

2020 Quota Report

Commercial Kangaroo Harvest South Australia

Amended 24/7/2020



**Government
of South Australia**

Department for
Environment and Water

Contents

Scope and Context.....	4
Legislation.....	4
Harvest regions used for quota setting	4
Kangaroo Monitoring Methods.....	6
Aerial survey	6
Ground survey.....	6
Quota setting procedures	7
Proportional harvest strategy.....	7
Low population thresholds.....	7
High Abundance Quota.....	7
Special Land Management Quota.....	7
Survey frequency.....	7
Adaptive Management Experiments	8
Population Estimates.....	9
Red Kangaroo	9
Western Grey Kangaroo	9
Euro	10
Eastern Grey Kangaroo and Tammar Wallaby	10
Harvest Statistics	11
Harvest 2018.....	11
Harvest January to August 2019	12
2020 Quotas	13
Regional harvest quotas for 2020	14
References	18

Tables and Figures

Table 1: Existing, revised and additional Kangaroo Harvest Regions and Sub-regions for South Australia.....	4
Table 2: Kangaroo survey methods used in each harvest sub-region for 2019 survey.....	6
Table 3: Harvest summary calculated for 2018 from meat processor returns. Note that no Special Land Management Quota was released during 2018.	11
Table 4: Harvest statistics for 2018 from field processor returns. Excludes Special Land Management Quota.	11
Table 5: Harvest statistics for 2019 from field processor returns. Excludes Special Land Management Quota.	12
Table 6: Harvest region harvest summary calculated from field processor returns for 1 January to 31 August 2019. Excludes Special Land Management Quota.....	12
Table 7: Commercial kangaroo harvesting quotas for 2020, and comparison with the 2019 quota. Quota is separated into original harvest area and expanded area to allow comparison with 2019 quota. Quotas do not include Special Land Management Quota.....	13
Table 8: Red Kangaroo population estimates for 2019 and harvesting quotas for 2020.....	14
Table 9: Western Grey Kangaroo population estimates for 2019 and harvesting quotas for 2020.....	15
Table 10: Euro population estimates for 2019 and harvesting quotas for 2020.....	16
Table 11: Eastern Grey Kangaroo population estimate for 2019 and harvesting quota for 2020.....	17
Table 12: Tammar Wallaby population estimate for 2019 and harvesting quota for 2020.....	17
Figure 1: Map of harvest regions and sub-regions of South Australia.....	5
Figure 2: Red Kangaroo population density estimate for each sub-region surveyed during 2019 compared to the low population threshold 1.....	9
Figure 3: Western Grey Kangaroo population density estimate for each sub-region surveyed during 2019 compared to the low population threshold 1.....	9
Figure 4: Population density estimates for Euros in the sub-regions surveyed during 2019 and species in the new sub-regions surveyed during 2019.....	10
Figure 5: Red Kangaroo, Western Grey Kangaroo and Euro combined population estimate, quota and harvest for South Australia between 1975 and 2020 Quota Years.....	13

Scope and Context

Legislation

All kangaroo species in South Australia are protected under the *National Parks and Wildlife Act 1972* (NPW Act), have value in ecosystem processes, and contribute to biodiversity. The NPW Act (section 60G) and associated regulations, allow for the sustainable harvest of the following common species of kangaroo:

- Red Kangaroo (*Macropus rufus*)
- Western Grey Kangaroo (*M. fuliginosus*)
- Eastern Grey Kangaroo (*M. giganteus*)
- Euro (*M. robustus*)
- Tamar Wallaby (*M. eugenii*)

The wildlife trade provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) regulate the export of kangaroo products from Australia. The harvest and export of these protected species requires a management plan endorsed under the NPW Act and a Wildlife Trade Management Plan endorsed under the EPBC Act.

As of 1 January 2020, the South Australian Commercial Kangaroo Management Plan 2020-2024 (Management Plan) has been approved by the Minister for Environment and Water under the NPW Act. However, approval of the plan under the EPBC Act is outstanding. Until the plan is approved as a Wildlife Trade Management Plan under the EPBC Act, only Red Kangaroos, Western Grey Kangaroos and Euros from the original harvest area may be exported internationally. Harvest and domestic use of Western Grey Kangaroos, Eastern Grey Kangaroos and Tamar Wallabies from the new sub-regions may occur as of 1 January 2020.

In accordance with the Management Plan, harvest quotas are set annually for each species of harvested kangaroo. Quotas are detailed in annual reports endorsed by the Director of National Parks and Wildlife and forwarded to the Commonwealth Department of Environment and Energy for information. Where quotas are set outside the standard quota parameters detailed in the Management Plan, quotas must be endorsed in writing by the Commonwealth Department of Environment and Energy prior to implementation.

This quota report has been developed in accordance with the Management Plan, and with regard to the current Wildlife Trade Management Plan at the time of writing (South Australian Kangaroo Management Plan 2018-2022). The quota report provides the necessary

detail on quota-setting procedures and the harvest quota for five kangaroo species for 2020. The report lists Harvest Quotas, Special Land Management Quota for 2020, a summary of harvest statistics for 2018 and the incomplete year of 2019 (January-August).

Harvest regions used for quota setting

In accordance with the provisions of the Management Plan, annual harvest quotas are based on the results of direct monitoring of kangaroo populations. Monitoring takes place in accordance with the standard survey techniques detailed in the Management Plan.

Five harvest regions have been defined in the Management Plan: Western Pastoral, Eastern Pastoral, Western Agricultural, Eastern Agricultural and Southern Agricultural.

The harvest regions contain sub-regions (detailed in Table 1 and Figure 1) primarily based on the administrative boundaries of the former Soil Conservation Board districts (or an amalgamation thereof). Population estimates and commercial quotas for 2020 are derived and set at the harvest sub-region level. Sub-region quotas can be re-distributed within, but not between, each harvest region in response to spatial and temporal changes in kangaroo distribution.

Table 1: Existing, revised and additional Kangaroo Harvest Regions and Sub-regions for South Australia

Harvest Region	Harvest Sub-region
Eastern Pastoral	North Flinders North East Pastoral Eastern Districts Mallee
Western Pastoral	Marla-Oodnadatta, Marree (inside dog fence) Marree (outside dog fence) Kingoonya Gawler Ranges
Eastern Agricultural	South Flinders Yorke Mid North
Western Agricultural	Eyre East Eyre West
Southern Agricultural	Adelaide Hills and Fleurieu Kangaroo Island Upper South East Lower South East

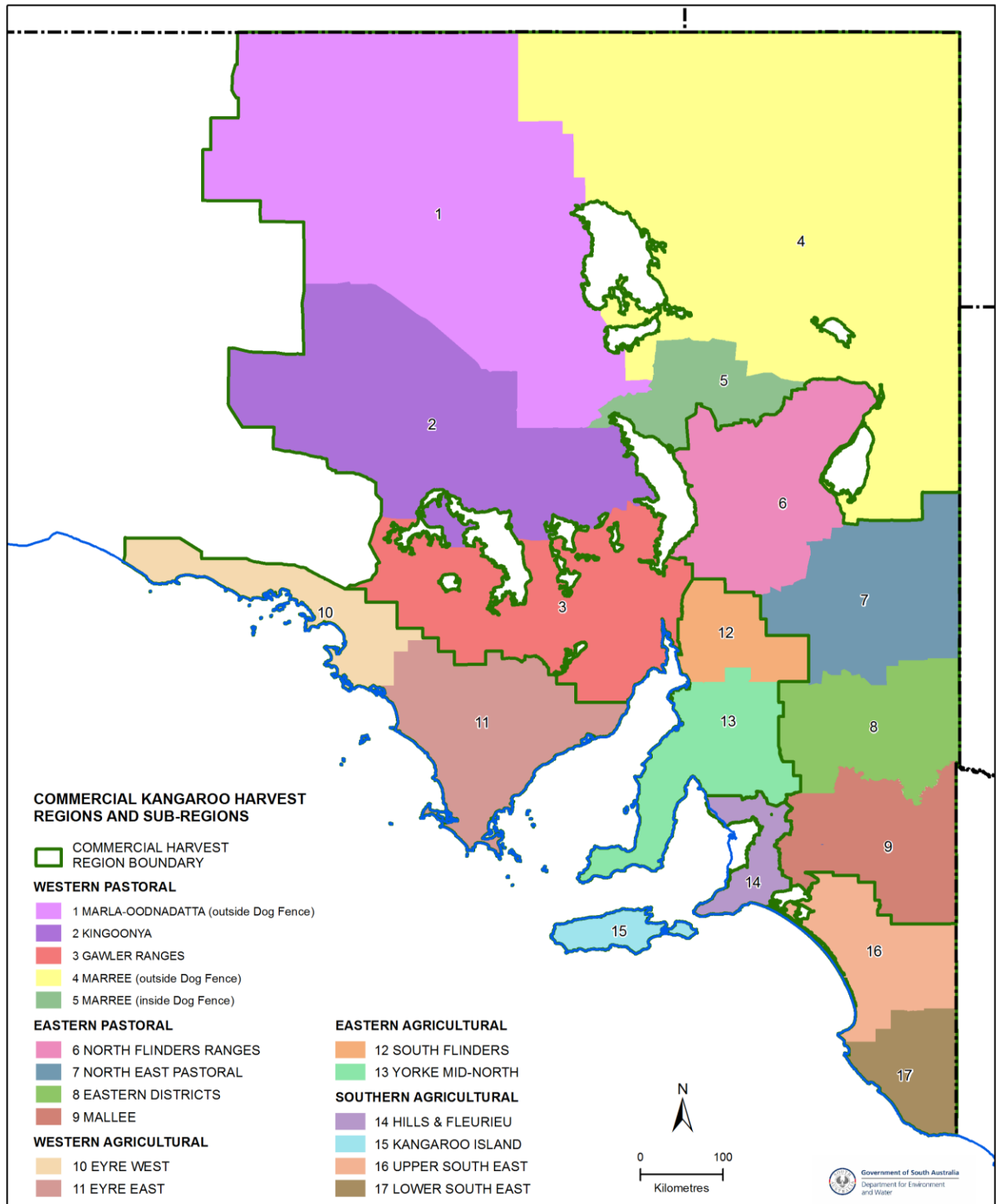


Figure 1: Map of harvest regions and sub-regions of South Australia

Kangaroo Monitoring Methods

A combination of fixed-wing aircraft and ground surveys (walking and driving) were used to survey kangaroo populations across South Australia between June and October 2019. Aerial survey lines have been established at regular intervals across all sub-regions where possible, and the same lines are surveyed at the same time every survey year to allow comparison of results between years. Ground surveys are employed in sub-regions where aerial survey is considered unsafe or dense vegetation prohibits observers from effectively counting kangaroos (Table 2).

Table 2: Kangaroo survey methods used in each harvest sub-region for 2019 survey.

Harvest Sub-region	Survey Method
Western Pastoral	
Marla - Oodnadatta	Aerial
Kingoonya	Aerial
Gawler Ranges	Aerial
Marree (inside dog fence)	Aerial
Marree (outside dog fence)	Aerial
Eastern Pastoral	
North Flinders	Aerial/ walking
North East Pastoral	Aerial/ walking
Eastern Districts	Aerial/ walking
Mallee	Aerial
Eastern Agricultural	
South Flinders	Aerial/ walking
Yorke Mid North	Aerial
Western Agricultural	
Eyre West	Aerial
Eyre East	Aerial
Southern Agricultural	
Hills and Fleurieu	Driving
Upper South East	Aerial
Lower South East	Aerial/ driving
Kangaroo Island	Aerial/ spotlight driving

Aerial survey

Aerial surveys for large-bodied kangaroos have been conducted annually since 1978 using standard transect lines. Surveys are conducted using standard 200 metre fixed-strip width transect methodology with a fixed-wing aircraft (see Grigg et al. 1999 for further detail). Two observers (one on each side of the aircraft) count kangaroos as the aircraft maintains a speed of 185 kilometres/hour (100 knots) and 76 m (250 feet) above the ground. Raw counts are converted to density estimates for each harvest sub-region by applying species specific habitat correction factors.

Ground survey

Two types of ground surveys were used where aerial surveys were not possible; these were driving and walking surveys. Both survey methods used the line transect 'Distance' sampling method (Buckland et al. 2001, Miller 2016). The design of ground surveys is based on obtaining sufficient data for line transect analysis to typically return results with a coefficient of variance between 10% and 25%.

Walking surveys were used to count Euros. The technique aims to assess Euro densities in targeted areas of suitable habitat within harvest sub-regions. Typically, a small sample area is surveyed in each harvest sub-region. These localised densities are used to develop regional densities for Euros, by multiplying obtained survey densities by the amount of suitable Euro habitat in each region.

Driving surveys were used in the Hills and Fleurieu, Lower South East and Kangaroo Island sub-regions. Approximately 300 kilometres of transect stratified for habitat type and based on public unsealed roads was surveyed twice in each sub-region. In the Hills and Fleurieu and Lower South East sub-regions the target species were Western and Eastern Grey Kangaroos which are generally active during the early morning and late afternoon. All transects were surveyed twice, once during the early morning and again during the late afternoon. The maximum number of detections for each transect was used for the analysis.

Spotlight driving surveys were used on Kangaroo Island to survey the Tammar Wallaby as this species is generally most active at night.

Quota setting procedures

Proportional harvest strategy

Quotas outlined in this report represent a constant proportional harvest strategy for kangaroos in South Australia. Quotas are set at a maximum of 20% of the estimated population size for Red Kangaroos, 15% for Western Grey Kangaroos, Eastern Grey Kangaroos and Euros and 10% for Tammar Wallabies.

More conservative quota percentages have been applied to sub-regions that are not surveyed on an annual basis, due to the low harvest pressure, and for sub-regions where the coefficient of variation is greater than 25% (Action 10 of the Management Plan). Some of the variation in the data can be explained by the patchy nature of kangaroos in the landscape. The coefficient of variation is calculated as the standard error of the density estimates across all transects for each harvest sub-region using the ratio estimate (Caughley 1977). The standard error is then divided by the mean density of kangaroos for the harvest sub-region to give the coefficient of variation, which is expressed as a percentage (the lower the percentage, the more reliable the density estimate).

Quotas for 2020 are set at the harvest region level and then further broken down into harvest sub-regions. The derivation of population estimates and quotas at the sub-region level provides added detail to allow for more accurate allocation of quota at the start of the harvest year. Quotas for each sub-region are rounded down to the nearest hundred.

Low population thresholds

In accordance with the Management Plan, thresholds based on the long-term average of populations are calculated for each harvest sub-region where sufficient data is available. If aerial survey results indicate a population has fallen below 1.5 standard deviations (SD) or 2 SD of the long-term average density for that species in that harvest sub-region, the commercial quota will be reduced or suspended for the following calendar year, respectively. This will remain in place until surveys indicate populations have increased.

During 2019, Red Kangaroos in the North East Pastoral experienced a large population decline and have reached the first threshold. Western Grey Kangaroos and Euros have also experienced a large decline in the North East Pastoral sub-region. As a conservative measure, quota has been reduced to 10% for all species in North East Pastoral. No other species in any other harvest sub-regions have reached a threshold during 2019.

High Abundance Quota

The Management Plan introduces a new quota, the High Abundance Quota (HAQ), which is aimed at reducing kangaroo populations during times of high abundance. The HAQ is an additional quota to the proportional quota and issued at the discretion of the Director of National Parks and Wildlife (refer Aim 4 Management Plan for more information). No HAQ is issued for 2020.

Special Land Management quota

Special Land Management Quota may be set up to 1.5% of the estimated population size of each species, and is used to account for land management issues that might arise due to localised or widespread seasonal conditions. This quota component is only for the harvest of kangaroos that would otherwise be culled under Permits to Destroy Wildlife, and is designed to minimise the number of kangaroos destroyed under these permits and not utilised.

Special Land Management Quota for 2020 has been set at 0.5% of the total estimated population for each species and will only be released when the commercial harvest quota for a harvest region has been fully allocated, and land management issues remain. This quota will be distributed between harvest regions where necessary. Release of this quota may warrant property or regional inspections of kangaroo density and/or potential impact(s).

Survey frequency

In accordance with the previous Management Plan (2018-2022), sub-regions that are not heavily harvested (that is, at least one annual harvest equal to or greater than 50% of the quota during the preceding five years, Action 9, the Management Plan) will be surveyed triennially. Under the current Management Plan (2020-2024), survey frequency will be reduced to every three years where the harvest is above the Low Harvest Threshold (set at 1.5% of the average population estimate for each sub-region). Where the harvest is below the threshold, surveys will stop in the original harvest regions (Western Pastoral, Eastern Pastoral, Western Agricultural, Eastern Agricultural) or be reduced to every five years in the new harvest region (Southern Agricultural, refer to Aim 4 Management Plan for more information).

During 2019, all sub-regions except for Marree (outside dog fence), Eyre West and Eyre East were surveyed for Red Kangaroos, Western Grey Kangaroos, Eastern Grey Kangaroos and Tammar Wallabies, where applicable.

Euros have a consistently low harvest across all sub-regions where they are present, and as such, all sub-regions are currently on a three year survey rotation. During 2019, Euros were surveyed in the North East Pastoral and South Flinders sub-regions. In sub-regions that were not surveyed during 2019, population estimates derived from surveys undertaken in 2016-2018 have been used to set quota for 2019 and the quota percentage has been reduced to 10%.

Adaptive Management Experiments

No adaptive management experiments were carried out during 2019.

Population Estimates

Red Kangaroo

The estimated size of the Red Kangaroo population across the original commercial harvest area the expanded Mallee and Yorke Mid North sub-regions is 1,552,679, a decrease of 39% from the previous year total of 2,550,094 and 4% lower than the long-term average of 1,614,184 (1998 -2018). Dry conditions during late 2018 and through 2019 have caused a rapid decline in the Red Kangaroo population.

Densities for the 2019 survey were below the long-term average in the Marla-Oodnadatta, Marree (Inside Dog Fence), North East Pastoral, Eastern Districts and Yorke Mid North sub-regions. The density estimate for North East Pastoral was below the first low population threshold (Figure 2).

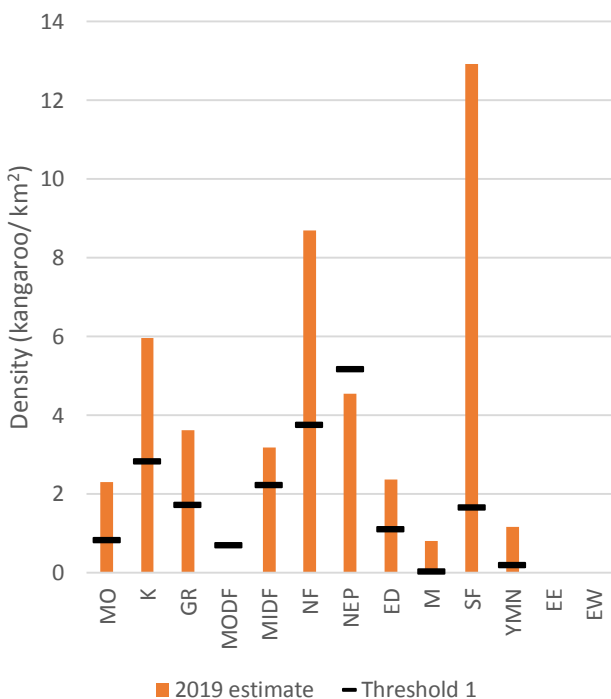


Figure 2: Red Kangaroo population density estimate for each sub-region surveyed during 2019 compared to the low population threshold 1. MODF was not surveyed during 2019. MO = Marla-Oodnadatta, K = Kingoonya, GR = Gawler Ranges, MODF = Marree (outside dog fence), MIDF = Marree (inside dog fence), NF = North Flinders, NEP = North East Pastoral, ED = Eastern Districts, M = Mallee, SF = South Flinders, YMN = Yorke Mid North, EE = Eyre East, EW = Eyre West.

Western Grey Kangaroo

The estimated size of the Western Grey Kangaroo population across the original commercial harvest area and the expanded Mallee and Yorke Mid North sub-regions is 1,085,193, a 13% decrease of the 2018 population of 1,241,347 and 32% above the long-term average of 873,341 (1998 -2018). The population in the new Southern Agricultural harvest region is estimated at 276,183.

Densities from the 2019 survey are below the long-term average in the Gawler Ranges, North Flinders, North East Pastoral and Eastern Districts sub-regions. Although no population density estimates were below the first low population threshold, North East Pastoral was close to reaching the threshold (Figure 3).

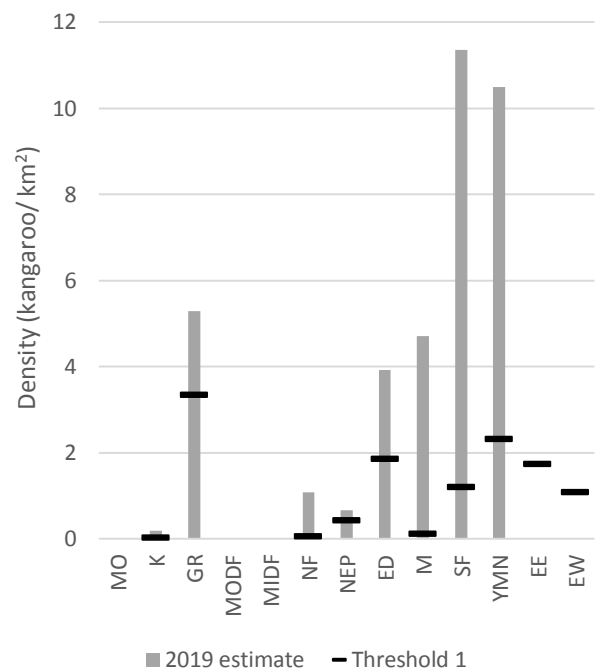


Figure 3: Western Grey Kangaroo population density estimate for each sub-region surveyed during 2019 compared to the low population threshold 1. EE and EW were not surveyed during 2019. MO = Marla-Oodnadatta, K = Kingoonya, GR = Gawler Ranges, MODF = Marree (outside dog fence), MIDF = Marree (inside dog fence), NF = North Flinders, NEP = North East Pastoral, ED = Eastern Districts, M = Mallee, SF = South Flinders, YMN = Yorke Mid North, EE = Eyre East, EW = Eyre West.

Euro

During 2019 only two sub-regions were surveyed for Euros, these were North East Pastoral and South Flinders (Figure 4). Other population estimates have come from data collected during 2017 and 2018 (see quota setting procedures for more information).

The estimated size of the Euro population across the commercial harvest area is 570,021, a decrease of 14% from the 2018 estimate of 662,134 and 21% greater than the long-term average of 471,895 (1998 -2018).

Densities for the 2019 survey were below the long-term average for North East Pastoral sub-region and above average in South Flinders sub-region.

Eastern Grey Kangaroo and Tammar Wallaby

Eastern Grey Kangaroos and Tammar Wallabies are now able to be harvested as part of the expansion of the commercial harvest area. Both species only have a quota in one sub-region, the Lower South East for the Eastern Grey Kangaroo and Kangaroo Island for the Tammar Wallaby. Driving surveys were conducted for both of these species.

Eastern Grey Kangaroos have a population density estimate in the Lower South East sub-region of 5.37 kangaroos/ km², which equates to a population estimate of 61,826 (Figure 4).

Tammar Wallabies have a population density estimate in the Kangaroo Island sub-region of 16.05 wallabies/ km², which equates to a population estimate of 87,043 (Figure 4).

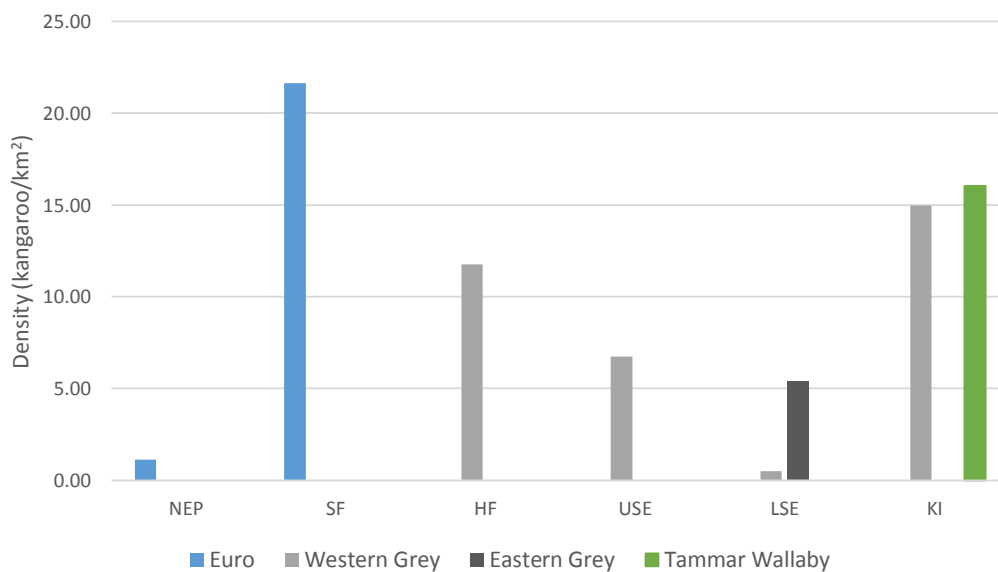


Figure 4: Population density estimates for Euros in the sub-regions surveyed during 2019 and species in the new sub-regions surveyed during 2019. NEP = North East Pastoral, SF = South Flinders, HF = Hills and Fleurieu, USE = Upper South East, LSE= Lower South East and KI = Kangaroo Island.

Harvest Statistics

Harvest 2018

In 2018, the commercial kangaroo harvest in South Australia was 108,541 (data from 2018 Commercial Kangaroo Harvest Report for South Australia). This figure represents 14% of the approved quota of 785,800 (including Special Land Management Quota) (Table 3).

Table 3: Harvest summary calculated for 2018 from meat processor returns. Note that no Special Land Management Quota was released during 2018.

Species	Quota	Harvest	% Quota Harvested
Red Kangaroo	498,800	74,597	15
Western Grey Kangaroo	205,400	26,697	13
Euro	81,600	7,247	9
TOTAL	785,800	108,541	14

Of the four harvest regions in the South Australian commercial harvest area, the Eastern Agricultural harvest region had the greatest percentage of quota harvested for Red Kangaroos (50%), Western Grey Kangaroos (22%), and Euros (26%). The extent of harvest for each harvest region and species is shown in Table 4.

Table 4: Harvest statistics for 2018 from field processor returns. Excludes Special Land Management Quota.

Harvest Region	Red Kangaroos		Western Grey Kangaroos		Euro	
	Quota	Harvest	Quota	Harvest	Quota	Harvest
Western Pastoral	169,000	22,947	57,400	4,109	23,000	1,258
Eastern Pastoral	278,900	32,723	55,700	10,527	45,200	3,659
Western Agricultural	0	0	29,100	56	0	0
Eastern Agricultural	37,200	18,719	55,200	12,254	10,100	2,581
Total	485,100	74,389	197,400	26,946	78,300	7,498

Harvest January to August 2019

A total of 64,645 kangaroos were harvested by field processors during the first eight months of 2019 (1 January 2019 – 31 August 2019; Table 5). This represents 9% of the combined kangaroo harvesting quota for the year. Based on current harvest rates, the projected harvest for 2019 for all species is 96,968. This will represent 13% of the combined quotas.

The harvest projection for 2019 (as shown in Table 5) represents a decrease from the 2018 harvest of 108,833 (calculated from field processor returns).

A harvest summary for each species in each harvest region for the 2019 year-to-date (1 January – 31 August) is shown in Table 6.

Table 5: Harvest statistics for 2019 from field processor returns. Excludes Special Land Management Quota.

Species	Quota	Actual (1 Jan - 31 Aug)		Projected (1 Jan – 31 Dec)	
		Harvest	Harvest as % of Quota	Harvest	Harvest as % of Quota
Red Kangaroo	488,500	43,617	9	65,426	13
Western Grey Kangaroo	164,700	16,985	10	25,478	15
Euro	77,000	4,043	5	6064	8
Total	730,200	64,645	9	96,968	13

Table 6: Harvest region harvest summary calculated from field processor returns for 1 January to 31 August 2019. Excludes Special Land Management Quota.

Harvest Region	Red Kangaroos		Western Grey Kangaroos		Euro	
	Quota	Harvest	Quota	Harvest	Quota	Harvest
Western Pastoral	262,000	18,020	60,400	2,309	22,200	808
Eastern Pastoral	203,800	12,653	47,600	3,245	46,900	1,193
Western Agricultural	0	0	24,200	655	0	0
Eastern Agricultural	22,700	12,944	32,500	10,776	7,900	2,042
Total	488,500	43,617	164,700	16,985	77,000	4,043

Between 1997 and 2018, the combined harvest of all three macropod species in South Australia has ranged between 98,500 and 326,600, representing a 14 – 52% utilisation of the annual kangaroo harvesting quota. Harvest of kangaroos in South Australia peaked in 1995 at approximately 360,000. Since this time, the combined State harvest has declined significantly, while quotas have fluctuated between 328,000 and 938,000. Trends of annual harvest and quota for all species are shown in Figure 5.

2020 Quotas

The 2020 commercial kangaroo harvesting quotas for South Australia are shown in Table 7. The 2020 harvest region quotas for each species are shown in Tables 8-12. Harvest quotas and annual harvests since 1979 for all Red Kangaroos, Western Grey Kangaroos and Euros combined are shown in Figure 5. The highest recorded annual quotas are 555,000 for Red Kangaroos (1997), 280,000 for Western Grey Kangaroos (1997), and 103,000 for Euros (1997).

Table 7: Commercial kangaroo harvesting quotas for 2020, and comparison with the 2019 quota. Quota is separated into original harvest area and expanded area to allow comparison with 2019 quota. Quotas do not include Special Land Management Quota.

Species	Quota 2019	Quota 2020	% Change 2019-2020
Red Kangaroo	488,500	269,800	-45%
Western Grey Kangaroo	164,700	126,300	-23%
Euro	77,000	57,500	-27%
Total (original area)	730,200	453,600	-38%
Western Grey Kangaroo		44,100	
Eastern Grey Kangaroo		7,400	
Tammar Wallaby		8,700	
Total Quota		513,800	

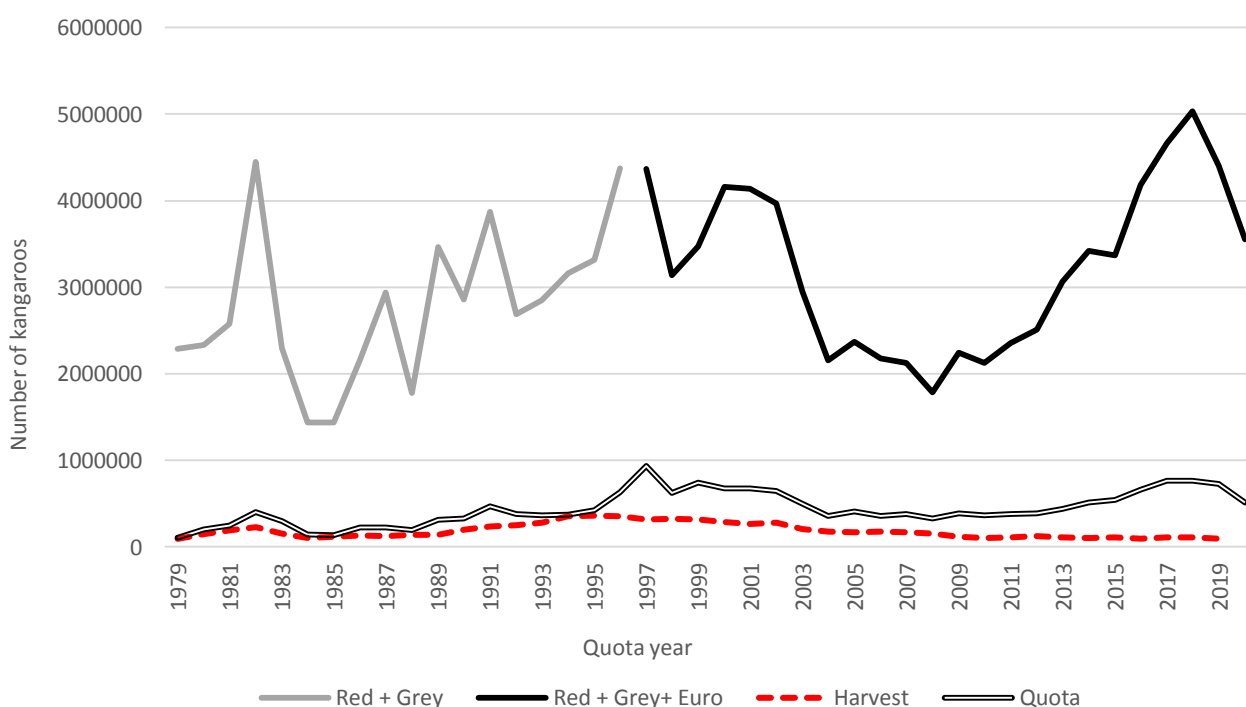


Figure 5: Red Kangaroo, Western Grey Kangaroo and Euro combined population estimate, quota and harvest for South Australia between 1979 and 2020 Quota Years. Population surveys for Euros commenced during 1997 and population estimates were used to calculate quotas from 1997 onwards. Prior to 1997, conservative quotas were set for Euros and harvest was very low. Figure includes data from the Southern Agricultural harvest region and expanded Mallee and Yorke Mid North sub-regions for Western Grey Kangaroos.

Regional harvest quotas for 2020

Table 8: Red Kangaroo population estimates for 2019 and harvesting quotas for 2020 per harvest region and sub-region. Harvest % refers to the percentage of population used to calculate the quota.

Harvest region	Area (km ²)	% Area Suitable	Pop. Density	Pop. Estimate	Harvest %	Quota
Western Pastoral						159,900
Marla - Oodnadatta	128,908	45	2.30	133,420	17	22,600
Kingoonya	73,392	100	5.96	437,416	20	87,400
Gawler Ranges	45,811	100	3.61	165,378	20	33,000
Marree (inside dog fence)	14,680	100	3.17	46,536	17	7,900
Marree (outside dog fence) ¹	177,517	50	1.02	90,534	10	9,000
Eastern Pastoral						77,700
North Flinders	34,622	100	8.69	300,865	17	51,100
North East Pastoral	31,448	100	4.54*	142,774	10	14,200
Eastern Districts	22,920	100	2.36	54,091	17	9,100
Murray Mallee (original)	19,715					2,700
Murray Plains (expansion)	4,279					600
Total Mallee ²	23,994		0.80	19,195	17	3,300
Eastern Agricultural						32,200
South Flinders	11,883	100	12.92	153,528	20	30,700
Mid North (original)	10,925					1,500
Yorke (expansion)	11,292					0
Total Yorke Mid North ²	22,217		1.16	8,942	17	1,500
Western Agricultural						0
Eyre West	22,459					0
Eyre East	31,164					0
Total	687,226			1,552,679		269,800
Special Land Management Quota³						7,700
Total quota available for 2020						277,500

¹ Last surveyed 2018, therefore quota has been reduced to 10% of 2018 population estimate.

² Mid North and Murray Mallee sub-regions were expanded as of 1 January 2020. Quota is broken into the original area, the expanded area and the total for the whole sub-region for both Yorke Mid North and Mallee sub-regions. Quota calculations did not use suitability estimates but stratified data according to habitat types.

³ Special Land Management Quota has been set at 0.5% of the total population estimate for the commercial harvest area.

* Red kangaroo population in North East Pastoral sub-region reached the first low population threshold, therefore quota has been reduced to 10% as per the Management Plan.

Table 9: Western Grey Kangaroo population estimates for 2019 and harvesting quotas for 2020 per harvest region and sub-region. Harvest % refers to the percentage of population used to calculate the quota.

Harvest region	Area (km ²)	% Area Suitable	Pop. Density	Pop. Estimate	Harvest %	Quota
Western Pastoral						30,800
Marla - Oodnadatta	128,908					0
Kingoonya	73,392	100	0.19	13,944	12	1,700
Gawler Ranges	45,811	100	5.29	242,340	12	29,100
Marree (inside dog fence)	14,680					0
Marree (outside dog fence)	177,517					0
Eastern Pastoral						33,600
North Flinders	34,622	100	1.08	37,392	12	4,500
North East Pastoral	31,448	100	0.66	20,756	10	2,100
Eastern Districts	22,920	100	3.92	89,846	15	13,500
Murray Mallee (original)	19,715					11,100
Murray Plains (expansion)	4,279					2,400
Total Mallee ¹	23,994		4.70	112,837	12	13,500
Eastern Agricultural						43,000
South Flinders	11,883	100	11.35	134,872	15	20,200
Mid North (original)	10,925					19,900
Yorke (expansion)	11,292					2,900
Total Yorke Mid North ¹	22,217		10.49	189,830	12	22,800
Western Agricultural						24,200
Eyre West	22,459	100	6.41	143,962	10	14,300
Eyre East	31,164	50	6.38	99,413	10	9,900
Southern Agricultural						38,800
Hills and Fleurieu ²	7,137		11.78	76,850	12	9,200
Lower South East ²	11,508		0.51	10,527	12	1,300
Upper South East	18,238	100	6.74	122,924	15	18,400
Kangaroo Island	4,398	100	14.98	65,882	15	9,900
Total	728,507			1,361,376		170,400
Special Land Management Quota³						6,800
Total quota available for 2020						177,200

¹ Mid North and Murray Mallee sub-regions were expanded as of 1 January 2020. Quota is broken into the original area, the expanded area and the total for the whole sub-region for both Yorke Mid North and Mallee sub-regions. Quota calculations did not use suitability estimates but stratified data according to habitat types.

² Driving surveys were used to determine population estimates in the Hills and Fleurieu and Lower South East sub-regions. Driving transects were stratified based on habitat type and densities applied across habitat blocks, excluding settled areas. Due to the different survey technique, a suitability percentage was not used.

³ Special Land Management Quota has been set at 0.5% of the total population estimate for the commercial harvest area.

Table 10: Euro population estimates for 2019 and harvesting quotas for 2020 per harvest region and sub-region. Harvest % refers to the percentage of population used to calculate the quota.

Harvest region	Area (km ²)	% Area Suitable	Pop. Density	Pop. Estimate	Harvest %	Quota
Western Pastoral						19,300
Marla - Oodnadatta	128,908	0	0.00	0	0	0
Kingoonya	73,392	0	0.00	0	0	0
Gawler Ranges	45,811	25	13.17	150,833	9	13,500
Marree (inside dog fence)	14,680	15	26.50	58,353	10	5,800
Marree (outside dog fence)	177,517	0	0.00	0	0	0
Eastern Pastoral						29,000
North Flinders	34,622	25	32.05	277,409	10	27,700
North-East Pastoral ¹	31,448	15	1.11	5,236	10	500
Eastern Districts	22,920	15	2.77	9,523	9	800
Murray Mallee (original) ²	19,715	0	0.00	0	0	0
Eastern Agricultural						9,200
South Flinders ¹	11,883	20	21.63	51,406	15	7,700
Mid North (original) ²	10,925	20	7.90	17,262	9	1,500
Western Agricultural						0
Eyre West	22,459	0	0.00	0	0	0
Eyre East	31,164	0	0.00	0	0	0
Total	625,444			570,021		57,500
Special Land Management Quota³						2,800
Total quota available for 2020						60,300

¹ Sub-regions surveys during 2019. Population estimates for other sub-regions were collected during 2018 and 2017.

² No surveys were conducted during 2019 for euros in these areas, therefore quota and population estimates are based on the original areas. Quota for Mid North may be issued across the Yorke Mid North sub-region, but quota has not been increased.

³ Special Land Management Quota has been set at 0.5% of the total population estimate for the commercial harvest area.

Table 11: Eastern Grey Kangaroo population estimate for 2019 and harvesting quota for 2020 per harvest region and sub-region. Harvest % refers to the percentage of population used to calculate the quota.

Harvest region	Area (km ²)	% Area Suitable	Pop. Density	Pop. Estimate	Harvest %	Quota
Southern Agricultural						
Hills and Fleurieu	7,137					
Upper South East	18,238					
Lower South East ¹	11,508		5.37	61,826	12	7,400
Kangaroo Island	4,398					
Total	41,281			61,826		7,400
Special Land Management Quota²						900
Total quota available for 2020						8,300

¹ Driving surveys were used to determine population estimate in the Lower South East sub-region. Driving transects were stratified based on habitat type and densities applied across habitat blocks, excluding large towns. Due to the different survey technique, a suitability percentage was not used.

² Special Land Management Quota has been set at 1.5% of the total population estimate for the commercial harvest area. This was amended from 0.5% on 24 July 2020.

Table 12: Tammar Wallaby population estimate for 2019 and harvesting quota for 2020 per harvest region and sub-region. Harvest % refers to the percentage of population used to calculate the quota.

Harvest region	Area (km ²)	% Area Suitable	Pop. Density	Pop. Estimate	Harvest %	Quota
Southern Agricultural						
Hills and Fleurieu	7,137					
Upper South East	18,238					
Lower South East	11,508					
Kangaroo Island ¹	4,398		16.05	87,043	10	8,700
Total	41,281			87,043		8,700
Special Land Management Quota²						400
Total quota available for 2020						9,100

¹ Driving surveys were used to determine population estimate in the Kangaroo Island sub-region. Driving transects were stratified based on habitat type and densities applied across habitat blocks, excluding large towns. Due to the different survey technique, a suitability percentage was not used.

² Special Land Management Quota has been set at 0.5% of the total population estimate for the commercial harvest area.

References

Caughley G. 1977. Sampling in aerial survey. *Journal of Wildlife Management*. 41: 605-615

Buckland, S.T., Anderson, D.R., Burnham, K.P, Laake, J.L., Borchers, D.L., and Thomas, L. 2001. *Introduction to Distance Sampling: Estimating abundance of biological populations*. Oxford University Press, Melbourne. 432pp.

Grigg, G.C., Beard, L.A., Alexander, P., Pople, A.R., and Cairns, S.C. 1999. Aerial survey of kangaroos in South Australia 1978 – 1998: A brief report focusing on methodology. *Australian Zoologist* 31: 292 – 300.

Miller, D.L. (2016). *Distance: Distance Sampling Detection Function and Abundance Estimation*. R package version 0.9.6. <https://CRAN.R-project.org/package=Distance>

Published by the Department for Environment and Water
Government of South Australia
November 2019

Telephone +61 (8) 8204 9000
Facsimile +61 (8) 8115 1256

ABN 36702093234

Report prepared by:
Department for Environment and Water
Conservation and Wildlife Branch
National Parks and Wildlife Service Division

www.environment.sa.gov.au



With the exception of the Piping Shrike emblem, other material or devices protected by Aboriginal rights or a trademark, and subject to review by the Government of South Australia at all times, the content of this document is licensed under the Creative Commons Attribution 4.0 Licence. All other rights are reserved.

© Crown in right of the State of South Australia



**Government
of South Australia**

Department for
Environment and Water