



Department of Planning, Industry and Environment

2022 Quota Report

NSW Commercial Kangaroo Management
Program



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Background

The NSW Department of Planning, Industry and Environment (the department) and its predecessor agencies have been researching and monitoring kangaroo populations in New South Wales, and managing the NSW Commercial Kangaroo Management Program (KMP) since the 1970s. During this time, in line with the best available science, adjustments have been made to the survey design, population estimation methods and the methods for calculating the commercial quota.

This *2022 Quota Report: NSW Commercial Kangaroo Management Program* provides the commercial quotas for the 2022 kangaroo harvest in accordance with the Wildlife Trade Management Plan for the Commercial Harvest of Kangaroos in New South Wales 2022–26 (the plan).

The report provides the 2021 population estimates for red kangaroos, eastern and western grey kangaroos, wallaroos, and the corresponding commercial harvesting quotas for 2022. All historical data for trends in kangaroo management can be found in the appendix.

Summary

The total quota available for allocation in 2022 is **1,692,207** kangaroos. There is also a maximum special quota of **163,612** that may be made available in specific circumstances (Table 1).

There are 15 commercial kangaroo management zones across New South Wales (Figure 1). Table 2 shows the 2022 quota by zone and species.

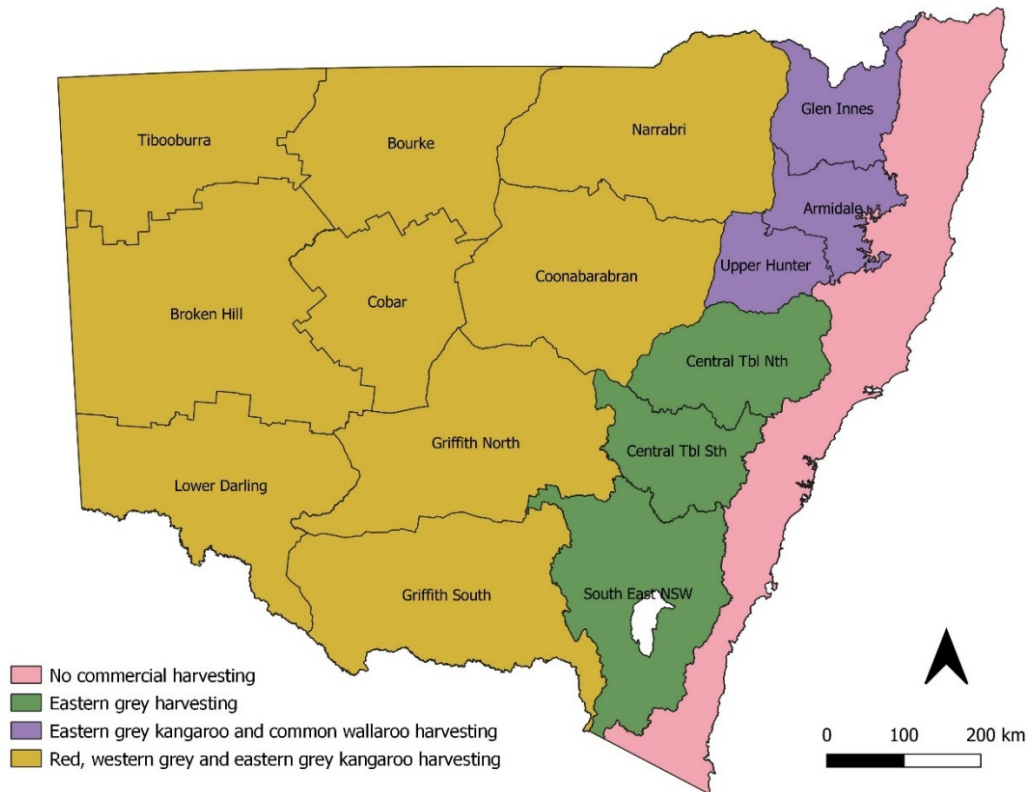


Figure 1 NSW commercial kangaroo management zones

Table 1 Population estimates for 2021, quotas, quota as percentage of population, maximum special quota for 2022, and 2021 quota for comparison

	Population estimates 2021	Quota 2022	Quota as percentage of population	Maximum special quota	Quota 2021
Red kangaroo	3,646,662	619,932	17.0%	54,699	474,852
Eastern grey kangaroo (Western Plains)	2,502,678	358,835	14.3%	37540	370,568
Eastern grey kangaroo (Central and Northern Tablelands and South East NSW)	3,828,020	574,202	15.0%	57381	618,092
Western grey kangaroo	639,428	94,754	14.8%	9,544	90,765
Wallaroo (Northern Tablelands) (2019 surveys)	296,555	44,484	15.0%	4448	44,484
Total	10,913,343	1,692,207		163,612	1,598,761

Table 2 Quota by species and commercial kangaroo management zone

Zone name	Red kangaroo quota	Western grey kangaroo quota	Eastern grey kangaroo quota	Common wallaroo quota	Totals all species
Bourke	27,940	1,386	2,261		31,587
Broken Hill	217,790	16,030	11,608		245,428
Cobar	30,685	5,935	4,298		40,918
Coonabarabran	38,490	10,870	144,415		193,775
Griffith North	48,284	17,400	84,954		150,638
Griffith South	19,231	13,036	63,645		95,912
Lower Darling	127,562	29,179	13,109		169,850
Narrabri	52,705	0	30,873		83,578
Tibooburra	57,245	918	3,672		61,835
Northern Tablelands – Glen Innes			81,780	20,230	102,010
Northern Tablelands – Armidale			63,285	17,594	80,879
Northern Tablelands – Upper Hunter			24,975	6,660	31,635
Central Tablelands – North			116,602		116,602
Central Tablelands – South			73,240		73,240
South East Tablelands			214,320		214,320
Total all zones	619,932	94,754	933,037	44,484	1,692,207

Blue shading indicates a reduced quota % has been applied (10% of population estimate)

Survey methods and population estimates

How surveys are conducted

Aerial surveys are used to assess kangaroo populations, annually on the Western Plains (fixed-wing aircraft surveys) and triennially on the Tablelands (helicopter surveys). Surveys are designed to suit the differences in terrain, and the species surveyed. The general underlying principles of the methodology are:

1. the aircraft flies at specified speed and height above the ground along a transect
2. trained aerial wildlife observers look through a frame or past a boom, each of which delineates the distance animals are from the transect line (for fixed-wing surveys these are: 0–50, 50–100, 100–200 and 200–300 metres)
3. animals seen from the aircraft within delineated distances from a transect are recorded by the observer for analysis using a data logger
4. collected data are analysed to calculate an estimated population density in the areas surveyed
5. the estimated density (e.g. the number of animals per square kilometre) is multiplied by the area of the kangaroo management zone to calculate the population estimate.

Western Plains

The 9 commercial kangaroo management zones in the Western Plains of New South Wales cover an estimated 555,280 square kilometres (see Table 12). Fixed-wing aerial surveys allow these areas to be surveyed quickly. The speed and height the plane must travel limits the time available for observers to detect, identify and record observations. Four observers independently record observations along the same transect, with 2 observers on each side of the aircraft. Observations are recorded onto a tablet computer by wildlife observers using data loggers. Customised software facilitates the recording of species (red kangaroo or grey kangaroo) group size (1, 2, 3 or 4) and distance class (0–50, 50–100, 100–200 and 200–300 metres). This system has been used since 2016 with benefits to data accuracy, data storage and methods of analysis.

Surveys and mark–recapture distance sampling

In keeping with advances in statistical analyses and survey methods, mark–recapture distance sampling (MRDS) is used to estimate the abundance of kangaroos in the Western Plains of New South Wales. This method allows for statistical consideration of the differences in detection between surveys, observers, species, group size, vegetation and other factors that may influence detection. It also accounts for kangaroos that are present during surveys but not counted.

MRDS combines 2 methods of surveying wildlife populations, line transect sampling and mark–recapture. Statistically reliable estimates of kangaroo abundance can be calculated using data obtained with the MRDS method. Differences in observations between front (mark or capture) and rear (recapture) observers shows variations between individuals. On its own, conventional line transect sampling by aerial survey is likely to overestimate detection probability and therefore underestimate kangaroo density.

Mark–recapture estimates derived from the aerial survey where 2 observers independently count animals along the same transect on both sides of the aircraft, is used to account for differences in detection probability between observers.

The combination of mark–recapture and line transect sampling combines the strengths of both methods, increasing precision and accuracy of population estimates.

2021 population estimates

Table 3 shows the current estimated population and density of red and grey kangaroos in each of the Western Plains management zones.

Table 3 Western Plains 2021 red and grey kangaroo population estimates and density (kangaroos per square kilometre)

Management zone	Red kangaroo population estimate	Red kangaroo density (km ²)	Grey kangaroo population estimate	Grey kangaroo density (km ²)
Bourke	164,351	3.0	36,462	0.7
Broken Hill	1,281,119	14.1	184,257	2.0
Cobar	180,501	4.5	68,223	1.7
Coonabarabran	226,411	3.7	1,035,233	16.8
Griffith North	284,023	4.3	682,365	9.2
Griffith South	113,125	1.8	511,201	9.2
Lower Darling	750,367	13.3	281,919	5.0
Narrabri	310,030	4.7	311,846	4.7
Tibooburra	336,735	6.1	30,600	0.6
Total	3,646,662		3,142,106	

The estimated population sizes and densities of red and grey kangaroos in each Western Plains management zone from 1990 onwards are given in Tables 13 to 32.

Tablelands surveys

The 6 commercial kangaroo management zones in the NSW Tablelands cover 132,724 square kilometres. Each tablelands zone is surveyed once every third year using line transect sampling by helicopter. The Northern, Central and South East tablelands were most recently surveyed in 2019, 2020 and 2021, respectively.

Helicopter surveys are robust and scientifically rigorous, with each survey transect being randomised and stratified using information on kangaroo densities gained from the previous survey in each zone, and advances in software capability. A full report outlining the design of the survey and analysis of the results is available on the *Kangaroo population monitoring and reporting* webpage.

Northern Tablelands

The most recent Northern Tablelands survey was in September 2019. Table 4 shows the current estimated populations and densities of kangaroos in each of the 3 Northern Tablelands kangaroo management zones, based on aerial surveys conducted in 2019. These zones will be next surveyed in 2022.

Historical population estimates, densities and quotas for Northern Tablelands kangaroo management zones are provided in Tables 33 to 38.

Table 4 Population estimates for Northern Tablelands kangaroo management zones. The Northern Tablelands was last surveyed in 2019

Management zone	Zone area (km ²) *	Eastern grey kangaroo		Wallaroo	
		Density (km ²)	Population estimate	Density (km ²)	Population estimate
Glen Innes	18,449	29.6	545,200	7.3	134,865
Armidale	15,809	26.7	421,900	7.4	117,290
Upper Hunter	14,004	11.9	166,500	3.2	44,400
Total	48,262		1,133,600		296,555

* 'Zone area' in this table excludes the national parks estate, forests and reserves, where harvesting is prohibited.

South East NSW

About 25% of the total area of the South East kangaroo management zone is not available for commercial harvest as it is either reserved for conservation or state forest, or the terrain is too difficult for harvesters to access. These areas are excluded from the survey.

Table 5 shows the current estimated population and density of eastern grey kangaroos in the South East kangaroo management zone.

Table 5 Population estimates and density for 2021 for eastern grey kangaroos within the South East kangaroo management zone

Management zone	Area (km ²)	Density (km ²)	Population estimate
South East	40,705	35.1	1,428,800

Historical population estimates, densities and quotas for the South East kangaroo management zone are provided in Table 39.

Central Tablelands

The 2 kangaroo management zones in the Central Tablelands were surveyed by helicopter in 2008, 2011, 2014, 2017 and 2020. The survey design utilises information from the previous survey in the delineation of low, medium, and high population density strata, providing improved precision in the population estimates. The population estimates and densities derived from the 2020 helicopter survey are shown in Table 6. These zones will be next surveyed in 2023.

Table 6 Population estimates the Central Tablelands commercial kangaroo management zones. Central Tablelands was last surveyed in 2020

Management zone	Area (km ²)	Density (km ²)	Population estimate
Central Tablelands North	24,396	31.9	777,350
Central Tablelands South	19,361	25.2	488,270
Total	43,757		1,265,620

Historical population estimates, densities and quotas for Central Tablelands kangaroo management zones are provided in Tables 40 and 41.

Determination of quotas

Commercial harvest quotas

The commercial kangaroo harvest quota is based on harvesting a proportion of the estimated population. Annual commercial harvest quotas are set at a proportion of the estimated kangaroo populations. Quotas are generally set at 17% of the estimated population for red kangaroos, and for eastern grey kangaroos, western grey kangaroos and wallaroos, 15% of the estimated population. These proportions are specified in the plan.

The incorporation of harvest thresholds further protects low kangaroo populations. The above percentages are reduced, or the harvest suspended (zero quotas) if the population of a species falls below the relevant threshold in that zone. Thresholds are set based on standard deviations relative to the long-term average population (Table 7).

Low population thresholds applicable for 2022

As discussed above, the plan protects low populations by requiring the commercial harvest quota to be either reduced or suspended, depending on the current population estimate relative to the long-term mean. Thresholds have been set based on standard deviations, which are standardised measures that indicate how much a population varies from the average population. A small standard deviation indicates the population does not vary by much from the average, whereas a large standard deviation indicates the population varies more. Each species in each zone has its own thresholds.

To manage commercial harvest quotas, the thresholds are based on densities of kangaroos, calculated as the number of kangaroos per square kilometre at the time of the aerial survey. There are two thresholds, representing increasingly significant population declines:

- Threshold 1 is set at 1.5 standard deviations below the average density
- Threshold 2 is set at 2.0 standard deviations below the average density.

If a population falls to below Threshold 1, but not as low as Threshold 2, the commercial harvest quota for the following year is calculated at 10% of the population rather than the usual 15% (greys) or 17% (reds). Reducing the quota will help the kangaroo population recover when the decline is not sufficient to warrant complete suspension of the harvest. If a population falls below Threshold 2, no commercial harvest quota is set for the following year.

The 2021 surveys mark 21 years since the survey method moved from 200 metre to 100 metre strip counts (Pople et al. 1998). It is also 21 years since helicopter surveys began in the tablelands. The last 21 years of survey data have been used to calculate thresholds that inform quotas for 2022. This time period is sufficiently long to determine population variance without relying on earlier data that were collected under several different methodologies.

Special quotas

The department may consider releasing a special quota where the annual commercial harvest quota for a species in a commercial kangaroo management zone has been fully issued. This is not an automatic decision. The special quota aims to minimise the number of kangaroos shot under non-commercial licences by allowing increased commercial use of kangaroos that would otherwise be shot and left in the field. In deciding whether to release a special quota, the department will consult the Kangaroo Management Advisory Panel and consider local conditions, climatic trends, population trends and Western Lands de-stocking orders to ensure populations can remain viable with increased harvesting.

A special quota for 2022 has been calculated in accordance with the plan (Table 1). When used, special quotas will be set at a maximum of 5% of the population estimate of each kangaroo species in any one zone, and a maximum of 1.5% of the population of each species across all zones.

Special quotas will not be allocated where the commercial harvest is reduced or suspended due to low populations.

Table 7 2021 density estimates, compared to long-term averages and thresholds for quota reduction and suspension

Western Plains zone	Tibooburra	Broken Hill	Lower Darling	Cobar	Bourke	Narrabri	Coonabarabran	Griffith
Grey kangaroos (eastern and western greys)								
Long-term average density	1.5	3.8	5.1	5.9	4.0	11.8	19.6	6.9
Threshold 1: 10% quota	0.4	1.8	2.6	1.1	1.0	5.1	9.6	3.5
Threshold 2: suspension of quota	0.2	1.4	2.1	0.6	0.6	3.9	7.6	2.8
2021 density estimate (kangaroos/km ²)	0.6	2.0	5.0	1.7	0.7	4.7	16.8	9.2
Red kangaroos								
Long-term average density	11.1	11.9	5.3	4.0	5.7	5.0	4.6	2.9
Threshold 1: 10% quota	3.8	7.1	2.3	1.5	2.4	2.1	2.3	1.5
Threshold 2: suspension of quota	2.7	6.0	1.7	1.1	1.8	1.6	1.8	1.2
2021 density estimate (kangaroos/km ²)	6.1	14.1	13.3	4.5	3.0	4.7	3.7	3.1

Blue shading indicates a reduced quota % has been applied (10% of population estimate)

Zones impacted by a reduced or suspended quota in 2022

The density of grey kangaroos in Bourke and Narrabri was estimated to be 0.66 and 4.74, respectively (Table 7). This places greys between the upper and lower thresholds for those kangaroo management zones. Consequently, they will have a reduced 10% quota for eastern greys (Bourke and Narrabri zones) and western greys (Bourke zone only) (Table 7).

Narrabri has only a very small population of western grey kangaroos because the zone is at the eastern edge of their range. No quota is set for western greys in this zone.

Quotas by species and zone are shown in Table 2 above.

Thresholds for new zones – Griffith North and Griffith South

The commercial kangaroo management area was expanded in 2020 to take in the former Wagga Wagga non-commercial zone to provide landholders with additional options to manage kangaroo numbers. Expanding the Griffith Zone to include the new area increased it from 98,171 to 129,884 square kilometres. To achieve more refined management, this area was divided into the two new zones of Griffith North (65,758 square kilometres) and Griffith South (64,126 square kilometres).

As the Griffith North and South zones have only two years of population survey data, thresholds for these zones are determined by using the long-term data of the former Griffith Zone.

Assuming the estimated long-term densities in the former Griffith kangaroo management zone are representative of the long-term densities of kangaroos in the new zones, the thresholds calculated for the new zones will be similar to the former Griffith Zone (Table 8).

Table 8 2021 density estimates and thresholds for Griffith kangaroo management zone

Management zone	Species	Upper threshold (kangaroos/km ²)	Lower threshold (kangaroos/km ²)	Density 2021
Griffith	Red kangaroo	1.50	1.20	3.1
	Grey kangaroo	3.53	2.82	9.2

There will be no reduction in harvest rates for any species in Griffith North or Griffith South kangaroo management zones in 2022.

Thresholds for tablelands zones

Thresholds for each of the tablelands kangaroo management zones are shown in Table 9 for eastern grey kangaroos and Table 10 for wallaroos. Current population densities are above the upper threshold; therefore, a normal 15% quota is set for each of these species and zones.

Table 9 Average and current density estimates, and thresholds for quota reduction and suspension for eastern grey kangaroos in the tablelands

Tablelands zone	Armidale	Glen Innes	Upper Hunter	Central Tablelands North	Central Tablelands South	South East NSW
Eastern grey						
Average density	14.8	16.6	9.1	34.6	30.3	19.7
Threshold 1: 10% quota	7.56	7.85	4.59	15.25	16.63	7.31
Threshold 2: suspension of quota	6.05	6.12	3.65	11.61	13.62	5.25
Density estimate (kangaroos/km ²)	26.7	29.6	11.9	31.9	25.2	35.1
Last survey year	2019	2019	2019	2020	2020	2021

Table 10 Average and current density estimates, and thresholds for quota reduction and suspension for wallaroos in the Northern Tablelands

Northern Tablelands zone	Armidale	Glen Innes	Upper Hunter
Wallaroo			
Average density	3.9	3.6	3.5
Threshold 1: 10% quota	1.65	1.38	1.19
Threshold 2: suspension of quota	1.24	1.01	0.83
Density estimate (wallaroos/km ²)	7.4	7.3	3.2
Last survey year	2019	2019	2019

New commercial harvest zones

No new zones have been added to the 2022 harvest area.

Proposed changes to quotas

For 2022, the department does not propose to set quotas that are higher than those specified in the plan.

In accordance with the provisions of the plan, as shown in Table 11 below, the department has:

- reduced the harvest quota for eastern grey kangaroos in Bourke zone to 10%
- reduced the harvest quota for western grey kangaroos in Bourke zone to 10%
- reduced the harvest quota for eastern grey kangaroos in Narrabri zone to 10%.

No quota is set for western grey kangaroos in Narrabri kangaroo zone because it has only a small population due to being the eastern edge of their range.

Table 11 Zones with suspended or reduced quotas in 2022

Management zone*	Species	Status
Tibooburra – Zone 01	Eastern grey	Open – 15% quota
	Western grey	Open – 15% quota
Bourke – Zone 07	Eastern grey	Reduced (10% quota)
	Western grey	Reduced (10% quota)
Narrabri – Zone 08	Eastern grey	Reduced (10% quota)

*This table does not include all zones with quotas set as per the summary table. It shows only zones with suspended or reduced quotas, or zones that have reopened from last year.

Non-commercial culling

Non-commercial culling is available to landholders throughout New South Wales to help manage the impact of kangaroos on their land. Maximum culling limits are set annually, based on the same population survey data used to set commercial kangaroo harvest quotas. Maximum culling limits are set according to property size for the same four species subject to commercial kangaroo harvesting (eastern grey, western grey and red kangaroo, and wallaroo). For all other kangaroo species, and where property size is less than 20 hectares, culling limits are determined on a case-by-case basis.

Non-commercial culling limits can be found on the department's *Licences to harm kangaroos* webpage.

Changes to non-commercial licence conditions were implemented in the 2018 NSW Government Drought Relief Package. The intention was to maintain animal welfare standards and ecologically sustainable kangaroo populations.

The changes included:

- introducing ecologically sustainable limits on the number of kangaroos that may be culled, based on property size
- processing licence applications over the phone for previous and current licence holders
- increasing limits on shooters to operate under each licence
- reduced red tape on provision of shooter details to the National Parks and Wildlife Service (NPWS)
- removal of the use of carcass tags (drop tags)
- removal of the 'shoot and let lie' licence condition to reduce biosecurity risks by allowing landholders and shooters to use carcasses for non-commercial purposes.

References

Pople AR, Cairns SC, Clancy TF, Grigg GC, Beard LA and Southwell CJ 1998, An assessment of the accuracy of kangaroo surveys using fixed-wing aircraft, *Wildlife Research*, vol.25, pp.315–326, DOI: [10.1071/WR97077](https://doi.org/10.1071/WR97077).

More information

- [Kangaroo population monitoring and reporting](#)
- [Licences to harm kangaroos](#)

Appendix A. Tables

Kangaroo management zone areas

Table 12 Areas of kangaroo management zones

Management zone	Area (km ²)
Western Plains	
Bourke	55,019
Broken Hill	91,044
Cobar	40,419
Coonabarabran	61,711
Griffith North	65,758
Griffith South	64,126
Lower Darling	56,599
Narrabri	65,755
Tibooburra	54,849
Total Western Plains zones	555,280
Tablelands	
Armidale	15,809
Glen Innes	18,449
Upper Hunter	14,004
Central Tablelands North	24,396
Central Tablelands South	19,361
South East Tablelands	40,705
Total Tablelands zones	132,724
Total kangaroo management zone area (all zones)	688,004

Notes to the tables that follow

For Western Plains zones only:

- dark shading indicates the use of 100 metre correction factors from September 2001; light shading indicates 200 metre correction factors for surveys using fixed-wing aircraft, as described in the section on ‘Survey methods and population estimates’
- in 2016 and 2017 the long East–West transects that had been used in previous years were flown but data collection and analysis changed to MRDS
- in 2018 the sampling design changed to zigzag transects within randomly placed 50 x 20 kilometre blocks. MRDS was used for data collection and analysis
- from 2016 the rows will be clear (no shading) indicating the MRDS method of surveying.

For all tables, ‘% population’ refers to the commercial harvest quota as a proportion of the previous year’s population estimate, upon which the quota is set.

Tablelands Management zones are surveyed by helicopter on a 3-yearly cycle. Population estimates remain the same for the intervening period.

Kangaroo management zone no. 1: Tibooburra

Table 13 Red kangaroo temporal variation – Tibooburra

Year	Population	Density	% change	Quota	% population
1990	1,004,500	18.3	-10.6	161,900	14.4
1991	1,468,600	26.8	46.2	149,200	14.9
1992	845,000	15.4	-42.5	337,800	23.0
1993	1,230,319	22.4	45.6	135,200	16.0
1994	1,103,648	20.1	-10.3	221,457	18.0
1995	1,078,399	19.7	-2.3	139,300	12.6
1996	1,009,295	18.4	-6.4	141,100	13.1
1997	1,673,668	30.5	65.8	132,800	13.2
1998	1,576,827	28.7	-5.8	190,900	11.4
1999	925,897	16.9	-41.3	104,570	6.6
2000	927,889	16.9	0.2	107,300	11.6
2001	1,389,398	25.3	49.7	106,200	11.4
2002	754,013	13.7	-45.7	229,200	16.5
2003	420,721	7.7	-44.2	124,700	16.5
2004	487,004	8.9	15.8	71,523	17.0
2005	629,502	11.5	29.3	82,791	17.0
2006	361,586	6.6	-42.6	107,015	17.0
2007	432,096	7.9	19.5	61,470	17.0
2008	606,518	11.1	40.4	73,456	17.0
2009	560,706	10.2	-7.6	103,108	17.0
2010	636,038	11.6	13.4	95,320	17.0
2011	621,124	11.3	-2.3	108,126	17.0
2012	937,643	17.1	51.0	105,591	17.0
2013	903,279	17.1	-3.7	159,399	17.0
2014	1,256,418	22.9	39.1	153,557	17.0
2015	1,061,784	19.4	-15.5	213,591	17.0
2016	1,567,598	30.2	47.6	180,503	17.0
2017	1,135,531	20.6	-27.6	266,492	17.0
2018	344,619	6.3	-69.7	193,040	17.0
2019	79,346	1.4	-77.0	0	0.0
2020	200,465	3.7	153	0	0.0
2021	336,735	6.1	68.0	20,046	10.0
2022				57,245	17.0

Table 14 Grey kangaroo temporal variation – Tibooburra

Year	Population	Density	% change	Quota	% population
1990	83,400	1.5	48.7	7,400	13.2
1991	55,500	1.0	-33.5	11,000	13.2
1992	45,900	0.8	-17.3	8,900	16.0
1993	136,489	2.5	197.4	7,803	17.0
1994	162,375	3.0	19.0	34,122	25.0
1995	150,510	2.7	-7.3	8,653	5.3
1996	151,515	2.8	0.7	10,460	6.9
1997	274,399	5.0	81.1	7,185	4.7
1998	356,751	6.5	30.0	12,410	4.5
1999	212,896	3.9	-40.3	36,300	10.2
2000	209,231	3.8	-1.7	16,350	7.7
2001	242,312	4.4	15.8	18,100	8.7
2002	184,093	3.4	-24.0	41,700	17.2
2003	73,098	1.3	-60.3	31,000	16.8
2004	72,890	1.3	-0.3	10,965	15.0
2005	52,605	1.0	-27.8	10,933	15.0
2006	59,034	1.1	12.2	7,891	15.0
2007	64,222	1.2	8.8	8,855	15.0
2008	93,058	1.7	44.9	9,633	15.0
2009	92,905	1.7	-0.2	13,959	15.0
2010	37,781	0.7	-59.3	951	1.0
2011	51,214	0.9	35.6	0	0.0
2012	73,882	1.4	44.3	7,153	14.0
2013	163,392	3.0	121.2	11,082	15.0
2014	44,669	0.8	-72.7	24,509	15.0
2015	234,927	4.3	426.0	4,467	10.0
2016	451,594	6.8	92.2	35,239	15.0
2017	176,058	3.2	-61.0	67,739	15.0
2018	184,002	3.3	4.5	26,409	15.0
2019	48,502	0.9	-73.6	27,600	15.0
2020	6,859	0.1	-86	6,782	14.0
2021	30,600	0.6	346.1	0.0	0.0
2022				4,590	15.0

Kangaroo management zone no. 2: Broken Hill

Table 15 Red kangaroo temporal variation – Broken Hill

Year	Population	Density	% change	Quota	% population
1991	1,480,900	16.3	-10.5	252,600	15.3
1992	1,031,700	11.4	-30.3	263,900	17.8
1993	1,205,576	13.3	16.9	160,785	15.6
1994	1,059,378	11.7	-12.1	148,568	12.3
1995	1,477,215	16.3	39.4	125,732	11.9
1996	1,100,017	12.1	-25.5	174,059	11.8
1997	1,785,627	19.7	62.3	120,768	11.0
1998	1,437,241	15.8	-19.5	223,480	12.5
1999	1,358,991	15.0	-5.4	203,800	14.2
2000	959,482	10.6	-29.4	191,175	14.1
2001	1,487,845	16.4	55.1	143,000	14.9
2002	1,121,294	12.3	-24.6	220,200	14.8
2003	584,448	6.4	-47.9	166,950	14.9
2004	925,845	10.2	58.4	99,356	17.0
2005	538,956	5.9	-41.8	157,394	17.0
2006	725,035	8.0	34.5	91,622	17.0
2007	1,092,982	12.0	50.7	123,256	17.0
2008	1,190,299	13.1	8.9	185,807	17.0
2009	809,665	8.9	-32.0	202,351	17.0
2010	855,368	9.4	5.6	137,643	17.0
2011	1,079,052	11.9	26.2	145,413	17.0
2012	1,138,627	12.5	5.5	183,439	17.0
2013	1,219,455	13.4	7.1	193,567	17.0
2014	2,192,347	24.1	79.8	207,307	17.0
2015	2,168,733	23.9	-1.1	372,699	17.0
2016	1,206,597	13.6	-44.4	368,685	17.0
2017	823,210	9.0	-31.8	205,121	17.0
2018	1,133,523	12.4	37.7	139,946	17.0
2019	1,124,115	12.3	-0.8	192,699	17.0
2020	1,197,474	13.2	6.5	191,100	17.0
2021	1,281,119	14.17	7.0	203,571	17.0
2022				217,790	17.0

Table 16 Grey kangaroo temporal variation – Broken Hill

Year	Population	Density	% change	Quota	% population
1990	465,100	5.1	87.7	37,100	15.0
1991	449,700	5.0	-3.3	81,600	17.5
1992	457,500	5.0	1.7	102,900	22.9
1993	1,071,541	11.8	134.2	106,642	23.3
1994	660,124	7.3	-38.4	81,954	7.6
1995	1,291,048	14.2	95.6	50,450	7.6
1996	704,719	7.8	-45.4	118,800	9.2
1997	840,578	9.3	19.3	59,687	8.5
1998	711,846	7.8	-15.3	62,650	7.5
1999	645,471	7.1	-9.3	79,160	11.1
2000	730,421	8.0	13.2	71,650	11.1
2001	723,937	8.0	-0.9	71,600	9.8
2002	982,041	10.8	35.7	101,000	14.0
2003	263,796	2.9	-73.1	138,000	14.1
2004	251,867	2.8	-4.5	39,569	15.0
2005	174,358	1.9	-30.8	37,780	15.0
2006	216,474	2.4	24.2	26,154	15.0
2007	281,904	3.1	30.2	32,471	15.0
2008	439,369	4.8	55.9	42,286	15.0
2009	366,677	4.0	-16.5	65,905	15.0
2010	241,831	2.7	-34.0	55,002	15.0
2011	179,320	2.0	-25.8	36,275	15.0
2012	221,803	2.4	23.7	21,382	11.9
2013	586,534	6.5	164.4	26,702	12.0
2014	444,547	4.9	-24.2	87,980	15.0
2015	564,083	6.2	26.9	66,682	15.0
2016	672,187	7.4	19.2	84,612	15.0
2017	438,131	4.8	-34.8	100,828	15.0
2018	395,360	4.3	-9.8	65,720	15.0
2019	326,644	3.6	-17.4	59,304	15.0
2020	281,410	3.1	-14.0	48,977	15.0
2021	184,257	2.0	-34.5	42,212	15.0
2022				27,638	15.0

Kangaroo management zone no. 4: Lower Darling

Table 17 Red kangaroo temporal variation – Lower Darling

Year	Population	Density	% change	Quota	% population
1991	377,600	6.7	8.1	49,700	14.2
1992	399,200	7.1	5.7	86,800	23.0
1993	268,066	4.7	-32.8	95,808	24.0
1994	555,979	9.8	107.4	42,890	16.0
1995	402,592	7.1	-27.6	75,768	13.6
1996	385,844	6.8	-4.2	55,900	13.9
1997	493,302	8.7	27.9	73,117	18.9
1998	315,945	5.6	-36.0	75,000	15.2
1999	364,651	6.5	15.4	39,910	12.6
2000	221,468	3.9	-39.3	54,300	14.9
2001	279,185	4.9	26.1	36,820	16.6
2002	468,072	8.3	67.7	40,900	14.6
2003	197,864	3.5	-57.7	69,200	14.8
2004	166,340	2.9	-15.9	33,637	17.0
2005	124,665	2.2	-25.1	28,278	17.0
2006	113,119	2.0	-9.3	21,193	17.0
2007	188,018	3.3	66.2	19,230	17.0
2008	251,731	4.5	33.9	31,963	17.0
2009	185,450	3.3	-26.3	42,794	17.0
2010	193,931	3.4	4.6	31,527	17.0
2011	186,473	3.3	-3.8	32,968	17.0
2012	295,180	5.2	58.3	31,700	17.0
2013	423,518	7.5	43.5	50,181	17.0
2014	289,106	5.1	-31.7	71,998	17.0
2015	387,272	6.9	34.0	49,148	17.0
2016	619,113	11.0	59.9	65,836	17.0
2017	289,385	5.1	-53.3	105,249	17.0
2018	307,619	5.4	6.3	49,195	17.0
2019	691,119	12.2	124.7	52,295	17.0
2020	583,802	10.3	-15.5	117,490	17.0
2021	750,367	13.3	28.5	99,246	17.0
2022				127,562	17.0

Table 18 Grey kangaroo temporal variation – Lower Darling

Year	Population	Density	% change	Quota	% population
1990	445,800	7.9	79.6	39,700	16.0
1991	696,900	12.3	56.3	75,800	17.0
1992	573,900	10.2	-17.6	188,163	27.0
1993	1,091,834	19.3	90.2	134,293	23.4
1994	1,050,128	18.6	-3.8	207,448	19.0
1995	880,562	15.6	-16.1	88,660	8.4
1996	609,376	10.8	-30.8	91,124	10.3
1997	620,029	11.0	1.7	59,340	9.7
1998	497,977	8.8	-19.7	54,150	8.7
1999	663,487	11.8	33.2	59,100	11.9
2000	362,692	6.4	-45.3	70,750	10.7
2001	454,782	8.1	25.4	44,600	12.3
2002	512,465	9.1	12.7	69,300	15.2
2003	336,387	6.0	-34.4	78,300	15.3
2004	306,466	5.4	-8.9	50,458	15.0
2005	110,876	2.0	-63.8	45,970	15.0
2006	220,666	3.9	99.0	16,631	15.0
2007	226,569	4.0	2.7	33,100	15.0
2008	367,220	6.5	62.1	33,985	15.0
2009	215,420	3.8	-41.3	55,083	15.0
2010	231,585	4.1	7.5	32,313	15.0
2011	98,973	1.8	-57.3	34,738	15.0
2012	232,187	4.1	134.6	3,259	3.3
2013	486,859	8.6	109.7	34,828	15.0
2014	397,584	7.0	-18.3	73,029	15.0
2015	360,959	6.4	-9.2	59,638	15.0
2016	566,970	10.7	57.1	54,144	15.0
2017	212,474	3.7	-62.5	85,046	15.0
2018	281,035	5.0	32.3	31,871	15.0
2019	378,718	6.7	34.8	42,155	15.0
2020	314,639	5.6	-17.0	56,808	15.0
2021	281,919	5.0	-10.4	47,196	15.0
2022				42,288	15.0

Kangaroo management zone no. 6: Cobar

Table 19 Red kangaroo temporal variation – Cobar

Year	Population	Density	% change	Quota	% population
1990	264,300	6.6	26.3	38,300	18.3
1991	238,600	5.9	-9.7	48,500	18.4
1992	170,700	4.2	-28.5	45,300	19.0
1993	127,658	3.2	-25.2	27,312	16.0
1994	201,113	5.0	57.5	12,766	10.0
1995	151,314	3.8	-24.8	28,116	14.0
1996	170,917	4.2	13.0	31,441	20.8
1997	163,624	4.1	-4.3	19,780	11.6
1998	312,413	7.7	90.9	25,580	15.6
1999	228,367	5.7	-26.9	41,640	13.3
2000	231,400	5.7	1.3	29,375	12.9
2001	196,029	4.9	-15.3	29,700	12.8
2002	258,662	6.4	32.0	29,200	14.9
2003	121,756	3.0	-52.9	38,600	14.9
2004	146,292	3.6	20.2	20,699	17.0
2005	117,137	2.9	-19.9	24,870	17.0
2006	107,825	2.7	-7.9	19,913	17.0
2007	85,913	2.1	-20.3	18,330	17.0
2008	156,639	3.9	82.3	14,605	17.0
2009	97,823	2.4	-37.5	26,629	17.0
2010	148,177	3.7	51.5	16,630	17.0
2011	210,921	5.2	42.3	25,190	17.0
2012	252,750	6.3	19.8	35,857	17.0
2013	193,738	4.8	-23.3	42,968	17.0
2014	298,459	7.4	54.1	32,935	17.0
2015	357,287	8.9	19.7	50,738	17.0
2016	437,129	10.8	22.3	60,739	17.0
2017	229,495	5.7	-47.5	74,312	17.0
2018	44,733	1.1	-80.5	39,014	17.0
2019	36,058	0.9	-19.4	0	0.0
2020	102,480	2.5	184.0	0	0.0
2021	180,501	4.5	76.1	17,422	17.0
2022				30,685	17.0

Table 20 Grey kangaroo temporal variation – Cobar

Year	Population	Density	% change	Quota	% population
1990	275,100	6.8	10.0	38,800	15.5
1991	305,800	7.6	11.2	44,700	16.2
1992	313,000	7.8	2.4	73,400	24.0
1993	602,794	14.9	92.6	78,250	25.0
1994	558,152	13.8	-7.4	126,587	21.0
1995	894,671	22.2	60.3	47,542	8.5
1996	598,600	14.8	-33.1	73,738	8.2
1997	683,136	16.9	14.1	40,820	6.8
1998	775,992	19.2	13.6	40,900	6.0
1999	857,216	21.3	10.5	81,650	10.5
2000	755,493	18.7	-11.9	78,850	9.2
2001	1,052,432	26.1	39.3	67,700	9.0
2002	938,507	23.3	-10.8	131,500	12.5
2003	551,434	13.7	-41.2	114,900	12.2
2004	303,491	7.5	-45.0	82,715	15.0
2005	279,121	6.9	-8.0	45,524	15.0
2006	208,066	5.2	-25.5	41,868	15.0
2007	282,841	7.0	35.9	31,210	15.0
2008	350,925	8.7	24.1	42,426	15.0
2009	251,233	6.2	-28.4	52,639	15.0
2010	256,097	6.4	1.9	37,685	15.0
2011	176,060	4.4	-31.3	38,415	15.0
2012	311,522	7.7	76.9	21,384	12.1
2013	660,596	16.4	112.1	46,728	15.0
2014	546,338	13.5	-17.3	99,089	15.0
2015	492,207	12.2	-9.9	81,951	15.0
2016	405,079	10.0	-17.7	73,831	15.0
2017	184,069	4.5	-54.6	60,762	15.0
2018	81,391	2.0	-55.8	22,239	12.1
2019	7,317	0.2	-91.0	0	0.0
2020	44,208	1.1	504	0	0.0
2021	68,223	1.7	54.3	4,421	10.0
2022				10,233	15.0

Kangaroo management zone no. 7: Bourke

Table 21 Red kangaroo temporal variation – Bourke

Year	Population	Density	% change	Quota	% population
1990	483,100	8.8	23.5	65,500	16.7
1991	356,600	6.5	-26.2	82,600	17.1
1992	245,300	4.5	-31.2	60,600	17.0
1993	380,260	6.9	55.0	39,248	16.0
1994	230,959	4.2	-39.3	68,447	18.0
1995	171,539	3.1	-25.7	14,920	6.5
1996	192,031	3.5	11.9	14,920	8.7
1997	208,276	3.8	8.5	19,080	9.9
1998	281,932	5.1	35.4	23,055	11.1
1999	380,435	6.9	34.9	45,950	16.3
2000	438,249	8.0	15.2	52,500	13.8
2001	487,321	8.9	11.2	59,200	13.5
2002	756,705	13.8	55.3	72,900	15.0
2003	191,581	3.5	-74.7	114,450	15.1
2004	203,764	3.7	6.4	32,569	17.0
2005	220,567	4.0	8.2	34,640	17.0
2006	258,668	4.7	17.3	37,496	17.0
2007	143,043	2.6	-44.7	43,973	17.0
2008	140,371	2.6	-1.9	24,317	17.0
2009	180,413	3.3	28.5	23,863	17.0
2010	251,196	4.6	39.2	30,670	17.0
2011	444,932	8.1	77.1	42,703	17.0
2012	429,000	7.8	-3.6	75,638	17.0
2013	460,225	8.4	7.3	72,930	17.0
2014	439,559	7.1	-4.5	78,238	17.0
2015	504,671	9.2	14.8	74,725	17.0
2016	730,140	13.3	44.7	85,794	17.0
2017	461,968	8.4	-36.7	124,124	17.0
2018	244,687	4.5	-47.0	78,535	17.0
2019	497,085	9.0	103.2	41,597	17.0
2020	117,975	2.1	-76.0	84,504	17.0
2021	164,351	3.0	39.3	11,797	10.0
2022				27,940	17.0

Table 22 Grey kangaroo temporal variation – Bourke

Year	Population	Density	% change	Quota	% population
1990	454,300	8.3	65.6	42,000	15.3
1991	338,200	6.1	-25.6	75,600	16.6
1992	524,400	9.5	55.1	54,100	16.0
1993	1,147,159	20.9	118.8	144,734	27.6
1994	753,367	13.7	-34.3	240,903	21.0
1995	438,500	8.0	-41.8	50,473	6.7
1996	554,855	10.1	26.5	17,500	4.0
1997	645,291	11.7	16.3	34,005	6.1
1998	616,180	11.2	-4.5	47,090	7.3
1999	751,599	13.7	22.0	65,950	10.7
2000	828,888	15.1	10.3	79,250	10.5
2001	1,220,882	22.2	47.3	88,300	10.7
2002	1,013,389	18.4	-17.0	152,200	12.5
2003	298,422	5.4	-70.6	126,700	12.5
2004	268,883	4.9	-9.9	44,763	15.0
2005	181,025	3.3	-32.7	40,332	15.0
2006	110,115	2.0	-39.2	27,154	15.0
2007	183,442	3.3	66.6	16,517	15.0
2008	152,776	2.8	-16.7	27,516	15.0
2009	147,001	2.7	-3.8	22,916	15.0
2010	140,721	2.6	-4.3	14,194	9.7
2011	128,018	2.3	-9.0	16,508	11.7
2012	446,909	8.1	249.1	12,802	10.0
2013	541,622	9.9	21.2	67,036	15.0
2014	471,812	8.6	-12.9	81,243	15.0
2015	474,326	8.6	0.5	70,772	15.0
2016	473,265	18.6	-0.2	71,149	15.0
2017	221,401	4.0	-53.2	70,990	15.0
2018	183,950	3.3	-16.9	33,210	15.0
2019	51,734	0.9	-71.9	27,592	15.0
2020	41,501	0.8	-20.0	0	0.0
2021	36,462	0.7	-12.1	4,150	10.0
2022				3,647	10.0

Kangaroo management zone no. 8: Narrabri

Table 23 Red kangaroo temporal variation – Narrabri

Year	Population	Density	% change	Quota	% population
1990	246,100	3.7	-9.6	44,500	16.3
1991	242,600	3.7	-1.4	41,700	16.9
1992	170,100	2.6	-29.9	41,200	17.0
1993	458,957	7.0	169.8	27,216	16.0
1994	222,974	3.4	-51.4	91,791	20.0
1995	297,913	4.5	33.6	17,220	7.7
1996	124,694	1.9	-58.1	26,809	9.0
1997	283,171	4.3	127.1	11,865	9.5
1998	1,046,075	15.9	269.4	23,200	8.2
1999	506,146	7.7	-51.6	109,450	10.5
2000	924,453	14.1	82.6	52,850	10.4
2001	532,460	8.1	-42.4	98,400	10.6
2002	692,966	10.5	30.1	79,800	15.0
2003	224,010	3.4	-67.7	103,950	15.0
2004	167,484	2.5	-25.2	38,082	17.0
2005	198,190	3.0	18.3	28,472	17.0
2006	233,780	3.6	18.0	33,692	17.0
2007	121,426	1.8	-48.1	39,743	17.0
2008	124,915	1.9	2.9	20,642	17.0
2009	189,118	2.9	51.4	21,236	17.0
2010	433,366	6.6	129.2	32,150	17.0
2011	530,367	8.1	22.4	73,672	17.0
2012	371,257	5.6	-30.0	90,162	17.0
2013	369,861	5.6	-0.4	63,114	17.0
2014	406,847	6.2	10.0	62,876	17.0
2015	315,429	4.8	-22.5	69,164	17.0
2016	780,834	11.9	147.5	53,623	17.0
2017	785,211	11.9	0.6	132,742	17.0
2018	353,348	5.4	-55.0	133,486	17.0
2019	346,451	5.3	-2.0	60,069	17.0
2020	190,458	2.9	-45.0	58,897	17.0
2021	310,030	4.7	62.8	32,380	17.0
2022				52,705	17.0

Table 24 Grey kangaroo temporal variation – Narrabri

Year	Population	Density	% change	Quota	% population
1990	1,005,900	15.3	24.5	142,700	17.7
1991	987,000	15.0	-1.9	186,000	18.5
1992	898,500	13.7	-9.0	187,500	19.0
1993	1,964,801	29.9	118.7	188,685	21.0
1994	1,168,552	17.8	-40.5	412,608	21.0
1995	835,633	12.7	-28.5	103,530	8.9
1996	369,992	5.6	-55.7	61,964	7.4
1997	671,027	10.2	81.4	34,931	9.4
1998	1,214,523	18.5	81.0	63,543	9.5
1999	867,516	13.2	-28.6	175,310	14.4
2000	1,491,090	22.7	71.9	119,500	13.8
2001	1,523,954	23.2	2.2	182,500	12.2
2002	1,927,959	29.3	26.5	191,200	12.5
2003	874,080	13.3	-54.7	247,300	12.8
2004	367,179	5.6	-58.0	131,112	15.0
2005	399,672	6.1	8.8	55,077	15.0
2006	398,589	6.1	-0.3	59,853	15.0
2007	697,531	10.6	75.0	59,788	15.0
2008	513,617	7.8	-26.4	104,630	15.0
2009	447,330	6.8	-12.9	77,043	15.0
2010	752,771	11.4	68.3	67,002	15.0
2011	1,229,345	18.7	63.3	112,851	15.0
2012	1,246,675	19.0	1.4	184,304	15.0
2013	1,874,886	28.5	50.4	186,514	15.0
2014	1,321,410	20.1	-29.5	280,485	15.0
2015	813,425	12.4	-38.4	197,692	15.0
2016	1,434,755	21.8	76.4	121,072	14.9
2017	445,768	6.8	-68.9	215,213	15.0
2018	728,648	11.1	63.5	66,378	14.9
2019	765,632	11.5	5.1	108,413	14.9
2020	745,775	11.3	-3.0	114,009	14.9
2021	311,846	4.7	-58.2	110,748	14.9
2022				30,873	9.9

Kangaroo management zone no. 10: Coonabarabran

Table 25 Red kangaroo temporal variation – Coonabarabran

Year	Population	Density	% change	Quota	% population
1990	186,000	3.0	-12.8	33,100	15.5
1991	311,600	5.1	67.5	29,900	16.1
1992	114,400	1.9	-63.3	71,700	23.0
1993	353,658	5.7	209.1	18,304	16.0
1994	95,586	1.6	-73.0	70,732	20.0
1995	254,715	4.1	166.5	9,675	10.1
1996	170,558	2.8	-33.0	23,494	9.2
1997	344,758	5.6	102.1	11,535	6.8
1998	567,057	9.2	64.5	24,015	7.0
1999	392,685	6.4	-30.8	64,100	11.3
2000	295,403	4.8	-24.8	44,000	11.2
2001	301,341	4.9	2.0	42,320	14.3
2002	345,431	5.6	14.6	45,100	15.0
2003	204,649	3.3	-40.8	51,300	14.9
2004	199,348	3.2	-2.6	34,790	17.0
2005	135,328	2.2	-32.1	33,889	17.0
2006	161,119	2.6	19.1	23,006	17.0
2007	168,001	2.7	4.3	27,390	17.0
2008	170,804	2.8	1.7	28,560	17.0
2009	202,199	3.3	18.4	29,037	17.0
2010	250,625	4.1	23.9	34,374	17.0
2011	343,239	5.6	37.0	42,606	17.0
2012	357,256	5.8	4.1	58,351	17.0
2013	373,924	6.1	4.7	60,734	17.0
2014	590,194	9.6	57.8	63,567	17.0
2015	505,429	8.2	-14.4	100,333	17.0
2016	421,498	6.8	-16.6	85,923	17.0
2017	588,404	9.5	39.6	71,655	17.0
2018	218,312	3.5	-62.9	100,029	17.0
2019	500,137	8.1	129.1	37,113	17.0
2020	152,052	2.5	-70.0	85,023	17.0
2021	226,411	3.7	48.9	25,849	17.0
2022				38,490	17.0

Table 26 Grey kangaroo temporal variation – Coonabarabran

Year	Population	Density	% change	Quota	% population
1990	755,700	12.3	7.0	124,600	17.6
1991	811,410	13.2	7.4	138,100	18.3
1992	521,100	8.5	-35.8	219,100	27.0
1993	2,151,730	34.9	312.9	88,587	17.0
1994	1,497,000	24.3	-30.4	537,933	25.0
1995	1,768,625	28.7	18.1	62,007	4.1
1996	1,422,035	23.1	-19.6	83,312	4.7
1997	1,683,707	27.3	18.4	54,810	3.9
1998	1,551,195	25.2	-7.9	91,245	5.4
1999	1,717,979	27.9	10.8	130,250	8.4
2000	1,430,884	23.2	-16.7	137,600	8.0
2001	2,078,208	33.7	45.2	112,700	7.9
2002	3,195,179	51.9	53.7	245,800	11.8
2003	1,824,168	29.6	-42.9	375,000	11.7
2004	1,259,605	20.5	-30.9	273,625	15.0
2005	702,576	11.4	-44.2	188,941	15.0
2006	905,594	14.7	28.9	105,386	15.0
2007	568,378	9.2	-37.2	135,839	15.0
2008	583,873	9.5	2.7	85,257	15.0
2009	695,066	11.3	19.0	87,581	15.0
2010	935,327	15.2	34.6	98,075	14.1
2011	1,089,829	17.7	16.5	135,214	14.5
2012	1,457,381	23.7	33.7	163,474	15.0
2013	2,071,115	33.6	42.1	218,607	15.0
2014	2,417,012	39.2	16.7	310,667	15.0
2015	1,836,656	29.8	-24.0	362,552	15.0
2016	1,089,374	17.7	-40.7	275,498	15.0
2017	915,211	14.8	-16.0	163,406	15.0
2018	1,274,243	20.7	39.2	133,875	14.6
2019	1,536,291	24.9	20.6	191,136	15.0
2020	891,090	14.4	-42.0	230,444	15.0
2021	1,035,233	16.8	16.2	133,663	15.0
2022				155,285	15.0

Kangaroo management zone no. 11: Griffith*

Table 27 Red kangaroo temporal variation – Griffith*

Year	Population	Density	% change	Quota	% population
1990	311,800	3.2	24.8	38,300	15.3
1991	278,900	2.8	-10.6	51,800	16.6
1992	408,500	4.2	46.5	48,800	17.5
1993	370,933	3.8	-9.2	94,895	23.2
1994	490,469	5.0	32.2	35,040	9.4
1995	351,806	3.6	-28.3	72,952	14.9
1996	633,758	6.5	80.1	38,930	11.1
1997	333,569	3.4	-47.4	76,868	12.1
1998	272,267	2.8	-18.4	33,310	10.0
1999	548,493	5.6	101.5	32,650	12.0
2000	393,042	4.0	-28.3	58,950	10.7
2001	447,833	4.6	13.9	43,110	11.0
2002	401,414	4.1	-10.4	48,600	10.9
2003	290,084	3.0	-27.7	35,200	8.8
2004	212,159	2.2	-26.9	49,314	17.0
2005	277,153	2.8	30.6	36,067	17.0
2006	221,656	2.3	-20.0	47,116	17.0
2007	292,970	3.0	32.2	37,682	17.0
2008	228,433	2.3	-22.0	49,805	17.0
2009	231,422	2.4	1.3	38,834	17.0
2010	245,208	2.5	6.0	39,342	17.0
2011	556,415	5.7	126.9	41,685	17.0
2012	366,603	3.7	-34.1	94,591	17.0
2013	536,580	5.5	46.4	62,322	17.0
2014	950,341	9.7	77.1	91,219	17.0
2015	589,282	6.0	-38.0	161,558	17.0
2016	601,325	6.1	2.0	100,178	17.0
2017	819,450	7.8	36.3	102,225	17.0
2018	284,853	2.7	-65.2	139,307	17.0

*Zone expanded prior to 2019 and population now estimated for Zone 17 and Zone 18; see Tables 29 to 32.

Table 28 Grey kangaroo temporal variation – Griffith*

Year	Population	Density	% change	Quota	% population
1990	566,000	5.8	41.1	62,800	15.7
1991	704,600	7.2	24.5	105,100	18.6
1992	669,100	6.8	-5.0	190,200	27.0
1993	1,395,898	14.2	108.6	160,584	24.0
1994	1,105,248	11.3	-20.8	108,744	7.8
1995	1,093,657	11.1	-1.0	128,016	11.6
1996	1,288,316	13.1	17.8	113,564	10.4
1997	1,121,800	11.4	-12.9	128,047	9.9
1998	1,349,050	13.7	20.3	74,650	6.7
1999	1,244,734	12.7	-7.7	154,860	11.5
2000	1,157,073	11.8	-7.0	131,050	10.5
2001	1,022,526	10.4	-11.6	147,600	12.8
2002	1,437,265	14.6	40.6	140,100	13.7
2003	874,589	8.9	-39.1	194,450	13.5
2004	722,872	7.4	-17.3	131,188	15.0
2005	701,493	7.1	-3.0	108,431	15.0
2006	677,124	6.9	-3.5	105,224	15.0
2007	571,999	5.8	-15.5	101,569	15.0
2008	638,262	6.5	11.6	85,800	15.0
2009	321,138	3.3	-49.7	95,739	15.0
2010	562,931	5.7	75.3	16,673	5.2
2011	541,306	5.5	-3.8	50,019	8.9
2012	700,388	7.1	29.4	78,012	14.4
2013	1,780,269	18.3	154.2	105,058	15.0
2014	1,376,362	14.0	-22.7	267,040	15.0
2015	1,476,232	15.0	7.3	206,454	15.0
2016	1,241,399	12.6	-15.9	221,435	15.0
2017	1,262,635	12.0	1.7	186,210	15.0
2018	919,282	8.7	-27.2	189,395	15.0

*Zone expanded prior to 2019 and population now estimated for Zone 17 and Zone 18; see Tables 29 to 32.

Kangaroo management zone no. 17: Griffith North

Table 29 Red kangaroo temporal variation – Griffith North

Year	Population	Density	% change	Quota	% population
2019	159,645	2.4	0.0	0	0
2020	126,160	1.9	-21.0	27,123	17.0
2021	284,023	4.3	125.1	21,447	17.0
2022				48,284	17.0

Table 30 Grey kangaroo temporal variation – Griffith North

Year	Population	Density	% change	Quota	% population
2019	1,029,202	15.7	0.0	0	0
2020	421,161	6.4	-59.0	154,380	15.0
2021	682,365	10.4	62.0	63,174	15.0
2022				102,354	15.0

Kangaroo management zone no. 18: Griffith South

Table 31 Red kangaroo temporal variation – Griffith South

Year	Population	Density	% change	Quota	% population
2019	106,788	1.7	0.0	0	0
2020	253,492	4.0	137.0	0	0
2021	113,125	1.8	-55.4	43,094	17.0
2022				19,231	17.0

Table 32 Grey kangaroo temporal variation – Griffith South

Year	Population	Density	% change	Quota	% population
2019	660,066	10.3	0.0	0	0
2020	371,796	5.8	-44	99,000	15.0
2021	511,201	8.0	37.5	55,769	15.0
2022				76,681	15.0

Kangaroo management zone no. 9: Armidale

Table 33 Eastern grey kangaroo temporal variation – Armidale

Year	Population	Density	% change	Quota	% population
1993	234,655	14.4	5.0	46,931	21.0
1994	199,474	12.2	-15	46,931	20.0
1995	207,462	12.7	4.0	43,882	22.0
1996	161,821	9.9	-22.0	45,640	22.0
1997	182,857	11.2	13.0	32,364	20.0
1998	198,765	12.2	9.0	31,085	17.0
1999	196,777	12.0	-1.0	33,790	17.0
2000	206,600	12.7	5.0	33,450	17.0
2001	173,109	10.6	-16.0	35,100	17.0
2002	173,109	10.6	0.0	25,966	15.0
2003	180,456	11	4.0	25,966	15.0
2004	161,726	10.2	-10.0	27,068	15.0
2005	161,726	10.2	0.0	24,259	15.0
2006	161,726	10.2	0.0	24,259	15.0
2007	141,610	8.7	-12.0	24,259	15.0
2008	141,610	8.7	0.0	21,242	15.0
2009	141,610	8.7	0.0	21,242	15.0
2010	199,200	12.2	41.0	21,242	15.0
2011	206,780	13.1	4.0	29,880	15.0
2012	206,780	13.1	0.0	31,017	15.0
2013	263,300	16.1	27.0	31,017	15.0
2014	263,300	16.1	0.0	39,495	15.0
2015	263,300	16.1	0.0	39,495	15.0
2016	420,800	28.0	60.0	39,495	15.0
2017	420,800	28.0	0.0	63,120	15.0
2018	420,800	28.0	0.0	63,120	15.0
2019	416,660	26.7	-1.0	63,120	15.0
2020	416,660	26.7	0.0	62,499	15.0
2021	416,660	26.7	0.0	62,499	15.0
2022				62,499	15.0

Table 34 Common wallaroo temporal variation – Armidale

Year	Population	Density	% change	Quota	% population
1993	127,680	7.8	0.0	6,160	4.8
1994	121,296	7.4	-5.0	6,432	5.0
1995	126,148	7.7	4.0	6,118	5.0
1996	98,396	6.0	-22	6,308	5.0
1997	111,187	6.8	13	4,920	5.0
1998	120,860	7.4	9.0	5,559	5.0
1999	119,651	7.3	-1.0	6,043	5.0
2000	125,600	7.7	5.0	5,975	5.0
2001	125,600	7.7	0.0	6,250	5.0
2002	125,600	7.7	0.0	6,250	5.0
2003	34,744	2.1	-72	6,250	5.0
2004	89,787	5.7	158	5,212	15.0
2005	89,787	5.7	0.0	13,468	15.0
2006	89,787	5.7	0.0	13,468	15.0
2007	37,859	2.3	-58	13,468	15.0
2008	37,859	2.3	0.0	5,679	15.0
2009	37,859	2.3	0.0	5,679	15.0
2010	41,255	2.5	9.0	5,679	15.0
2011	41,255	2.5	0.0	6,188	15.0
2012	41,255	2.5	0.0	6,188	15.0
2013	45,140	2.8	9.0	6,188	15.0
2014	45,140	2.8	0.0	6,771	15.0
2015	45,140	2.8	0.0	6,771	15.0
2016	134,310	8.2	197.5	6,771	15.0
2017	134,310	8.2	0.0	20,147	15.0
2018	134,310	8.2	0.0	20,147	15.0
2019	117,290	7.4	-12.7	20,147	15.0
2020	117,290	7.4	0.0	17,594	15.0
2021	117,290	7.4	0.0	17,594	15.0
2022				17,594	15.0

Kangaroo management zone no. 13: Glen Innes

Table 35 Eastern grey kangaroo temporal variation – Glen Innes

Year	Population	Density	% change	Quota	% population
1993	234,655	11.2	5.0	46,931	21.0
1994	199,474	9.5	-15.0	46,931	20.0
1995	207,462	9.9	4.0	43,882	22.0
1996	161,821	7.7	-22.0	45,640	22.0
1997	182,857	8.7	13.0	32,364	20.0
1998	198,765	9.5	9.0	31,085	17.0
1999	196,777	9.4	-1.0	33,790	17.0
2000	206,600	9.9	5.0	33,450	17.0
2001	221,975	10.6	7.0	35,122	17.0
2002	221,975	10.6	0.0	33,296	15.0
2003	229,723	11.0	3.0	33,296	15.0
2004	149,621	8.1	-35.0	34,458	15.0
2005	149,621	8.1	0.0	22,443	15.0
2006	149,621	8.1	0.0	22,443	15.0
2007	236,600	11.3	58.0	22,443	15.0
2008	236,600	11.3	0.0	35,490	15.0
2009	236,600	11.3	0.0	35,490	15.0
2010	269,500	12.9	14.0	35,490	15.0
2011	269,500	12.9	0.0	40,425	15.0
2012	269,500	12.9	0.0	40,425	15.0
2013	374,300	17.9	39.0	40,425	15.0
2014	374,300	17.9	0.0	56,145	15.0
2015	374,300	17.9	0.0	56,145	15.0
2016	587,400	34.0	57.0	56,145	15.0
2017	587,400	34.0	0.0	88,110	15.0
2018	587,400	34.0	0.0	88,110	15.0
2019	545,200	29.6	-7.2	88,110	15.0
2020	545,200	29.6	0.0	81,780	15.0
2021	545,200	29.6	0.0	81,780	15.0
2022				81,780	15.0

Table 36 Common wallaroo temporal variation – Glen Innes

Year	Population	Density	% change	Quota	% population
1993	127,680	6.1	0.0	6,160	4.8
1994	121,296	5.8	-5.0	6,432	5.0
1995	126,148	6.0	4.0	6,118	5.0
1996	98,396	4.7	-22.0	6,308	5.0
1997	111,187	5.3	13.0	4,920	5.0
1998	120,860	5.8	9.0	5,559	5.0
1999	119,651	5.7	-1.0	6,043	5.0
2000	125,600	6.0	5.0	5,975	5.0
2001	215,500	10.3	72.0	6,250	5.0
2002	215,500	10.3	0.0	6,250	2.9
2003	128,232	6.1	-40.0	6,250	2.9
2004	56,657	3.1	-56.0	19,235	15.0
2005	56,657	3.1	0.0	8,499	15.0
2006	56,657	3.1	0.0	8,499	15.0
2007	59,570	2.8	5.1	8,499	15.0
2008	59,570	2.8	0.0	8,936	15.0
2009	59,570	2.8	0.0	8,936	15.0
2010	32,190	1.5	0.0	8,936	15.0
2011	32,190	1.5	0.0	4,829	15.0
2012	32,190	1.5	0.0	4,829	15.0
2013	28,305	1.4	-12.0	4,829	15.0
2014	28,305	1.4	0.0	4,246	15.0
2015	28,305	1.4	0.0	4,246	15.0
2016	101,565	4.9	258.8	4,246	15.0
2017	101,565	4.9	0.0	15,235	15.0
2018	101,565	4.9	0.0	15,235	15.0
2019	134,865	7.3	32.8	15,235	15.0
2020	134,865	7.3	0.0	20,230	15.0
2021	134,865	7.3	0.0	20,230	15.0
2022				20,230	15.0

Kangaroo management zone no. 14: Upper Hunter

Table 37 Eastern grey kangaroo temporal variation – Upper Hunter

Year	Population	Density	% change	Quota	% population
1993	191,690	13.1	5.0	38,338	21.0
1994	162,952	11.2	-15.0	38,338	20.0
1995	169,476	11.6	4.0	35,848	22.0
1996	132,192	9.1	-22.0	37,283	22.0
1997	149,377	10.2	13.0	26,438	20.0
1998	162,372	11.1	9.0	25,394	17.0
1999	160,748	11.0	-1.0	27,600	17.0
2000	168,750	11.6	5.0	27,350	17.0
2001	95,273	6.5	-44.0	25,313	15.0
2002	95,273	6.5	0.0	14,291	15.0
2003	94,251	6.5	-1.0	14,291	15.0
2004	67,499	4.8	-28.0	14,138	15.0
2005	67,499	4.8	0.0	10,125	15.0
2006	67,499	4.8	0.0	10,125	15.0
2007	92,016	6.3	36.0	10,125	15.0
2008	92,016	6.3	0.0	13,802	15.0
2009	92,016	6.3	0.0	13,802	15.0
2010	167,500	11.5	82.0	13,802	15.0
2011	167,500	11.5	0.0	25,125	15.0
2012	167,500	11.5	0.0	25,125	15.0
2013	126,800	8.7	-24.0	25,125	15.0
2014	126,800	8.7	0.0	19,020	15.0
2015	126,800	8.7	0.0	19,020	15.0
2016	259,600	32.5	105.0	19,020	15.0
2017	259,600	32.5	0.0	38,940	15.0
2018	259,600	32.5	0.0	38,940	15.0
2019	166,500	11.9	-35.9	38,940	15.0
2020	166,500	11.9	0.0	24,975	15.0
2021	166,500	11.9	0.0	24,975	15.0
2022				24,975	15.0

Table 38 Common wallaroo temporal variation – Upper Hunter

Year	Population	Density	% change	Quota	% population
1993	109,440	7.5	0.0	5,280	4.8
1994	103,968	7.1	-5.0	5,512	5.0
1995	108,128	7.4	4.0	5,244	5.0
1996	84,340	5.8	-22.0	5,408	5.0
1997	95,304	6.5	13.0	4,217	5.0
1998	103,595	7.1	9.0	4,765	5.0
1999	102,559	7.0	-1.0	5,180	5.0
2000	107,650	7.4	5.0	5,125	5.0
2001	107,650	7.4	0.0	5,350	5.0
2002	107,650	7.4	0.0	5,350	5.0
2003	57,762	4.0	-46.0	5,350	5.0
2004	61,660	4.4	7.0	8,664	15.0
2005	61,660	4.4	0.0	9,249	15.0
2006	61,660	4.4	0.0	9,249	15.0
2007 [^]	80,105	5.5	29.9	9,249	15.0
2008 [^]	80,105	5.5	0.0	12,016	15.0
2009 [^]	80,105	5.5	0.0	12,016	15.0
2010	14,985	1.0	-67.0	5,287	6.6
2011	14,985	1.0	0.0	0	0.0
2012	14,985	1.0	0.0	1,499	10.0
2013	27,380	1.9	83.0	1,499	10.0
2014	27,380	1.9	0.0	4,107	15.0
2015	27,380	1.9	0.0	4,107	15.0
2016	135,790	9.2	395.9	4,107	15.0
2017	135,790	9.2	0.0	20,369	15.0
2018	135,790	9.2	0.0	20,369	15.0
2019	44,400	3.2	-67.3	20,369	15.0
2020	44,400	3.2	0.0	6,660	15.0
2021	44,400	3.2	0.0	6,660	15.0
2022				6,660	15.0

Kangaroo management zone no. 16: South East NSW

Table 39 Eastern grey kangaroo temporal variation – South East NSW

Year	Population	Density	% change	Quota	% population
2003	292,455	11.95	–	–	–
2004	292,455	11.95	0.0	43,868	15.0
2005	292,455	11.95	0.0	43,868	15.0
2006	415,271	14.07	42.0	43,868	15.0
2007	415,271	14.07	0.0	62,291	15.0
2008	415,271	14.07	0.0	62,291	15.0
2009	655,900	17.07	58.0	62,291	15.0
2010	655,900	17.07	0.0	98,385	15.0
2011	655,900	17.07	0.0	98,385	15.0
2012	858,900	22.35	30.9	98,385	15.0
2013	858,900	22.35	0.0	128,835	15.0
2014	858,900	22.35	0.0	128,835	15.0
2015	1,284,300	33.04	49.5	128,835	15.0
2016	1,284,300	33.04	0.0	192,645	15.0
2017	1,284,300	33.04	0.0	192,645	15.0
2018	1,721,400	41.3	34.0	192,645	15.0
2019	1,721,400	41.3	0.0	258,210	15.0
2020	1,721,400	41.3	0.0	258,210	15.0
2021	1,428,800	35.1	-17.0	258,210	15.0
2022				214,320	15.0

Kangaroo management zone no. 48: Central Tablelands North

Table 40 Eastern grey kangaroo temporal variation – Central Tablelands North

Year	Population	Density	% change	Quota	% population
2008	433,030	17.8	0.0		
2009	433,030	17.8	0.0	64,995	15.0
2010	433,030	17.8	0.0	64,995	15.0
2011	612,590	25.1	41.5	64,955	15.0
2012	612,590	25.1	0.0	91,889	15.0
2013	612,590	25.1	0.0	91,889	15.0
2014	1,193,600	48.9	95.0	91,889	15.0
2015	1,193,600	48.9	0.0	179,040	15.0
2016	1,193,600	48.9	0.0	179,040	15.0
2017	1,728,200	70.8	45.0	179,040	15.0
2018	1,728,200	70.8	0.0	259,230	15.0
2019	1,728,200	70.8	0.0	259,230	15.0
2020	777,350	31.9	-55.0	259,230	15.0
2021	777,350	31.9	0.0	116,603	15.0
2022				116,603	15.0

Kangaroo management zone no. 49: Central Tablelands South

Table 41 Eastern grey kangaroo temporal variation – Central Tablelands South

Year	Population	Density	% change	Quota	% population
2008	535,600	27.7	0.0		
2009	535,600	27.7	0.0	80,340	15.0
2010	535,600	27.7	0.0	80,340	15.0
2011	347,830	18.0	-35.06	80,340	15.0
2012	347,830	18.0	0.0	52,175	15.0
2013	347,830	18.0	0.0	52,175	15.0
2014	811,800	41.9	133.0	52,175	15.0
2015	811,800	41.9	0.0	121,770	15.0
2016	811,800	41.9	0.0	121,770	15.0
2017	933,900	48.2	15.0	121,770	15.0
2018	933,900	48.2	0.0	140,085	15.0
2019	933,900	48.2	0.0	140,085	15.0
2020	488,270	25.2	-48.0	140,085	15.0
2021	488,270	25.2	0.0	73,241	15.0
2022				73,241	15.0