continuing to maintain control over the future course and extent of commercial exploitation. The kangaroo trade has demonstrated its ability to take what has obviously been a large fraction of the State's Red Kangaroo stocks within a two to three year period in the past, e.g. in 1935 and 1936, and again in 1969 and 1970 (see also Prince 1984).

The counter possibility of a future collapse of the commercial kangaroo market similar to that of the 1950s poses a different problem in natural resource management from that discussed above. The solution to such a problem obviously lies outside the ambit of the direct responsibilities of the Department of Fisheries and Wildlife. However, the real difficulties occasioned by such an event point to the desirability of maintaining the greatest range of possible markets for kangaroo products at all times. Lifting of the temporary Australian embargo on the export of kangaroo products in September 1975 relieved some of the financial strains placed on the Western Australian kangaroo trade in 1973, but further access to the United State's market for kangaroo skins still appears relevant to continued effective management of the State's Red Kangaroos.

Protection of Red Kangaroos via provision of Nature Reserves within the established pastoral areas of Western Australia has not been an integral feature of the State's Red Kangaroo Management Programme to date, and such land reservation is not essential for conservation of the Red Kangaroo alone. However, the reservation of representative samples of the rangeland ecosystems of which the Red Kangaroo is but one part is a legitimate and necessary wildlife conservation objective. Acquisition of some suitably large Nature Reserves containing areas of prime Red Kangaroo habitat should therefore be pursued within the pastoral rangeland areas on this account.

Commercial harvesting of Red Kangaroos in Western Australia during the 1970-1979 decade continued the long established pattern of exploitation of this species on the State's pastoral rangelands and made an important contribution to regulation of the total grazing pressure in these areas without major cost to the general public. The kangaroos harvested also provided valuable income and employment for many people.

**A self-sustained commercially based kangaroo industry will continue to provide the most effective and economic means of removing excess numbers of Red Kangaroos from the State's pastoral rangelands in the future.**

The fact that the Red Kangaroo is a member of the unique Australian fauna separates consideration of its management from that which may be considered appropriate for feral exotic species in the same situation, however.

**The obligation of Governments to effectively conserve indigenous wildlife is in this instance compatible with the established management practice of permitting the commercial harvest of excess numbers of kangaroos while also favouring the continued persistence of a widespread viable core population of kangaroos sharing the rangelands with the pastoral industry.**

The provision of extensive Nature Reserves within the Western Australian pastoral areas has not been a feature of the State's Red Kangaroo Management Programme to date and is not presently essential to conservation of the Red Kangaroo itself.

**The failure to provide suitable Nature Reserves within the pastoral rangeland areas of the State does nevertheless inhibit attainment of the objectives relevant to general wildlife conservation in these areas. Acquisition of Nature Reserves which may contain large areas of prime Red Kangaroo habitat should therefore be pursued on this account.**

The Red Kangaroo Management Programme being developed in Western Australia during 1969-1970 and finally implemented in early 1971 was aimed firstly at stabilizing management of the rangeland Red Kangaroo stocks at a time of major change in the pattern of commercial exploitation of the species within the State, and of then ensuring future compatibility between rangeland management and wildlife conservation objectives in the most efficient manner possible. A continuing kangaroo industry was recognized as a key factor in this equation.

**The above management objectives have been satisfied to date.**

The apparent reduction in the total rangeland Red Kangaroo stocks remaining in Western Australia at the end of 1979 was largely attributable to the effects of prolonged drought during the last four years of the decade on the productivity of the rangeland vegetation and the consequent impact on the dependent animal populations. The kangaroo

management responses during this drought were generally in tune with the needs for rangeland grazing management, but control over the course and extent of exploitation of the residual kangaroo stocks was maintained. Thus, the management programme permitted the correct response to changing conditions in the field as far as management of the kangaroo stocks was concerned without sacrificing its main conservation objective.

**The existing State Red Kangaroo Management Programme therefore remains relevant to management and conservation of the Red Kangaroo in Western Australia in the 1980s because the most recent decline in abundance of the field stocks has not generally altered the basic pattern of distribution of the remaining Red Kangaroos relative to the pastoral industry, nor has it affected the expected pattern of interaction between the animals involved or their responses to changes in prevailing weather patterns.**

Consistent with the continuing relevance of the established management programme, it is apparent that harvest documentation obtained via the use of detailed shooter's returns has provided a most practical and efficient method of procuring a broad overall appreciation of important changes in the status of the exploited Red Kangaroo stocks in Western Australia. This system has also served the purpose of facilitating surveillance of operations and law enforcement activities.

**The high rate of compliance achieved in obtaining the data required and the generally acceptable quality of the majority of the data so obtained, combined with the ability to effectively check the veracity of the individual reports, enhances the value of this system of harvest monitoring. Its continuing role in the total programme is not diminished.**

Aerial census can nevertheless provide much more specific information on the distribution and abundance of the State's Red Kangaroos than the indirect harvest data. Still, application of the aerial census technique does not replace the need for ongoing harvest reporting. These two facets of the monitoring process are therefore complementary.

The April-June 1981 aerial census of the Western Australian Red Kangaroo population (Caughley, pers. comm.; Short et al. 1983) confirmed the initial assumptions made in the early stages of implementation of formal management for this species in the early 1970s regarding the general distribution and abundance of Red Kangaroos in Western Australia, and showed that there were approximately one million Red Kangaroos present at the time of census. The exploited pastoral rangeland stocks included about 75% of this population.

**Aerial census can be expected to fill a more prominent role in the future management of Red Kangaroos in Western Australia because of its ability to provide direct quantitative data on distribution and abundance. Choice of the**

appropriate frequency of census should however be determined by considering the potential contribution of the population data to the monitoring process and ensuing management decisions, the cost effectiveness of mounting and executing a census, and the relationship between such routinely collected census data and the underlying pattern of variation in abundance of the species. Adequate census of an area as extensive as that occupied by the rangeland stocks of Red Kangaroos in Western Australia is indeed a costly venture that cannot be lightly entertained by the State's wildlife managers. There is also ample evidence to show that there are 2 to 3 year lags in adult kangaroo population responses to changes in field conditions, and that a period of 5 to 6 years is more typical of recurrent short-term variation in overall abundance of Western Australian Red Kangaroo populations. Routine aerial census supplementation at intervals of between 3 and 5 or 6 years of the

indirect harvest monitoring data usually collected from the kangaroo trade appears best suited to the Western Australian situation.

In the past it appears that a relatively fine balance between the average levels of productivity of the kangaroo stocks and their exploitation was able to be achieved by an industry that operated in circumstances where real product values were relatively low and harvest efficiency was less than that which might now be the case.

The practical dependence on commercial exploitation for the major rangeland kangaroo management effort suggests that pressures on the wildlife managers could grow if the real value of kangaroo products was to increase appreciably, or the harvest efficiency increased further. Management must remain cognizant of these possibilities in the future.

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APPENDIX   I

ANALYSIS OF THE PATTERNS IN THE WESTERN
AUSTRALIAN RED KANGAROO HARVEST DATA AND
STATISTICS : 1972 - 1979

## ANALYSIS OF THE PATTERNS IN THE WESTERN AUSTRALIAN RED KANGAROO HARVEST DATA AND STATISTICS : 1972 - 1979

### INTRODUCTION

The catch/unit effort (C/f) statistic was chosen as the primary harvest variable to be considered in harvest monitoring because of its potential to reflect changes in numbers in the exploited Red Kangaroo stocks, but it was recognized that the particular indices calculated could be biased because of changes in the behaviour of the shooters, and also the kangaroos. Further statistics considered to permit better interpretations of the variations in the C/f indices were therefore collected. (Section IV  C., this paper).

It follows from the above (provided of course that the data to be used in analyses would be reliable) that the recorded patterns of variation in the various C/f indices calculated from the harvest record (see Figs. 13 - 36, this paper, and Appendix II) should be quantifiable in terms of variables which relate to either the productivity of the kangaroo stocks and hence numbers (S, the stock size), or the interaction between the kangaroo shooters and the kangaroos (q, the catchability coefficient) if the initial assumptions made regarding the impact of harvest etc. on the local kangaroo stocks were correct (see Section V  also).

Analyses of the patterns of variation in the monthly C/f indices calculated from the harvest data applicable to each of the Murchison, Gascoyne Catchment and Carnarvon Management Areas to test this hypothesis are detailed below.

### METHODS

The preliminary harvest pattern analyses reported here were performed using the step-wise multiple regression technique of Nie et al. (1975; the SPSS programme package).

Available monthly harvest data for 1972 through 1979 for each of the Murchison, Gascoyne Catchment, and Carnarvon Management Areas were analysed separately, but all the analyses being attempted were done sequentially (see below).

It was assumed for these analyses that the numbers of kangaroos within each of the three separate Management Areas · being considered were unaffected by kangaroo numbers elsewhere, i.e. that there was no significant mobility of kangaroos between the different Management Areas, and that the recorded C/f indices were not sequentially biased, e.g. by technological or other changes affecting harvest efficiency.

Required monthly harvest rate (C/f) indices were converted to natural log (Ln) values for the analyses and other harvest input data required were derived from the relevant harvest data summaries (see Appendix II, Tables A  II. 2 - 4).

Previous analysis of the pattern of variation in the

historic annual harvest records for the Red Kangaroo in Western Australia (Prince 1984, Appendix I) showed that rainfall patterns were of major importance in relation to realized harvest patterns and that rainfall up to six years prior to the year of harvest influenced the harvest pattern. A similar length prior rainfall record was therefore considered in this instance. Rainfall input data required for the proposed analyses were obtained from the Australian Monthly Rainfall Review series published by the Australian Bureau of Meteorology. The figures listed in Table 2 of these publications for Districts 6, 7, and 7A  were used as approximations for monthly rainfall received within the Carnarvon, Gascoyne Catchment and Murchison Management Areas, respectively (cf.  Fig. A  I. 1 and Fig. 4; Appendix III).

Continuity of substantial exploitation through the whole of the  1970-1979  decade was considered adequate demonstration of the continued commercial viability of exploitation in view of the minor component of the historic annual harvest variability attributable to variations in market prices in similar circumstances (Prince, ibid.).

### PROCEDURES AND RESULTS

The separate data for each of the three selected Management Areas were first examined to test their concordance with some generally believed hypotheses concerning shooter behaviour, e.g. that heavy rainfall impedes shooters in the short term, and that hunting is generally focussed on situations where kangaroos are most readily obtained. Following this, the actual patterns of variation in the monthly  C/f  indices were explored to test the assumption that these indices would generally reflect changes in the status of the exploited kangaroo populations within the three Management Areas.

Main correlation results derived from the first series of analyses are summarized in Table A  I. 1. These results showed that hunting effort expended within any month was negatively correlated with the rainfall recorded within the month without reference to the timing of the rainfall in all three Management Areas. All harvest rate vs rainfall within the month  correlations were also negative in sign, but statistically 'not significant', as were those for male carcase weight  vs  rainfall. Female carcase weight  vs  rainfall correlations were also negative, with that for the Murchison Management Area again being 'not significant', but coefficients for the Gascoyne Catchment and Carnarvon Management Areas were 'significant' and of similar magnitude. The total numbers, and the numbers of both male and female kangaroos taken per month were also negatively correlated with rainfall received within the month.

## Table A I. 1.

### Summary of Main Results from Simple Correlation Analyses : Harvest Data vs Rainfall and Time

| Correlation Examined[1] | Management Area[2] | Correlation Results | |
| | | r values | Significance Test Probability |
| --- | --- | --- | --- |
| EFFORT vs RAIN | MU, GC and CN | -0.34 to -0.35 | <0.001 |
| FWT vs RAIN | MU | - ve | NS |
| | GC and CN | -0.32 | <0.001 |
| HNO, MNO and FNO vs RAIN | MU, GC and CN | -0.33 to -0.44 | <0.001 |
| EFFORT vs MONTH | MU | -0.47 | <0.001 |
| | GC | -0.19 | <0.05 |
| | CN | +0.18 | <0.05 |
| LMRATE and LFRATE vs MONTH | MU and GC | +0.21 to +0.57 | <0.02 to <0.001 |
| LMRATE, LFRATE vs MONTH | CN | -0.34 +0.41 | <0.001 <0.001 |
| MNO vs MONTH | MU and GC | -0.14 | <0.10 |
| | CN | -0.08 | NS |
| FNO vs MONTH | MU | -0.19 | <0.05 |
| | GC | -0.03 | NS |
| | CN | +0.33 | <0.001 |
| HNO vs MONTH | MU | -0.17 | ≃0.05 |
| | GC | -0.09 | NS |
| | CN | +0.15 | <0.10 |
| MWT vs MONTH | MU, GC and CN | -0.16 to -0.24 | ≃0.05 to ≃0.01 |
| FWT vs MONTH | MU | -0.43 | <0.001 |
| | GC | -0.13 | NS |
| | CN | -0.05 | NS |

[1] The Variable Names refer to variables described as follows:-

| | | |
| --- | --- | --- |
| EFFORT | = | monthly hunting effort : (Hours expended within the harvest month) |
| RAIN | = | monthly rainfall : (mm rec'd within the harvest month) |
| FWT | = | monthly average female carcase weight : (kg/carcase) |
| MWT | = | monthly average male carcase weight : (kg/carcase) |
| MNO | = | monthly male harvest : (No. of male carcases taken) |
| FNO | = | monthly female harvest : (No. of female carcases taken) |
| HNO | = | monthly total harvest : (No. of male + female carcases) |
| MONTH | = | month of record : (No. of months elapsed commencing from January 1972 = 1) |
| LMRATE | = | monthly male harvest rate :   Ln (MNO/EFFORT) |
| LFRATE | = | monthly female harvest rate :   Ln (FNO/EFFORT) |
| Ln | = | Logarithm to base e |

[2] Management Area (M.A.) Codes (see Fig. 4) as follows:-

MU = Murchison M.A.; GC = Gascoyne Catchment M.A.; CN = Carnarvon M.A.
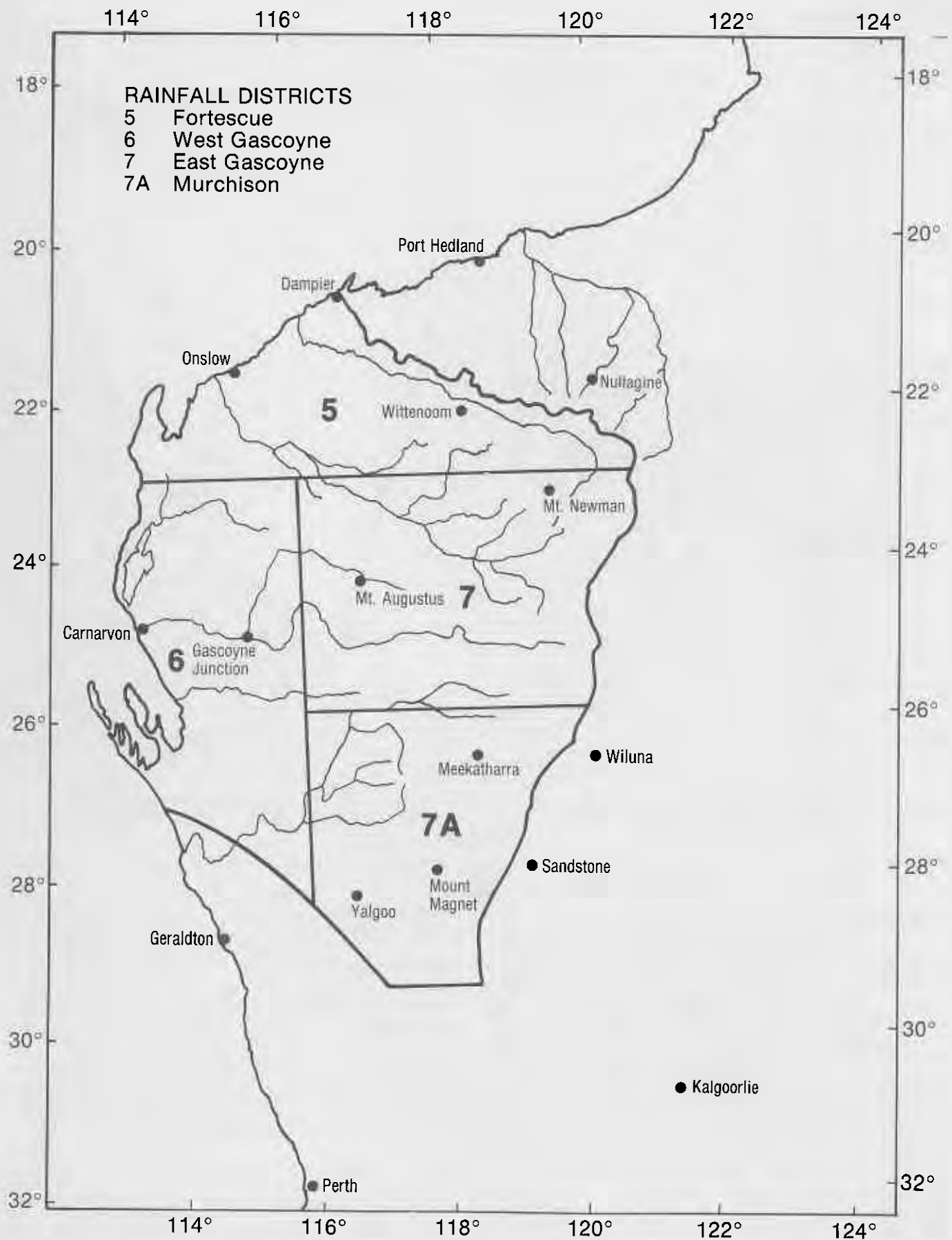
**Figure A I. 1.** Rainfall Districts - Western Australia. As defined by Australian Bureau of Meteorology.
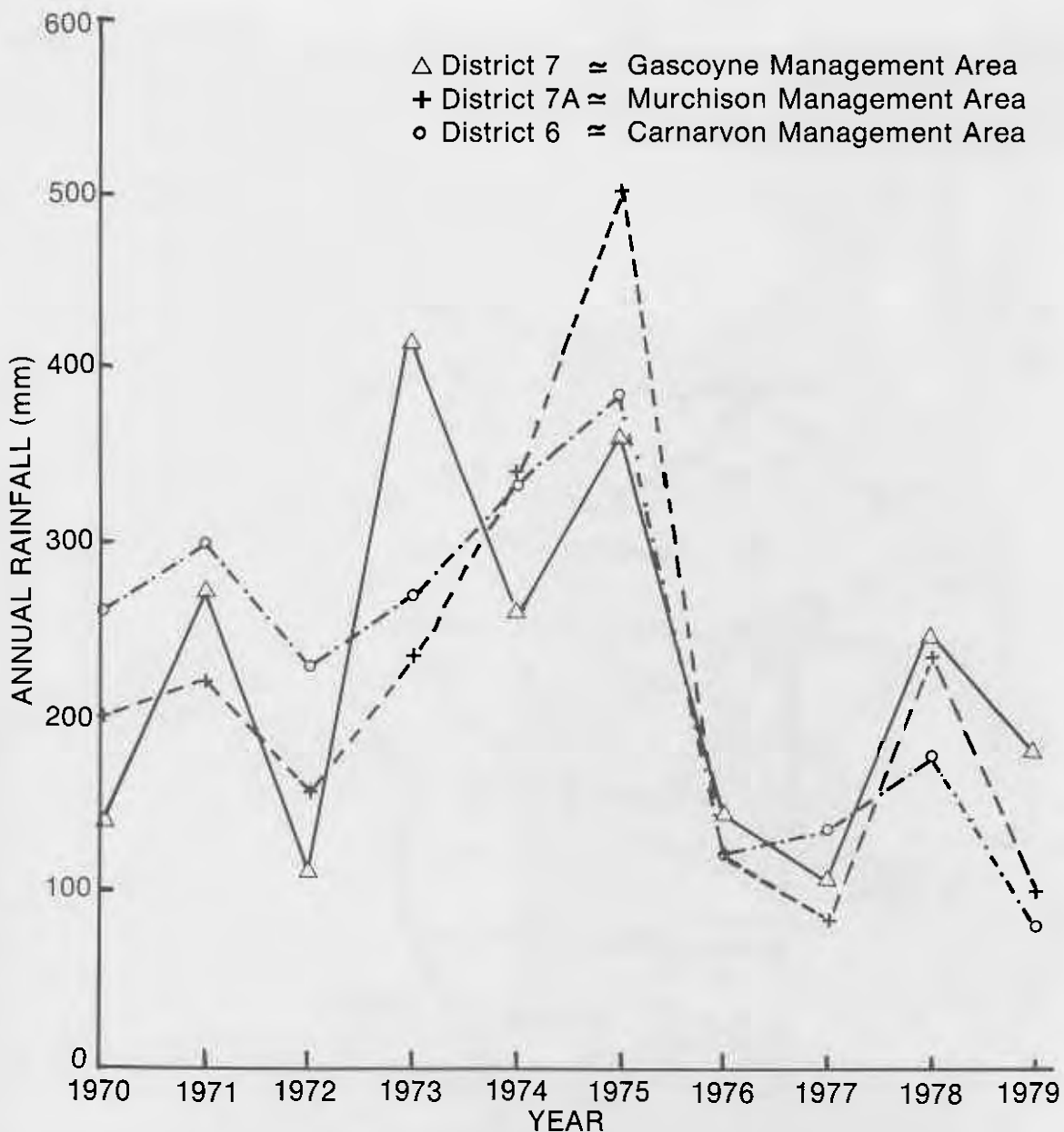
**Figure A I. 2.** Annual rainfall received in some of the Red Kangaroo hunting areas - Western Australia : 1970-1979.

Considering the latter result above and the fact that drought conditions prevailed throughout the areas in which Red Kangaroos were being exploited during 1976, 1977, and 1979, with only minor relief during 1978 (Fig. A I. 2), the correlation was tested between monthly rainfall and time elapsed from the beginning of each of the data sets being examined. The correlation coefficients obtained for all three Management Areas were negative but 'not significant', no doubt because the inherent variability in monthly rainfall in this arid part of the State was sufficient to obscure the total rainfall deficiency accumulated within the last four years of the record. The harvest changes observed cannot therefore simply be explained by immediate changes in total monthly rainfall (cf. Section III B., Table 1). Nevertheless, the total harvest effort expended per month declined with time in both the Murchison and Gascoyne Catchment Management Areas, but a slight increase occurred in the Carnarvon Area.

Reported average harvest rates for animals of each sex also increased with time in both the Murchison and Gascoyne Catchment Areas, although the total numbers taken per month tended to decline over the same period. On the other hand, the male harvest rate declined markedly in the Carnarvon Area, while the female harvest rate increased to an even greater extent, so that the combined male + female harvest rate tended to increase. In contrast, average male carcase weights declined with time in all three Management Areas, whereas female carcase weights only declined appreciably within the Murchison Management Area.

The next step in the sequence of analyses attempted here was a general exploration of the relationship between the monthly harvest rates and rainfall patterns recorded within each of the three selected Management Areas. Three separate analyses were undertaken in each case, viz. male harvest rate (LMRATE), female harvest rate

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(LFRATE), and the combined male + female harvest rate (LHRATE), because of the sex specific hunting bias known to be exercised by shooters and the additional observation that hunting impact was apparently greater in respect to the male sector of the stock (Prince, unpublished observations; see Appendix II also). The separate Rainfall variables included at this level ranged from rainfall received within the month of record (RAIN) to rainfall received within each month up to six years prior to the observation (RAINL 1 to RAINL72).

The simple analyses above indicated a 'significant' negative association between harvest rate and rainfall within each month from one to three months prior to the month of record (RAINL 1 to RAINL 3), consistent with the general hypothesis of reduced hunting success immediately following rain. In the case of the Gascoyne Catchment data, harvest rates were also negatively associated in general with rainfall centred on the period around six months prior to the harvest month. In fact, the combined male + female harvest rate in this instance was negatively associated with rainfall within seven of the first 12 months prior to the harvest month in question.

Correlations between monthly harvest rates and the rainfall received within months further back in the record than the end of the first year were more variable in each case. Probably because of the male harvest bias mentioned above, the male harvest rate equations appeared to provide the best indications of the possible links between prior rainfall events and the presumed pattern of subsequent recruitment to the exploited stocks. The Gascoyne Catchment data appeared clearest in this respect and suggested that rainfall events within approximately 2½ to 4 years prior to the month of record were the most important. The Murchison analysis suggested a similar, although less clearcut association. In contrast, the Carnarvon male analysis suggested a different pattern of variation in harvest rates related to rainfall within a shorter period of time.

Results for the corresponding female harvest rate analyses tended to differ slightly, but to still be generally similar to those described for the males above, while those for the combined male + female harvests tended to be closer to the results for the males, no doubt because of the general predominance of males in the harvests taken (see Appendix II).

Following the first general run of analyses examining the possible effects of past rainfall patterns on harvest rates (above), the Gascoyne Catchment data were selected for more detailed examination. Two further factors were considered in conjunction with the separate rainfall variables at this point.

Thus, the observed changes in harvest patterns (Figs. 13 - 36) suggested that short term changes in selectivity exercised by shooters could influence the male harvest rate, e.g. if smaller male carcases than usually taken were to be considered acceptable from time to time, then the corresponding male harvest rate could temporarily be increased. The observed changes in harvest composition summarized by the percentage maleness (MPCT) in

the harvest could also reflect both changes in abundance of the preferred target sex (males), and probably some interactive component reflecting possible changes in shooter behaviour as well.

The selection difference variable added and tested here (SELWT) was defined by the ratio of (Average male carcase weight / average female carcase weight). This variable was chosen so as to reflect the general difference between weight vs age curves for male and female kangaroos (e.g. Frith and Calaby 1969, p. 145) while at the same time correcting for the anticipated effects of seasonal changes in nutrition and the expected impact of interrupted recruitment, both of which could be expected to similarly affect males and females.

Both the SELWT and MPCT variables were 'significantly' associated with variations in the male and female harvest rates (LMRATE and LFRATE) reported for the Gascoyne Catchment, with the partial correlation for SELWT being negative in each case, and MPCT positive in respect to the males and negative for the females. Together, these two variables accounted for nearly half the variation in male harvest rates ($R^2$ = 0.46) and one quarter of the variation in female harvest rates ($R^2$ = 0.24). Further variation at this point was also accounted for by a combination of the above two variables and mid-year rainfall in the harvest year (RAINL7; - ve coefficient) plus rainfall in five of the 12 months within the fourth year prior to the harvest month (all coefficients + ve). Total variation accounted for at this point was approximately 65% for males and 50% for females.

The latter result above also suggested that total rainfall received within the fourth year prior to the harvest record in question (i.e. RAINLY4) could provide a good approximation to the component accounted for by the separate monthly rainfall variables within this particular year. RAINLY4 was accordingly substituted in the regression variable lists for the 12 separate monthly rainfall records, RAINL37 to RAINL48, and the equations recalculated. The new equations derived accounted for a similar proportion of the total variation in harvest rates as before (LMRATE, $R^2$ = 0.66; LFRATE, $R^2$ = 0.53). Residual variation unaccounted for by the latter equations was then examined. Attention was concentrated on the male data. The new results suggested that rainfall in two or three of the last six months of the third year prior to the record, i.e. within the set RAINL31 to RAINL36, could be individually important in influencing harvest rates, and that total rainfall in this third year (RAINLY3) might also provide a good approximation.

RAINLY3 was chosen for inclusion as an independent variable at this point. The relevant equations were recalculated, and further analysis pursued by utilizing the zero (0) inclusion level facility provided by the SPSS multiple regression procedures (Nie et al. 1975, p. 347).

Inclusion of RAINLY3 in the new regression equation showed that this variable replaced SELWT (partial correlation now reduced to NS; P ≃ 0.15). The related zero inclusion level analysis also suggested that total rainfall in the 12 months

## Table A I. 2.

### Equations Describing Patterns of Variation in Observed Red Kangaroo Harvest Rates in Three of the Western Australian State Management Areas : 1972 -1979.

#### A. GASCOYNE CATCHMENT MANAGEMENT AREA

$$LMRATE = -0.27386993 + 2.1257757*MPCT - 0.56180854*RAINLY1 - 1.3972971*RAINL7 + 0.92101761*RAINL12 + 0.45200766*RAINLY3 + 0.77190694*RAINLY4 + [0.5*0.10622**2]$$

$$LFRATE = 1.7430621 - 1.908838*MPCT - 0.55989838*RAINLY1 - 1.3955602*RAINL7 + 0.91591402*RAINL12 + 0.45039957*RAINLY3 + 0.77292417*RAINLY4 + [0.5*0.10621**2]$$

$$LHRATE = 1.4837161 - 0.55312037*RAINLY1 - 1.4030265*RAINL7 + 0.90365767*RAINL12 + 0.44793242*RAINLY3 + 0.77082476*RAINLY4 + [0.5*0.10613**2]$$

#### B. MURCHISON MANAGEMENT AREA

$$LMRATE = -1.4049754 + 3.380834*MPCT - 0.99061851*RL1T3 + 0.74349578*RAINLY2 + 0.75908057*RAINLY4 + 0.29108765*RAINLY5 + 0.54519955*RAINLY6 + [0.5*0.13655**2]$$

$$LFRATE = 0.62131638 - 0.67411978*MPCT - 0.098931713*RL1T3 + 0.74687199*RAINLY2 + 0.76342138*RAINLY4 + 0.2879804*RAINLY5 + 0.54706559*RAINLY6 + [0.5*0.13662**2]$$

$$LHRATE = 0.25491924 + 1.4438513*MPCT = 0.94938205*RL1T3 + 0.73881911*RAINLY2 + 0.75909542*RAINLY4 + 0.28320566*RAINLY5 + 0.57403791*RAINLY6 + [0.5*0.13570**2]$$

#### C. CARNARVON MANAGEMENT AREA

$$LMRATE = -0.23660948 + 1.8187187*MPCT - 1.9612883*RL1T3 + 1.1860095*RAINLY2 + [0.5*0.19230**2]$$

$$LFRATE = 1.8094772 - 2.2782406*MPCT - 1.9647047*RL1T3 + 1.200869*RAINLY2 + [0.5*0.19230**2]$$

$$LHRATE = 1.4070038 - 2.0061261*RL1T3 + 1.0652096*RAINLY2 + [0.5*0.19402**2]$$

### Key to Variables and Equations

| | | |
|---|---|---|
| LMRATE | = | Monthly Male Harvest Rate : Ln (MNO/EFFORT) |
| LFRATE | = | Monthly Female Harvest Rate : Ln (FNO/EFFORT) |
| LHRATE | = | Monthly Male + Female Harvest Rate : Ln (HNO/EFFORT) |
| Ln | = | Logarithm to Base e |
| MNO | = | Monthly Male Harvest : Total Number of Male Carcases Taken |
| FNO | = | Monthly Female Harvest : Total Number of Female Carcases Taken |
| HNO | = | Monthly Total Harvest : Total Number of Male + Female Carcases Taken |
| EFFORT | = | Monthly Hunting Effort : Total Hours Expended Within the Harvest Month |

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RAINL7      =    Monthly Rainfall Received 7 Months Prior to the Harvest Month

RAINL12     =    Monthly Rainfall Received 12 Months Prior to the Harvest Month

RL1T3       =    Total Rainfall Received Within the Period 1 to 3 Months Prior to the Harvest Month

RAINLY1     =    Annual Rainfall Received Between 1 and 2 Months Prior to the Harvest Month

RAINLY2     =    Annual Rainfall Received Between 13 and 24 Months Prior to the Harvest Month

RAINLY3     =    Annual Rainfall Received Between 25 and 36 Months Prior to the Harvest Month

RAINLY4     =    Annual Rainfall Received Between 37 and 48 Months Prior to the Harvest Month

RAINLY5     =    Annual Rainfall Received Between 49 and 60 Months Prior to the Harvest Month

RAINLY6     =    Annual Rainfall Received Between 61 and 72 Months Prior to the Harvest Month

MPCT        =    Observed Percentage of Males Within the Total Monthly Harvests

Note 2:       The Value of All Rainfall Variables Above is $Mm*10^{-3}$

Note 3:       The Value of MPCT Used in the Above Equations is = (MNO/HNO)

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immediately preceding the month of record (RAINLY1) should be added to the remaining independent regression variables. Changes suggested by the series of results above were made and the final equation was calculated. This equation accounted for just over 70% of the total variability ($R^2 = 0.72$) in male harvest rates recorded in the Gascoyne Catchment and was of the form:

$$LMRATE = b_0 + b_1 MPCT + b_2 RAINLY1 + b_3 RAINL7 + b_4 RAINL12 + b_5 RAINLY3 + b_6 RAINLY4$$

An equation of similar form accounted for 60% of the total variability in the female harvest rates. An equation including all the above variables, with the exception of MPCT, also accounted for a slightly lower proportion of the total variability in the combined male + female harvest rates ($R^2 = 0.56$). The three equations calculated are listed in Table A I. 2.

The preliminary solution describing the pattern of variation in the Gascoyne Catchment harvest rate data was next used as a guide to possible variable combinations to test in further exploring the patterns of variation in harvest rates in the Murchison and Carnarvon Management Areas. The Murchison data were considered first.

The two variables MPCT and RL1T3 (the total rainfall received within months 1, 2, and 3 prior to the harvest month) accounted for just over 60% of the total variability ($R^2 = 0.62$) in the Murchison male harvest rates, and these two variables, in combination with total rainfall received within years 2, 4, 5, and 6 prior to the harvest month in question (RAINLY2, RAINLY4, RAINLY5, RAINLY6) finally accounted for nearly three-quarters of the total variability ($R^2 = 0.74$).

A similar combination of variables also accounted for just under half ($R^2 = 0.47$) the variability in the female harvest rates in the Murchison, and just over half ($R^2 = 0.56$) the variability in the combined male + female harvest rates. The inclusion of MPCT as a 'significant' variable in respect to the combined male + female harvest rate equation in this instance contrasts with its omission from the same equation for the Gascoyne data.

The initial examination of the pattern of variability in harvest rates relative to rainfall in the Carnarvon Management Area data had already suggested that relatively short-term rainfall only, i.e. within two years of the harvest record, was associated with the observed variability in harvest rates. This was confirmed on further examination of these data. The combination of MPCT, RL1T3, and RAINLY2 accounted for 60% ($R^2 = 0.60$) of the total variability in male harvest rates and just over half ($R^2 = 0.51$) of the total variability in female harvest rates. As in the case for the Gascoyne Catchment data, MPCT was not significantly related to the pattern of variability in the combined male + female harvest rates in these Carnarvon data. The combination of RL1T3 and RAINLY2 alone accounted for just 39% ($R^2 = 0.39$) of the variability in this latter case.

The equations fitted to the Murchison and Carnarvon harvest rate data are included in Table A I. 2.

## Table A I. 3.

Summary of Contributions Made by Different Combinations of Independent Variables in Explaining Observed Variability in Harvest Rates in the Gascoyne Catchment, Murchison and Carnarvon Management Areas – Western Australia.

| | | Management Area | | | |
|---|---|---|---|---|---|
| **GASCOYNE CATCHMENT** | | **MURCHISON** | | **CARNARVON** | |
| **A.** | | Male Harvest Rate (LMRATE[1]) Equations | | | |
| Independent Variables[2] | $R^2$ | Independent Variables[2] | $R^2$ | Independent Variables[2] | $R^2$ |
| RAINLY1 + RAINLY3 + RAINLY4 + RAINL7 only | 0.53 | RL1T3 + RAINLY2 + RAINLY4 only | 0.46 | RL1T3 + RAINLY2 only | 0.46 |
| Above vars. + RAINL12 | 0.55 | Above vars. + MPCT | 0.70 | | |
| Above vars. + MPCT | 0.72 | Above vars. + RAINLY5 + RAINLY6 | 0.74 | Above + MPCT | 0.60 |
| **B.** | | Female Harvest Rate (LFRATE[1]) Equations | | | |
| Independent variables[2] | $R^2$ | Independent variables[2] | $R^2$ | Independent variables[2] | $R^2$ |
| RAINLY1 + RAINLY4 | 0.38 | RL1T3 + RAINLY2 + RAINLY 4 + RAINLY5 + RAINLY6 | 0.44 | RL1T3 | 0.23 |
| Above vars. + MPCT | 0.50 | | | Above var. + MPCT (or RAINLY2 + MPCT = | 0.39 0.36) |
| Above vars. + RAINLY3 + RAINL7 + RAINL12 | 0.60 | Above vars. + MPCT | 0.47 | Above vars. + RAINLY2 | 0.51 |
| **C.** | | Male + Female Harvest Rate (LHRATE[1]) Equations | | | |
| Independent variables[2] | $R^2$ | Independent variables[2] | $R^2$ | Independent variables[2] | $R^2$ |
| | | RL1T3 + RAINLY2 + RAINLY4 only | 0.45 | | |
| | | Above vars. + MPCT | 0.48 | | |
| RAINLY1 + RAINLY3 + RAINLY 4 + RAINL7 + RAINL12 | 0.56 | Above vars. + RAINLY5 + RAINLY 6 | 0.56 | RL1T3 + RAINLY2 | 0.39 |

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The consistent inclusion of the variable MPCT in the majority of the equations discussed above and the apparently major contributory role of MPCT in regard to the proportion of the total variability in the observed harvest rates actually accounted for by the appropriate equations posed the question as to whether MPCT, a harvest numbers related variable, could validly be included as an independent variable in the fitted equations. The problem did not of course arise in the case of the predictive equations derived for the monthly combined male + female harvest rates in the Carnarvon and Gascoyne Catchment Management Areas because MPCT was not included in these equations, but the possibility that misleading results could have been obtained in the other cases considered was investigated by excluding MPCT from the list of independent variables included in the separate predictive equations previously derived. The results of these tests are summarized in Table A I. 3.

Exclusion of MPCT from the respective equations describing variation in the monthly male and female harvest rates within the Carnarvon and Gascoyne Catchment Management Areas showed in the case of the male harvest rate data that the rainfall variables now considered alone generally remained 'significant' and accounted for approximately 75% of the total variability previously accounted for by the final equation with MPCT included (cf. Table A I. 2). In contrast, exclusion of MPCT from the fitted female harvest rate equations tended to reduce the list of 'significant' rainfall related variables. Alone, only RL1T3 was 'significant' in respect to the Carnarvon female harvest rate, while only RAINLY1 and RAINLY4 remained 'significant' in the case of the Gascoyne female data. In each instance, MPCT was the next 'significant' variable to be included, and the additional Rainfall variables previously included in the full equations only then became 'significant'.

Omission of MPCT from the list of variables included in the combined male + female harvest rate equation calculated for the Murchison data showed that only RL1T3, RAINLY2 and RAINLY4

remained 'significant'. These three variables together accounted for 45% of the total variability in the harvest rate and 80% of the total variability actually accounted for by the previously derived final equation (e.g. partial $R^2$ = 0.45 cf. total $R^2$ = 0.56). RAINLY6 was 'not significant' (P ≃ 0.08) when entered as the fourth variable in the equation, but zero inclusion level analysis at this point suggested that rainfall received both early within the first year from the month of record and in the second half of the second year would still be 'significant' without the inclusion of MPCT, even though similar variables were already included in the equation. This result, and the fact that both RAINLY5 and RAINLY6 only picked up residual variability after inclusion of MPCT suggests that the contribution of these two variables, particularly in respect to the greater relative importance of RAINLY6, could reflect a reinforcement of a predominant shorter term cycle that could possibly be defined more precisely using more suitable subdivisions within the prior rainfall record than have been tested so far. The partial correlation coefficient for total rainfall in months 20 to 23 prior to the record (RL20T23) also remained close to significance (P ≃ 0.06) at this point.

The further examination of the separated rainfall contributions in respect to the Murchison male harvest rate equation presented a similar picture to that described above. RL1T3, RAINLY2 and RAINLY4 together accounted for 46% of the total variability and 62% of the variability actually described by the full list of independent variables included in the original equation (e.g. partial $R^2$ = 0.46 cf. total $R^2$ = 0.74). The combination of MPCT with the former three variables accounted for 70% of the total variability in harvest rates.

In contrast with the above two cases, all rainfall variables previously included in the predictive equation for the Murchison female harvest rate were individually 'significant' without the inclusion of MPCT, and accounted for the major portion of the total variability previously described ($R^2$ = 0.44, cf. 0.47 for the full equation). Apart

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from the relatively low proportion of the total variability accounted for in this instance, the minor contribution attributable to MPCT and the apparently weaker influence of RAINLY2 and RAINLY4 on the pattern of variation in the female harvest rates are both suggestive of a proportionately lesser impact of commercial harvesting on the female sector of the kangaroo stocks in the Murchison Area. This result is consistent with the observations mentioned previously, i.e. that harvest impact usually falls more heavily on the male sector of the stock.

In summary, it suffices to say at this point that the generally high proportion of the total harvest rate variability that was still accounted for by the 'significant' Rainfall variables when MPCT was omitted from those equations in which MPCT was initially included is supportive of the view that variation in MPCT is largely reflective of changing abundance of kangaroos relative to the shooters' desired harvesting performance criteria. MPCT may, therefore, be validly included among the independent variables in deriving the predictive equations discussed above.

## DISCUSSION

The common feature of the results discussed above is the incorporation in the fitted harvest rate equations of short-term rainfall variables (i.e. those relating to rainfall received within 12 months or less prior to the month of record) having a predominantly negative impact on harvest rates, and the consistent inclusion of MPCT in all the male and female harvest rate equations.

The inclusion of short-term rainfall as a negative factor influencing the recorded harvest rates is consistent with the common belief that hunting of Red Kangaroos is less successful following rain. The initial correlation analyses (Table A I. 1) showed however that rainfall could be expected to influence the behaviour of shooters just as easily as it could affect the behaviour of kangaroos. Thus, reductions in harvest offtake immediately following rain can firstly be attributed to shooters reducing effort simply because of physical difficulties, e.g. reduced mobility and a greater risk of bogging their vehicles, and secondly, because of expected reductions in the availability of animals to shoot, which further reduces the expected profitability of hunting on these occasions.

In contrast with the above responses of shooters, the observed changes in total harvests and the total harvest effort relative to the average harvest rates attainable through the 1972-1979 period within the Murchison and Gascoyne Catchment Management Areas appear paradoxical at first sight. Incidentally, results of this sort highlight the type of bias to be expected in the harvest monitoring statistics being collected from shooters. Even so, the response observed can still be readily explained in terms of the effects of changing expectations of profitability on the operations of the professional kangaroo shooters. The key factors contributing to the response in this instance are:

i)    the effects of the declining exploited stocks

of kangaroos on the composition of the harvests potentially available to the shooters to the end of 1979; and,

ii)    the attendant relative changes in distribution of the residual stocks of kangaroos then being hunted.

Thus, the harvest data (Appendix II, Tables A II. 2 & 3) show that the average carcase weights of the male kangaroos being taken declined to the end of 1979 and that the harvest composition also changed to a predominance of females. Both these factors would have increased the relative harvesting costs/carcase taken. In addition to these direct changes affecting the harvesting of kangaroos, the reduction in numbers would also have confronted shooters with a much more patchy distribution of relative abundance (e.g. Frith and Calaby 1969, p. 90), although the local centres of greatest abundance would not generally have shifted and high harvest rates could still be maintained while hunting in these locations. Hunting in these circumstances is increasingly focussed on the limited centres of abundance and effort is not expended in looking elsewhere for kangaroos during hunting trips because the shooters know from experience that they will be unlikely to find many animals. The harvest rates (C/f indices) reported at this point are therefore less likely to be representative of the average abundance of the kangaroo stocks than at other times. The associated changes in the distribution of the harvests taken as shown in Figs. 5 - 12 and detailed in Tables A II. 1 - A II.12 support this view.

Apart from the general observation that the inclusion of MPCT in the separate male and female harvest rate equations most probably reflects the changing abundance of kangaroos relative to the professional shooters' desired harvesting performance criteria, the particular results obtained may also be affected by the fact that the total harvest effort recorded has not been apportioned by sex in calculating the separate C/f indices for the male and female sectors of the harvests.

The inclusion of MPCT in the male + female harvest rate equation calculated for the Murchison Management Area and the relatively low proportion of the total variability also accounted for by MPCT in the equation fitted to the Murchison female harvest rate data when compared with the results for the Gascoyne Catchment (Table A I. 2) appears to be attributable to the fact that shooters were able to maintain a marked predominance of males in the Murchison harvests through most of the record (cf. Figs. 15 and 17). I have no data which would assist in deciding whether this difference between Management Areas is due either to differences in the selection differentials that shooters in each area have been able to apply, or to differences in the composition of the respective kangaroo stocks.

The apparently different pattern of influence of short-term rainfall on the harvest rates recorded within the Gascoyne Catchment also deserves further comment at this point. The inclusion of

both the monthly rainfall received seven months prior to the harvest month in question and the monthly rainfall 12 months prior to the harvest month (RAINL 7 and RAINL12) along with the total rainfall received within the first 12 months preceding the harvest month (RAINLY1) as significant variables in the full equations fitted to the Gascoyne Catchment harvest rate data suggested that the influence on harvest rates apparently being described by these three variables could possibly be defined more simply by some other rainfall variable(s) not previously considered in the analyses attempted. Division of the expected monthly rainfall pattern within this Management Area into an expected 'rainy' and a slightly shorter 'non-rainy' period within the year suggested a possible starting point for further investigation. This line was pursued further, but the question raised was not resolved.

It is of course possible that an artifact could have been responsible for the apparent difference referred to above, due to the primary rainfall input data used in the analyses being averaged over a much wider area than that included within the Gascoyne Catchment Management Area itself (cf. Fig. A I. 1 and Fig. 4). However, two other possibilities are suggested. Firstly, it is possible that the within year pattern suggested could reflect some underlying variation in pasture growth patterns in response to rainfall in this area and its resultant effects on dispersal of the kangaroo stocks relative to the shooters. Secondly, this pattern could also reflect some other difference peculiar to the Gascoyne Catchment Management Area. This latter possibility is further considered in the following discussion.

The rainfall variables related to prior rainfall events further removed from the harvest month than the end of the first 12 month period that were included in the full equations fitted to the various sets of harvest data all had positive partial correlation coefficients. The real factors relating to the association of these rainfall variables with harvest rates are therefore likely to be those describing changes in recruitment and total stock abundance.

Rainfall between 13 and 24 months prior to the harvest month (RAINLY2) is included in all the equations calculated for the Murchison and Carnarvon Management Areas (Tables A I. 2 and 3), and although this specific variable is excluded from the Gascoyne Catchment equations, the apparently more complex relationship between the harvest rates and rainfall within the first 12 months prior to the harvest month discussed above in relation to the Gascoyne Catchment can be considered similarly because very few Red Kangaroos of 2 years of age or less are taken by professional kangaroo shooters in Western Australia (Prince, unpublished data). Rainfall patterns which would influence recruitment to stocks therefore appear to be important in all three Management Areas considered.

The within year rainfall events contributing to this presumed stock recruitment effect in each instance have not been further separated, but three possible changes could be involved, e.g. :

i) improved rainfall very late in the period could have improved reproductive success;

ii) generally good rainfall could be expected to have enhanced the survival of mature and newly independent joeys and so boosted stock recruitment; and,

iii) the availability of kangaroos to shooters could be improved by the accumulation of kangaroos in more accessible places as a consequence of redistribution of stocks within the particular Management Area following changes in the pastures.

The latter two changes appear to be the most probable direct contributors because shooter behaviour rules out any immediate impact attributable to the first suggestion. If the correct explanation is provided here, it follows that the relative contributions of the two main recruitment factors suggested have differed with respect to the different Management Areas considered. Direct recruitment seems likely to be the more important factor in the Carnarvon and Murchison Management Areas, whereas redistribution of stocks following increased breeding success appears most likely to be the major contributor within the Gascoyne Catchment Management Area.

The apparent qualitative differences between the Murchison and Gascoyne Catchment Management Areas discussed above may thus be responsible also for the differences between these two Management Areas with respect to the apparent associations between harvest rates and rainfall earlier in the record than 24 months prior to the harvest month, e.g. the apparent associations between harvest rates and and the rainfall variables RAINLY 3 through RAINLY6 (Table A I. 3).

The data considered in the analyses presented here were insufficient to more adequately explore the possible questions raised within the above discussion, but it is clear that the sustained pattern of exploitation observed is based on both recruitment to stocks in the shorter term and also on the size of the residual stocks remaining after prolonged droughts. The present pattern of interaction between rainfall and harvests therefore appears consistent with the general pattern of interaction between rainfall and harvest previously deduced in regard to the historic harvest data (Prince 1984, Appendix I).

One further feature of the results discussed that is worthy of final comment is the omission of specific body-weight related variables from the lists of 'significant' independent variables included in the full harvest rate equations derived in each case. The variable SELWT was initially included in the Gascoyne harvest rate equations, but was apparently replaced by RAINLY3 in the final equations. This result, and the fact that average male carcase weights have been observed to increase approximately two years after the onset of sustained drought (see Figs. 13 - 36) suggests that the average male carcase weight parameter is generally indicative of changes in the rate of

recruitment to Red Kangaroo stocks in Western Australia rather than the intensity of harvest. The observed pattern of change in average male carcase weight has not been fully investigated as yet, but the usually anticipated long-term changes might still be expected to show in situations where harvesting is having the greatest impact on the local kangaroo populations.

## CONCLUSION

The equations discussed above have accounted for a relatively high proportion of the total variability in monthly C/f indices in terms of variables which can be related to both short-term changes in relative abundance and presumed real changes in abundance related to patterns of recruitment and prior exploitation. The harvest monitoring data collected in Western Australia to 1979 can therefore be regarded as providing useful insights into the status of the exploited Red Kangaroo populations. The equations derived here should not be considered definitive however, although they are suitable for the primary purpose of the analyses attempted.

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# APPENDIX II

## SUMMARY OF THE RED KANGAROO HARVEST DATA FOR HARVESTS TAKEN WITHIN NOMINATED STATE MANAGEMENT AREAS - WESTERN AUSTRALIA : 1971 - 1979

TABLE A II. 1.    SUMMARY OF THE RED KANGAROO HARVEST DATA FOR
HARVESTS TAKEN WITHIN THE WHOLE OF WESTERN
AUSTRALIA : 1971 - 1979.

[NOTE - N/A  = DATA NOT AVAILABLE.
(1971 DATA)* = PARTIAL DATA ONLY
RELATING TO THIS PART OF HARVEST.]

SUMMARY FOR WHOLE OF STATE                                              YEAR  1971

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,71 | | | | | NO DETAILED RECORDS | | | | |
| FEB,71 | 97 / +164* | N/A | 1836 / +2784 | 1451 / +2329 | N/A | N/A | 23.3 | 13.9 | 55.9 / 54.4 |
| MAR,71 | 212 / +85* | N/A | 3051 / +1200 | 2648 / +1161 | N/A | N/A | 22.9 | 13.7 | 53.5 / 50.8 |
| APR,71 | 441 / +52* | N/A | 7368 / +819 | 5997 / +743 | N/A | N/A | 22.2 | 13.3 | 55.1 / 52.4 |
| MAY,71 | 490 | N/A | 8035 | 6349 | N/A | N/A | 22.6 | 13.5 | 55.7 |
| JUN,71 | 422 | N/A | 5428 | 4893 | N/A | N/A | 23.2 | 14.0 | 52.6 |
| JUL,71 | 496 | N/A | 6440 | 5265 | N/A | N/A | 24.1 | 14.4 | 55.0 |
| AUG,71 | 404 | N/A | 4333 | 4781 | N/A | N/A | 23.7 | 14.1 | 47.5 |
| SEP,71 | 510 | N/A | 6311 | 5333 | N/A | N/A | 24.5 | 14.8 | 54.2 |
| OCT,71 | 547 | N/A | 6375 | 6127 | N/A | N/A | 24.7 | 14.9 | 51.0 |
| NOV,71 | 646 | N/A | 8890 | 8199 | N/A | N/A | 24.4 | 14.9 | 52.0 |
| DEC,71 | 586 | N/A | 8173 | 8333 | N/A | N/A | 24.0 | 14.5 | 49.5 |
| TOTAL ,1971 | 4851 / +301* | N/A | 46230 / +4803 | 59376 / +4233 | N/A | N/A | 23.7 | 14.2 | 52.7 / 53.2 |

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SUMMARY FOR WHOLE OF STATE                                          YEAR 1972

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 652 | N/A | 8996 | 9635 | N/A | N/A | 23.7 | 14.1 | 48.3 |
| FEB,72 | 455 | 2358 | 6379 | 6443 | 2.705 | 2.732 | 22.9 | 13.7 | 49.3 |
| MAR,72 | 673 | 4605 | 10788 | 9560 | 2.344 | 2.076 | 22.8 | 13.6 | 53.0 |
| APR,72 | 601 | 4294 | 9929 | 8755 | 2.312 | 2.039 | 23.1 | 13.7 | 53.1 |
| MAY,72 | 565 | 4175 | 8009 | 9092 | 1.918 | 2.178 | 21.9 | 13.6 | 46.8 |
| JUN,72 | 459 | 2989 | 6135 | 6299 | 2.053 | 2.107 | 21.7 | 13.4 | 49.3 |
| JUL,72 | 569 | 3713 | 7662 | 7047 | 1.900 | 1.898 | 21.4 | 13.2 | 50.0 |
| AUG,72 | 690 | 4471 | 8873 | 8892 | 1.984 | 1.989 | 21.9 | 13.5 | 49.9 |
| SEP,72 | 596 | 4196 | 8386 | 8529 | 1.999 | 2.035 | 22.5 | 14.1 | 49.5 |
| OCT,72 | 654 | 4286 | 9734 | 9296 | 2.271 | 2.169 | 23.3 | 14.4 | 51.2 |
| NOV,72 | 582 | 3863 | 8295 | 8381 | 2.147 | 2.170 | 23.1 | 14.4 | 49.7 |
| DEC,72 | 462 | 2917 | 6306 | 6927 | 2.162 | 2.375 | 22.2 | 13.9 | 47.7 |
| TOTAL | 6949 | 46780 | 98983 | 98945 | 2.114 | 2.113 | 22.6 | 13.8 | 50.0 |

SUMMARY FOR WHOLE OF STATE                                          YEAR 1973

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 502 | 3162 | 7359 | 7136 | 2.327 | 2.257 | 21.3 | 13.5 | 50.8 |
| FEB,73 | 323 | 1923 | 4920 | 4218 | 2.558 | 2.193 | 22.2 | 13.6 | 53.8 |
| MAR,73 | 330 | 1910 | 5303 | 4036 | 2.777 | 2.113 | 22.0 | 13.3 | 56.8 |
| APR,73 | 320 | 2007 | 5054 | 4243 | 2.519 | 2.114 | 22.7 | 13.7 | 54.4 |
| MAY,73 | 325 | 1834 | 4657 | 3649 | 2.537 | 1.988 | 22.7 | 14.2 | 56.1 |
| JUN,73 | 322 | 1751 | 3672 | 3718 | 2.098 | 2.124 | 22.6 | 13.6 | 49.7 |
| JUL,73 | 301 | 1655 | 3411 | 3367 | 2.061 | 2.035 | 22.9 | 13.8 | 50.3 |
| AUG,73 | 345 | 1914 | 4084 | 3578 | 2.134 | 1.869 | 22.9 | 14.4 | 53.3 |
| SEP,73 | 434 | 2596 | 5426 | 4690 | 2.167 | 1.807 | 22.8 | 14.4 | 54.5 |
| OCT,73 | 472 | 2922 | 6445 | 5885 | 2.206 | 2.014 | 23.3 | 14.9 | 52.3 |
| NOV,73 | 450 | 2839 | 6417 | 6132 | 2.260 | 2.160 | 23.8 | 14.6 | 51.1 |
| DEC,73 | 395 | 2398 | 6001 | 4940 | 2.502 | 2.060 | 23.1 | 14.3 | 54.3 |
| TOTAL | 4519 | 26908 | 62949 | 55592 | 2.339 | 2.066 | 22.7 | 14.0 | 53.1 |

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SUMMARY FOR WHOLE OF STATE                                                                              YEAR 1974

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL MALES | NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN.74 | 482 | 3001 | 4591 | 7680 | 2.196 | 2.359 | 23.1 | 13.8 | 48.2 |
| FEB.74 | 345 | 2021 | 4713 | 4373 | 2.332 | 2.164 | 22.6 | 13.9 | 51.9 |
| MAR.74 | 393 | 2269 | 5092 | 5008 | 2.244 | 2.207 | 23.1 | 13.9 | 50.4 |
| APR.74 | 430 | 2378 | 6401 | 5756 | 2.692 | 2.421 | 23.2 | 14.1 | 52.7 |
| MAY.74 | 431 | 2464 | 5009 | 5219 | 2.398 | 2.116 | 22.9 | 14.0 | 53.1 |
| JUN.74 | 494 | 2890 | 7466 | 6702 | 2.576 | 2.312 | 23.2 | 13.9 | 52.7 |
| JUL.74 | 213 | 1194 | 3044 | 2429 | 2.549 | 2.034 | 24.1 | 14.4 | 55.6 |
| AUG.74 | 259 | 1558 | 3481 | 3138 | 2.362 | 2.014 | 23.7 | 13.9 | 54.0 |
| SEP.74 | 404 | 2365 | 5291 | 4628 | 2.237 | 1.957 | 24.2 | 14.1 | 53.? |
| OCT.74 | 434 | 2446 | 5509 | 5223 | 2.252 | 2.125 | 24.2 | 14.3 | 51.3 |
| NOV.74 | 509 | 2924 | 7159 | 6450 | 2.449 | 2.206 | 23.8 | 14.6 | 52.6 |
| DEC.74 | 429 | 2297 | 6623 | 5385 | 2.383 | 2.344 | 24.5 | 14.6 | 55.? |
| TOTAL | 4823 | 27817 | 67479 | 61391 | 2.426 | 2.207 | 23.5 | 14.1 | 52.3 |

SUMMARY FOR WHOLE OF STATE                                                                              YEAR 1975

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL MALES | NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN.75 | 435 | 2481 | 6298 | 6334 | 2.538 | 2.553 | 24.0 | 14.2 | 49.9 |
| FEB.75 | 129 | 791 | 1844 | 2186 | 2.332 | 2.745 | 24.3 | 13.9 | 45.8 |
| MAR.75 | 210 | 1292 | 2691 | 2722 | 2.082 | 2.106 | 23.6 | 13.7 | 49.7 |
| APR.75 | 319 | 1752 | 3748 | 3656 | 2.139 | 2.047 | 23.3 | 13.9 | 50.6 |
| MAY.75 | 343 | 2004 | 4407 | 3984 | 2.192 | 1.988 | 23.6 | 14.0 | 52.5 |
| JUN.75 | 356 | 1925 | 4415 | 4349 | 2.293 | 2.259 | 22.9 | 13.9 | 50.4 |
| JUL.75 | 395 | 2241 | 4968 | 4482 | 2.217 | 2.000 | 22.4 | 14.1 | 52.4 |
| AUG.75 | 373 | 2267 | 5162 | 5125 | 2.277 | 2.241 | 23.2 | 14.4 | 50.2 |
| SEP.75 | 464 | 2711 | 6742 | 6401 | 2.487 | 2.361 | 23.0 | 14.8 | 51.3 |
| OCT.75 | 373 | 2210 | 5312 | 5005 | 2.404 | 2.265 | 24.1 | 14.7 | 51.5 |
| NOV.75 | 453 | 2571 | 7141 | 5729 | 2.773 | 2.228 | 23.7 | 14.5 | 55.5 |
| DEC.75 | 275 | 1498 | 4149 | 3346 | 2.783 | 2.234 | 24.1 | 14.4 | 55.5 |
| TOTAL | 4145 | 23755 | 56897 | 53318 | 2.395 | 2.244 | 23.6 | 14.3 | 51.6 |

SUMMARY FOR WHOLE OF STATE                                                                      YEAR 1976

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,76 | 450 | 2486 | 6331 | 5437 | 2.547 | 2.187 | 22.9 | 14.0 | 53.8 |
| FEB,76 | 298 | 1726 | 4419 | 3710 | 2.560 | 2.153 | 23.5 | 14.1 | 54.4 |
| MAR,76 | 395 | 2266 | 6123 | 5442 | 2.703 | 2.402 | 22.8 | 13.9 | 52.9 |
| APR,76 | 424 | 2427 | 6481 | 5410 | 2.671 | 2.229 | 23.2 | 14.0 | 54.5 |
| MAY,76 | 404 | 2309 | 5915 | 5927 | 2.545 | 2.572 | 22.8 | 13.8 | 49.9 |
| JUN,76 | 408 | 2448 | 6662 | 6541 | 2.678 | 2.629 | 22.8 | 14.1 | 50.5 |
| JUL,76 | 365 | 2234 | 6125 | 5179 | 2.742 | 2.319 | 22.8 | 14.1 | 54.2 |
| AUG,76 | 410 | 2423 | 6451 | 5808 | 2.745 | 2.397 | 23.4 | 14.2 | 53.4 |
| SEP,76 | 445 | 2537 | 7120 | 6222 | 2.807 | 2.492 | 22.8 | 14.3 | 53.0 |
| OCT,76 | 459 | 2588 | 7482 | 6799 | 2.891 | 2.627 | 22.5 | 14.3 | 52.4 |
| NOV,76 | 470 | 2652 | 7574 | 6726 | 2.856 | 2.536 | 22.1 | 14.2 | 53.0 |
| DEC,76 | 304 | 1924 | 5491 | 4231 | 2.853 | 2.199 | 22.5 | 14.0 | 56.5 |
| TOTAL | 4832 | 28052 | 76274 | 67532 | 2.722 | 2.408 | 22.8 | 14.1 | 53.1 |

SUMMARY FOR WHOLE OF STATE                                                                      YEAR 1977

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,77 | 280 | 1512 | 4989 | 4199 | 3.300 | 2.780 | 21.5 | 13.7 | 54.3 |
| FEB,77 | 350 | 1933 | 5508 | 4651 | 2.850 | 2.406 | 21.4 | 13.3 | 54.2 |
| MAR,77 | 348 | 1961 | 5998 | 5046 | 3.358 | 2.573 | 20.4 | 13.2 | 54.3 |
| APR,77 | 424 | 2394 | 6731 | 6439 | 2.311 | 2.689 | 21.2 | 13.8 | 51.1 |
| MAY,77 | 483 | 2742 | 7273 | 6773 | 2.653 | 2.473 | 20.9 | 13.6 | 51.8 |
| JUN,77 | 466 | 2610 | 7240 | 6219 | 2.774 | 2.383 | 21.1 | 13.4 | 53.8 |
| JUL,77 | 560 | 3104 | 9304 | 7465 | 2.997 | 2.405 | 22.1 | 13.9 | 55.5 |
| AUG,77 | 464 | 2533 | 7519 | 7212 | 2.969 | 2.848 | 21.9 | 13.9 | 51.0 |
| SEP,77 | 436 | 2503 | 6708 | 6063 | 2.680 | 2.422 | 21.6 | 14.2 | 52.5 |
| OCT,77 | 460 | 2507 | 6875 | 5523 | 2.743 | 2.602 | 21.8 | 14.3 | 51.3 |
| NOV,77 | 504 | 2766 | 6772 | 6851 | 2.448 | 2.477 | 21.5 | 14.2 | 49.7 |
| DEC,77 | 324 | 1705 | 4704 | 4377 | 2.759 | 2.567 | 21.3 | 13.9 | 51.3 |
| TOTAL | 5099 | 28272 | 79621 | 71818 | 2.816 | 2.541 | 21.4 | 13.8 | 52.6 |

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SUMMARY FOR WHOLE OF STATE

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL MALES | NUMBER FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 348 | 1972 | 4960 | 4848 | 2.515 | 2.458 | 20.1 | 13.0 | 50.6 |
| FEB,78 | 271 | 1517 | 3653 | 3309 | 2.408 | 2.181 | 20.4 | 13.1 | 52.5 |
| MAR,78 | 351 | 1852 | 4394 | 3552 | 2.372 | 1.917 | 21.0 | 13.4 | 55.3 |
| APR,78 | 422 | 2241 | 5281 | 4638 | 2.256 | 1.968 | 21.7 | 14.0 | 53.4 |
| MAY,78 | 477 | 2743 | 6464 | 6007 | 2.357 | 2.190 | 21.7 | 13.9 | 51.8 |
| JUN,78 | 452 | 2559 | 5743 | 5926 | 2.244 | 2.320 | 22.3 | 14.2 | 49.2 |
| JUL,78 | 367 | 1985 | 4475 | 4369 | 2.255 | 2.201 | 21.8 | 14.1 | 50.6 |
| AUG,78 | 457 | 2420 | 5649 | 5085 | 2.334 | 2.101 | 22.1 | 14.1 | 52.6 |
| SEP,78 | 487 | 2688 | 5558 | 5947 | 2.067 | 2.212 | 22.2 | 14.4 | 48.3 |
| OCT,78 | 488 | 2719 | 5925 | 5870 | 2.179 | 2.159 | 23.4 | 14.6 | 50.2 |
| NOV,78 | 546 | 3137 | 7629 | 7710 | 2.432 | 2.458 | 23.4 | 14.6 | 49.7 |
| DEC,78 | 481 | 2721 | 6860 | 7026 | 2.521 | 2.596 | 23.0 | 14.1 | 49.4 |
| TOTAL | 5147 | 28665 | 66591 | 64277 | 2.323 | 2.242 | 22.2 | 14.0 | 50.9 |

SUMMARY FOR WHOLE OF STATE

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL MALES | NUMBER FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 452 | 2476 | 5870 | 6338 | 2.371 | 2.560 | 23.0 | 13.9 | 48.1 |
| FEB,79 | 339 | 1790 | 3974 | 4555 | 2.220 | 2.544 | 22.6 | 14.0 | 46.6 |
| MAR,79 | 422 | 2369 | 5154 | 5359 | 2.175 | 2.262 | 22.7 | 13.7 | 49.0 |
| APR,79 | 424 | 2393 | 5492 | 6318 | 2.295 | 2.640 | 22.8 | 13.8 | 46.5 |
| MAY,79 | 438 | 2430 | 5648 | 6242 | 2.325 | 2.569 | 23.2 | 13.9 | 47.5 |
| JUN,79 | 492 | 2629 | 6444 | 7137 | 2.451 | 2.715 | 23.5 | 14.0 | 47.4 |
| JUL,79 | 474 | 2535 | 6000 | 7281 | 2.367 | 2.872 | 23.8 | 13.8 | 45.2 |
| AUG,79 | 406 | 2128 | 5281 | 6150 | 2.482 | 2.890 | 23.5 | 13.9 | 46.2 |
| SEP,79 | 524 | 2833 | 6465 | 7582 | 2.282 | 2.676 | 24.3 | 14.2 | 46.0 |
| OCT,79 | 423 | 2433 | 7149 | 9147 | 2.206 | 2.823 | 24.0 | 14.3 | 43.9 |
| NOV,79 | 600 | 3555 | 6395 | 8944 | 1.798 | 2.488 | 24.1 | 14.2 | 42.0 |
| DEC,79 | 478 | 2650 | 5469 | 6381 | 2.064 | 2.408 | 23.8 | 13.8 | 46.2 |
| TOTAL | 5572 | 30969 | 69341 | 81334 | 2.238 | 2.624 | 23.5 | 14.0 | 46.0 |

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TABLE A II. 2.   SUMMARY OF THE RED KANGAROO HARVEST DATA FOR
HARVESTS TAKEN WITHIN THE MURCHISON MANAGEMENT
AREA - WESTERN AUSTRALIA : 1971 - 1979.

[NOTE - N/A    = DATA NOT AVAILABLE.
(1971 DATA)* = PARTIAL DATA ONLY
RELATING TO THIS PART OF HARVEST.]

SUMMARY FOR THE MURCHISON MANAGEMENT AREA        YEAR 1971

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,71 | 15 | N/A | 403 | 366 | N/A | N/A | 23.9 | 14.5 | 52.4 |
| FEB,71 | +52* | | +998 | +553 | | | | | 44.3 |
| MAR,71 | 50 | N/A | 938 | 757 | N/A | N/A | 22.6 | 14.7 | 55.3 |
| | +12* | | +208 | +130 | | | | | 61.5 |
| APR,71 | 71 | N/A | 1664 | 963 | N/A | N/A | 22.6 | 14.1 | 63.3 |
| | +29* | | +509 | +364 | | | | | 58.3 |
| MAY,71 | 88 | N/A | 1726 | 1006 | N/A | N/A | 23.3 | 14.4 | 63.2 |
| JUN,71 | 80 | N/A | 1178 | 1264 | N/A | N/A | 24.4 | 14.5 | 48.2 |
| JUL,71 | 72 | N/A | 1190 | 1146 | N/A | N/A | 23.6 | 14.5 | 50.9 |
| AUG,71 | 44 | N/A | 375 | 582 | N/A | N/A | 24.5 | 14.5 | 39.2 |
| SEP,71 | 80 | N/A | 703 | 855 | N/A | N/A | 24.3 | 14.5 | 45.1 |
| OCT,71 | 100 | N/A | 1254 | 1183 | N/A | N/A | 24.3 | 15.1 | 51.5 |
| NOV,71 | 118 | N/A | 2111 | 1793 | N/A | N/A | 24.3 | 15.0 | 54.1 |
| DEC,71 | 97 | N/A | 1431 | 1374 | N/A | N/A | 25.4 | 14.8 | 51.0 |
| TOTAL ,1971 | 915 | N/A | 12973 | 11289 | N/A | N/A | 23.9 | 14.7 | 53.5 |
| | +93* | | +1715 | +1047 | | | | | 62.1 |

NO DETAILED RECORDS

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SUMMARY FOR THE MURCHISON MANAGEMENT AREA
YEAR 1972

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 108 | N/A | 1374 | 1363 | N/A | N/A | 24.6 | 14.4 | 50.2 |
| FEB,72 | 132 | N/A | 1758 | 1700 | N/A | N/A | 22.8 | 14.1 | 50.8 |
| MAR,72 | 141 | 839 | 2022 | 1841 | 2.469 | 2.194 | 22.9 | 14.2 | 52.3 |
| APR,72 | 134 | 1034 | 1965 | 2009 | 1.900 | 1.943 | 22.7 | 14.2 | 49.4 |
| MAY,72 | 188 | 1479 | 2467 | 3118 | 1.568 | 2.109 | 21.5 | 13.7 | 44.2 |
| JUN,72 | 118 | 745 | 1237 | 1421 | 1.617 | 1.857 | 20.5 | 13.5 | 46.5 |
| JUL,72 | 146 | 958 | 1629 | 1446 | 1.701 | 1.531 | 20.9 | 13.4 | 52.6 |
| AUG,72 | 204 | 1301 | 1908 | 2211 | 1.467 | 1.699 | 21.2 | 13.6 | 46.3 |
| SEP,72 | 152 | 1037 | 1668 | 1846 | 1.609 | 1.760 | 22.4 | 12.8 | 47.5 |
| OCT,72 | 181 | 1157 | 2230 | 2109 | 1.927 | 1.823 | 24.8 | 14.6 | 51.4 |
| NOV,72 | 131 | 878 | 1636 | 1729 | 1.964 | 1.970 | 24.2 | 14.8 | 48.6 |
| DEC,72 | 85 | 590 | 898 | 1243 | 1.521 | 2.105 | 22.0 | 13.6 | 41.9 |
| TOTAL | 1720 | 11720 | 20792 | 22056 | 1.774 | 1.882 | 22.6 | 14.0 | 48.5 |

SUMMARY FOR THE MURCHISON MANAGEMENT AREA
YEAR 1973

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 132 | 666 | 1588 | 1601 | 1.834 | 1.952 | 22.3 | 13.7 | 48.4 |
| FEB,73 | 102 | 602 | 1464 | 1184 | 2.431 | 1.966 | 22.1 | 13.5 | 55.3 |
| MAR,73 | 104 | 622 | 1898 | 1322 | 3.047 | 2.122 | 20.7 | 13.3 | 58.9 |
| APR,73 | 111 | 725 | 1562 | 1509 | 2.155 | 2.082 | 22.0 | 13.6 | 50.9 |
| MAY,73 | 134 | 757 | 1882 | 1336 | 2.485 | 1.765 | 21.9 | 14.2 | 58.5 |
| JUN,73 | 73 | 324 | 474 | 546 | 1.464 | 1.686 | 23.1 | 13.4 | 46.5 |
| JUL,73 | 62 | 330 | 547 | 583 | 1.658 | 1.768 | 20.6 | 13.4 | 48.4 |
| AUG,73 | 120 | 598 | 825 | 1012 | 1.380 | 1.693 | 22.7 | 13.8 | 44.9 |
| SEP,73 | 141 | 925 | 1565 | 1517 | 1.691 | 1.639 | 20.8 | 13.9 | 50.8 |
| OCT,73 | 151 | 965 | 1956 | 1821 | 2.026 | 1.886 | 21.9 | 14.4 | 51.8 |
| NOV,73 | 162 | 1069 | 2405 | 2194 | 2.250 | 2.052 | 23.9 | 14.7 | 52.3 |
| DEC,73 | 111 | 767 | 1862 | 1460 | 2.429 | 1.904 | 22.7 | 14.5 | 56.1 |
| TOTAL | 1403 | 8556 | 18028 | 16175 | 2.107 | 1.890 | 22.1 | 14.0 | 52.7 |

SUMMARY FOR THE MURCHISON MANAGEMENT AREA                    YEAR 1974

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,74 | 155 | 963 | 2345 | 1942 | 2.436 | 2.017 | 23.1 | 14.1 | 54.7 |
| FEB,74 | 100 | 597 | 1477 | 1288 | 2.474 | 2.157 | 22.2 | 14.4 | 53.4 |
| MAR,74 | 92 | 586 | 1459 | 1220 | 2.490 | 2.083 | 22.7 | 13.8 | 54.5 |
| APR,74 | 115 | 729 | 2282 | 1598 | 3.132 | 2.193 | 22.1 | 13.8 | 58.8 |
| MAY,74 | 147 | 852 | 2436 | 1585 | 2.869 | 1.661 | 21.9 | 14.1 | 60.6 |
| JUN,74 | 151 | 917 | 2607 | 1667 | 2.843 | 1.818 | 22.5 | 13.8 | 61.0 |
| JUL,74 | 29 | 168 | 478 | 334 | 2.946 | 1.989 | 22.4 | 14.1 | 58.9 |
| AUG,74 | 47 | 269 | 490 | 465 | 1.822 | 1.729 | 22.1 | 14.0 | 51.3 |
| SEP,74 | 152 | 794 | 1364 | 1292 | 1.718 | 1.552 | 21.4 | 14.0 | 52.5 |
| OCT,74 | 123 | 686 | 1369 | 1284 | 1.997 | 1.873 | 23.6 | 15.0 | 51.4 |
| NOV,74 | 129 | 733 | 1643 | 1552 | 2.240 | 2.116 | 23.1 | 14.8 | 51.4 |
| DEC,74 | 109 | 631 | 1550 | 1414 | 2.455 | 2.240 | 24.1 | 15.0 | 52.3 |
| TOTAL | 1249 | 7926 | 19500 | 15591 | 2.460 | 1.966 | 22.6 | 14.3 | 55.6 |

SUMMARY FOR THE MURCHISON MANAGEMENT AREA                    YEAR 1975

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,75 | 90 | 505 | 1113 | 1138 | 2.203 | 2.253 | 22.1 | 14.1 | 49.4 |
| FEB,75 | 40 | 278 | 640 | 627 | 2.302 | 2.255 | 24.0 | 14.0 | 50.5 |
| MAR,75 | 40 | 248 | 509 | 558 | 2.049 | 2.247 | 22.8 | 13.6 | 47.7 |
| APR,75 | 79 | 392 | 772 | 819 | 1.971 | 2.091 | 21.2 | 14.0 | 48.5 |
| MAY,75 | 96 | 514 | 1003 | 936 | 1.951 | 1.821 | 22.2 | 14.0 | 51.7 |
| JUN,75 | 61 | 319 | 680 | 629 | 2.195 | 2.030 | 19.4 | 13.4 | 51.9 |
| JUL,75 | 102 | 598 | 1038 | 1041 | 1.735 | 1.808 | 20.2 | 13.3 | 49.0 |
| AUG,75 | 110 | 673 | 1216 | 1293 | 1.807 | 1.921 | 19.6 | 13.6 | 48.5 |
| SEP,75 | 131 | 741 | 1708 | 1509 | 2.305 | 2.037 | 21.9 | 14.4 | 53.1 |
| OCT,75 | 44 | 419 | 836 | 777 | 1.996 | 1.855 | 22.0 | 14.3 | 51.8 |
| NOV,75 | 133 | 779 | 1497 | 1352 | 2.179 | 1.736 | 22.7 | 14.1 | 55.7 |
| DEC,75 | 89 | 478 | 1223 | 925 | 2.561 | 1.937 | 22.0 | 13.8 | 56.9 |
| TOTAL | 1044 | 5934 | 12435 | 11644 | 2.096 | 1.942 | 21.7 | 13.9 | 51.6 |

SUMMARY FOR THE MURCHISON MANAGEMENT AREA                                        YEAR 1976

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,76 | 91 | 530 | 1168 | 1021 | 2.206 | 1.928 | 22.9 | 13.9 | 53.4 |
| FEB,76 | 88 | 544 | 1240 | 834 | 2.281 | 1.534 | 22.6 | 13.6 | 59.8 |
| MAR,76 | 138 | 774 | 2282 | 1549 | 2.947 | 2.066 | 22.1 | 13.5 | 59.6 |
| APR,76 | 122 | 648 | 1815 | 1292 | 2.800 | 1.993 | 22.2 | 13.8 | 58.4 |
| MAY,76 | 133 | 715 | 1941 | 1931 | 2.715 | 2.701 | 22.3 | 13.4 | 50.1 |
| JUN,76 | 116 | 655 | 2063 | 2001 | 3.103 | 3.010 | 22.3 | 13.7 | 50.8 |
| JUL,76 | 87 | 467 | 1461 | 1003 | 3.130 | 2.149 | 22.8 | 14.1 | 59.3 |
| AUG,76 | 112 | 607 | 1619 | 1500 | 2.668 | 2.472 | 22.7 | 13.9 | 51.9 |
| SEP,76 | 108 | 542 | 1538 | 1488 | 2.835 | 2.743 | 22.3 | 13.9 | 50.9 |
| OCT,76 | 119 | 584 | 1629 | 1544 | 2.791 | 2.645 | 22.0 | 13.8 | 51.3 |
| NOV,76 | 121 | 648 | 1789 | 1606 | 2.762 | 2.479 | 21.7 | 13.9 | 52.7 |
| DEC,76 | 67 | 417 | 1147 | 1062 | 2.747 | 2.544 | 22.6 | 13.7 | 51.9 |
| TOTAL | 1302 | 7132 | 19692 | 16831 | 2.761 | 2.360 | 22.4 | 13.8 | 53.9 |

SUMMARY FOR THE MURCHISON MANAGEMENT AREA                                        YEAR 1977

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,77 | 62 | 327 | 1051 | 800 | 3.217 | 2.449 | 20.1 | 13.2 | 56.8 |
| FEB,77 | 99 | 532 | 1457 | 1220 | 2.740 | 2.295 | 21.1 | 12.8 | 54.4 |
| MAR,77 | 124 | 641 | 2003 | 1554 | 3.127 | 2.426 | 20.5 | 13.1 | 56.3 |
| APR,77 | 127 | 672 | 2029 | 1580 | 3.020 | 2.352 | 20.9 | 13.0 | 56.2 |
| MAY,77 | 102 | 554 | 1131 | 972 | 2.042 | 1.755 | 20.5 | 12.9 | 53.8 |
| JUN,77 | 150 | 816 | 2452 | 1426 | 3.004 | 2.004 | 19.7 | 13.1 | 60.0 |
| JUL,77 | 170 | 911 | 3467 | 2128 | 3.807 | 2.337 | 21.6 | 13.5 | 42.0 |
| AUG,77 | 101 | 537 | 2032 | 1548 | 3.786 | 2.884 | 20.8 | 13.9 | 56.8 |
| SEP,77 | 109 | 595 | 1796 | 1349 | 3.020 | 2.268 | 21.5 | 14.0 | 57.1 |
| OCT,77 | 103 | 538 | 1585 | 1474 | 2.947 | 2.741 | 21.4 | 14.2 | 51.8 |
| NOV,77 | 155 | 808 | 1993 | 1985 | 2.468 | 2.458 | 20.1 | 13.5 | 50.1 |
| DEC,77 | 77 | 375 | 984 | 918 | 2.626 | 2.450 | 19.7 | 13.0 | 51.7 |
| TOTAL | 1379 | 7304 | 21980 | 17164 | 3.009 | 2.350 | 20.7 | 13.4 | 56.2 |

SUMMARY FOR THE MURCHISON MANAGEMENT AREA                                          YEAR  1978

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCETAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 105 | 545 | 1643 | 1258 | 3.017 | 2.310 | 19.4 | 12.6 | 56.6 |
| FEB,78 | 51 | 202 | 1619 | 331 | 3.063 | 1.638 | 18.7 | 12.7 | 65.2 |
| MAR,78 | 87 | 463 | 1187 | 759 | 2.562 | 1.638 | 19.9 | 12.9 | 61.0 |
| APR,78 | 106 | 557 | 1238 | 1053 | 2.224 | 1.891 | 20.3 | 13.3 | 54.0 |
| MAY,78 | 116 | 630 | 1403 | 1292 | 2.546 | 2.052 | 20.7 | 13.6 | 55.4 |
| JUN,78 | 124 | 685 | 1656 | 1443 | 2.417 | 2.136 | 21.7 | 13.8 | 53.1 |
| JUL,78 | 86 | 405 | 1004 | 768 | 2.478 | 1.895 | 20.4 | 13.6 | 56.7 |
| AUG,78 | 124 | 624 | 1563 | 1171 | 2.504 | 1.876 | 21.3 | 14.2 | 57.2 |
| SEP,78 | 125 | 671 | 1319 | 1446 | 1.967 | 2.186 | 22.4 | 14.4 | 47.4 |
| OCT,78 | 132 | 695 | 1613 | 1489 | 2.321 | 2.143 | 22.4 | 14.7 | 52.0 |
| NOV,78 | 144 | 784 | 2310 | 2098 | 2.940 | 2.671 | 22.7 | 14.7 | 52.4 |
| DEC,78 | 117 | 616 | 1852 | 1754 | 3.009 | 2.849 | 22.1 | 13.7 | 51.4 |
| TOTAL | 1319 | 6869 | 17607 | 14902 | 2.563 | 2.169 | 21.3 | 13.8 | 54.2 |

SUMMARY FOR THE MURCHISON MANAGEMENT AREA                                          YEAR  1979

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCETAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 100 | 518 | 1595 | 1537 | 3.090 | 2.968 | 22.4 | 13.6 | 50.9 |
| FEB,79 | 74 | 459 | 1111 | 1136 | 2.423 | 2.477 | 22.2 | 13.7 | 49.4 |
| MAR,79 | 121 | 652 | 1875 | 1626 | 2.877 | 2.495 | 21.6 | 13.5 | 53.6 |
| APR,79 | 98 | 580 | 1807 | 1626 | 3.116 | 2.821 | 21.6 | 13.6 | 52.5 |
| MAY,79 | 85 | 511 | 1492 | 1420 | 2.922 | 2.781 | 22.7 | 13.6 | 51.2 |
| JUN,79 | 126 | 642 | 1881 | 1777 | 2.928 | 2.766 | 23.3 | 13.6 | 51.4 |
| JUL,79 | 90 | 471 | 1128 | 1247 | 2.395 | 2.647 | 22.9 | 13.5 | 47.5 |
| AUG,79 | 99 | 544 | 1489 | 1716 | 2.740 | 3.157 | 22.5 | 13.1 | 46.5 |
| SEP,79 | 91 | 446 | 1120 | 1274 | 2.514 | 2.860 | 22.3 | 13.4 | 46.8 |
| OCT,79 | 114 | 668 | 1346 | 1808 | 2.016 | 2.707 | 22.4 | 13.6 | 42.7 |
| NOV,79 | 59 | 314 | 573 | 731 | 1.826 | 2.330 | 21.7 | 13.1 | 43.9 |
| DEC,79 | 70 | 357 | 826 | 724 | 2.313 | 2.027 | 22.1 | 13.3 | 52.3 |
| TOTAL | 1127 | 6156 | 16243 | 16632 | 2.639 | 2.702 | 22.3 | 13.5 | 49.4 |

TABLE A II. 3.  SUMMARY OF THE RED KANGAROO HARVEST DATA FOR
HARVESTS TAKEN WITHIN THE GASCOYNE CATCHMENT
MANAGEMENT AREA - WESTERN AUSTRALIA : 1971 - 1979.

[NOTE - N/A     = DATA NOT AVAILABLE.
(1971 DATA)* = PARTIAL DATA ONLY
RELATING TO THIS PART OF HARVEST.]

SUMMARY FOR THE GASCOYNE MANAGEMENT AREA                    YEAR 1971

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,71 | | | | | | | | | |
| FEB,71 | 10 | N/A | 137 | 159 | N/A | N/A | 21.9 | 12.8 | 46.3 |
|  | +43* | | +645 | +527 | | | | | 55.0 |
| MAR,71 | 32 | N/A | 430 | 380 | N/A | N/A | 22.3 | 13.5 | 53.1 |
|  | +21* | | +310 | +290 | | | | | 51.7 |
| APR,71 | 114 | N/A | 2068 | 1558 | N/A | N/A | 22.1 | 13.8 | 57.0 |
| MAY,71 | 77 | N/A | 1395 | 815 | N/A | N/A | 22.8 | 14.4 | 63.1 |
| JUN,71 | 61 | N/A | 840 | 644 | N/A | N/A | 21.9 | 13.7 | 56.9 |
| JUL,71 | 95 | N/A | 1350 | 942 | N/A | N/A | 23.6 | 14.3 | 58.9 |
| AUG,71 | 64 | N/A | 792 | 874 | N/A | N/A | 22.5 | 14.0 | 47.5 |
| SEP,71 | 98 | N/A | 1396 | 1074 | N/A | N/A | 23.5 | 14.9 | 56.5 |
| OCT,71 | 122 | N/A | 1594 | 1271 | N/A | N/A | 24.6 | 15.2 | 55.5 |
| NOV,71 | 121 | N/A | 1556 | 1208 | N/A | N/A | 25.4 | 15.4 | 56.3 |
| DEC,71 | 118 | N/A | 1684 | 1834 | N/A | N/A | 23.3 | 14.2 | 47.9 |
| TOTAL, 1971 | 912 | N/A | 13242 | 10759 | N/A | N/A | 23.3 | 14.4 | 55.2 |
|  | +64* | | +955 | +817 | | | | | 53.9 |

(Harvest Rate: NO DETAILED RECORDS)

SUMMARY FOR THE GASCOYNE MANAGEMENT AREA                                                    YEAR  1972

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 113 | N/A | 1577 | 1493 | N/A | N/A | 23.7 | 13.6 | 51.4 |
| FEB,72 | 89 | 484 | 1404 | 1443 | 2.903 | 2.983 | 21.9 | 13.4 | 49.3 |
| MAR,72 | 203 | 1440 | 2045 | 3373 | 2.684 | 2.342 | 22.4 | 13.5 | 53.4 |
| APR,72 | 165 | 977 | 2586 | 2212 | 2.447 | 2.264 | 22.7 | 13.6 | 53.9 |
| MAY,72 | 133 | 874 | 2181 | 2091 | 2.495 | 2.392 | 21.2 | 13.4 | 51.1 |
| JUN,72 | 129 | 773 | 2047 | 1839 | 2.647 | 2.378 | 20.7 | 13.1 | 52.7 |
| JUL,72 | 133 | 785 | 1709 | 1882 | 2.178 | 2.398 | 21.2 | 12.9 | 47.6 |
| AUG,72 | 112 | 708 | 1391 | 1597 | 1.966 | 2.257 | 21.6 | 13.2 | 46.6 |
| SEP,72 | 123 | 761 | 1581 | 1674 | 2.077 | 2.462 | 22.3 | 14.1 | 45.8 |
| OCT,72 | 122 | 825 | 1765 | 1764 | 2.139 | 2.065 | 21.6 | 14.3 | 50.9 |
| NOV,72 | 155 | 997 | 2076 | 2281 | 2.083 | 2.289 | 21.7 | 14.3 | 47.5 |
| DEC,72 | 125 | 806 | 1579 | 1783 | 1.960 | 2.213 | 21.9 | 13.7 | 47.0 |
| TOTAL | 1602 | 10245 | 23761 | 23572 | 2.319 | 2.301 | 21.9 | 13.6 | 50.2 |

SUMMARY FOR THE GASCOYNE MANAGEMENT AREA                                                    YEAR  1973

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 108 | 443 | 1483 | 1609 | 2.305 | 2.501 | 19.4 | 12.9 | 48.0 |
| FEB,73 | 52 | 326 | 769 | 696 | 2.361 | 2.137 | 20.5 | 12.8 | 52.5 |
| MAR,73 | 66 | 337 | 862 | 774 | 2.558 | 2.297 | 21.5 | 12.5 | 52.7 |
| APR,73 | 55 | 339 | 1119 | 809 | 3.309 | 2.393 | 22.0 | 12.9 | 58.0 |
| MAY,73 | 38 | 221 | 513 | 408 | 2.322 | 1.847 | 21.9 | 13.6 | 55.7 |
| JUN,73 | 65 | 346 | 656 | 627 | 1.897 | 2.391 | 22.2 | 12.9 | 44.2 |
| JUL,73 | 48 | 272 | 497 | 593 | 1.828 | 2.182 | 22.9 | 13.6 | 45.6 |
| AUG,73 | 44 | 247 | 410 | 584 | 1.695 | 2.362 | 22.8 | 14.1 | 41.8 |
| SEP,73 | 62 | 351 | 693 | 757 | 1.974 | 2.156 | 23.7 | 14.6 | 47.9 |
| OCT,73 | 78 | 422 | 785 | 1075 | 1.858 | 2.544 | 24.3 | 14.8 | 42.2 |
| NOV,73 | 67 | 345 | 726 | 822 | 2.107 | 2.396 | 24.4 | 14.9 | 46.9 |
| DEC,73 | 85 | 496 | 959 | 1157 | 1.934 | 2.334 | 23.1 | 14.2 | 45.3 |
| TOTAL | 778 | 4345 | 9481 | 10111 | 2.182 | 2.327 | 22.1 | 13.6 | 48.4 |

SUMMARY FOR THE GASCOYNE MANAGEMENT AREA

YEAR 1974

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,74 | 112 | 744 | 1540 | 2143 | 2.070 | 2.907 | 22.9 | 13.7 | 41.6 |
| FEB,74 | 48 | 372 | 784 | 933 | 2.109 | 2.510 | 22.3 | 13.7 | 45.7 |
| MAR,74 | 95 | 540 | 1240 | 1457 | 2.295 | 2.697 | 22.8 | 13.7 | 46.0 |
| APR,74 | 115 | 448 | 1644 | 1971 | 2.539 | 3.044 | 23.7 | 14.3 | 45.5 |
| MAY,74 | 72 | 391 | 904 | 1140 | 2.054 | 2.913 | 23.8 | 14.0 | 41.4 |
| JUN,74 | 107 | 661 | 1531 | 1945 | 2.316 | 2.942 | 23.7 | 14.0 | 44.0 |
| JUL,74 | 18 | 84 | 166 | 232 | 1.964 | 2.746 | 24.3 | 13.7 | 41.7 |
| AUG,74 | 46 | 304 | 621 | 839 | 2.045 | 2.763 | 22.9 | 13.6 | 42.5 |
| SEP,74 | 81 | 432 | 728 | 1218 | 1.685 | 2.818 | 24.0 | 13.3 | 37.4 |
| OCT,74 | 68 | 351 | 568 | 903 | 1.952 | 2.503 | 24.3 | 13.8 | 42.5 |
| NOV,74 | 78 | 446 | 1001 | 1087 | 2.244 | 2.437 | 23.2 | 14.5 | 47.9 |
| DEC,74 | 82 | 402 | 1036 | 1041 | 2.576 | 2.589 | 25.6 | 14.4 | 49.9 |
| TOTAL | 942 | 5386 | 11763 | 14929 | 2.184 | 2.772 | 23.5 | 13.9 | 44.1 |

SUMMARY FOR THE GASCOYNE MANAGEMENT AREA

YEAR 1975

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,75 | 89 | 484 | 1019 | 1337 | 2.104 | 2.760 | 24.3 | 14.1 | 43.3 |
| FEB,75 | 28 | 178 | 368 | 435 | 2.064 | 2.439 | 22.8 | 12.9 | 45.3 |
| MAR,75 | 44 | 283 | 471 | 594 | 1.642 | 2.097 | 22.1 | 13.0 | 44.2 |
| APR,75 | 61 | 336 | 568 | 719 | 1.691 | 2.140 | 23.5 | 13.4 | 44.1 |
| MAY,75 | 66 | 378 | 944 | 943 | 2.550 | 2.495 | 23.2 | 13.6 | 50.6 |
| JUN,75 | 96 | 564 | 1203 | 1337 | 2.132 | 2.370 | 22.7 | 13.6 | 47.4 |
| JUL,75 | 80 | 403 | 987 | 899 | 2.447 | 2.229 | 21.6 | 13.6 | 52.3 |
| AUG,75 | 69 | 366 | 869 | 1090 | 2.374 | 2.978 | 23.7 | 14.2 | 44.4 |
| SEP,75 | 90 | 521 | 1317 | 1408 | 2.529 | 2.703 | 23.8 | 14.4 | 48.3 |
| OCT,75 | 84 | 449 | 1115 | 1339 | 2.491 | 2.991 | 23.7 | 14.3 | 45.4 |
| NOV,75 | 60 | 332 | 917 | 685 | 2.763 | 2.064 | 24.2 | 14.0 | 57.2 |
| DEC,75 | 49 | 294 | 698 | 665 | 2.373 | 2.261 | 24.3 | 14.1 | 51.2 |
| TOTAL | 819 | 4589 | 10496 | 11451 | 2.288 | 2.496 | 23.4 | 13.9 | 47.8 |

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SUMMARY FOR THE GASCOYNE MANAGEMENT AREA                                    YEAR 1976

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCETAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,76 | 118 | 681 | 1769 | 1503 | 2.599 | 2.208 | 21.3 | 13.8 | 54.1 |
| FEB,76 | 78 | 472 | 1193 | 1207 | 2.527 | 2.557 | 22.1 | 13.5 | 49.7 |
| MAR,76 | 93 | 565 | 1350 | 1695 | 2.390 | 3.001 | 22.9 | 13.4 | 44.3 |
| APR,76 | 79 | 506 | 1067 | 1109 | 2.108 | 2.191 | 21.4 | 13.3 | 49.0 |
| MAY,76 | 73 | 456 | 1025 | 1314 | 2.246 | 2.880 | 22.0 | 13.3 | 43.8 |
| JUN,76 | 84 | 589 | 1270 | 1434 | 2.161 | 2.440 | 22.1 | 13.6 | 47.0 |
| JUL,76 | 96 | 598 | 1552 | 1559 | 2.597 | 2.609 | 21.9 | 12.8 | 49.9 |
| AUG,76 | 94 | 612 | 1722 | 1788 | 2.813 | 2.839 | 21.6 | 13.8 | 49.3 |
| SEP,76 | 83 | 555 | 1420 | 1443 | 2.561 | 2.602 | 20.8 | 13.6 | 49.6 |
| OCT,76 | 104 | 590 | 1783 | 1941 | 3.020 | 3.288 | 21.3 | 14.1 | 47.9 |
| NOV,76 | 116 | 620 | 1711 | 2031 | 2.721 | 3.230 | 20.8 | 13.8 | 45.7 |
| DEC,76 | 62 | 348 | 1122 | 1010 | 3.224 | 2.902 | 21.7 | 13.7 | 52.6 |
| TOTAL | 1080 | 6599 | 16984 | 17984 | 2.574 | 2.725 | 21.6 | 13.7 | 48.6 |

SUMMARY FOR THE GASCOYNE MANAGEMENT AREA                                    YEAR 1977

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCETAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,77 | 103 | 571 | 2085 | 1743 | 3.453 | 3.053 | 21.4 | 13.5 | 54.5 |
| FEB,77 | 84 | 421 | 1393 | 1292 | 3.312 | 3.072 | 20.7 | 12.9 | 51.9 |
| MAR,77 | 97 | 548 | 1784 | 1712 | 3.258 | 3.127 | 20.3 | 12.7 | 51.0 |
| APR,77 | 91 | 550 | 1516 | 1579 | 2.758 | 2.873 | 19.3 | 13.7 | 49.0 |
| MAY,77 | 110 | 568 | 2028 | 1749 | 3.571 | 3.115 | 19.5 | 12.5 | 53.4 |
| JUN,77 | 105 | 561 | 1770 | 1820 | 3.154 | 3.243 | 19.3 | 12.5 | 49.3 |
| JUL,77 | 99 | 551 | 1511 | 1591 | 2.743 | 2.870 | 19.9 | 13.0 | 48.9 |
| AUG,77 | 124 | 676 | 2113 | 2298 | 3.126 | 3.400 | 20.6 | 13.5 | 47.9 |
| SEP,77 | 101 | 536 | 1747 | 1773 | 3.262 | 3.210 | 21.1 | 14.2 | 49.6 |
| OCT,77 | 116 | 613 | 1740 | 1880 | 2.939 | 3.067 | 20.1 | 13.7 | 48.1 |
| NOV,77 | 128 | 751 | 1781 | 2080 | 2.371 | 2.769 | 20.3 | 13.8 | 46.1 |
| DEC,77 | 63 | 311 | 937 | 1070 | 3.011 | 3.439 | 19.2 | 13.2 | 46.7 |
| TOTAL | 1223 | 6648 | 20405 | 20597 | 3.069 | 3.098 | 20.2 | 13.3 | 49.8 |

SUMMARY FOR THE GASCOYNE MANAGEMENT AREA                          YEAR 1978

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 60 | 318 | 921 | 1313 | 2.900 | 4.135 | 17.7 | 12.3 | 41.2 |
| FEB,78 | 55 | 313 | 863 | 1104 | 2.756 | 3.525 | 17.0 | 12.1 | 43.9 |
| MAR,78 | 45 | 293 | 863 | 681 | 2.947 | 2.325 | 19.5 | 12.4 | 55.9 |
| APR,78 | 56 | 251 | 612 | 534 | 2.439 | 2.128 | 19.9 | 13.4 | 53.4 |
| MAY,78 | 74 | 442 | 2166 | 1125 | 2.639 | 2.568 | 20.3 | 13.6 | 50.7 |
| JUN,78 | 62 | 353 | 962 | 1025 | 2.728 | 2.907 | 21.5 | 14.6 | 48.4 |
| JUL,78 | 76 | 370 | 904 | 1154 | 2.443 | 3.118 | 20.8 | 14.0 | 43.9 |
| AUG,78 | 100 | 437 | 1175 | 1294 | 2.691 | 2.963 | 20.5 | 13.7 | 47.6 |
| SEP,78 | 90 | 449 | 908 | 1099 | 2.021 | 2.446 | 21.5 | 14.4 | 45.2 |
| OCT,78 | 89 | 539 | 1095 | 1201 | 2.033 | 2.229 | 21.6 | 14.4 | 47.7 |
| NOV,78 | 107 | 629 | 1591 | 2026 | 2.512 | 3.219 | 21.6 | 14.0 | 43.8 |
| DEC,78 | 104 | 542 | 1525 | 1794 | 2.620 | 3.082 | 22.0 | 13.9 | 45.9 |
| TOTAL | 940 | 4993 | 12575 | 14340 | 2.522 | 2.680 | 20.5 | 13.6 | 46.7 |

SUMMARY FOR THE GASCOYNE MANAGEMENT AREA                          YEAR 1979

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 119 | 633 | 1614 | 1796 | 2.550 | 2.837 | 22.1 | 13.4 | 47.3 |
| FEB,79 | 46 | 221 | 543 | 692 | 2.462 | 3.138 | 19.5 | 12.6 | 44.0 |
| MAR,79 | 67 | 387 | 712 | 972 | 1.933 | 2.510 | 21.9 | 13.0 | 42.3 |
| APR,79 | 122 | 559 | 1290 | 1741 | 2.309 | 3.152 | 22.2 | 13.3 | 42.3 |
| MAY,79 | 90 | 418 | 949 | 1472 | 2.270 | 3.522 | 22.6 | 13.6 | 39.2 |
| JUN,79 | 100 | 503 | 1106 | 1630 | 2.201 | 3.243 | 22.7 | 13.9 | 40.4 |
| JUL,79 | 107 | 536 | 1273 | 1521 | 2.374 | 2.837 | 23.6 | 13.7 | 45.6 |
| AUG,79 | 86 | 427 | 1044 | 1416 | 2.447 | 3.319 | 24.2 | 13.9 | 42.4 |
| SEP,79 | 82 | 381 | 917 | 1263 | 2.407 | 3.315 | 23.7 | 13.8 | 42.1 |
| OCT,79 | 143 | 744 | 1779 | 1781 | 2.390 | 2.393 | 24.0 | 14.0 | 50.0 |
| NOV,79 | 165 | 1101 | 1821 | 2618 | 1.654 | 2.378 | 23.2 | 14.0 | 41.0 |
| DEC,79 | 135 | 472 | 1411 | 1627 | 2.101 | 2.422 | 23.1 | 13.2 | 46.4 |
| TOTAL | 1262 | 6576 | 14459 | 18549 | 2.199 | 2.821 | 22.9 | 13.6 | 43.8 |

TABLE A II. 4.   SUMMARY OF THE RED KANGAROO HARVEST DATA FOR
HARVESTS TAKEN WITHIN THE CARNARVON MANAGEMENT
AREA - WESTERN AUSTRALIA : 1971 - 1979.

[NOTE : N/A = DATA NOT AVAILABLE.]

SUMMARY FOR THE CARNARVON MANAGEMENT AREA                              YEAR  1971

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN.71 | | | NO DETAILED RECORDS | | | | | | |
| FEB.71 | 25 | N/A | 486 | 423 | N/A | N/A | 25.1 | 15.2 | 53.5 |
| MAR.71 | 24 | N/A | 404 | 376 | N/A | N/A | 26.3 | 14.9 | 51.8 |
| APR.71 | 33 | N/A | 584 | 370 | N/A | N/A | 28.6 | 15.1 | 61.2 |
| MAY.71 | 54 | N/A | 910 | 489 | N/A | N/A | 26.9 | 15.5 | 56.9 |
| JUN.71 | 61 | N/A | 1100 | 729 | N/A | N/A | 26.2 | 15.6 | 60.1 |
| JUL.71 | 60 | N/A | 1241 | 646 | N/A | N/A | 27.0 | 15.9 | 65.3 |
| AUG.71 | 34 | N/A | 473 | 491 | N/A | N/A | 27.4 | 15.0 | 49.1 |
| SEP.71 | 77 | N/A | 1529 | 1013 | N/A | N/A | 27.6 | 15.7 | 60.1 |
| OCT.71 | 87 | N/A | 1313 | 986 | N/A | N/A | 27.9 | 15.6 | 57.1 |
| NOV.71 | 46 | N/A | 960 | 720 | N/A | N/A | 28.9 | 16.0 | 57.1 |
| DEC.71 | 56 | N/A | 857 | 727 | N/A | N/A | 29.2 | 15.5 | 54.1 |
| TOTAL ,1971 | 577 | N/A | 9857 | 7170 | N/A | N/A | 27.4 | 15.5 | 57.9 |

SUMMARY FOR THE CARNARVON MANAGEMENT AREA    YEAR 1972

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCETAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 44 | N/A | 913 | 652 | N/A | N/A | 26.3 | 15.3 | 58.3 |
| FEB,72 | 36 | 200 | 471 | 422 | 2.359 | 2.114 | 27.0 | 14.2 | 52.7 |
| MAR,72 | 47 | 414 | 849 | 593 | 2.053 | 1.434 | 26.3 | 14.1 | 58.9 |
| APR,72 | 41 | 350 | 868 | 727 | 2.413 | 2.021 | 24.6 | 14.4 | 54.4 |
| MAY,72 | 57 | 466 | 999 | 982 | 2.144 | 2.108 | 24.5 | 14.4 | 50.4 |
| JUN,72 | 48 | 349 | 664 | 713 | 1.900 | 2.041 | 23.7 | 13.9 | 48.2 |
| JUL,72 | 65 | 484 | 941 | 846 | 1.987 | 1.749 | 22.7 | 14.3 | 52.2 |
| AUG,72 | 94 | 732 | 1620 | 1207 | 2.213 | 1.649 | 23.0 | 14.4 | 57.3 |
| SEP,72 | 84 | 633 | 1422 | 1205 | 2.247 | 1.904 | 22.8 | 14.7 | 54.1 |
| OCT,72 | 43 | 287 | 738 | 459 | 2.574 | 2.299 | 23.5 | 15.5 | 52.8 |
| NOV,72 | 32 | 253 | 502 | 507 | 2.332 | 2.003 | 24.5 | 15.5 | 53.9 |
| DEC,72 | 45 | 329 | 911 | 621 | 2.768 | 1.867 | 23.8 | 15.1 | 59.6 |
| TOTAL | 633 | 4910 | 11008 | 9134 | 2.242 | 1.860 | 24.1 | 14.6 | 54.7 |

SUMMARY FOR THE CARNARVON MANAGEMENT AREA    YEAR 1973

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCETAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 41 | 266 | 1045 | 633 | 2.857 | 1.731 | 22.3 | 14.6 | 62.3 |
| FEB,73 | 41 | 334 | 860 | 607 | 2.571 | 1.815 | 23.7 | 15.1 | 58.6 |
| MAR,73 | 36 | 260 | 721 | 559 | 2.772 | 2.149 | 25.0 | 14.9 | 56.3 |
| APR,73 | 29 | 230 | 689 | 686 | 2.998 | 2.985 | 25.2 | 15.4 | 50.1 |
| MAY,73 | 28 | 173 | 468 | 356 | 2.708 | 2.660 | 25.3 | 15.5 | 56.8 |
| JUN,73 | 18 | 85 | 365 | 167 | 4.306 | 1.970 | 25.0 | 15.1 | 68.6 |
| JUL,73 | 26 | 101 | 314 | 231 | 3.109 | 2.287 | 22.5 | 14.0 | 57.6 |
| AUG,73 | 31 | 200 | 578 | 356 | 2.889 | 1.779 | 23.3 | 14.8 | 61.9 |
| SEP,73 | 19 | 152 | 328 | 319 | 2.158 | 2.099 | 26.6 | 15.6 | 50.7 |
| OCT,73 | 24 | 194 | 488 | 426 | 2.513 | 2.193 | 26.7 | 15.3 | 53.4 |
| NOV,73 | 17 | 157 | 397 | 265 | 2.529 | 1.688 | 27.6 | 15.6 | 60.0 |
| DEC,73 | 20 | 149 | 410 | 322 | 2.758 | 2.166 | 24.3 | 14.7 | 56.9 |
| TOTAL | 324 | 2400 | 6663 | 4927 | 2.777 | 2.053 | 24.5 | 15.2 | 57.5 |

SUMMARY FOR THE CARNARVON MANAGEMENT AREA          YEAR 1974

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN.74 | 28 | 176 | 549 | 452 | 3.119 | 2.568 | 23.9 | 14.7 | 54.8 |
| FEB.74 | 11 | 98 | 230 | 237 | 2.347 | 2.418 | 23.9 | 15.1 | 49.3 |
| MAR.74 | 18 | 136 | 286 | 294 | 2.103 | 2.162 | 24.2 | 14.4 | 49.3 |
| APR.74 | 33 | 205 | 452 | 476 | 2.207 | 2.324 | 24.2 | 14.1 | 48.7 |
| MAY.74 | 28 | 191 | 449 | 334 | 2.345 | 1.744 | 24.8 | 14.3 | 57.3 |
| JUN.74 | 40 | 279 | 759 | 447 | 2.716 | 1.599 | 24.0 | 14.6 | 62.9 |
| JUL.74 | 27 | 161 | 370 | 223 | 2.291 | 1.381 | 25.2 | 15.1 | 62.4 |
| AUG.74 | 13 | 138 | 109 | 134 | 2 .790 | .971 | 23.5 | 14.4 | 44.9 |
| SEP.74 | 19 | 164 | 325 | 280 | 1.976 | 1.702 | 24.8 | 15.7 | 53.7 |
| OCT.74 | 3 | 10 | 31 | 19 | 2.952 | 1.810 | 25.6 | 16.4 | 62.0 |
| NOV.74 | 31 | 228 | 547 | 444 | 2.397 | 1.946 | 23.9 | 15.0 | 55.2 |
| DEC.74 | 34 | 197 | 545 | 549 | 2.766 | 2.787 | 24.2 | 14.9 | 49.8 |
| TOTAL | 285 | 1986 | 4652 | 3889 | 2.342 | 1.958 | 24.3 | 14.7 | 54.5 |

SUMMARY FOR THE CARNARVON MANAGEMENT AREA          YEAR 1975

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN.75 | 44 | 344 | 1150 | 1148 | 3.347 | 3.342 | 24.1 | 14.6 | 50.0 |
| FEB.75 | 8 | 31 | 107 | 148 | 3.500 | 4.841 | 24.2 | 15.4 | 42.0 |
| MAR.75 | 12 | 89 | 175 | 162 | 1.773 | 1.827 | 25.3 | 14.2 | 51.9 |
| APR.75 | 23 | 142 | 332 | 292 | 2.339 | 2.058 | 23.1 | 15.3 | 53.2 |
| MAY.75 | 14 | 97 | 129 | 117 | 1.330 | 1.206 | 25.6 | 16.3 | 52.4 |
| JUN.75 | 44 | 191 | 482 | 407 | 2.521 | 2.128 | 24.5 | 14.6 | 54.2 |
| JUL.75 | 44 | 258 | 786 | 645 | 3.050 | 2.581 | 23.5 | 14.8 | 54.2 |
| AUG.75 | 29 | 180 | 517 | 457 | 2.870 | 2.537 | 23.9 | 14.8 | 53.1 |
| SEP.75 | 64 | 321 | 632 | 650 | 2.591 | 2.647 | 25.4 | 15.3 | 49.5 |
| OCT.75 | 35 | 212 | 547 | 511 | 2.672 | 2.408 | 26.3 | 15.3 | 52.6 |
| NOV.75 | 37 | 207 | 729 | 539 | 3.524 | 2.606 | 26.7 | 15.4 | 57.5 |
| DEC.75 | 48 | 248 | 884 | 719 | 3.571 | 2.905 | 26.7 | 15.1 | 55.1 |
| TOTAL | 426 | 2318 | 6690 | 6015 | 2.986 | 2.594 | 25.0 | 15.0 | 52.7 |

## SUMMARY FOR THE CARNARVON MANAGEMENT AREA    YEAR 1976

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,76 | 46 | 235 | 801 | 536 | 3.404 | 2.278 | 25.5 | 15.4 | 59.9 |
| FEB,76 | 33 | 162 | 524 | 399 | 3.231 | 2.440 | 26.9 | 15.1 | 56.8 |
| MAR,76 | 43 | 217 | 589 | 478 | 2.713 | 2.202 | 24.7 | 14.7 | 55.2 |
| APR,76 | 37 | 182 | 469 | 416 | 2.582 | 2.291 | 25.7 | 15.0 | 53.0 |
| MAY,76 | 28 | 147 | 444 | 379 | 3.020 | 2.578 | 23.4 | 15.0 | 53.9 |
| JUN,76 | 32 | 196 | 571 | 529 | 2.913 | 2.750 | 23.1 | 15.4 | 51.4 |
| JUL,76 | 17 | 110 | 286 | 246 | 2.597 | 2.236 | 22.2 | 14.6 | 53.8 |
| AUG,76 | 52 | 280 | 824 | 569 | 2.940 | 2.030 | 22.7 | 15.5 | 59.2 |
| SEP,76 | 40 | 280 | 787 | 604 | 3.517 | 2.654 | 27.7 | 15.5 | 57.0 |
| OCT,76 | 28 | 224 | 674 | 531 | 3.002 | 2.365 | 25.5 | 14.9 | 55.9 |
| NOV,76 | 32 | 166 | 553 | 526 | 3.336 | 3.173 | 25.1 | 15.3 | 51.3 |
| DEC,76 | 30 | 199 | 578 | 471 | 2.911 | 2.372 | 21.7 | 14.4 | 55.1 |
| TOTAL | 428 | 2342 | 7100 | 5484 | 3.032 | 2.427 | 24.9 | 15.1 | 55.5 |

## SUMMARY FOR THE CARNARVON MANAGEMENT AREA    YEAR 1977

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,77 | 19 | 109 | 309 | 331 | 2.835 | 3.037 | 21.9 | 14.1 | 48.3 |
| FEB,77 | 10 | 81 | 225 | 214 | 2.778 | 2.642 | 21.2 | 14.0 | 51.3 |
| MAR,77 | 6? | 45 | 191 | 140 | 2.879 | 3.077 | 17.4 | 13.6 | 48.3 |
| APR,77 | 62 | 302 | 1189 | 1165 | 3.933 | 3.857 | 21.10 | 14.5 | 50.5 |
| MAY,77 | 78 | 394 | 1041 | 1127 | 2.645 | 2.643 | 21.0 | 14.2 | 48.0 |
| JUN,77 | 67 | 362 | 822 | 887 | 2.269 | 2.449 | 23.6 | 14.2 | 48.1 |
| JUL,77 | 75 | 367 | 1058 | 864 | 2.885 | 2.416 | 22.6 | 14.7 | 54.4 |
| AUG,77 | 74 | 380 | 1030 | 629 | 2.704 | 2.469 | 22.1 | 15.2 | 52.3 |
| SEP,77 | 40 | 247 | 496 | 521 | 2.008 | 2.109 | 23.5 | 14.6 | 48.8 |
| OCT,77 | 66 | 383 | 913 | 879 | 2.385 | 2.296 | 21.8 | 15.1 | 50.9 |
| NOV,77 | 30 | 250 | 651 | 543 | 2.604 | 2.172 | 23.4 | 15.2 | 54.5 |
| DEC,77 | 51 | 327 | 633 | 864 | 2.849 | 2.639 | 22.7 | 15.4 | 51.9 |
| TOTAL | 590 | 3224 | 8798 | 8497 | 2.729 | 2.636 | 22.1 | 14.8 | 50.9 |

SUMMARY FOR THE CARNARVON MANAGEMENT AREA                    YEAR 1978

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 24 | 154 | 339 | 302 | 2.202 | 1.961 | 22.6 | 15.4 | 52.9 |
| FEB,78 | 20 | 187 | 444 | 426 | 2.376 | 2.280 | 21.9 | 14.1 | 51.0 |
| MAR,78 | 30 | 201 | 317 | 222 | 1.577 | 1.104 | 19.8 | 14.5 | 58.8 |
| APR,78 | 54 | 257 | 451 | 544 | 1.754 | 2.115 | 23.3 | 14.4 | 45.3 |
| MAY,78 | 45 | 233 | 533 | 538 | 2.283 | 2.305 | 22.8 | 14.5 | 49.8 |
| JUN,78 | 87 | 517 | 1105 | 1255 | 2.137 | 2.427 | 23.8 | 14.6 | 46.8 |
| JUL,78 | 40 | 744 | 391 | 447 | 1.605 | 1.835 | 27.6 | 15.0 | 46.7 |
| AUG,78 | 58 | 356 | 431 | 429 | 1.210 | 1.205 | 22.9 | 15.0 | 50.1 |
| SEP,78 | 54 | 328 | 540 | 615 | 1.647 | 1.876 | 22.8 | 15.6 | 46.8 |
| OCT,78 | 38 | 207 | 301 | 408 | 1.452 | 1.969 | 23.2 | 15.7 | 42.5 |
| NOV,78 | 64 | 406 | 787 | 865 | 1.939 | 2.131 | 24.5 | 16.0 | 47.5 |
| DEC,78 | 49 | 256 | 524 | 587 | 2.048 | 2.294 | 24.4 | 15.1 | 47.2 |
| TOTAL | 573 | 3346 | 6163 | 6638 | 1.842 | 1.984 | 23.2 | 15.0 | 48.1 |

SUMMARY FOR THE CARNARVON MANAGEMENT AREA                    YEAR 1979

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 54 | 321 | 622 | 792 | 1.935 | 2.464 | 24.6 | 15.4 | 44.0 |
| FEB,79 | 64 | 325 | 815 | 935 | 2.509 | 2.879 | 24.2 | 15.5 | 46.6 |
| MAR,79 | 35 | 229 | 393 | 379 | 1.718 | 1.656 | 23.5 | 14.6 | 50.9 |
| APR,79 | 40 | 253 | 499 | 617 | 1.973 | 2.440 | 24.5 | 15.6 | 44.7 |
| MAY,79 | 50 | 304 | 540 | 717 | 1.940 | 2.356 | 24.3 | 15.6 | 43.9 |
| JUN,79 | 57 | 365 | 673 | 855 | 1.844 | 2.343 | 24.6 | 14.9 | 44.0 |
| JUL,79 | 69 | 370 | 760 | 1204 | 2.054 | 2.255 | 25.2 | 14.8 | 38.7 |
| AUG,79 | 42 | 253 | 465 | 726 | 1.841 | 2.874 | 26.2 | 15.1 | 39.0 |
| SEP,79 | 75 | 448 | 1137 | 1389 | 2.536 | 3.098 | 27.2 | 15.6 | 45.0 |
| OCT,79 | 84 | 392 | 963 | 1659 | 2.459 | 4.236 | 25.6 | 14.9 | 36.7 |
| NOV,79 | 76 | 428 | 808 | 1435 | 1.899 | 3.354 | 25.7 | 14.9 | 36.0 |
| DEC,79 | 50 | 372 | 587 | 1059 | 1.580 | 2.850 | 23.6 | 14.0 | 35.7 |
| TOTAL | 696 | 4046 | 8282 | 11767 | 2.047 | 2.909 | 25.1 | 15.1 | 41.3 |

TABLE A II. 5.   SUMMARY OF THE RED KANGAROO HARVEST DATA FOR
HARVESTS TAKEN WITHIN THE ASHBURTON (WEST)
MANAGEMENT AREA - WESTERN AUSTRALIA : 1971 - 1979.

[NOTE = N/A   = DATA NOT AVAILABLE.]

SUMMARY FOR THE ASHBURTON (WEST) MANAGEMENT AREA                    YEAR 1971

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCNTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,71 | | | NO DETAILED RECORDS | | | | | | |
| FEB,71 | 23 | N/A | 484 | 117 | N/A | N/A | 24.1 | 15.4 | 80.5 |
| MAR,71 | 26 | N/A | 459 | 110 | N/A | N/A | 26.5 | 15.6 | 79.4 |
| APR,71 | 31 | N/A | 449 | 160 | N/A | N/A | 27.1 | 14.9 | 73.7 |
| MAY,71 | 41 | N/A | 705 | 202 | N/A | N/A | 28.8 | 15.7 | 77.7 |
| JUN,71 | 12 | N/A | 195 | 34 | N/A | N/A | 27.3 | 16.3 | 85.2 |
| JUL,71 | 41 | N/A | 476 | 213 | N/A | N/A | 27.5 | 16.1 | 69.1 |
| AUG,71 | 32 | N/A | 488 | 226 | N/A | N/A | 27.2 | 15.7 | 68.3 |
| SEP,71 | 22 | N/A | 407 | 211 | N/A | N/A | 27.4 | 16.2 | 65.9 |
| OCT,71 | 25 | N/A | 338 | 340 | N/A | N/A | 26.3 | 15.5 | 49.9 |
| NOV,71 | 71 | N/A | 1219 | 792 | N/A | N/A | 26.3 | 15.5 | 60.6 |
| DEC,71 | 47 | N/A | 1099 | 880 | N/A | N/A | 26.0 | 14.9 | 55.5 |
| TOTAL ,1971 | 391 | N/A | 6319 | 3294 | N/A | N/A | 26.9 | 15.5 | 65.7 |

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## SUMMARY FOR THE ASHBURTON (WEST) MANAGEMENT AREA          YEAR 1972

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 66 | N/A | 1001 | 857 | N/A | N/A | 26.2 | 14.5 | 53.9 |
| FEB,72 | 48 | N/A | 643 | 456 | N/A | N/A | 25.2 | 14.1 | 53.5 |
| MAR,72 | 71 | 461 | 1065 | 713 | 2.309 | 1.546 | 24.8 | 13.9 | 59.9 |
| APR,72 | 51 | 343 | 856 | 502 | 2.495 | 1.463 | 25.4 | 14.1 | 63.0 |
| MAY,72 | 24 | 169 | 200 | 193 | 1.181 | 1.140 | 26.3 | 16.0 | 50.9 |
| JUN,72 | 17 | 95 | 176 | 114 | 1.850 | 1.198 | 23.2 | 15.3 | 60.7 |
| JUL,72 | 24 | 162 | 431 | 193 | 2.655 | 1.189 | 23.7 | 14.1 | 59.1 |
| AUG,72 | 31 | 162 | 515 | 231 | 3.184 | 1.428 | 24.9 | 14.6 | 59.0 |
| SEP,72 | 49 | 326 | 717 | 706 | 2.200 | 2.167 | 25.9 | 14.9 | 50.4 |
| OCT,72 | 102 | 667 | 1391 | 1498 | 2.087 | 2.247 | 25.7 | 14.6 | 48.1 |
| NOV,72 | 90 | 676 | 1519 | 1474 | 2.246 | 2.181 | 25.0 | 14.5 | 50.7 |
| DEC,72 | 75 | 658 | 2122 | 1358 | 1.976 | 2.391 | 24.4 | 14.4 | 45.2 |
| TOTAL | 648 | 4341 | 9635 | 8295 | 2.219 | 1.911 | 25.2 | 14.5 | 53.7 |

## SUMMARY FOR THE ASHBURTON (WEST) MANAGEMENT AREA          YEAR 1973

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 63 | 399 | 961 | 884 | 2.409 | 2.216 | 23.0 | 13.9 | 52.1 |
| FEB,73 | 20 | 96 | 260 | 157 | 2.719 | 1.642 | 24.9 | 14.1 | 62.4 |
| MAR,73 | 37 | 206 | 657 | 354 | 3.246 | 1.723 | 23.2 | 13.8 | 65.3 |
| APR,73 | 36 | 198 | 696 | 206 | 3.480 | 1.493 | 23.7 | 14.2 | 70.0 |
| MAY,73 | 24 | 148 | 550 | 283 | 2.724 | 1.916 | 24.1 | 14.7 | 66.0 |
| JUN,73 | 51 | 305 | 867 | 610 | 2.845 | 2.002 | 22.2 | 14.2 | 58.7 |
| JUL,73 | 66 | 389 | 1007 | 671 | 2.586 | 1.723 | 23.3 | 14.1 | 60.0 |
| AUG,73 | 68 | 389 | 1106 | 711 | 2.845 | 1.829 | 22.5 | 14.2 | 60.9 |
| SEP,73 | 87 | 483 | 1557 | 843 | 3.226 | 1.747 | 23.6 | 14.7 | 64.9 |
| OCT,73 | 71 | 367 | 1234 | 801 | 3.363 | 2.183 | 23.7 | 14.7 | 60.6 |
| NOV,73 | 50 | 254 | 781 | 548 | 3.073 | 2.235 | 24.2 | 14.5 | 57.9 |
| DEC,73 | 65 | 306 | 1155 | 828 | 3.776 | 2.707 | 23.6 | 14.4 | 53.2 |
| TOTAL | 638 | 3552 | 10835 | 7006 | 3.950 | 1.972 | 23.4 | 14.3 | 60.7 |

SUMMARY FOR THE ASHBURTON (WEST) MANAGEMENT AREA                    YEAR 1974

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN.74 | 49 | 215 | 561 | 453 | 2.610 | 2.108 | 21.4 | 12.9 | 55.3 |
| FEB.74 | 41 | 339 | 843 | 787 | 2.653 | 2.328 | 22.6 | 13.0 | 52.3 |
| MAR.74 | 59 | 259 | 699 | 574 | 2.701 | 2.218 | 23.0 | 13.4 | 54.9 |
| APR.74 | 79 | 374 | 1125 | 908 | 2.989 | 2.413 | 24.4 | 14.4 | 55.3 |
| MAY.74 | 54 | 303 | 740 | 739 | 2.439 | 2.436 | 23.9 | 13.7 | 50.0 |
| JUN.74 | 34 | 134 | 477 | 233 | 2.550 | 1.734 | 26.3 | 14.3 | 47.2 |
| JUL.74 | 40 | 260 | 847 | 574 | 3.340 | 2.212 | 25.4 | 14.4 | 60.2 |
| AUG.74 | 36 | 170 | 627 | 330 | 3.692 | 1.943 | 25.9 | 14.5 | 65.5 |
| SEP.74 | 44 | 310 | 1109 | 559 | 3.576 | 1.603 | 26.4 | 14.7 | 66.5 |
| OCT.74 | 51 | 281 | 950 | 597 | 3.024 | 2.124 | 25.3 | 14.6 | 53.7 |
| NOV.74 | 97 | 503 | 1408 | 1224 | 2.798 | 2.432 | 25.9 | 14.8 | 53.5 |
| DEC.74 | 72 | 360 | 1463 | 878 | 4.060 | 2.436 | 26.3 | 15.4 | 62.5 |
| TOTAL | 699 | 3510 | 10789 | 7856 | 3.074 | 2.238 | 24.9 | 14.3 | 57.9 |

SUMMARY FOR THE ASHBURTON (WEST) MANAGEMENT AREA                    YEAR 1975

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN.75 | 48 | 280 | 1129 | 694 | 4.039 | 2.483 | 25.6 | 14.7 | 61.9 |
| FEB.75 | 8 | 44 | 704 | 135 | 2.351 | 3.052 | 22.3 | 14.2 | 43.5 |
| MAR.75 | 33 | 150 | 382 | 416 | 2.539 | 2.765 | 26.2 | 14.5 | 47.9 |
| APR.75 | 43 | 193 | 641 | 477 | 2.907 | 2.472 | 25.3 | 14.3 | 54.0 |
| MAY.75 | 54 | 244 | 897 | 498 | 3.676 | 2.041 | 25.3 | 14.4 | 64.3 |
| JUN.75 | 76 | 366 | 1061 | 935 | 2.899 | 2.554 | 24.8 | 14.8 | 53.2 |
| JUL.75 | 70 | 373 | 923 | 741 | 2.475 | 1.987 | 24.4 | 15.4 | 55.5 |
| AUG.75 | 67 | 395 | 1141 | 604 | 2.892 | 2.038 | 25.1 | 15.1 | 58.7 |
| SEP.75 | 63 | 407 | 1127 | 812 | 2.793 | 1.994 | 24.5 | 15.7 | 58.3 |
| OCT.75 | 61 | 404 | 1129 | 903 | 2.797 | 1.889 | 24.9 | 15.8 | 58.4 |
| NOV.75 | 75 | 441 | 1503 | 912 | 3.407 | 2.067 | 24.4 | 15.3 | 62.2 |
| DEC.75 | 41 | 250 | 746 | 443 | 2.989 | 1.775 | 24.1 | 14.6 | 42.7 |
| TOTAL | 639 | 3546 | 10713 | 7670 | 3.021 | 2.163 | 24.8 | 15.1 | 58.3 |

## SUMMARY FOR THE ASHBURTON (WEST) MANAGEMENT AREA  YEAR 1976

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,76 | 30 | 216 | 552 | 499 | 2.557 | 2.311 | 23.6 | 14.3 | 52.5 |
| FEB,76 | 39 | 177 | 891 | 292 | 2.465 | 1.452 | 26.1 | 15.5 | 56.4 |
| MAR,76 | 40 | 243 | 720 | 457 | 2.964 | 1.861 | 22.6 | 14.6 | 61.2 |
| APR,76 | 74 | 444 | 1236 | 820 | 2.785 | 1.870 | 25.6 | 14.4 | 59.8 |
| MAY,76 | 79 | 450 | 1141 | 843 | 2.489 | 1.839 | 24.2 | 14.4 | 57.5 |
| JUN,76 | 71 | 432 | 1064 | 754 | 2.457 | 1.741 | 24.2 | 14.0 | 59.5 |
| JUL,76 | 65 | 389 | 999 | 624 | 2.647 | 1.604 | 24.3 | 14.3 | 61.4 |
| AUG,76 | 51 | 314 | 930 | 621 | 2.957 | 1.975 | 24.1 | 15.2 | 60.0 |
| SEP,76 | 43 | 213 | 592 | 459 | 2.738 | 1.159 | 25.2 | 15.2 | 55.9 |
| OCT,76 | 42 | 220 | 511 | 713 | 3.243 | 2.542 | 24.6 | 15.2 | 56.1 |
| NOV,76 | 24 | 134 | 541 | 223 | 4.052 | 1.670 | 22.2 | 15.2 | 70.8 |
| DEC,76 | 29 | 200 | 727 | 531 | 3.626 | 2.448 | 24.0 | 14.4 | 57.8 |
| TOTAL | 592 | 3501 | 9794 | 6244 | 2.794 | 1.955 | 24.3 | 14.9 | 58.4 |

## SUMMARY FOR THE ASHBURTON (WEST) MANAGEMENT AREA  YEAR 1977

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,77 | 9 | 44 | 135 | 111 | 3.034 | 2.494 | 28.1 | 14.8 | 54.9 |
| FEB,77 | 29 | 171 | 561 | 383 | 3.284 | 2.242 | 23.0 | 14.7 | 59.4 |
| MAR,77 | 27 | 159 | 534 | 401 | 3.348 | 2.514 | 23.0 | 15.1 | 57.1 |
| APR,77 | 34 | 229 | 554 | 442 | 2.424 | 1.927 | 26.5 | 14.6 | 55.7 |
| MAY,77 | 40 | 265 | 811 | 722 | 3.060 | 2.725 | 24.4 | 14.6 | 52.9 |
| JUN,77 | 59 | 391 | 945 | 727 | 2.415 | 1.858 | 26.2 | 15.0 | 56.5 |
| JUL,77 | 78 | 493 | 1311 | 909 | 2.658 | 1.843 | 27.2 | 15.7 | 59.1 |
| AUG,77 | 48 | 289 | 714 | 620 | 2.466 | 2.176 | 26.6 | 15.7 | 53.1 |
| SEP,77 | 44 | 289 | 591 | 562 | 2.020 | 1.954 | 27.2 | 15.0 | 50.8 |
| OCT,77 | 40 | 221 | 591 | 523 | 2.674 | 2.411 | 26.6 | 14.7 | 52.6 |
| NOV,77 | 45 | 271 | 543 | 450 | 2.001 | 1.659 | 25.3 | 14.5 | 54.7 |
| DEC,77 | 28 | 193 | 442 | 381 | 2.293 | 1.977 | 27.9 | 14.5 | 53.7 |
| TOTAL | 483 | 3017 | 7724 | 5251 | 2.560 | 2.072 | 26.0 | 15.1 | 55.3 |

SUMMARY FOR THE ASHBURTON (WEST) MANAGEMENT AREA   YEAR 1978

| MONTH,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 25 | 180 | 385 | 325 | 2.139 | 1.806 | 26.4 | 13.9 | 54.2 |
| FEB,78 | 23 | 144 | 303 | 242 | 2.097 | 1.675 | 25.9 | 13.8 | 55.6 |
| MAR,78 | 32 | 166 | 365 | 316 | 2.197 | 1.902 | 24.6 | 14.7 | 53.6 |
| APR,78 | 58 | 372 | 844 | 737 | 2.269 | 1.982 | 23.0 | 14.8 | 53.4 |
| MAY,78 | 94 | 553 | 1237 | 1134 | 2.238 | 2.052 | 23.1 | 14.8 | 52.2 |
| JUN,78 | 51 | 277 | 619 | 535 | 2.236 | 1.932 | 22.4 | 14.9 | 53.6 |
| JUL,78 | 41 | 238 | 548 | 379 | 2.299 | 1.590 | 22.2 | 14.7 | 59.1 |
| AUG,78 | 44 | 257 | 657 | 599 | 2.163 | 2.288 | 24.3 | 14.9 | 48.6 |
| SEP,78 | 60 | 353 | 771 | 796 | 2.185 | 2.256 | 25.3 | 14.8 | 49.2 |
| OCT,78 | 64 | 380 | 834 | 656 | 2.192 | 1.724 | 25.0 | 14.8 | 56.0 |
| NOV,78 | 66 | 374 | 1057 | 710 | 2.809 | 1.887 | 24.6 | 15.3 | 59.8 |
| DEC,78 | 73 | 440 | 1044 | 942 | 2.374 | 1.875 | 23.7 | 14.6 | 55.9 |
| TOTAL | 631 | 3746 | 9586 | 7261 | 2.292 | 1.938 | 24.0 | 14.7 | 54.2 |

SUMMARY FOR THE ASHBURTON (WEST) MANAGEMENT AREA   YEAR 1979

| MONTH,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 45 | 282 | 546 | 499 | 1.939 | 1.772 | 24.3 | 14.8 | 52.2 |
| FEB,79 | 41 | 255 | 367 | 418 | 1.435 | 1.636 | 22.5 | 14.0 | 46.8 |
| MAR,79 | 62 | 401 | 591 | 531 | 1.473 | 1.323 | 21.9 | 14.7 | 52.7 |
| APR,79 | 45 | 296 | 462 | 502 | 1.561 | 1.696 | 23.8 | 14.6 | 47.9 |
| MAY,79 | 70 | 460 | 901 | 773 | 1.959 | 1.680 | 24.5 | 15.0 | 53.8 |
| JUN,79 | 51 | 319 | 679 | 588 | 2.129 | 1.843 | 25.3 | 15.3 | 53.6 |
| JUL,79 | 21 | 119 | 365 | 349 | 3.054 | 2.921 | 25.9 | 15.6 | 51.1 |
| AUG,79 | 29 | 155 | 352 | 405 | 2.271 | 2.613 | 24.8 | 15.1 | 46.5 |
| SEP,79 | 86 | 515 | 969 | 1011 | 1.883 | 1.965 | 25.3 | 14.9 | 48.9 |
| OCT,79 | 73 | 438 | 643 | 848 | 1.466 | 1.934 | 25.1 | 15.1 | 43.1 |
| NOV,79 | 110 | 789 | 1301 | 1523 | 1.649 | 1.943 | 25.9 | 15.2 | 45.9 |
| DEC,79 | 66 | 451 | 798 | 977 | 1.770 | 2.167 | 25.5 | 14.8 | 45.0 |
| TOTAL | 599 | 4478 | 7974 | 8434 | 1.781 | 1.824 | 24.8 | 14.9 | 48.6 |

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TABLE A II. 6.   SUMMARY OF THE RED KANGAROO HARVEST DATA FOR
                 HARVESTS TAKEN WITHIN THE PILBARA MANAGEMENT
                 AREA - WESTERN AUSTRALIA : 1971 - 1979.

[NOTE = N/A = DATA NOT AVAILABLE.]

SUMMARY FOR THE PILBARA MANAGEMENT AREA          YEAR  1971

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,71 | | | | NO DETAILED RECORDS | | | | | |
| FEB,71 | 4 | N/A | 54 | 72 | N/A | N/A | 21.8 | 12.8 | 42.9 |
| MAR,71 | 31 | N/A | 211 | 350 | N/A | N/A | 22.0 | 13.1 | 37.6 |
| APR,71 | 37 | N/A | 373 | 399 | N/A | N/A | 24.6 | 13.7 | 49.3 |
| MAY,71 | 35 | N/A | 435 | 391 | N/A | N/A | 25.3 | 14.2 | 52.7 |
| JUN,71 | 16 | N/A | 98 | 78 | N/A | N/A | 32.4 | 16.0 | 55.7 |
| JUL,71 | 58 | N/A | 397 | 528 | N/A | N/A | 23.6 | 14.0 | 42.9 |
| AUG,71 | 91 | N/A | 759 | 1119 | N/A | N/A | 25.4 | 14.2 | 40.4 |
| SEP,71 | 48 | N/A | 522 | 467 | N/A | N/A | 28.5 | 15.5 | 42.8 |
| OCT,71 | 34 | N/A | 263 | 423 | N/A | N/A | 24.2 | 14.3 | 38.3 |
| NOV,71 | 19 | N/A | 287 | 454 | N/A | N/A | 22.7 | 16.7 | 38.7 |
| DEC,71 | 15 | N/A | 187 | 315 | N/A | N/A | 24.0 | 15.9 | 37.3 |
| TOTAL ,1971 | 388 | N/A | 3586 | 4596 | N/A | N/A | 25.1 | 14.6 | 43.8 |

## SUMMARY FOR THE PILBARA MANAGEMENT AREA  YEAR 1972

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 45 | N/A | 588 | 773 | N/A | N/A | 22.9 | 14.9 | 43.2 |
| FEB,72 | 24 | 113 | 210 | 429 | 1.864 | 3.808 | 25.2 | 14.0 | 32.9 |
| MAR,72 | 40 | 274 | 788 | 362 | 2.379 | 1.323 | 24.1 | 14.1 | 68.5 |
| APR,72 | 33 | 400 | 1164 | 258 | 2.912 | .896 | 25.0 | 14.2 | 76.5 |
| MAY,72 | 14 | 133 | 349 | 166 | 2.532 | 1.204 | 26.0 | 16.1 | 67.3 |
| JUN,72 | 26 | 259 | 675 | 321 | 2.616 | 1.244 | 25.8 | 14.9 | 67.3 |
| JUL,72 | 55 | 364 | 977 | 704 | 2.688 | 1.937 | 23.1 | 13.3 | 58.1 |
| AUG,72 | 94 | 585 | 1714 | 1485 | 2.930 | 2.539 | 22.4 | 13.6 | 53.6 |
| SEP,72 | 46 | 266 | 929 | 555 | 3.493 | 2.087 | 23.5 | 14.2 | 62.6 |
| OCT,72 | 28 | 220 | 868 | 170 | 3.940 | .772 | 24.4 | 13.8 | 93.6 |
| NOV,72 | 32 | 176 | 579 | 162 | 3.294 | .922 | 23.8 | 13.4 | 78.1 |
| DEC,72 | 12 | 40 | 137 | 61 | 3.389 | 2.004 | 22.2 | 12.8 | 62.9 |
| TOTAL | 462 | 3114 | 8978 | 5566 | 2.883 | 1.787 | 23.8 | 14.1 | 61.7 |

## SUMMARY FOR THE PILBARA MANAGEMENT AREA  YEAR 1973

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 21 | 96 | 225 | 131 | 2.340 | 1.362 | 21.8 | 14.0 | 63.2 |
| FEB,73 | 12 | 95 | 318 | 23 | 3.347 | .242 | 24.6 | 15.6 | 93.3 |
| MAR,73 | 29 | 146 | 396 | 49 | 2.709 | .472 | 24.3 | 14.0 | 85.2 |
| APR,73 | 31 | 169 | 311 | 211 | 1.836 | 1.246 | 20.0 | 14.0 | 59.6 |
| MAY,73 | 53 | 230 | 566 | 439 | 2.456 | 1.905 | 22.5 | 14.8 | 56.3 |
| JUN,73 | 40 | 163 | 476 | 378 | 2.912 | 2.312 | 22.5 | 14.2 | 55.7 |
| JUL,73 | 45 | 227 | 615 | 441 | 2.764 | 1.939 | 23.7 | 15.2 | 58.2 |
| AUG,73 | 43 | 295 | 777 | 575 | 2.638 | 1.952 | 23.7 | 15.5 | 57.5 |
| SEP,73 | 37 | 224 | 622 | 340 | 2.772 | 1.515 | 23.1 | 15.3 | 64.7 |
| OCT,73 | 52 | 361 | 1033 | 480 | 2.859 | 1.328 | 22.6 | 17.2 | 68.3 |
| NOV,73 | 42 | 277 | 799 | 438 | 2.884 | 1.581 | 21.2 | 15.5 | 64.6 |
| DEC,73 | 24 | 167 | 553 | 125 | 3.311 | .749 | 21.9 | 14.9 | 81.6 |
| TOTAL | 429 | 2457 | 6691 | 3650 | 2.723 | 1.485 | 22.7 | 15.3 | 64.7 |

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,74 | 13 | 103 | 189 | 275 | 1.835 | 2.670 | 24.1 | 12.4 | 40.7 |
| FEB,74 | 27 | 148 | 481 | 109 | 3.250 | .736 | 22.1 | 15.3 | 81.5 |
| MAR,74 | 31 | 186 | 481 | 202 | 2.588 | 1.087 | 21.7 | 16.2 | 76.4 |
| APR,74 | 31 | 159 | 505 | 165 | 3.168 | 1.035 | 22.4 | 14.9 | 75.4 |
| MAY,74 | 30 | 153 | 340 | 309 | 2.220 | 2.017 | 24.5 | 14.0 | 52.4 |
| JUN,74 | 19 | N/A | 199 | 329 | N/A | N/A | 25.4 | 14.9 | 37.7 |
| JUL,74 | 28 | 213 | 397 | 317 | 1.866 | 1.490 | 24.2 | 15.1 | 55.6 |
| AUG,74 | 41 | 250 | 915 | 269 | 3.660 | 1.076 | 23.5 | 15.4 | 77.3 |
| SEP,74 | 39 | 236 | 850 | 446 | 3.598 | 1.888 | 25.9 | 14.7 | 65.6 |
| OCT,74 | 48 | 318 | 868 | 622 | 2.734 | 1.959 | 24.9 | 14.1 | 58.3 |
| NOV,74 | 41 | 248 | 817 | 262 | 3.297 | 1.461 | 21.4 | 14.6 | 69.3 |
| DEC,74 | 44 | 247 | 826 | 163 | 3.349 | .661 | 21.2 | 13.9 | 93.5 |
| TOTAL | 392 | 2388 | 6868 | 3568 | 2.876 | 1.527 | 23.3 | 14.5 | 65.8 |

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,75 | 35 | 230 | 534 | 397 | 2.327 | 1.730 | 22.9 | 14.4 | 57.4 |
| FEB,75 | 22 | 149 | 297 | 375 | 1.989 | 2.511 | 23.0 | 13.8 | 44.2 |
| MAR,75 | 40 | 290 | 742 | 504 | 2.649 | 1.800 | 22.7 | 13.4 | 59.6 |
| APR,75 | 35 | 236 | 469 | 438 | 1.991 | 1.860 | 24.9 | 13.7 | 51.7 |
| MAY,75 | 32 | 189 | 326 | 315 | 1.728 | 1.669 | 23.5 | 14.5 | 50.9 |
| JUN,75 | 11 | 59 | 59 | 115 | 1.003 | 1.956 | 24.0 | 13.8 | 33.9 |
| JUL,75 | 24 | 181 | 344 | 262 | 1.899 | 1.557 | 23.6 | 14.8 | 55.0 |
| AUG,75 | 31 | 254 | 565 | 446 | 2.225 | 1.756 | 22.6 | 14.5 | 55.9 |
| SEP,75 | 37 | 226 | 477 | 535 | 2.999 | 1.756 | 22.6 | 16.2 | 55.9 |
| OCT,75 | 55 | 307 | 712 | 602 | 2.318 | 2.370 | 25.2 | 14.8 | 54.2 |
| NOV,75 | 58 | 308 | 979 | 850 | 3.184 | 1.960 | 22.2 | 15.1 | 53.5 |
| DEC,75 | 4 | 24 | 53 | 58 | 2.254 | 2.466 | 26.8 | 15.2 | 47.7 |
| TOTAL | 387 | 2433 | 5757 | 4917 | 2.361 | 2.017 | 23.6 | 14.7 | 53.9 |

SUMMARY FOR THE PILBARA MANAGEMENT AREA     YEAR 1976

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,76 | 8 | 44 | 104 | 63 | 2.364 | 2.114 | 19.5 | 12.5 | 52.8 |
| FEB,76 | 17 | 88 | 246 | 224 | 2.722 | 2.441 | 24.4 | 14.5 | 51.7 |
| MAR,76 | 22 | 128 | 285 | 315 | 2.221 | 2.465 | 23.7 | 14.4 | 47.8 |
| APR,76 | 45 | 221 | 703 | 662 | 2.497 | 2.517 | 24.7 | 14.4 | 51.5 |
| MAY,76 | 48 | 241 | 601 | 634 | 2.090 | 2.432 | 22.2 | 14.7 | 44.1 |
| JUN,76 | 47 | 272 | 665 | 712 | 2.463 | 2.569 | 24.2 | 14.0 | 49.0 |
| JUL,76 | 34 | 224 | 492 | 502 | 2.931 | 2.507 | 23.4 | 15.0 | 63.9 |
| AUG,76 | 20 | 142 | 478 | 259 | 3.334 | 1.806 | 25.4 | 15.0 | 64.9 |
| SEP,76 | 39 | 227 | 635 | 412 | 2.684 | 1.741 | 25.4 | 14.9 | 60.6 |
| OCT,76 | 49 | 228 | 778 | 704 | 2.371 | 2.425 | 22.9 | 14.4 | 60.4 |
| NOV,76 | 53 | 232 | 743 | 815 | 2.315 | 2.457 | 23.7 | 14.2 | 49.4 |
| DEC,76 | 25 | 141 | 347 | 317 | 2.446 | 2.264 | 24.0 | 14.1 | 52.7 |
| TOTAL | 395 | 2476 | 6216 | 6931 | 2.511 | 2.355 | 22.6 | 14.5 | 51.4 |

SUMMARY FOR THE PILBARA MANAGEMENT AREA     YEAR 1977

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,77 | 12 | 55 | 159 | 129 | 2.904 | 2.356 | 24.2 | 14.2 | 55.2 |
| FEB,77 | 34 | 236 | 663 | 571 | 2.809 | 2.419 | 22.2 | 14.2 | 53.7 |
| MAR,77 | 27 | 195 | 430 | 481 | 2.200 | 2.461 | 18.5 | 13.9 | 47.2 |
| APR,77 | 51 | 335 | 682 | 865 | 2.035 | 2.582 | 22.1 | 14.3 | 44.1 |
| MAY,77 | 37 | 287 | 750 | 638 | 2.611 | 2.221 | 21.5 | 14.6 | 54.0 |
| JUN,77 | 25 | 177 | 432 | 377 | 2.439 | 2.128 | 21.5 | 14.5 | 53.4 |
| JUL,77 | 34 | 253 | 648 | 604 | 2.562 | 2.388 | 23.3 | 15.1 | 51.8 |
| AUG,77 | 43 | 249 | 743 | 721 | 2.982 | 2.893 | 22.3 | 14.9 | 50.8 |
| SEP,77 | 46 | 312 | 865 | 749 | 2.768 | 2.461 | 23.4 | 14.5 | 52.9 |
| OCT,77 | 37 | 268 | 711 | 718 | 2.654 | 2.681 | 22.8 | 14.9 | 49.8 |
| NOV,77 | 47 | 296 | 726 | 777 | 2.449 | 2.621 | 22.7 | 14.4 | 48.3 |
| DEC,77 | 52 | 260 | 837 | 581 | 3.216 | 2.233 | 22.0 | 13.4 | 59.0 |
| TOTAL | 447 | 2928 | 7646 | 7231 | 2.611 | 2.470 | 22.2 | 14.5 | 51.4 |

SUMMARY FOR THE PILBARA MANAGEMENT AREA                    YEAR 1978

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 14 | 80 | 147 | 213 | 1.642 | 2.380 | 23.4 | 14.4 | 40.8 |
| FEB,78 | 24 | 164 | 353 | 382 | 2.152 | 2.329 | 22.7 | 14.6 | 48.0 |
| MAR,78 | 35 | 220 | 373 | 431 | 1.596 | 1.960 | 23.8 | 15.1 | 46.4 |
| APR,78 | 42 | 256 | 590 | 540 | 2.335 | 2.105 | 23.4 | 15.0 | 52.6 |
| MAY,78 | 39 | 272 | 420 | 473 | 1.545 | 1.741 | 22.7 | 14.4 | 47.0 |
| JUN,78 | 16 | 118 | 217 | 235 | 1.832 | 1.984 | 24.4 | 14.7 | 48.0 |
| JUL,78 | 33 | 264 | 485 | 470 | 1.839 | 1.782 | 23.9 | 14.9 | 50.3 |
| AUG,78 | 19 | 144 | 292 | 240 | 2.024 | 1.663 | 25.8 | 14.5 | 54.9 |
| SEP,78 | 20 | 157 | 353 | 342 | 2.120 | 2.054 | 25.6 | 14.7 | 50.8 |
| OCT,78 | 61 | 386 | 725 | 793 | 1.877 | 2.053 | 25.6 | 14.7 | 47.8 |
| NOV,78 | 44 | 277 | 492 | 674 | 1.777 | 2.074 | 26.0 | 15.0 | 46.2 |
| DEC,78 | 30 | 209 | 492 | 536 | 2.354 | 2.564 | 24.8 | 15.1 | 47.9 |
| TOTAL | 377 | 2586 | 4948 | 5229 | 1.913 | 2.022 | 24.4 | 14.9 | 48.6 |

SUMMARY FOR THE PILBARA MANAGEMENT AREA                    YEAR 1979

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 30 | 186 | 483 | 448 | 2.592 | 2.404 | 24.6 | 14.1 | 51.9 |
| FEB,79 | 30 | 145 | 329 | 373 | 2.265 | 2.567 | 24.0 | 14.5 | 46.9 |
| MAR,79 | 33 | 223 | 434 | 500 | 1.944 | 2.242 | 24.4 | 14.5 | 46.5 |
| APR,79 | 29 | 218 | 361 | 375 | 1.655 | 1.719 | 24.1 | 14.9 | 49.0 |
| MAY,79 | 12 | 90 | 188 | 255 | 2.097 | 2.845 | 21.3 | 15.1 | 42.4 |
| JUN,79 | 17 | 138 | 429 | 440 | 3.097 | 3.184 | 21.5 | 15.3 | 49.3 |
| JUL,79 | 31 | 207 | 479 | 595 | 2.309 | 2.875 | 24.1 | 15.0 | 44.5 |
| AUG,79 | 19 | 117 | 258 | 334 | 2.211 | 2.663 | 25.5 | 15.0 | 43.6 |
| SEP,79 | 20 | 136 | 286 | 348 | 2.108 | 2.565 | 24.2 | 15.4 | 45.1 |
| OCT,79 | 21 | 101 | 172 | 308 | 1.695 | 3.034 | 25.9 | 15.1 | 35.8 |
| NOV,79 | 25 | 128 | 289 | 383 | 2.249 | 2.981 | 22.5 | 14.6 | 43.0 |
| DEC,79 | 30 | 162 | 375 | 391 | 2.316 | 2.415 | 21.8 | 14.3 | 49.0 |
| TOTAL | 297 | 1953 | 4081 | 4750 | 2.202 | 2.563 | 23.6 | 14.8 | 45.2 |

TABLE A II. 7.  SUMMARY OF THE RED KANGAROO HARVEST DATA FOR
HARVESTS TAKEN WITHIN THE ASHBURTON (EAST)
MANAGEMENT AREA - WESTERN AUSTRALIA : 1971 - 1979.

[NOTE - N/A    DATA NOT AVAILABLE.]

SUMMARY FOR THE ASHBURTON (EAST) MANAGEMENT AREA          YEAR 1971

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN.71 | | | | | NO DETAILED RECORDS | | | | |
| FEB.71 | 2 | N/A | 26 | 10 | N/A | N/A | 20.8 | 14.0 | 72.2 |
| MAR.71 | 0 | 0 | 0 | 0 | | | | | |
| APR.71 | 3 | N/A | 34 | 38 | N/A | N/A | 22.6 | 13.0 | 47.2 |
| MAY.71 | 5 | N/A | 58 | 44 | N/A | N/A | 19.8 | 14.8 | 56.9 |
| JUN.71 | 24 | N/A | 198 | 248 | N/A | N/A | 21.9 | 14.3 | 44.4 |
| JUL.71 | 11 | N/A | 70 | 93 | N/A | N/A | 23.1 | 14.6 | 42.9 |
| AUG.71 | 0 | 0 | 0 | 0 | | | | | |
| SEP.71 | 0 | 0 | 0 | 0 | | | | | |
| OCT.71 | 1 | N/A | 12 | 0 | N/A | N/A | 27.2 | 0.0 | 100.0 |
| NOV.71 | 0 | 0 | 0 | 0 | | | | | |
| DEC.71 | 16 | N/A | 238 | 260 | N/A | N/A | 24.3 | 14.2 | 47.8 |
| TOTAL ,1971 | 62 | N/A | 636 | 693 | N/A | N/A | 22.9 | 14.2 | 47.9 |

SUMMARY FOR THE ASHBURTON (EAST) MANAGEMENT AREA — YEAR 1972

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 28 | N/A | 309 | 468 | N/A | N/A | 23.7 | 14.0 | 39.8 |
| FEB,72 | 13 | N/A | 176 | 194 | N/A | N/A | 23.9 | 13.9 | 47.6 |
| MAR,72 | 13 | N/A | 163 | 254 | N/A | N/A | 22.5 | 14.0 | 39.1 |
| APR,72 | 20 | N/A | 358 | 553 | N/A | N/A | 22.4 | 13.3 | 39.3 |
| MAY,72 | 11 | 104 | 214 | 267 | 2.064 | 2.576 | 22.9 | 12.3 | 44.5 |
| JUN,72 | 4 | N/A | 19 | 70 | N/A | N/A | 23.8 | 13.3 | 21.3 |
| JUL,72 | 0 | 0 | 0 | 0 | | | | | |
| AUG,72 | 0 | 0 | 0 | 0 | | | | | |
| SEP,72 | 0 | 0 | 0 | 0 | | | | | |
| OCT,72 | 0 | 0 | 0 | 0 | | | | | |
| NOV,72 | 0 | 0 | 0 | 0 | | | | | |
| DEC,72 | 3 | N/A | 33 | 45 | N/A | N/A | 25.9 | 14.7 | 42.3 |
| TOTAL | 92 | 673 | 1272 | 1851 | 1.899 | 2.750 | 23.2 | 13.7 | 40.7 |

SUMMARY FOR THE ASHBURTON (EAST) MANAGEMENT AREA — YEAR 1973

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 5 | N/A | 100 | 33 | N/A | N/A | 23.2 | 13.0 | 75.2 |
| FEB,73 | 3 | 6 | 18 | 17 | 3.000 | 2.833 | 21.4 | 12.4 | 51.4 |
| MAR,73 | 0 | 0 | 0 | 0 | | | | | |
| APR,73 | 0 | 0 | 0 | 0 | | | | | |
| MAY,73 | 0 | 0 | 0 | 0 | | | | | |
| JUN,73 | 18 | 129 | 207 | 275 | 2.302 | 2.132 | N/A | N/A | 51.9 |
| JUL,73 | 2 | 17 | 53 | 22 | 3.119 | 1.294 | N/A | N/A | 70.7 |
| AUG,73 | 8 | 63 | 219 | 88 | 3.504 | 1.408 | 20.1 | 15.1 | 71.3 |
| SEP,73 | 34 | 168 | 430 | 314 | 2.560 | 1.869 | 23.1 | 14.1 | 57.9 |
| OCT,73 | 28 | 201 | 322 | 434 | 1.602 | 2.159 | 24.5 | 14.2 | 42.6 |
| NOV,73 | 33 | 217 | 430 | 661 | 1.982 | 3.046 | 23.2 | 14.1 | 39.4 |
| DEC,73 | 30 | 154 | 418 | 303 | 2.714 | 1.968 | 23.1 | 13.9 | 58.0 |
| TOTAL | 161 | 984 | 2287 | 2147 | 2.324 | 2.182 | 23.0 | 14.1 | 51.6 |

SUMMARY FOR THE ASHBURTON (EAST) MANAGEMENT AREA          YEAR 1974

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,74 | 29 | 193 | 271 | 423 | 1.404 | 2.192 | 23.5 | 14.0 | 39.0 |
| FEB,74 | 7 | 31 | 62 | 75 | 2.000 | 2.419 | 22.5 | 14.5 | 45.3 |
| MAR,74 | 23 | 144 | 195 | 325 | 1.354 | 2.257 | 25.1 | 13.8 | 37.5 |
| APR,74 | 0 | 0 | 0 | 0 | | | | | |
| MAY,74 | 51 | 303 | 614 | 478 | 2.028 | 1.579 | 24.1 | 14.2 | 56.2 |
| JUN,74 | 54 | 334 | 832 | 823 | 2.488 | 2.461 | 22.6 | 13.9 | 50.3 |
| JUL,74 | 23 | 138 | 425 | 306 | 3.080 | 2.217 | 23.3 | 13.9 | 58.1 |
| AUG,74 | 33 | 202 | 485 | 474 | 2.400 | 2.346 | 25.2 | 14.2 | 50.6 |
| SEP,74 | 30 | 199 | 530 | 406 | 2.669 | 2.045 | 25.1 | 14.1 | 56.6 |
| OCT,74 | 37 | 221 | 634 | 438 | 2.868 | 1.981 | 24.7 | 14.2 | 59.1 |
| NOV,74 | 47 | 306 | 704 | 606 | 2.297 | 1.977 | 25.2 | 14.0 | 53.7 |
| DEC,74 | 23 | 119 | 272 | 392 | 2.292 | 3.303 | 23.6 | 13.9 | 41.0 |
| TOTAL | 357 | 2205 | 5024 | 4746 | 2.279 | 2.152 | 24.2 | 14.0 | 51.4 |

SUMMARY FOR THE ASHBURTON (EAST) MANAGEMENT AREA          YEAR 1975

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,75 | 14 | 89 | 183 | 183 | 2.067 | 2.067 | 23.7 | 13.4 | 50.0 |
| FEB,75 | 2 | 15 | 46 | 13 | 3.067 | .867 | 24.1 | 13.8 | 78.0 |
| MAR,75 | 19 | 122 | 225 | 213 | 1.838 | 1.740 | 23.9 | 13.9 | 51.4 |
| APR,75 | 47 | 311 | 754 | 542 | 2.427 | 1.809 | 22.8 | 13.5 | 57.3 |
| MAY,75 | 41 | 246 | 466 | 532 | 1.892 | 2.160 | 24.8 | 14.3 | 46.7 |
| JUN,75 | 21 | 145 | 327 | 267 | 2.262 | 1.847 | 23.6 | 13.6 | 55.1 |
| JUL,75 | 22 | 127 | 295 | 208 | 2.329 | 1.642 | 23.0 | 14.2 | 58.6 |
| AUG,75 | 24 | 199 | 407 | 564 | 2.056 | 2.848 | 26.4 | 14.9 | 41.9 |
| SEP,75 | 21 | 155 | 321 | 511 | 2.068 | 3.292 | 23.7 | 14.3 | 38.6 |
| OCT,75 | 17 | 142 | 304 | 309 | 2.141 | 2.176 | 24.8 | 13.9 | 49.6 |
| NOV,75 | 42 | 286 | 704 | 716 | 2.463 | 2.505 | 23.5 | 13.6 | 49.6 |
| DEC,75 | 3 | N/A | 30 | 28 | N/A | N/A | 23.5 | 13.9 | 51.7 |
| TOTAL | 273 | 1857 | 4062 | 4106 | 2.188 | 2.212 | 24.0 | 14.1 | 49.7 |

SUMMARY FOR THE ASHBURTON (EAST) MANAGEMENT AREA          YEAR 1976

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN.76 | 44 | 301 | 601 | 476 | 1.994 | 1.579 | 22.3 | 13.2 | 55.? |
| FEB.76 | 0 | 0 | 0 | 0 | | | | | |
| MAR.76 | 5 | N/A | 65 | 59 | N/A | N/A | 15.9 | 12.9 | 52.4 |
| APR.76 | 15 | 80 | 329 | 310 | 4.113 | 3.875 | 20.9 | 13.0 | 51.5 |
| MAY.76 | 0 | 0 | 0 | 0 | | | | | |
| JUN.76 | 21 | 100 | 385 | 473 | 3.850 | 4.730 | 20.1 | 13.9 | 44.9 |
| JUL.76 | 9 | 49 | 90 | 121 | 1.853 | 2.698 | 19.2 | 14.1 | 40.7 |
| AUG.76 | 16 | 85 | 113 | 160 | 1.329 | 1.882 | 19.8 | 14.3 | 41.4 |
| SEP.76 | 27 | 152 | 371 | 404 | 2.441 | 2.658 | 21.7 | 14.5 | 47.9 |
| OCT.76 | 11 | 51 | 124 | 169 | 2.431 | 2.137 | 20.8 | 14.8 | 53.2 |
| NOV.76 | 16 | 98 | 191 | 214 | 1.949 | 2.184 | 19.1 | 13.6 | 47.2 |
| DEC.76 | 0 | 0 | 0 | 0 | | | | | |
| TOTAL | 164 | 941 | 2269 | 2336 | 2.411 | 2.482 | 20.8 | 13.9 | 49.3 |

SUMMARY FOR THE ASHBURTON (EAST) MANAGEMENT AREA          YEAR 1977

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN.77 | 10 | 53 | 95 | 165 | 1.792 | 2.925 | 19.5 | 12.7 | 33.0 |
| FEB.77 | 0 | 0 | 0 | 0 | | | | | |
| MAR.77 | 0 | 0 | 0 | 0 | | | | | |
| APR.77 | 0 | 0 | 0 | 0 | | | | | |
| MAY.77 | 26 | 141 | 323 | 524 | 2.296 | 3.724 | 22.3 | 14.8 | 38.1 |
| JUN.77 | 6 | 17 | 78 | 46 | 1.647 | 2.706 | 17.5 | 13.4 | 37.8 |
| JUL.77 | 25 | 122 | 223 | 343 | 1.329 | 2.813 | 19.1 | 14.1 | 39.4 |
| AUG.77 | 11 | 56 | 70 | 197 | 1.061 | 2.985 | 20.5 | 14.2 | 26.2 |
| SEP.77 | 0 | 0 | 0 | 0 | | | | | |
| OCT.77 | 0 | 0 | 0 | 0 | | | | | |
| NOV.77 | 10 | N/A | 45 | 126 | N/A | N/A | 16.9 | 12.0 | 26.3 |
| DEC.77 | 7 | N/A | 75 | 57 | N/A | N/A | 17.0 | 13.1 | 56.8 |
| TOTAL | 95 | 469 | 859 | 1448 | 1.832 | 2.088 | 20.1 | 14.0 | 37.2 |

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## SUMMARY FOR THE ASHBURTON (EAST) MANAGEMENT AREA — YEAR 1978

| MONTH YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 11 | N/A | 154 | 244 | N/A | N/A | 17.0 | 12.4 | 38.7 |
| FEB,78 | 0 | 0 | 0 | 0 | | | | | |
| MAR,78 | 0 | 0 | 0 | 0 | | | | | |
| APR,78 | 0 | 0 | 0 | 0 | | | | | |
| MAY,78 | 0 | 0 | 0 | 0 | | | | | |
| JUN,78 | 13 | N/A | 123 | 213 | N/A | N/A | 25.1 | 14.5 | 36.6 |
| JUL,78 | 15 | N/A | 167 | 232 | N/A | N/A | 25.2 | 14.0 | 41.9 |
| AUG,78 | 5 | N/A | 55 | 74 | N/A | N/A | 24.3 | 14.9 | 42.6 |
| SEP,78 | 16 | N/A | 96 | 177 | N/A | N/A | 28.3 | 14.5 | 35.2 |
| OCT,78 | 8 | 42 | 105 | 141 | 2.505 | 3.364 | 21.4 | 13.8 | 42.7 |
| NOV,78 | 3 | 21 | 19 | 26 | .914 | 1.250 | 23.5 | 13.7 | 42.2 |
| DEC,78 | 11 | 74 | 103 | 151 | 1.383 | 2.027 | 20.3 | 13.5 | 40.6 |
| TOTAL | 82 | 531 | 622 | 1258 | 1.548 | 2.369 | 22.9 | 13.8 | 39.5 |

## SUMMARY FOR THE ASHBURTON (EAST) MANAGEMENT AREA — YEAR 1979

| MONTH YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 3 | N/A | 15 | 28 | N/A | N/A | 20.7 | 13.0 | 34.9 |
| FEB,79 | 9 | 51 | 85 | 114 | 1.677 | 2.252 | 19.9 | 13.8 | 42.7 |
| MAR,79 | 2 | 12 | 27 | 24 | 2.335 | 2.075 | 21.2 | 16.7 | 52.9 |
| APR,79 | 0 | 0 | 0 | 0 | | | | | |
| MAY,79 | 0 | 0 | 0 | 0 | | | | | |
| JUN,79 | 13 | 72 | 92 | 184 | 1.273 | 2.556 | 25.0 | 14.2 | 33.3 |
| JUL,79 | 0 | 0 | 0 | 0 | | | | | |
| AUG,79 | 8 | 54 | 43 | 45 | .796 | 1.204 | 22.0 | 14.6 | 39.3 |
| SEP,79 | 0 | 0 | 0 | 0 | | | | | |
| OCT,79 | 22 | 92 | 175 | 369 | 1.902 | 4.228 | 22.8 | 16.1 | 31.0 |
| NOV,79 | 7 | 52 | 86 | 133 | 1.078 | 2.560 | 19.3 | 14.4 | 29.6 |
| DEC,79 | 4 | N/A | 20 | 35 | N/A | N/A | 18.7 | 13.5 | 36.4 |
| TOTAL | 66 | 355 | 513 | 972 | 1.447 | 2.741 | 22.0 | 15.0 | 34.5 |

TABLE A II. 8.  SUMMARY OF THE RED KANGAROO HARVEST DATA FOR
HARVESTS TAKEN WITHIN THE NORTH EASTERN PASTORAL
MGMT AREA - WESTERN AUSTRALIA : 1971 - 1979.

[NOTE : N/A = DATA NOT AVAILABLE.]

SUMMARY FOR THE NORTH EASTERN PASTORAL MGMT AREA          YEAR 1971

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,71 | 0 | 0 | 0 | 0 | | | | | |
| FEB,71 | 0 | 0 | 0 | 0 | NO DETAILED RECORDS | | | | |
| MAR,71 | 10 | N/A | 142 | 114 | N/A | N/A | 22.0 | 13.5 | 55.5 |
| APR,71 | 12 | N/A | 153 | 102 | N/A | N/A | 20.3 | 12.8 | 44.3 |
| MAY,71 | 0 | 0 | 0 | 0 | | | | | |
| JUN,71 | 11 | N/A | 127 | 121 | N/A | N/A | 0.0 | 0.0 | 51.2 |
| JUL,71 | 17 | N/A | 235 | 183 | N/A | N/A | 22.0 | 13.0 | 56.2 |
| AUG,71 | 14 | N/A | 152 | 166 | N/A | N/A | 23.6 | 14.3 | 47.3 |
| SEP,71 | 15 | N/A | 244 | 197 | N/A | N/A | 23.5 | 14.5 | 57.3 |
| OCT,71 | 52 | N/A | 449 | 890 | N/A | N/A | 22.9 | 14.7 | 42.2 |
| NOV,71 | 71 | N/A | 863 | 1155 | N/A | N/A | 23.0 | 14.3 | 42.8 |
| DEC,71 | 28 | N/A | 319 | 434 | N/A | N/A | 22.5 | 14.4 | 42.4 |
| TOTAL ,1971 | 230 | N/A | 2904 | 3452 | N/A | N/A | 22.7 | 14.3 | 45.7 |

SUMMARY FOR THE NORTH EASTERN PASTORAL MGMT AREA    YEAR 1972

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 49 | N/A | 792 | 923 | N/A | N/A | 23.7 | 14.1 | 46.2 |
| FEB,72 | 14 | 104 | 314 | 235 | 3.028 | 2.266 | 22.4 | 13.5 | 57.2 |
| MAR,72 | 10 | N/A | 147 | 217 | N/A | N/A | 23.3 | 13.7 | 40.4 |
| APR,72 | 11 | 97 | 352 | 272 | 3.629 | 2.804 | 26.1 | 15.3 | 55.4 |
| MAY,72 | 13 | 75 | 136 | 186 | 1.813 | 2.480 | 21.8 | 13.7 | 42.2 |
| JUN,72 | 9 | 62 | 73 | 155 | 1.177 | 2.500 | 24.8 | 14.8 | 32.0 |
| JUL,72 | 28 | 203 | 264 | 373 | 1.298 | 1.833 | 25.4 | 14.1 | 41.4 |
| AUG,72 | 22 | 187 | 261 | 423 | 1.396 | 2.262 | 22.9 | 14.1 | 35.2 |
| SEP,72 | 35 | 330 | 641 | 699 | 1.942 | 2.118 | 22.1 | 13.4 | 47.3 |
| OCT,72 | 29 | 252 | 461 | 590 | 1.832 | 2.344 | 22.3 | 14.4 | 43.9 |
| NOV,72 | 28 | 223 | 386 | 466 | 1.731 | 2.090 | 23.1 | 14.6 | 45.3 |
| DEC,72 | 15 | 119 | 329 | 297 | 2.765 | 2.496 | 22.7 | 14.1 | 52.6 |
| TOTAL | 263 | 2166 | 4156 | 4936 | 1.919 | 2.233 | 23.0 | 14.2 | 46.2 |

SUMMARY FOR THE NORTH EASTERN PASTORAL MGMT AREA    YEAR 1973

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 21 | 203 | 554 | 398 | 2.729 | 1.961 | 21.6 | 13.7 | 58.2 |
| FEB,73 | 17 | 95 | 233 | 161 | 2.453 | 1.695 | 22.8 | 12.9 | 59.1 |
| MAR,73 | 0 | 0 | 0 | 0 | | | | | |
| APR,73 | 12 | 38 | 175 | 120 | 1.989 | 1.364 | 23.1 | 13.0 | 59.3 |
| MAY,73 | 10 | N/A | 130 | 172 | N/A | N/A | 23.4 | 13.3 | 43.0 |
| JUN,73 | 21 | 172 | 209 | 345 | 1.215 | 2.006 | 23.9 | 13.9 | 37.7 |
| JUL,73 | 18 | 128 | 158 | 253 | 1.234 | 1.977 | 25.0 | 13.8 | 38.4 |
| AUG,73 | 2 | 9 | 10 | 5 | 1.063 | .531 | 28.3 | 16.3 | 66.7 |
| SEP,73 | 15 | 91 | 125 | 180 | 1.374 | 1.976 | 25.4 | 14.3 | 41.0 |
| OCT,73 | 19 | 150 | 208 | 260 | 1.389 | 1.736 | 27.2 | 14.5 | 44.4 |
| NOV,73 | 24 | 213 | 299 | 435 | 1.404 | 2.042 | 28.4 | 14.5 | 40.7 |
| DEC,73 | 11 | 96 | 197 | 178 | 2.052 | 1.854 | 27.9 | 14.0 | 52.5 |
| TOTAL | 170 | 1325 | 2298 | 2507 | 1.734 | 1.892 | 24.5 | 13.9 | 47.8 |

SUMMARY FOR THE NORTH EASTERN PASTORAL MGMT AREA                                    YEAR 1974

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL MALES | NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,74 | 21 | 142 | 256 | 244 | 1.803 | 1.718 | 26.5 | 13.6 | 51.2 |
| FEB,74 | 17 | 94 | 157 | 156 | 1.670 | 1.660 | 26.3 | 13.7 | 50.2 |
| MAR,74 | 20 | 140 | 213 | 305 | 1.521 | 2.179 | 25.7 | 14.1 | 41.1 |
| APR,74 | 20 | 129 | 177 | 234 | 1.372 | 1.814 | 25.2 | 13.8 | 43.1 |
| MAY,74 | 6 | 32 | 33 | 60 | 1.017 | 1.849 | 30.8 | 15.0 | 35.5 |
| JUN,74 | 6 | 41 | 77 | 49 | 1.955 | 1.181 | 31.9 | 15.6 | 61.1 |
| JUL,74 | 13 | 91 | 145 | 123 | 1.593 | 1.352 | 29.8 | 15.5 | 54.1 |
| AUG,74 | 0 | 0 | 0 | 0 | | | | | |
| SEP,74 | 9 | 60 | 148 | 110 | 2.467 | 1.833 | 23.8 | 14.6 | 57.4 |
| OCT,74 | 23 | 160 | 364 | 458 | 2.275 | 2.663 | 22.8 | 13.8 | 44.3 |
| NOV,74 | 34 | 220 | 470 | 525 | 2.134 | 2.384 | 24.7 | 14.4 | 47.2 |
| DEC,74 | 17 | 102 | 284 | 229 | 2.807 | 2.247 | 26.1 | 14.1 | 55.5 |
| TOTAL | 186 | 1712 | 2326 | 2493 | 1.919 | 2.057 | 25.6 | 14.1 | 48.3 |

SUMMARY FOR THE NORTH EASTERN PASTORAL MGMT AREA                                    YEAR 1975

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL MALES | NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,75 | 23 | 156 | 284 | 358 | 2.471 | 2.292 | 26.8 | 13.9 | 51.9 |
| FEB,75 | 4 | 24 | 60 | 55 | 2.478 | 2.272 | 26.8 | 14.2 | 52.2 |
| MAR,75 | 13 | 83 | 154 | 157 | 1.855 | 1.892 | 25.9 | 13.9 | 49.5 |
| APR,75 | 15 | 86 | 161 | 171 | 1.880 | 1.997 | 25.2 | 13.7 | 48.5 |
| MAY,75 | 41 | 282 | 500 | 491 | 1.776 | 1.744 | 23.6 | 13.6 | 50.5 |
| JUN,75 | 36 | 230 | 497 | 549 | 2.156 | 2.469 | 22.1 | 13.6 | 46.6 |
| JUL,75 | 14 | 33 | 214 | 207 | 2.563 | 2.479 | 21.7 | 13.7 | 50.8 |
| AUG,75 | 15 | 100 | 238 | 247 | 2.376 | 2.466 | 24.2 | 14.1 | 49.1 |
| SEP,75 | 34 | 282 | 571 | 548 | 2.024 | 1.943 | 24.6 | 14.4 | 51.0 |
| OCT,75 | 22 | 150 | 297 | 287 | 1.975 | 1.908 | 25.0 | 14.5 | 50.9 |
| NOV,75 | 18 | 96 | 246 | 227 | 2.559 | 2.361 | 24.2 | 14.5 | 52.0 |
| DEC,75 | 13 | 90 | 206 | 150 | 2.289 | 1.667 | 24.0 | 13.5 | 57.9 |
| TOTAL | 252 | 1648 | 3530 | 3467 | 2.142 | 2.104 | 24.2 | 14.0 | 50.5 |

SUMMARY FOR THE NORTH EASTERN PASTORAL MGMT AREA                          YEAR 1976

| MONTH,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,76 | 31 | 175 | 409 | 338 | 2.343 | 1.936 | 24.7 | 14.1 | 54.9 |
| FEB,76 | 21 | 151 | 417 | 402 | 2.756 | 2.654 | 25.5 | 14.4 | 50.9 |
| MAR,76 | 24 | 142 | 349 | 409 | 2.599 | 2.889 | 24.8 | 15.2 | 47.4 |
| APR,76 | 21 | 149 | 347 | 301 | 2.604 | 2.027 | 23.3 | 14.0 | 56.3 |
| MAY,76 | 20 | 164 | 402 | 316 | 2.588 | 2.031 | 23.4 | 14.2 | 55.0 |
| JUN,76 | 21 | 178 | 326 | 309 | 2.542 | 2.409 | 22.9 | 14.1 | 52.3 |
| JUL,76 | 35 | 230 | 481 | 457 | 2.432 | 2.345 | 22.2 | 13.1 | 50.9 |
| AUG,76 | 16 | 127 | 295 | 248 | 2.322 | 2.116 | 22.1 | 13.4 | 52.4 |
| SEP,76 | 27 | 191 | 535 | 569 | 2.804 | 2.929 | 22.1 | 14.3 | 48.7 |
| OCT,76 | 22 | 152 | 456 | 461 | 3.000 | 3.033 | 22.7 | 14.3 | 49.7 |
| NOV,76 | 20 | 203 | 443 | 554 | 3.160 | 2.732 | 23.7 | 14.0 | 53.6 |
| DEC,76 | 10 | 79 | 267 | 171 | 2.625 | 2.145 | 22.1 | 13.9 | 54.6 |
| TOTAL | 277 | 1921 | 5127 | 4747 | 2.670 | 2.472 | 22.1 | 14.2 | 51.9 |

SUMMARY FOR THE NORTH EASTERN PASTORAL MGMT AREA                          YEAR 1977

| MONTH,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,77 | 24 | 151 | 520 | 417 | 3.444 | 2.762 | 22.2 | 14.6 | 55.5 |
| FEB,77 | 14 | 105 | 222 | 213 | 2.114 | 2.029 | 21.5 | 13.0 | 51.0 |
| MAR,77 | 11 | 97 | 219 | 148 | 2.517 | 1.701 | 20.4 | 13.1 | 59.7 |
| APR,77 | 13 | 81 | 212 | 174 | 2.617 | 2.148 | 19.5 | 12.9 | 54.9 |
| MAY,77 | 31 | 223 | 404 | 328 | 1.812 | 1.471 | 19.7 | 12.9 | 55.7 |
| JUN,77 | 4 | 31 | 74 | 55 | 2.387 | 1.774 | 20.0 | 12.9 | 57.4 |
| JUL,77 | 10 | 79 | 185 | 126 | 2.342 | 1.595 | 19.6 | 12.9 | 59.5 |
| AUG,77 | 12 | 79 | 154 | 134 | 1.958 | 1.704 | 18.3 | 12.5 | 53.5 |
| SEP,77 | 19 | 110 | 252 | 271 | 2.291 | 2.464 | 17.3 | 12.1 | 48.2 |
| OCT,77 | 19 | 114 | 273 | 260 | 2.395 | 2.261 | 17.6 | 12.4 | 51.2 |
| NOV,77 | 4 | 29 | 36 | 40 | 1.800 | 2.000 | 19.7 | 12.7 | 47.4 |
| DEC,77 | 3 | 18 | 38 | 78 | 2.111 | 1.556 | 20.4 | 14.2 | 57.6 |
| TOTAL | 164 | 1098 | 2589 | 2194 | 2.359 | 1.999 | 19.9 | 13.4 | 54.1 |

SUMMARY FOR THE NORTH EASTERN PASTORAL MGMT AREA     YEAR 1978

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL MALES | NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 25 | 143 | 265 | 281 | 1.851 | 1.962 | 18.8 | 13.0 | 48.5 |
| FEB,78 | 20 | 130 | 229 | 171 | 1.756 | 1.311 | 19.3 | 12.9 | 57.3 |
| MAR,78 | 1 | 9 | 21 | 21 | 2.625 | 2.625 | 20.4 | 12.6 | 50.0 |
| APR,78 | 13 | 108 | 247 | 196 | 2.287 | 1.815 | 20.6 | 13.1 | 55.8 |
| MAY,78 | 12 | 92 | 196 | 149 | 2.130 | 1.620 | 20.8 | 13.4 | 56.8 |
| JUN,78 | 11 | 84 | 170 | 168 | 2.024 | 2.000 | 20.8 | 13.2 | 50.3 |
| JUL,78 | 8 | 60 | 102 | 125 | 1.700 | 2.083 | 20.9 | 13.2 | 44.9 |
| AUG,78 | 20 | 115 | 214 | 228 | 1.853 | 1.974 | 21.1 | 13.3 | 48.4 |
| SEP,78 | 17 | 144 | 295 | 374 | 2.049 | 2.597 | 22.9 | 13.9 | 44.1 |
| OCT,78 | 8 | 68 | 149 | 172 | 2.191 | 2.529 | 24.5 | 13.9 | 46.4 |
| NOV,78 | 12 | 96 | 197 | 223 | 2.052 | 2.323 | 24.4 | 14.0 | 46.9 |
| DEC,78 | 21 | 164 | 383 | 461 | 2.307 | 2.777 | 25.4 | 13.7 | 45.4 |
| TOTAL | 168 | 1215 | 2468 | 2559 | 2.031 | 2.114 | 21.9 | 13.5 | 49.0 |

SUMMARY FOR THE NORTH EASTERN PASTORAL MGMT AREA     YEAR 1979

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL MALES | NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 16 | 113 | 166 | 281 | 1.469 | 2.487 | 24.3 | 13.9 | 37.1 |
| FEB,79 | 22 | 132 | 164 | 280 | 1.247 | 2.128 | 24.5 | 13.8 | 36.9 |
| MAR,79 | 26 | 155 | 211 | 418 | 1.359 | 2.492 | 24.0 | 12.8 | 33.5 |
| APR,79 | 30 | 187 | 278 | 382 | 1.485 | 2.041 | 23.7 | 13.1 | 42.1 |
| MAY,79 | 23 | 140 | 210 | 341 | 1.495 | 2.428 | 24.9 | 13.0 | 38.1 |
| JUN,79 | 25 | 123 | 198 | 227 | 1.612 | 1.848 | 24.3 | 12.7 | 46.6 |
| JUL,79 | 22 | 167 | 177 | 433 | 1.060 | 2.593 | 25.8 | 12.5 | 29.0 |
| AUG,79 | 11 | 62 | 113 | 225 | 1.823 | 3.629 | 26.8 | 13.3 | 33.4 |
| SEP,79 | 27 | 164 | 310 | 574 | 1.892 | 3.504 | 25.2 | 13.4 | 35.1 |
| OCT,79 | 38 | 226 | 417 | 831 | 1.849 | 3.685 | 23.9 | 13.9 | 33.4 |
| NOV,79 | 33 | 201 | 276 | 598 | 1.375 | 2.980 | 25.5 | 14.1 | 31.6 |
| DEC,79 | 13 | 76 | 184 | 317 | 2.409 | 4.150 | 25.6 | 14.2 | 36.7 |
| TOTAL | 286 | 1746 | 2704 | 4907 | 1.549 | 2.811 | 24.7 | 13.4 | 35.5 |

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TABLE A II.9.   SUMMARY OF THE RED KANGAROO HARVEST DATA FOR
HARVESTS TAKEN WITHIN THE MAGNET MANAGEMENT
AREA - WESTERN AUSTRALIA : 1971 - 1979.

[NOTE - N/A = DATA NOT AVAILABLE.
(1971 DATA)* = PARTIAL DATA ONLY
RELATING TO THIS PART OF HARVEST.]

SUMMARY FOR THE MAGNET MANAGEMENT AREA                                    YEAR   1971

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,71 | | | | | | | | | |
| FEB,71 | 9 | N/A | 102 | <1 | N/A | N/A | 25.0 | 13.7 | 62.6 |
|  | +24* | | +360 | +375 | | | | | 49.0 |
| MAR,71 | 3 | N/A | 14 | 19 | N/A | N/A | 25.3 | 14.3 | 42.4 |
|  | +33* | | +486 | +505 | | | | | 49.0 |
| APR,71 | 69 | N/A | 849 | 842 | N/A | N/A | 20.3 | 12.3 | 50.2 |
|  | +23* | | +310 | +379 | | | | | 45.0 |
| MAY,71 | 85 | N/A | 1130 | 1298 | N/A | N/A | 20.3 | 13.3 | 46.5 |
| JUN,71 | 85 | N/A | 973 | 902 | N/A | N/A | 21.5 | 13.3 | 51.9 |
| JUL,71 | 81 | N/A | 970 | 873 | N/A | N/A | 22.3 | 14.1 | 52.6 |
| AUG,71 | 74 | N/A | 887 | 909 | N/A | N/A | 20.7 | 13.4 | 49.4 |
| SEP,71 | 108 | N/A | 986 | 1018 | N/A | N/A | 21.1 | 13.9 | 49.2 |
| OCT,71 | 60 | N/A | 492 | 588 | N/A | N/A | 22.7 | 13.9 | 45.6 |
| NOV,71 | 93 | N/A | 973 | 1160 | N/A | N/A | 21.3 | 13.6 | 45.6 |
| DEC,71 | 85 | N/A | 916 | 963 | N/A | N/A | 21.6 | 13.7 | 48.7 |
| TOTAL ,1971 | 749 | N/A | 8292 | 8633 | N/A | N/A | 21.3 | 13.5 | 49.0 |
|  | +80* | | +1156 | +1259 | | | | | 47.9 |

(NO DETAILED RECORDS)

SUMMARY FOR THE MAGNET MANAGEMENT AREA

YEAR 1972

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 93 | N/A | 857 | 1348 | N/A | N/A | 21.7 | 13.4 | 38.9 |
| FEB,72 | 25 | N/A | 242 | 341 | N/A | N/A | 21.0 | 12.8 | 41.5 |
| MAR,72 | 73 | 830 | 814 | 906 | .981 | 1.092 | 21.2 | 12.6 | 47.3 |
| APR,72 | 66 | 485 | 749 | 895 | 1.544 | 1.845 | 20.3 | 12.5 | 45.6 |
| MAY,72 | 56 | 416 | 483 | 776 | 1.161 | 1.865 | 19.2 | 12.2 | 39.4 |
| JUN,72 | 49 | 324 | 434 | 571 | 1.339 | 1.720 | 20.8 | 12.1 | 43.2 |
| JUL,72 | 59 | N/A | 463 | 737 | N/A | N/A | 17.6 | 11.2 | 38.6 |
| AUG,72 | 48 | 316 | 418 | 455 | 1.322 | 1.439 | 19.5 | 12.6 | 47.9 |
| SEP,72 | 40 | 203 | 359 | 395 | 1.763 | 1.947 | 19.1 | 13.2 | 47.6 |
| OCT,72 | 59 | 494 | 1049 | 760 | 2.122 | 1.537 | 22.2 | 14.3 | 58.0 |
| NOV,72 | 46 | 325 | 602 | 612 | 1.853 | 1.576 | 22.6 | 14.0 | 54.0 |
| DEC,72 | 38 | 210 | 358 | 368 | 1.708 | 1.756 | 20.1 | 13.7 | 49.3 |
| TOTAL | 662 | 4559 | 6828 | 8064 | 1.498 | 1.769 | 20.8 | 12.9 | 45.9 |

SUMMARY FOR THE MAGNET MANAGEMENT AREA

YEAR 1973

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 34 | 196 | 306 | 378 | 1.563 | 1.930 | 21.1 | 13.3 | 44.7 |
| FEB,73 | 24 | 145 | 299 | 269 | 2.046 | 1.841 | 20.1 | 13.0 | 52.6 |
| MAR,73 | 35 | 254 | 439 | 552 | 1.728 | 2.173 | 18.4 | 12.1 | 44.3 |
| APR,73 | 32 | 225 | 307 | 497 | 1.363 | 2.207 | 20.1 | 12.6 | 38.2 |
| MAY,73 | 34 | 207 | 353 | 485 | 1.702 | 2.339 | 20.1 | 13.5 | 42.1 |
| JUN,73 | 29 | 188 | 228 | 434 | 1.213 | 2.309 | 17.2 | 12.7 | 34.4 |
| JUL,73 | 25 | 157 | 108 | 436 | .689 | 2.780 | 20.2 | 12.2 | 19.9 |
| AUG,73 | 13 | 54 | 54 | 92 | 1.004 | 1.710 | 18.0 | 13.6 | 37.0 |
| SEP,73 | 30 | 184 | 265 | 385 | 1.440 | 2.092 | 20.0 | 13.4 | 40.8 |
| OCT,73 | 39 | 258 | 771 | 525 | 1.437 | 2.033 | 20.5 | 13.6 | 41.4 |
| NOV,73 | 42 | 296 | 511 | 670 | 1.785 | 2.341 | 20.6 | 13.8 | 43.3 |
| DEC,73 | 36 | 226 | 387 | 493 | 1.710 | 2.179 | 21.6 | 13.9 | 44.0 |
| TOTAL | 373 | 2372 | 3628 | 5216 | 1.530 | 2.199 | 20.1 | 13.1 | 41.0 |

# SUMMARY FOR THE MAGNET MANAGEMENT AREA — YEAR 1974

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,74 | 61 | 410 | 689 | 803 | 1.679 | 1.959 | 21.1 | 13.5 | 46.1 |
| FEB,74 | 40 | 258 | 413 | 460 | 1.604 | 1.786 | 21.2 | 13.3 | 47.3 |
| MAR,74 | 30 | 190 | 271 | 316 | 1.363 | 1.586 | 22.4 | 13.0 | 46.2 |
| APR,74 | 20 | 101 | 159 | 248 | 1.571 | 2.450 | 21.5 | 13.4 | 39.1 |
| MAY,74 | 40 | 230 | 472 | 543 | 2.053 | 2.362 | 20.4 | 13.4 | 46.5 |
| JUN,74 | 51 | 312 | 644 | 791 | 2.126 | 2.533 | 20.5 | 13.2 | 45.6 |
| JUL,74 | 10 | 76 | 126 | 215 | 1.564 | 2.839 | 21.1 | 13.3 | 37.0 |
| AUG,74 | 35 | 189 | 338 | 457 | 1.785 | 2.413 | 21.0 | 12.6 | 42.5 |
| SEP,74 | 12 | 60 | 59 | 45 | .975 | .744 | 20.1 | 13.2 | 56.7 |
| OCT,74 | 35 | 252 | 280 | 358 | 1.111 | 1.420 | 22.5 | 13.4 | 43.9 |
| NOV,74 | 27 | 149 | 247 | 275 | 1.652 | 1.839 | 22.5 | 14.0 | 47.3 |
| DEC,74 | 9 | 62 | 66 | 23 | 1.065 | .371 | 24.2 | 14.6 | 74.2 |
| TOTAL | 379 | 2299 | 3783 | 4534 | 1.645 | 1.972 | 21.3 | 13.3 | 45.5 |

# SUMMARY FOR THE MAGNET MANAGEMENT AREA — YEAR 1975

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,75 | 37 | 271 | 355 | 442 | 1.309 | 1.629 | 22.6 | 13.6 | 44.5 |
| FEB,75 | 1 | 8 | 6 | 3 | .750 | .375 | 27.0 | 14.4 | 66.7 |
| MAR,75 | 4 | 20 | 111 | 111 | .550 | .550 | 20.6 | 13.0 | 50.0 |
| APR,75 | 12 | 46 | 83 | 116 | 1.913 | 2.534 | 18.6 | 12.0 | 41.7 |
| MAY,75 | 12 | 40 | 79 | 92 | 1.963 | 2.286 | 17.1 | 12.3 | 46.2 |
| JUN,75 | 11 | 60 | 106 | 90 | 1.763 | 1.497 | 21.4 | 13.6 | 54.1 |
| JUL,75 | 33 | 195 | 283 | 314 | 1.450 | 1.608 | 21.8 | 13.7 | 47.4 |
| AUG,75 | 11 | 65 | 95 | 98 | 1.462 | 1.508 | 20.8 | 13.7 | 49.2 |
| SEP,75 | 4 | 13 | 211 | 42 | 1.615 | 3.231 | 23.5 | 13.7 | 33.3 |
| OCT,75 | 13 | 53 | 107 | 133 | 2.034 | 2.528 | 21.6 | 13.8 | 44.6 |
| NOV,75 | 10 | 47 | 90 | 111 | 1.935 | 2.387 | 23.6 | 13.5 | 44.8 |
| DEC,75 | 7 | 29 | 27 | 76 | .926 | 2.607 | 30.3 | 14.1 | 26.2 |
| TOTAL | 155 | 847 | 1263 | 1528 | 1.491 | 1.604 | 21.8 | 13.5 | 45.3 |

## SUMMARY FOR THE MAGNET MANAGEMENT AREA     YEAR 1976

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,76 | 30 | 127 | 185 | 266 | 1.453 | 2.090 | 24.1 | 13.3 | 41.0 |
| FEB,76 | 8 | 40 | 73 | 54 | 1.844 | 1.364 | 21.6 | 13.6 | 57.5 |
| MAR,76 | 12 | 51 | 77 | 97 | 1.514 | 1.908 | 22.9 | 13.6 | 44.3 |
| APR,76 | 1 | 4 | 8 | 10 | 2.000 | 2.500 | 18.3 | 14.7 | 44.4 |
| MAY,76 | 14 | 54 | 139 | 140 | 2.550 | 2.587 | 21.4 | 13.0 | 49.6 |
| JUN,76 | 12 | 42 | 94 | 115 | 2.720 | 2.716 | 19.3 | 12.0 | 45.0 |
| JUL,76 | 6 | 27 | 73 | 64 | 2.704 | 2.000 | 24.0 | 13.2 | 57.5 |
| AUG,76 | 10 | 55 | 86 | 99 | 1.657 | 1.793 | 23.2 | 13.7 | 46.6 |
| SEP,76 | 17 | 59 | 153 | 113 | 2.651 | 1.958 | 23.4 | 13.4 | 47.6 |
| OCT,76 | 23 | 109 | 341 | 226 | 3.128 | 2.165 | 22.3 | 13.7 | 59.1 |
| NOV,76 | 17 | 103 | 265 | 110 | 2.571 | 1.067 | 21.7 | 14.5 | 70.7 |
| DEC,76 | 22 | 167 | 201 | 196 | 1.200 | 1.170 | 21.6 | 14.0 | 50.6 |
| TOTAL | 173 | 827 | 1694 | 1490 | 2.049 | 1.802 | 22.3 | 13.5 | 53.2 |

## SUMMARY FOR THE MAGNET MANAGEMENT AREA     YEAR 1977

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,77 | 14 | 66 | 164 | 106 | 2.485 | 1.606 | 19.9 | 13.3 | 60.7 |
| FEB,77 | 19 | 105 | 185 | 99 | 1.767 | .946 | 20.4 | 13.0 | 65.1 |
| MAR,77 | 14 | 62 | 146 | 97 | 2.355 | 1.565 | 20.4 | 12.9 | 60.1 |
| APR,77 | 10 | 42 | 77 | 34 | 1.828 | .807 | 20.1 | 12.8 | 69.4 |
| MAY,77 | 25 | 94 | 272 | 261 | 2.894 | 2.777 | 20.3 | 12.3 | 51.0 |
| JUN,77 | 11 | 49 | 121 | 80 | 2.469 | 1.632 | 19.7 | 13.0 | 60.2 |
| JUL,77 | 14 | 43 | 88 | 140 | 2.047 | 3.256 | 20.5 | 13.0 | 38.6 |
| AUG,77 | 17 | 61 | 124 | 127 | 2.040 | 2.089 | 20.5 | 13.2 | 49.4 |
| SEP,77 | 28 | 137 | 247 | 225 | 1.800 | 1.640 | 19.2 | 13.2 | 52.3 |
| OCT,77 | 23 | 120 | 339 | 178 | 2.822 | 1.482 | 19.1 | 13.0 | 65.6 |
| NOV,77 | 16 | 57 | 132 | 126 | 2.316 | 2.387 | 20.0 | 12.8 | 49.3 |
| DEC,77 | 4 | 33 | 80 | 71 | 2.429 | 2.156 | 19.7 | 14.1 | 53.0 |
| TOTAL | 199 | 868 | 1975 | 1554 | 2.275 | 1.790 | 19.9 | 12.9 | 56.0 |

SUMMARY FOR THE MAGNET MANAGEMENT AREA                                    YEAR 1978

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 3 | 21 | 95 | 75 | 4.524 | 1.190 | 18.6 | 13.1 | 79.2 |
| FEB,78 | 8 | 51 | 211 | 39 | 4.137 | .765 | 20.8 | 13.4 | 84.4 |
| MAR,78 | 21 | 103 | 270 | 236 | 2.634 | 2.302 | 19.5 | 12.1 | 53.4 |
| APR,78 | 15 | 91 | 201 | 129 | 2.197 | 1.410 | 19.7 | 13.3 | 60.9 |
| MAY,78 | 11 | 60 | 206 | 112 | 3.406 | 1.852 | 21.4 | 13.7 | 64.3 |
| JUN,78 | 11 | 64 | 149 | 160 | 2.314 | 2.484 | 20.5 | 13.2 | 48.2 |
| JUL,78 | 8 | 45 | 93 | 71 | 2.048 | 1.563 | 21.5 | 14.2 | 56.7 |
| AUG,78 | 12 | 59 | 106 | 61 | 1.790 | 1.030 | 19.9 | 13.0 | 63.5 |
| SEP,78 | 33 | 144 | 225 | 223 | 1.563 | 1.549 | 19.6 | 12.7 | 50.2 |
| OCT,78 | 33 | 136 | 274 | 249 | 2.014 | 1.831 | 21.0 | 13.7 | 52.4 |
| NOV,78 | 41 | 274 | 401 | 391 | 1.464 | 1.427 | 23.7 | 14.2 | 50.6 |
| DEC,78 | 34 | 193 | 345 | 325 | 1.798 | 1.684 | 21.4 | 13.9 | 51.5 |
| TOTAL | 230 | 1241 | 2576 | 2021 | 2.075 | 1.629 | 20.8 | 13.5 | 56.0 |

SUMMARY FOR THE MAGNET MANAGEMENT AREA                                    YEAR 1979

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 49 | 236 | 354 | 457 | 1.500 | 1.936 | 21.5 | 13.8 | 43.6 |
| FEB,79 | 27 | 95 | 196 | 218 | 2.063 | 2.295 | 22.1 | 12.9 | 47.3 |
| MAR,79 | 48 | 187 | 462 | 414 | 2.481 | 2.218 | 23.7 | 13.3 | 52.8 |
| APR,79 | 31 | 168 | 390 | 525 | 2.325 | 3.130 | 22.3 | 13.1 | 42.6 |
| MAY,79 | 58 | 260 | 628 | 593 | 2.420 | 2.670 | 22.5 | 12.9 | 47.5 |
| JUN,79 | 47 | 227 | 529 | 630 | 2.330 | 2.774 | 22.4 | 12.6 | 45.6 |
| JUL,79 | 69 | 334 | 970 | 1081 | 2.526 | 2.815 | 21.9 | 12.7 | 47.3 |
| AUG,79 | 51 | 250 | 636 | 604 | 2.542 | 2.414 | 21.2 | 12.9 | 51.3 |
| SEP,79 | 66 | 311 | 937 | 911 | 2.694 | 2.932 | 21.8 | 13.3 | 47.9 |
| OCT,79 | 65 | 305 | 853 | 763 | 2.799 | 2.504 | 23.7 | 13.9 | 52.8 |
| NOV,79 | 51 | 232 | 517 | 735 | 2.228 | 3.148 | 22.3 | 13.5 | 41.3 |
| DEC,79 | 21 | 96 | 200 | 279 | 2.083 | 2.906 | 23.4 | 13.4 | 41.8 |
| TOTAL | 583 | 2761 | 6573 | 7310 | 2.381 | 2.648 | 22.4 | 13.2 | 47.3 |

TABLE A II.10.  SUMMARY OF THE RED KANGAROO HARVEST DATA FOR
HARVESTS TAKEN WITHIN THE SANDSTONE MANAGEMENT
AREA - WESTERN AUSTRALIA : 1971 - 1979.

[NOTE - N/A   = DATA NOT AVAILABLE.
(1971 DATA)* = PARTIAL DATA ONLY
RELATING TO THIS PART OF HARVEST.]

SUMMARY FOR THE SANDSTONE MANAGEMENT AREA                    YEAR 1971

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,71 | | | NO DETAILED RECORDS | | | | | | |
| FEB,71 | 14 +24* | N/A | 239 +337 | 306 +384 | N/A | N/A | 17.6 | 11.9 | 43.9 46.7 |
| MAR,71 | 22 +14* | N/A | 296 +186 | 395 +246 | N/A | N/A | 18.3 | 10.8 | 42.8 43.1 |
| APR,71 | 16 | N/A | 283 | 350 | N/A | . | 15.9 | 12.0 | 44.7 |
| MAY,71 | 24 | N/A | 282 | 318 | N/A | N/A | 16.9 | 11.3 | 47.0 |
| JUN,71 | 4 | N/A | 28 | 43 | N/A | N/A | 15.6 | 11.4 | 39.4 |
| JUL,71 | 0 | 0 | 0 | 0 | | | | | |
| AUG,71 | 0 | 0 | 0 | 0 | | | | | |
| SEP,71 | 1 | N/A | 11 | 14 | N/A | N/A | 22.7 | 15.0 | 44.0 |
| OCT,71 | 0 | 0 | 0 | 0 | | | | | |
| NOV,71 | 9 | N/A | 87 | 103 | N/A | N/A | 18.1 | 13.3 | 45.8 |
| DEC,71 | 6 | N/A | 61 | 102 | N/A | N/A | 20.1 | 14.2 | 37.4 |
| TOTAL ,1971 | 96 +38* | N/A | 1287 +523 | 1631 +630 | N/A | N/A | 17.4 | 11.8 | 44.1 45.4 |

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SUMMARY FOR THE SANDSTONE MANAGEMENT AREA    YEAR 1972

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 10 | N/A | 147 | 165 | N/A | N/A | 18.7 | 14.2 | 47.1 |
| FEB,72 | 24 | N/A | 358 | 345 | N/A | N/A | 20.0 | 12.9 | 49.5 |
| MAR,72 | 10 | 50 | 163 | 139 | 2.769 | 2.361 | 17.7 | 12.0 | 54.0 |
| APR,72 | 9 | 48 | 93 | 106 | 1.943 | 2.215 | 21.0 | 11.9 | 46.7 |
| MAY,72 | 13 | 72 | 150 | 219 | 2.090 | 2.052 | 20.2 | 12.9 | 40.7 |
| JUN,72 | 6 | 31 | 58 | 92 | 1.862 | 2.954 | 19.1 | 12.6 | 38.7 |
| JUL,72 | 9 | 45 | 79 | 83 | 1.743 | 1.831 | 19.5 | 13.6 | 48.8 |
| AUG,72 | 5 | 29 | 53 | 49 | 1.828 | 1.690 | 20.6 | 14.4 | 52.0 |
| SEP,72 | 20 | 120 | 400 | 228 | 3.320 | 1.975 | 21.1 | 14.1 | 62.7 |
| OCT,72 | 11 | 57 | 120 | 154 | 2.119 | 2.720 | 21.9 | 15.1 | 43.8 |
| NOV,72 | 9 | 56 | 90 | 118 | 1.593 | 2.089 | 20.9 | 14.6 | 43.3 |
| DEC,72 | 7 | 36 | 78 | 92 | 2.137 | 2.521 | 18.2 | 15.4 | 45.9 |
| TOTAL | 133 | 792 | 1789 | 1820 | 2.258 | 2.297 | 20.1 | 13.5 | 49.6 |

SUMMARY FOR THE SANDSTONE MANAGEMENT AREA    YEAR 1973

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 36 | 174 | 545 | 671 | 3.130 | 3.854 | 19.6 | 13.3 | 44.8 |
| FEB,73 | 21 | 85 | 285 | 398 | 3.336 | 4.659 | 20.2 | 13.7 | 41.7 |
| MAR,73 | 3 | 20 | 30 | 46 | 1.538 | 2.359 | 17.0 | 12.4 | 39.5 |
| APR,73 | 0 | 0 | 0 | 0 | | | | | |
| MAY,73 | 0 | 0 | 0 | 0 | | | | | |
| JUN,73 | 0 | 0 | 0 | 0 | | | | | |
| JUL,73 | 0 | 0 | 0 | 0 | | | | | |
| AUG,73 | 0 | 0 | 0 | 0 | | | | | |
| SEP,73 | 0 | 0 | 0 | 0 | | | | | |
| OCT,73 | 0 | 0 | 0 | 0 | | | | | |
| NOV,73 | 0 | 0 | 0 | 0 | | | | | |
| DEC,73 | 0 | 0 | 0 | 0 | | | | | |
| TOTAL | 60 | 278 | 860 | 1115 | 3.095 | 4.013 | 19.7 | 13.4 | 43.5 |

SUMMARY FOR THE SANDSTONE MANAGEMENT AREA                         YEAR 1974

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,74 | 0 | 0 | 0 | 0 | | | | | |
| FEB,74 | 6 | 38 | 73 | 91 | 1.947 | 2.427 | 25.2 | 13.8 | 44.5 |
| MAR,74 | 3 | 21 | 45 | 51 | 2.143 | 2.429 | 16.9 | 14.4 | 46.9 |
| APR,74 | 1 | 2 | 4 | 4 | 2.000 | 2.000 | 21.9 | 13.3 | 50.0 |
| MAY,74 | 0 | 0 | 0 | 0 | | | | | |
| JUN,74 | 0 | 0 | 0 | 0 | | | | | |
| JUL,74 | 0 | 0 | 0 | 0 | | | | | |
| AUG,74 | 0 | 0 | 0 | 0 | | | | | |
| SEP,74 | 8 | 31 | 57 | 141 | 1.810 | 4.476 | 22.3 | 12.9 | 28.8 |
| OCT,74 | 13 | 54 | 88 | 183 | 1.637 | 3.405 | 26.5 | 13.5 | 32.5 |
| NOV,74 | 0 | 0 | 0 | 0 | | | | | |
| DEC,74 | 10 | 47 | 94 | 119 | 1.992 | 2.522 | 22.5 | 14.3 | 44.1 |
| TOTAL | 41 | 193 | 361 | 588 | 1.871 | 3.053 | 23.3 | 13.6 | 38.0 |

SUMMARY FOR THE SANDSTONE MANAGEMENT AREA                         YEAR 1975

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,75 | 13 | 50 | 115 | 132 | 2.296 | 2.635 | 21.4 | 13.7 | 46.6 |
| FEB,75 | 1 | 5 | 24 | 25 | 4.800 | 5.000 | 25.7 | 14.0 | 49.0 |
| MAR,75 | 0 | 0 | 0 | 0 | | | | | |
| APR,75 | 0 | 0 | 0 | 0 | | | | | |
| MAY,75 | 1 | 8 | 29 | 34 | 3.625 | 4.250 | 21.6 | 9.3 | 46.0 |
| JUN,75 | 0 | 0 | 0 | 0 | | | | | |
| JUL,75 | 0 | 0 | 0 | 0 | | | | | |
| AUG,75 | 4 | 16 | 19 | 36 | 1.188 | 2.250 | 22.3 | 13.7 | 34.5 |
| SEP,75 | 13 | 44 | 94 | 98 | 2.153 | 2.245 | 18.0 | 13.7 | 49.0 |
| OCT,75 | 10 | 64 | 159 | 159 | 2.485 | 2.485 | 18.0 | 12.7 | 50.0 |
| NOV,75 | 14 | 44 | 106 | 145 | 2.419 | 3.332 | 18.8 | 11.9 | 42.1 |
| DEC,75 | 9 | 30 | 71 | 76 | 2.399 | 2.568 | 19.4 | 12.0 | 48.3 |
| TOTAL | 74 | 260 | 617 | 706 | 2.372 | 2.714 | 19.5 | 12.8 | 46.6 |

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## SUMMARY FOR THE SANDSTONE MANAGEMENT AREA — YEAR 1976

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,76 | 14 | 54 | 189 | 222 | 3.471 | 4.077 | 18.6 | 12.5 | 46.0 |
| FEB,76 | 9 | 27 | 76 | 81 | 2.837 | 3.024 | 20.7 | 12.3 | 48.4 |
| MAR,76 | 1 | 7 | 12 | 47 | 1.600 | 6.267 | 23.0 | 13.0 | 20.3 |
| APR,76 | 16 | 59 | 136 | 217 | 2.321 | 3.704 | 19.0 | 12.0 | 38.5 |
| MAY,76 | 8 | 37 | 117 | 150 | 3.151 | 4.040 | 22.4 | 13.0 | 43.8 |
| JUN,76 | 2 | 19 | 63 | 64 | 3.231 | 3.282 | 24.0 | 13.9 | 49.6 |
| JUL,76 | 7 | 33 | 93 | 115 | 2.862 | 3.538 | 21.3 | 13.5 | 44.7 |
| AUG,76 | 17 | 67 | 214 | 279 | 3.212 | 4.195 | 21.6 | 13.2 | 43.4 |
| SEP,76 | 18 | 86 | 335 | 317 | 3.886 | 3.677 | 21.1 | 13.5 | 51.4 |
| OCT,76 | 11 | 38 | 138 | 140 | 3.625 | 3.678 | 20.9 | 13.3 | 49.6 |
| NOV,76 | 17 | 59 | 204 | 273 | 3.451 | 4.631 | 19.8 | 12.7 | 42.8 |
| DEC,76 | 3 | 14 | 45 | 29 | 3.333 | 2.148 | 23.5 | 13.1 | 60.8 |
| TOTAL | 123 | 500 | 1422 | 1934 | 3.245 | 3.869 | 20.8 | 13.0 | 45.6 |

## SUMMARY FOR THE SANDSTONE MANAGEMENT AREA — YEAR 1977

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,77 | 16 | 60 | 228 | 222 | 3.825 | 3.724 | 20.9 | 13.3 | 50.7 |
| FEB,77 | 24 | 71 | 234 | 273 | 3.314 | 3.866 | 20.6 | 12.5 | 46.2 |
| MAR,77 | 14 | 50 | 174 | 209 | 3.490 | 4.192 | 18.5 | 12.0 | 45.4 |
| APR,77 | 14 | 42 | 143 | 188 | 3.368 | 4.428 | 20.5 | 12.5 | 43.2 |
| MAY,77 | 0 | 0 | 0 | 0 | | | | | |
| JUN,77 | 15 | 57 | 209 | 238 | 3.547 | 4.153 | 18.7 | 12.5 | 46.8 |
| JUL,77 | 16 | 65 | 232 | 219 | 3.564 | 3.364 | 18.7 | 12.1 | 51.4 |
| AUG,77 | 4 | 24 | 57 | 106 | 2.369 | 4.406 | 21.2 | 12.4 | 35.0 |
| SEP,77 | 4 | 23 | 74 | 63 | 3.348 | 2.775 | 19.2 | 13.2 | 54.7 |
| OCT,77 | 11 | 40 | 145 | 179 | 3.646 | 4.501 | 18.8 | 12.4 | 44.8 |
| NOV,77 | 28 | 117 | 342 | 306 | 2.913 | 2.607 | 20.6 | 13.6 | 52.8 |
| DEC,77 | 16 | 52 | 120 | 143 | 1.930 | 2.300 | 21.7 | 13.6 | 45.6 |
| TOTAL | 168 | 511 | 1960 | 2146 | 3.209 | 3.512 | 19.9 | 12.6 | 47.7 |

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SUMMARY FOR THE SANDSTONE MANAGEMENT AREA

YEAR 1978

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 22 | 95 | 224 | 234 | 2.350 | 2.455 | 19.9 | 12.1 | 48.9 |
| FEB,78 | 5 | 24 | 56 | 41 | 2.391 | 1.743 | 19.9 | 12.2 | 57.7 |
| MAR,78 | 9 | 36 | 89 | 72 | 2.475 | 2.002 | 19.8 | 11.9 | 55.3 |
| APR,78 | 6 | 23 | 108 | 45 | 4.751 | 1.980 | 21.4 | 13.8 | 73.6 |
| MAY,78 | 14 | 62 | 221 | 190 | 3.744 | 2.918 | 21.0 | 13.3 | 56.2 |
| JUN,78 | 14 | 64 | 135 | 205 | 2.100 | 3.188 | 20.8 | 12.6 | 39.7 |
| JUL,78 | 12 | 37 | 141 | 125 | 3.837 | 3.402 | 23.3 | 13.2 | 53.0 |
| AUG,78 | 32 | 199 | 449 | 329 | 2.257 | 1.657 | 23.0 | 12.8 | 57.7 |
| SEP,78 | 35 | 191 | 495 | 376 | 2.597 | 1.972 | 22.4 | 13.2 | 56.8 |
| OCT,78 | 21 | 124 | 306 | 210 | 2.475 | 1.699 | 24.5 | 14.1 | 59.3 |
| NOV,78 | 16 | 71 | 163 | 160 | 2.298 | 2.256 | 25.7 | 14.9 | 50.5 |
| DEC,78 | 6 | 19 | 45 | 35 | 2.363 | 1.842 | 23.1 | 13.3 | 56.3 |
| TOTAL | 196 | 951 | 2441 | 2012 | 2.565 | 2.115 | 22.4 | 13.1 | 54.8 |

SUMMARY FOR THE SANDSTONE MANAGEMENT AREA

YEAR 1979

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 6 | 26 | 45 | 88 | 1.781 | 2.411 | 23.3 | 13.2 | 42.5 |
| FEB,79 | 3 | 12 | 35 | 41 | 2.866 | 2.347 | 21.7 | 12.7 | 46.1 |
| MAR,79 | 4 | 16 | 29 | 49 | 1.838 | 3.105 | 20.9 | 11.9 | 37.2 |
| APR,79 | 8 | 29 | 75 | 50 | 2.576 | 1.718 | 22.2 | 13.0 | 60.0 |
| MAY,79 | 24 | 120 | 310 | 224 | 2.545 | 1.868 | 21.7 | 13.0 | 59.1 |
| JUN,79 | 17 | 97 | 285 | 165 | 2.931 | 1.962 | 24.1 | 13.0 | 60.6 |
| JUL,79 | 26 | 87 | 368 | 216 | 4.248 | 2.493 | 24.3 | 13.5 | 63.0 |
| AUG,79 | 37 | 190 | 475 | 307 | 2.502 | 1.617 | 22.5 | 14.3 | 60.7 |
| SEP,79 | 49 | 235 | 493 | 404 | 2.095 | 1.717 | 23.4 | 13.2 | 55.0 |
| OCT,79 | 25 | 131 | 370 | 283 | 2.926 | 2.161 | 23.3 | 13.6 | 56.7 |
| NOV,79 | 26 | 110 | 280 | 286 | 2.542 | 2.594 | 22.9 | 13.0 | 49.5 |
| DEC,79 | 21 | 137 | 325 | 291 | 2.368 | 2.121 | 23.6 | 13.1 | 52.9 |
| TOTAL | 246 | 1204 | 3110 | 2424 | 2.582 | 2.012 | 23.2 | 13.3 | 56.2 |

TABLE A II.11.  SUMMARY OF THE RED KANGAROO HARVEST DATA FOR HARVESTS TAKEN WITHIN THE LEONORA-EASTERN GOLDFIELDS M. AREA - WESTERN AUSTRALIA : 1971 - 1979.

[NOTE - N/A = DATA NOT AVAILABLE.
(1971 DATA)* = PARTIAL DATA ONLY
RELATING TO THIS PART OF HARVEST.]

SUMMARY FOR THE LEONORA-EASTERN GOLDFIELDS M. AREA                    YEAR 1971

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,71 | 0 | 0 | 0 | 0 | NO DETAILED RECORDS | | | | |
| FEB,71 | +21* | | +349 | +427 | | | | | 45.0 |
| MAR,71 | 14 | N/A | 157 | 138 | N/A | N/A | 15.8 | 13.6 | 53.2 |
| APR,71 | 55 | N/A | 911 | 1125 | N/A | N/A | 18.3 | 12.1 | 44.7 |
| MAY,71 | 45 | N/A | 1144 | 1226 | N/A | N/A | 17.4 | 12.0 | 48.3 |
| JUN,71 | 40 | N/A | 285 | 530 | N/A | N/A | 18.1 | 12.5 | 42.1 |
| JUL,71 | 32 | N/A | 272 | 362 | N/A | N/A | 19.2 | 13.0 | 38.0 |
| AUG,71 | 19 | N/A | 233 | 181 | N/A | N/A | 19.2 | 13.3 | 56.3 |
| SEP,71 | 27 | N/A | 291 | 300 | N/A | N/A | 19.5 | 13.6 | 49.2 |
| OCT,71 | 27 | N/A | 247 | 238 | N/A | N/A | 21.3 | 14.2 | 50.9 |
| NOV,71 | 52 | N/A | 604 | 647 | N/A | N/A | 21.1 | 14.2 | 51.6 |
| DEC,71 | 74 | N/A | 1130 | 1147 | N/A | N/A | 21.4 | 14.2 | 49.6 |
| TOTAL ,1971 | 405 +21* | N/A | 5324 +349 | 5814 +427 | N/A | N/A | 19.4 | 13.0 | 47.9 / 45.0 |

SUMMARY FOR THE LEONORA-EASTERN GOLDFIELDS M. AREA       YEAR 1972

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 82 | N/A | 1358 | 1491 | N/A | N/A | 21.5 | 14.1 | 47.7 |
| FEB,72 | 33 | N/A | 611 | 732 | N/A | N/A | 21.0 | 13.5 | 45.5 |
| MAR,72 | 49 | 346 | 729 | 947 | 2.138 | 2.740 | 19.3 | 12.7 | 43.8 |
| APR,72 | 52 | 320 | 784 | 971 | 2.383 | 2.944 | 20.3 | 13.1 | 44.7 |
| MAY,72 | 36 | 249 | 558 | 795 | 2.238 | 3.189 | 20.1 | 12.9 | 41.2 |
| JUN,72 | 40 | 243 | 582 | 844 | 2.396 | 3.475 | 19.6 | 13.1 | 40.8 |
| JUL,72 | 39 | 255 | 466 | 621 | 1.930 | 2.478 | 19.8 | 13.0 | 42.5 |
| AUG,72 | 55 | 331 | 824 | 1026 | 2.487 | 3.127 | 19.9 | 13.0 | 44.3 |
| SEP,72 | 40 | 263 | 626 | 910 | 2.376 | 3.454 | 19.9 | 13.3 | 40.8 |
| OCT,72 | 77 | 410 | 1091 | 1635 | 2.660 | 3.987 | 20.1 | 13.4 | 40.0 |
| NOV,72 | 53 | 234 | 778 | 1043 | 3.320 | 4.451 | 20.4 | 13.5 | 42.7 |
| DEC,72 | 57 | 247 | 661 | 1039 | 3.489 | 4.211 | 19.7 | 13.4 | 45.3 |
| TOTAL | 613 | 3579 | 9280 | 12074 | 2.593 | 3.374 | 20.3 | 13.3 | 43.5 |

SUMMARY FOR THE LEONORA-EASTERN GOLDFIELDS M. AREA       YEAR 1973

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 41 | 157 | 552 | 708 | 3.527 | 4.523 | 18.9 | 12.7 | 43.8 |
| FEB,73 | 27 | 122 | 347 | 620 | 2.838 | 5.071 | 19.9 | 13.1 | 35.9 |
| MAR,73 | 16 | 46 | 168 | 281 | 3.686 | 6.166 | 21.0 | 13.4 | 37.4 |
| APR,73 | 0 | 0 | 0 | 0 | | | | | |
| MAY,73 | 0 | 0 | 0 | 0 | | | | | |
| JUN,73 | 9 | 8 | 20 | 22 | 2.438 | 2.682 | 21.6 | 14.3 | 47.6 |
| JUL,73 | 6 | N/A | 15 | 9 | N/A | N/A | 25.9 | 17.4 | 62.5 |
| AUG,73 | 8 | N/A | 23 | 13 | N/A | N/A | 24.3 | 13.2 | 63.9 |
| SEP,73 | 8 | N/A | 14 | 12 | N/A | N/A | 20.7 | 13.2 | 53.8 |
| OCT,73 | 11 | N/A | 29 | 19 | N/A | N/A | 25.0 | 14.9 | 60.4 |
| NOV,73 | 12 | N/A | 23 | 27 | N/A | N/A | 25.8 | 14.0 | 46.0 |
| DEC,73 | | | | | | | | | |
| TOTAL | 138 | 354 | 1191 | 1711 | 3.368 | 4.838 | 20.0 | 13.1 | 41.0 |

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,74 | 6 | N/A | 8 | 14 | N/A | N/A | 22.1 | 14.3 | 36.4 |
| FEB,74 | 5 | 26 | 76 | 127 | 2.971 | 4.965 | 26.7 | 14.2 | 37.4 |
| MAR,74 | 16 | 14 | 47 | 47 | 3.356 | 4.783 | 22.8 | 13.0 | 41.2 |
| APR,74 | 13 | 16 | 21 | 70 | 1.333 | 4.442 | 22.7 | 13.3 | 23.1 |
| MAY,74 | 0 | 0 | 0 | 0 | | | | | |
| JUN,74 | 27 | 91 | 272 | 327 | 2.975 | 3.577 | 22.3 | 13.0 | 45.4 |
| JUL,74 | 5 | 13 | 12 | 46 | .889 | 3.407 | 26.5 | 14.0 | 20.7 |
| AUG,74 | 5 | 15 | 42 | 80 | 2.745 | 5.228 | 25.5 | 13.4 | 34.4 |
| SEP,74 | 9 | 38 | 99 | 149 | 2.605 | 4.184 | 23.7 | 14.1 | 28.4 |
| OCT,74 | 23 | 104 | 357 | 361 | 3.434 | 3.472 | 22.6 | 14.2 | 49.7 |
| NOV,74 | 25 | 89 | 322 | 375 | 3.629 | 4.226 | 22.6 | 14.4 | 46.2 |
| DEC,74 | 29 | 129 | 485 | 577 | 3.771 | 4.487 | 23.7 | 13.8 | 45.7 |
| TOTAL | 163 | 539 | 1741 | 2203 | 3.237 | 4.096 | 23.2 | 13.9 | 44.1 |

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,75 | 20 | 81 | 314 | 505 | 3.871 | 4.226 | 25.2 | 13.9 | 38.3 |
| FEB,75 | 13 | 50 | 156 | 330 | 3.112 | 6.582 | 28.6 | 13.9 | 32.1 |
| MAR,75 | 5 | 16 | 22 | 107 | 1.375 | 6.688 | 26.7 | 14.9 | 17.1 |
| APR,75 | 2 | 2 | 6 | 20 | 3.231 | 10.769 | 21.8 | 13.3 | 23.1 |
| MAY,75 | 1 | 6 | 14 | 26 | 2.333 | 4.333 | 24.0 | 14.5 | 35.0 |
| JUN,75 | 0 | 0 | 0 | 0 | | | | | |
| JUL,75 | 6 | 22 | 98 | 85 | 4.416 | 3.830 | 21.6 | 14.4 | 53.6 |
| AUG,75 | 3 | 16 | 63 | 64 | 3.938 | 4.000 | 23.1 | 14.3 | 49.6 |
| SEP,75 | 3 | 22 | 64 | 88 | 2.909 | 4.000 | 23.6 | 14.6 | 42.1 |
| OCT,75 | 1 | 7 | 18 | 24 | 2.571 | 3.429 | 25.1 | 14.6 | 42.9 |
| NOV,75 | 1 | 2 | 6 | 8 | 3.000 | 4.000 | 22.7 | 14.2 | 42.9 |
| DEC,75 | 6 | 21 | 87 | 59 | 4.097 | 2.779 | 24.9 | 14.4 | 59.6 |
| TOTAL | 61 | 246 | 848 | 1316 | 3.442 | 5.342 | 25.1 | 14.1 | 39.2 |

SUMMARY FOR THE LEONORA-EASTERN GOLDFIELDS M. AREA                    YEAR 1976

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,76 | 22 | 88 | 364 | 265 | 4.117 | 2.997 | 22.4 | 13.5 | 57.9 |
| FEB,76 | 7 | 31 | 104 | 78 | 3.326 | 2.494 | 23.9 | 13.7 | 57.1 |
| MAR,76 | 14 | 60 | 276 | 242 | 4.631 | 4.061 | 21.8 | 13.7 | 53.3 |
| APR,76 | 7 | 31 | 168 | 115 | 5.402 | 3.698 | 23.5 | 14.2 | 59.4 |
| MAY,76 | 7 | 23 | 113 | 101 | 4.840 | 4.326 | 23.0 | 14.7 | 52.8 |
| JUN,76 | 7 | 31 | 110 | 108 | 3.548 | 3.484 | 23.9 | 14.9 | 50.5 |
| JUL,76 | 7 | 37 | 149 | 164 | 3.959 | 4.387 | 25.3 | 14.9 | 47.4 |
| AUG,76 | 17 | 112 | 312 | 273 | 2.772 | 2.425 | 24.6 | 14.4 | 53.3 |
| SEP,76 | 41 | 273 | 731 | 504 | 2.679 | 1.847 | 23.3 | 14.2 | 59.2 |
| OCT,76 | 33 | 217 | 520 | 220 | 2.396 | 1.014 | 23.3 | 14.5 | 70.3 |
| NOV,76 | 42 | 261 | 812 | 267 | 3.110 | 1.023 | 22.3 | 14.9 | 75.3 |
| DEC,76 | 55 | 379 | 1100 | 430 | 2.979 | 1.161 | 22.5 | 14.4 | 71.9 |
| TOTAL | 256 | 1583 | 4758 | 2767 | 3.006 | 1.748 | 23.0 | 14.3 | 63.2 |

SUMMARY FOR THE LEONORA-EASTERN GOLDFIELDS M. AREA                    YEAR 1977

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,77 | 9 | 65 | 190 | 121 | 2.923 | 2.015 | 22.8 | 14.7 | 59.2 |
| FEB,77 | 33 | 199 | 507 | 330 | 2.561 | 1.667 | 21.9 | 14.0 | 60.6 |
| MAR,77 | 25 | 143 | 499 | 155 | 3.490 | 1.084 | 19.9 | 14.6 | 76.3 |
| APR,77 | 18 | 120 | 288 | 358 | 2.398 | 2.981 | 21.7 | 14.0 | 44.6 |
| MAY,77 | 32 | 101 | 423 | 347 | 2.214 | 1.817 | 20.0 | 13.2 | 54.9 |
| JUN,77 | 22 | 134 | 288 | 287 | 2.151 | 2.144 | 21.6 | 13.4 | 50.1 |
| JUL,77 | 32 | 202 | 456 | 388 | 2.754 | 1.917 | 20.6 | 13.2 | 54.0 |
| AUG,77 | 26 | 162 | 482 | 512 | 2.969 | 3.154 | 21.3 | 13.8 | 48.5 |
| SEP,77 | 38 | 245 | 479 | 355 | 1.954 | 1.448 | 19.8 | 13.1 | 57.4 |
| OCT,77 | 40 | 211 | 541 | 404 | 2.565 | 1.915 | 22.0 | 14.8 | 57.2 |
| NOV,77 | 32 | 160 | 523 | 408 | 3.262 | 2.545 | 21.7 | 13.9 | 56.2 |
| DEC,77 | 21 | 96 | 258 | 264 | 2.690 | 2.753 | 22.0 | 13.9 | 49.4 |
| TOTAL | 328 | 1933 | 4934 | 3930 | 2.553 | 2.036 | 21.1 | 13.9 | 55.4 |

SUMMARY FOR THE LEONORA-EASTERN GOLDFIELDS M. AREA                                            YEAR 1978

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 56 | 332 | 702 | 589 | 2.112 | 1.772 | 21.0 | 13.3 | 54.4 |
| FEB,78 | 51 | 243 | 472 | 434 | 1.946 | 1.790 | 22.0 | 12.6 | 52.1 |
| MAR,78 | 65 | 315 | 759 | 606 | 2.406 | 1.921 | 22.2 | 13.4 | 55.6 |
| APR,78 | 65 | 393 | 796 | 582 | 2.076 | 1.518 | 22.4 | 13.4 | 57.8 |
| MAY,78 | 69 | 409 | 816 | 917 | 1.999 | 2.246 | 22.7 | 13.4 | 47.1 |
| JUN,78 | 62 | 319 | 683 | 605 | 1.830 | 1.899 | 22.4 | 13.5 | 49.1 |
| JUL,78 | 46 | 210 | 666 | 527 | 2.499 | 2.513 | 21.7 | 13.2 | 51.8 |
| AUG,78 | 39 | 179 | 675 | 596 | 3.784 | 3.341 | 21.4 | 13.5 | 53.1 |
| SEP,78 | 30 | 161 | 344 | 258 | 2.134 | 2.221 | 23.2 | 14.1 | 49.0 |
| OCT,78 | 26 | 106 | 346 | 382 | 3.250 | 3.588 | 23.7 | 14.0 | 47.5 |
| NOV,78 | 45 | 192 | 493 | 541 | 2.547 | 2.817 | 23.0 | 14.3 | 47.7 |
| DEC,78 | 35 | 138 | 500 | 614 | 3.614 | 3.715 | 23.3 | 14.0 | 49.3 |
| TOTAL | 589 | 2970 | 7052 | 6651 | 2.367 | 2.232 | 22.3 | 13.6 | 51.5 |

SUMMARY FOR THE LEONORA-EASTERN GOLDFIELDS M. AREA                                            YEAR 1979

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 28 | 126 | 371 | 344 | 2.940 | 2.884 | 23.3 | 13.5 | 50.5 |
| FEB,79 | 20 | 70 | 251 | 269 | 3.562 | 3.818 | 23.7 | 13.5 | 48.3 |
| MAR,79 | 17 | 65 | 141 | 172 | 2.169 | 2.646 | 23.8 | 13.0 | 45.0 |
| APR,79 | 17 | 78 | 154 | 276 | 1.962 | 3.514 | 22.2 | 12.6 | 35.8 |
| MAY,79 | 22 | 91 | 257 | 154 | 2.831 | 1.697 | 22.5 | 13.3 | 62.5 |
| JUN,79 | 34 | 103 | 415 | 316 | 4.025 | 3.045 | 23.7 | 13.3 | 56.8 |
| JUL,79 | 32 | 142 | 325 | 316 | 2.285 | 2.222 | 24.3 | 13.2 | 50.7 |
| AUG,79 | 23 | 55 | 295 | 218 | 5.389 | 3.962 | 22.7 | 13.3 | 57.5 |
| SEP,79 | 24 | 155 | 271 | 262 | 1.752 | 1.694 | 24.7 | 13.4 | 50.8 |
| OCT,79 | 32 | 102 | 270 | 327 | 2.735 | 3.205 | 23.2 | 13.5 | 46.0 |
| NOV,79 | 34 | 129 | 298 | 286 | 2.314 | 2.221 | 25.4 | 13.6 | 51.0 |
| DEC,79 | 41 | 178 | 380 | 371 | 2.133 | 2.082 | 25.3 | 12.6 | 50.6 |
| TOTAL | 325 | 1308 | 3437 | 3321 | 2.527 | 2.546 | 23.8 | 13.3 | 50.9 |

TABLE A II.12.   SUMMARY OF THE RED KANGAROO HARVEST DATA FOR
HARVESTS TAKEN WITHIN THE NULLARBOR MANAGEMENT
AREA - WESTERN AUSTRALIA : 1971 - 1979.

[NOTE : N/A  = DATA NOT AVAILABLE.]

SUMMARY FOR THE NULLARBOR MANAGEMENT AREA            YEAR 1971

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,71 | | | | | NO DETAILED RECORDS | | | | |
| FEB,71 | 0 | 0 | 0 | 0 | | | | | 0 |
| MAR,71 | 0 | 0 | 0 | 0 | | | | | 0 |
| APR,71 | 0 | 0 | 0 | 0 | | | | | 0 |
| MAY,71 | 0 | 0 | 0 | 0 | | | | | 0 |
| JUN,71 | 0 | 0 | 0 | 0 | | | | | 0 |
| JUL,71 | 0 | 0 | 0 | 0 | | | | | 0 |
| AUG,71 | 0 | 0 | 0 | 0 | | | | | 0 |
| SEP,71 | 0 | 0 | 0 | 0 | | | | | 0 |
| OCT,71 | 0 | 0 | 0 | 0 | | | | | 0 |
| NOV,71 | 0 | 0 | 0 | 0 | | | | | 0 |
| DEC,71 | 0 | 0 | 0 | 0 | | | | | 0 |
| TOTAL ,1971 | 0 | 0 | 0 | 0 | | | | | 0 |

SUMMARY FOR THE NULLARBOR MANAGEMENT AREA    YEAR 1972

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,72 | 0 | 0 | 0 | 0 | | | | | |
| FEB,72 | 0 | 0 | 0 | 0 | | | | | |
| MAR,72 | 0 | 0 | 0 | 0 | | | | | |
| APR,72 | 0 | 0 | 0 | 0 | | | | | |
| MAY,72 | 1 | 16 | 15 | 19 | .939 | 1.188 | 26.7 | 15.6 | 44.1 |
| JUN,72 | 3 | 54 | 92 | 104 | 1.705 | 1.927 | 30.3 | 16.3 | 46.9 |
| JUL,72 | 1 | N/A | 20 | 19 | N/A | N/A | 27.7 | 15.4 | 51.3 |
| AUG,72 | 4 | 31 | 125 | 107 | 4.032 | 3.452 | 24.9 | 14.6 | 53.9 |
| SEP,72 | 0 | 0 | 0 | 0 | | | | | |
| OCT,72 | 0 | 0 | 0 | 0 | | | | | |
| NOV,72 | 0 | 0 | 0 | 0 | | | | | |
| DEC,72 | 0 | 0 | 0 | 0 | | | | | |
| TOTAL | 9 | 105 | 252 | 249 | 2.391 | 2.362 | 27.2 | 15.4 | 50.3 |

SUMMARY FOR THE NULLARBOR MANAGEMENT AREA    YEAR 1973

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | FEMALES | HARVEST RATE MALES | FEMALES | AVERAGE WEIGHT MALES | FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,73 | 0 | 0 | 0 | 0 | | | | | |
| FEB,73 | 4 | 15 | 67 | 85 | 4.061 | 5.212 | 28.9 | 14.8 | 43.8 |
| MAR,73 | 4 | 19 | 122 | 79 | 6.421 | 4.158 | 27.2 | 15.3 | 60.7 |
| APR,73 | 4 | 33 | 201 | 115 | 6.091 | 3.485 | 26.9 | 14.6 | 63.6 |
| MAY,73 | 4 | 33 | 195 | 170 | 5.909 | 5.152 | 26.7 | 15.2 | 53.4 |
| JUN,73 | 7 | 39 | 100 | 136 | 2.564 | 3.487 | 26.6 | 14.7 | 42.4 |
| JUL,73 | 6 | 22 | 92 | 115 | 4.089 | 5.111 | 29.7 | 15.0 | 44.4 |
| AUG,73 | 10 | 47 | 81 | 146 | 1.723 | 3.106 | 29.8 | 15.5 | 35.7 |
| SEP,73 | 1 | 7 | 18 | 22 | 2.571 | 3.143 | 32.9 | 15.7 | 45.0 |
| OCT,73 | 2 | 14 | 34 | 51 | 2.429 | 3.643 | 31.4 | 15.6 | 40.0 |
| NOV,73 | 2 | 9 | 40 | 60 | 4.211 | 6.316 | 28.0 | 15.8 | 40.0 |
| DEC,73 | 1 | 9 | 37 | 47 | 4.111 | 5.222 | 28.6 | 15.1 | 44.0 |
| TOTAL | 45 | 249 | 987 | 1027 | 3.956 | 4.116 | 27.9 | 15.1 | 49.0 |

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SUMMARY FOR THE NULLARBOR MANAGEMENT AREA                                    YEAR 1974

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,74 | 8 | 51 | 184 | 311 | 3.608 | 6.098 | 28.5 | 15.2 | 37.2 |
| FEB,74 | 3 | 22 | 97 | 110 | 4.311 | 4.889 | 28.5 | 15.4 | 46.9 |
| MAR,74 | 6 | 36 | 156 | 197 | 4.333 | 5.472 | 29.0 | 15.3 | 44.2 |
| APR,74 | 3 | 15 | 32 | 82 | 2.133 | 5.467 | 26.7 | 15.5 | 28.1 |
| MAY,74 | 1 | 8 | 21 | 31 | 2.625 | 3.875 | 28.3 | 14.6 | 40.4 |
| JUN,74 | 2 | 10 | 48 | 91 | 2.526 | 4.789 | 28.5 | 15.0 | 34.5 |
| JUL,74 | 2 | 15 | 58 | 59 | 3.742 | 3.606 | 29.3 | 15.1 | 49.6 |
| AUG,74 | 3 | 19 | 54 | 90 | 2.842 | 4.737 | 30.8 | 14.2 | 37.5 |
| SEP,74 | 1 | 7 | 22 | 32 | 3.143 | 4.571 | 25.2 | 15.2 | 40.7 |
| OCT,74 | 0 | 0 | 0 | 0 | | | | | |
| NOV,74 | 0 | 0 | 0 | 0 | | | | | |
| DEC,74 | 0 | 0 | 0 | 0 | | | | | |
| TOTAL | 30 | 193 | 672 | 1003 | 3.482 | 5.197 | 28.7 | 15.1 | 40.1 |

SUMMARY FOR THE NULLARBOR MANAGEMENT AREA                                    YEAR 1975

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,75 | 0 | 0 | 0 | 0 | | | | | |
| FEB,75 | 1 | 8 | 36 | 40 | 4.500 | 5.060 | 35.6 | 14.5 | 47.4 |
| MAR,75 | 0 | 0 | 0 | 0 | | | | | |
| APR,75 | 2 | 10 | 42 | 42 | 4.200 | 4.200 | 24.6 | 15.1 | 50.0 |
| MAY,75 | 0 | 0 | 0 | 0 | | | | | |
| JUN,75 | 0 | 0 | 0 | 0 | | | | | |
| JUL,75 | 0 | 0 | 0 | 0 | | | | | |
| AUG,75 | 1 | 4 | 32 | 26 | 8.000 | 4.500 | 28.1 | 14.8 | 55.2 |
| SEP,75 | 0 | 0 | 0 | 0 | | | | | |
| OCT,75 | 2 | 11 | 58 | 61 | 6.413 | 5.753 | 25.0 | 15.7 | 52.7 |
| NOV,75 | 5 | 33 | 144 | 182 | 4.983 | 5.530 | 25.2 | 15.4 | 47.4 |
| DEC,75 | 4 | 24 | 144 | 147 | 6.000 | 6.125 | 28.4 | 16.3 | 49.5 |
| TOTAL | 15 | 90 | 486 | 498 | 5.398 | 5.531 | 27.0 | 15.6 | 49.4 |

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,76 | 4 | 26 | 189 | 218 | 5.250 | 6.056 | 29.0 | 15.2 | 46.4 |
| FEB,76 | 4 | 28 | 142 | 125 | 5.144 | 4.890 | 26.6 | 15.4 | 51.3 |
| MAR,76 | 3 | 21 | 98 | 94 | 4.667 | 4.476 | 25.7 | 12.9 | 51.0 |
| APR,76 | 5 | 36 | 163 | 148 | 4.523 | 4.111 | 27.0 | 14.7 | 52.4 |
| MAY,76 | 3 | 24 | 83 | 119 | 3.875 | 4.958 | 25.5 | 14.7 | 43.9 |
| JUN,76 | 0 | 0 | 0 | 0 | | | | | |
| JUL,76 | 0 | 0 | 0 | 0 | | | | | |
| AUG,76 | 0 | 0 | 0 | 0 | | | | | |
| SEP,76 | 0 | 0 | 0 | 0 | | | | | |
| OCT,76 | 3 | 20 | 128 | 108 | 5.400 | 5.400 | 22.1 | 14.9 | 54.2 |
| NOV,76 | 2 | 20 | 83 | 96 | 4.150 | 4.800 | 24.2 | 14.5 | 46.4 |
| DEC,76 | 0 | 0 | 0 | 0 | | | | | |
| TOTAL | 26 | 185 | 896 | 918 | 4.854 | 4.973 | 26.1 | 14.5 | 49.4 |

| MONTH, YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCENTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,77 | 2 | 12 | 53 | 54 | 4.417 | 4.500 | 23.7 | 15.3 | 49.5 |
| FEB,77 | 2 | 14 | 61 | 56 | 4.357 | 4.000 | 24.5 | 14.9 | 52.1 |
| MAR,77 | 3 | 25 | 78 | 149 | 3.300 | 5.731 | 24.2 | 14.3 | 34.4 |
| APR,77 | 1 | N/A | 39 | 53 | N/A | N/A | 25.2 | 14.5 | 42.4 |
| MAY,77 | 2 | 16 | 90 | 85 | 5.625 | 5.313 | 24.2 | 14.8 | 51.4 |
| JUN,77 | 2 | 14 | 99 | 66 | 7.071 | 4.714 | 25.7 | 16.4 | 60.0 |
| JUL,77 | 3 | 20 | 125 | 141 | 6.250 | 7.050 | 22.4 | 14.8 | 47.0 |
| AUG,77 | 0 | 0 | 0 | 0 | | | | | |
| SEP,77 | 2 | 15 | 42 | 123 | 2.800 | 8.200 | 23.1 | 14.6 | 25.5 |
| OCT,77 | 0 | 0 | 0 | 0 | | | | | |
| NOV,77 | 0 | 0 | 0 | 0 | | | | | |
| DEC,77 | 0 | 0 | 0 | 0 | | | | | |
| TOTAL | 17 | 126 | 587 | 727 | 4.666 | 5.779 | 24.0 | 14.8 | 44.7 |

SUMMARY FOR THE NULLARBOR MANAGEMENT AREA          YEAR 1978

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,78 | 1 | 5 | 29 | 30 | 5.800 | 6.000 | 25.3 | 14.3 | 49.2 |
| FEB,78 | 4 | 27 | 103 | 139 | 3.815 | 5.148 | 24.1 | 14.1 | 42.6 |
| MAR,78 | 6 | 39 | 150 | 208 | 3.846 | 5.333 | 23.9 | 14.4 | 41.9 |
| APR,78 | 5 | 37 | 195 | 248 | 5.000 | 6.703 | 22.8 | 14.3 | 42.7 |
| MAY,78 | 1 | 9 | 56 | 77 | 6.222 | 8.556 | 21.9 | 14.0 | 42.1 |
| JUN,78 | 1 | 5 | 24 | 72 | 4.800 | 14.400 | 21.2 | 13.7 | 25.0 |
| JUL,78 | 2 | 12 | 74 | 71 | 6.167 | 5.917 | 24.8 | 14.6 | 51.0 |
| AUG,78 | 3 | 22 | 133 | 74 | 6.045 | 3.364 | 26.7 | 15.7 | 44.3 |
| SEP,78 | 4 | 28 | 212 | 121 | 7.571 | 4.321 | 26.6 | 15.0 | 63.7 |
| OCT,78 | 5 | 32 | 153 | 150 | 4.781 | 4.688 | 28.1 | 15.7 | 50.5 |
| NOV,78 | 4 | 26 | 129 | 96 | 4.962 | 3.692 | 28.4 | 15.4 | 57.3 |
| DEC,78 | 1 | 5 | 25 | 37 | 5.000 | 7.400 | 29.5 | 17.9 | 40.3 |
| TOTAL | 37 | 247 | 1273 | 1323 | 5.154 | 5.356 | 25.5 | 14.8 | 49.0 |

SUMMARY FOR THE NULLARBOR MANAGEMENT AREA          YEAR 1979

| MONTH ,YEAR | SHOOTING DAYS | HUNTING HOURS | TOTAL NUMBER MALES | TOTAL NUMBER FEMALES | HARVEST RATE MALES | HARVEST RATE FEMALES | AVERAGE WEIGHT MALES | AVERAGE WEIGHT FEMALES | PERCTAGE MALES |
|---|---|---|---|---|---|---|---|---|---|
| JAN,79 | 2 | 10 | 30 | 48 | 3.900 | 4.800 | 29.0 | 15.6 | 44.3 |
| FEB,79 | 3 | 13 | 78 | 79 | 6.000 | 6.077 | 27.2 | 16.0 | 49.7 |
| MAR,79 | 7 | 48 | 278 | 274 | 5.792 | 5.708 | 28.1 | 15.0 | 50.4 |
| APR,79 | 4 | 25 | 176 | 194 | 7.040 | 7.760 | 28.0 | 14.2 | 47.6 |
| MAY,79 | 4 | 29 | 153 | 193 | 5.249 | 6.621 | 26.1 | 14.9 | 44.2 |
| JUN,79 | 5 | 35 | 158 | 305 | 4.514 | 8.714 | 25.7 | 14.4 | 34.1 |
| JUL,79 | 7 | 46 | 156 | 319 | 3.391 | 6.935 | 26.0 | 15.0 | 32.8 |
| AUG,79 | 3 | 25 | 111 | 134 | 4.269 | 5.154 | 26.8 | 15.4 | 45.3 |
| SEP,79 | 4 | 33 | 125 | 146 | 3.788 | 4.424 | 27.8 | 15.4 | 46.1 |
| OCT,79 | 3 | 18 | 95 | 100 | 5.278 | 5.556 | 27.5 | 15.1 | 48.7 |
| NOV,79 | 8 | 24 | 110 | 62 | 4.605 | 2.595 | 30.0 | 15.7 | 64.0 |
| DEC,79 | 16 | 38 | 210 | 201 | 5.474 | 5.240 | 29.8 | 16.8 | 51.1 |
| TOTAL | 66 | 337 | 1689 | 2055 | 5.012 | 6.098 | 27.9 | 15.1 | 45.1 |

# APPENDIX   III

## LISTING OF DISTRICT RAINFALL DATA USED IN DERIVING CORRELATIONS GIVEN IN TABLE A I. 1. AND EQUATIONS GIVEN IN TABLE A I. 2., APPENDIX I

# APPENDIX III

## LISTING OF DISTRICT RAINFALL DATA USED IN DERIVING CORRELATIONS GIVEN IN TABLE A I. 1. AND EQUATIONS GIVEN IN TABLE A I. 2., APPENDIX I.

(Data Source and Data as Described in Appendix I)

| Month & Year | District 7 = GC | District 7A = MU | District 6 = CN |
|---|---|---|---|
| 0166 | 34 | 2 | 0 |
| 0266 | 18 | 15 | 1 |
| 0366 | 10 | 4 | 0 |
| 0466 | 87 | 81 | 64 |
| 0566 | 0 | 0 | 16 |
| 0666 | 14 | 22 | 27 |
| 0766 | 0 | 14 | 22 |
| 0866 | 11 | 12 | 17 |
| 0966 | 0 | 5 | 5 |
| 1066 | 28 | 27 | 2 |
| 1166 | 6 | 5 | 1 |
| 1266 | 1 | 0 | 0 |
| 0167 | 51 | 89 | 111 |
| 0267 | 21 | 3 | 36 |
| 0367 | 1 | 0 | 5 |
| 0467 | 0 | 3 | 3 |
| 0567 | 15 | 37 | 37 |
| 0667 | 0 | 20 | 44 |
| 0767 | 0 | 19 | 12 |
| 0867 | 3 | 20 | 33 |
| 0967 | 0 | 3 | 0 |
| 1067 | 2 | 7 | 1 |
| 1167 | 3 | 3 | 1 |
| 1267 | 48 | 15 | 0 |
| 0168 | 20 | 24 | 20 |
| 0268 | 49 | 18 | 20 |
| 0368 | 65 | 52 | 18 |
| 0468 | 21 | 34 | 49 |
| 0568 | 14 | 20 | 8 |
| 0668 | 63 | 99 | 92 |
| 0768 | 27 | 10 | 13 |
| 0868 | 3 | 8 | 3 |
| 0968 | 6 | 12 | 5 |
| 1068 | 4 | 1 | 2 |
| 1168 | 0 | 3 | 0 |
| 1268 | 2 | 0 | 0 |
| 0169 | 15 | 0 | 0 |
| 0269 | 26 | 19 | 3 |
| 0369 | 0 | 0 | 0 |
| 0469 | 0 | 2 | 3 |
| 0569 | 43 | 54 | 55 |
| 0669 | 6 | 19 | 36 |
| 0769 | 0 | 7 | 4 |
| 0869 | 0 | 1 | 1 |
| 0969 | 0 | 6 | 5 |
| 1069 | 1 | 3 | 2 |
| 1169 | 0 | 4 | 2 |
| 1269 | 3 | 1 | 1 |
| 0170 | 7 | 2 | 0 |
| 0270 | 2 | 56 | 114 |
| 0370 | 11 | 4 | 0 |
| 0470 | 15 | 29 | 37 |
| 0570 | 71 | 31 | 50 |
| 0670 | 3 | 29 | 29 |
| 0770 | 2 | 8 | 8 |
| 0870 | 0 | 6 | 6 |
| 0970 | 22 | 11 | 13 |
| 1070 | 0 | 3 | 2 |
| 1170 | 0 | 1 | 1 |

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| Month & Year | District 7 = GC | District 7A = MU | District 6 = CN |
|---|---|---|---|
| 1270 | 3 | 17 | 2 |
| 0171 | 21 | 19 | 52 |
| 0271 | 56 | 37 | 4 |
| 0371 | 21 | 35 | 28 |
| 0471 | 0 | 3 | 1 |
| 0571 | 12 | 14 | 15 |
| 0671 | 132 | 29 | 20 |
| 0771 | 14 | 54 | 133 |
| 0871 | 4 | 16 | 34 |
| 0971 | 0 | 2 | 0 |
| 1071 | 0 | 7 | 9 |
| 1171 | 5 | 2 | 0 |
| 1271 | 0 | 0 | 2 |
| 0172 | 0 | 4 | 4 |
| 0272 | 6 | 4 | 0 |
| 0372 | 9 | 5 | 4 |
| 0472 | 0 | 0 | 0 |
| 0572 | 2 | 14 | 47 |
| 0672 | 8 | 40 | 57 |
| 0772 | 52 | 55 | 94 |
| 0872 | 3 | 13 | 12 |
| 0972 | 0 | 10 | 6 |
| 1072 | 1 | 0 | 4 |
| 1172 | 6 | 8 | 0 |
| 1272 | 20 | 2 | 0 |
| 0173 | 110 | 6 | 11 |
| 0273 | 2 | 5 | 0 |
| 0373 | 47 | 0 | 32 |
| 0473 | 36 | 26 | 14 |
| 0573 | 37 | 27 | 28 |
| 0673 | 41 | 35 | 56 |
| 0773 | 42 | 62 | 41 |
| 0873 | 27 | 22 | 21 |
| 0973 | 1 | 10 | 4 |
| 1073 | 3 | 7 | 6 |
| 1173 | 10 | 18 | 5 |
| 1273 | 51 | 13 | 52 |
| 0174 | 26 | 17 | 19 |
| 0274 | 25 | 14 | 5 |
| 0374 | 54 | 34 | 21 |
| 0474 | 22 | 34 | 4 |
| 0574 | 9 | 49 | 61 |
| 0674 | 7 | 15 | 23 |
| 0774 | 74 | 101 | 128 |
| 0874 | 22 | 32 | 36 |
| 0974 | 5 | 23 | 2 |
| 1074 | 4 | 11 | 31 |
| 1174 | 3 | 7 | 1 |
| 1274 | 6 | 10 | 2 |
| 0175 | 2 | 0 | 0 |
| 0275 | 42 | 157 | 103 |
| 0375 | 90 | 43 | 27 |
| 0475 | 22 | 79 | 44 |
| 0575 | 4 | 30 | 23 |
| 0675 | 6 | 29 | 40 |
| 0775 | 23 | 31 | 41 |
| 0875 | 1 | 17 | 8 |
| 0975 | 1 | 4 | 4 |
| 1075 | 42 | 57 | 39 |
| 1175 | 41 | 38 | 54 |
| 1275 | 88 | 18 | 1 |
| 0176 | 32 | 6 | 9 |
| 0276 | 20 | 28 | 15 |
| 0376 | 37 | 4 | 5 |
| 0476 | 8 | 17 | 1 |

| Month & Year | District 7 = GC | District 7A = MU | District 6 = CN |
|---|---|---|---|
| 0576 | 4 | 14 | 21 |
| 0676 | 0 | 5 | 5 |
| 0776 | 1 | 5 | 28 |
| 0876 | 12 | 9 | 25 |
| 0976 | 4 | 11 | 7 |
| 1076 | 9 | 19 | 5 |
| 1176 | 0 | 2 | 1 |
| 1276 | 16 | 0 | 0 |
| 0177 | 12 | 2 | 3 |
| 0277 | 3 | 2 | 4 |
| 0377 | 27 | 10 | 18 |
| 0477 | 1 | 10 | 13 |
| 0577 | 15 | 15 | 48 |
| 0677 | 11 | 16 | 41 |
| 0777 | 2 | 4 | 0 |
| 0877 | 7 | 12 | 3 |
| 0977 | 1 | 1 | 0 |
| 1077 | 1 | 4 | 2 |
| 1177 | 9 | 8 | 3 |
| 1277 | 18 | 30 | 1 |
| 0178 | 20 | 51 | 16 |
| 0278 | 72 | 63 | 26 |
| 0378 | 44 | 4 | 21 |
| 0478 | 6 | 11 | 43 |
| 0578 | 0 | 1 | 1 |
| 0678 | 6 | 10 | 18 |
| 0778 | 21 | 43 | 32 |
| 0878 | 60 | 31 | 16 |
| 0978 | 1 | 21 | 4 |
| 1078 | 5 | 3 | 0 |
| 1178 | 9 | 3 | 0 |
| 1278 | 3 | 9 | 0 |
| 0179 | 5 | 0 | 0 |
| 0279 | 54 | 18 | 21 |
| 0379 | 27 | 5 | 26 |
| 0479 | 19 | 16 | 5 |
| 0579 | 19 | 7 | 6 |
| 0679 | 1 | 14 | 7 |
| 0779 | 0 | 5 | 0 |
| 0879 | 26 | 16 | 12 |
| 0979 | 4 | 1 | 0 |
| 1079 | 0 | 0 | 0 |
| 1179 | 1 | 7 | 0 |
| 1279 | 23 | 14 | 5 |