Victorian Kangaroo Harvest Management Plan

2019

VICTORIA State Government | Environment, Land, Water and Planning

Acknowledgment

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.

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Accessibility

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1. Introduction

This plan has been developed to guide the sustainable harvest of kangaroos in Victoria. The plan has been prepared so that it may be treated as a 'recognised wildlife management plan' under section 28A(1)(h) of the *Wildlife Act 1975* and enables the authorisation of the harvesting activities that support this plan.

This plan covers the period 1 October 2019 – 31 December 2019 and authorisations until 31 December 2019 will be issued in support of the plan. However, the arrangements described under this plan will remain in place for 2020 under an updated plan, to specifically enable the renewal of the harvest quotas set out in Schedule 1. Authorisations for the full 2020 calendar year will accordingly be issued in support of the updated plan.

The plan has been written to meet the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as a Wildlife Trade Management Plan (WTMP) to enable the overseas export of kangaroo products that are harvested in Victoria. Approval as a WTMP will be sought in due course but will not be in place for the initial period of Victoria's commercial kangaroo harvest. Revisions to the plan may be made within its lifespan, if required to achieve approval as a WTMP.

This plan only permits the commercial harvest of Eastern Grey and Western Grey kangaroos on private land in designated harvest zones. For the initial period harvesting and processing for pet food only will be permitted. A review of the operation of the plan and Victoria's regulatory framework more broadly is intended by December 2020; this review will consider whether the scope of the plan is appropriate for the longer term.

The plan describes the requirements for the operation of Victoria's kangaroo harvesting program under a series of objectives, with associated management actions for enacting the requirements and, where appropriate, targets to help measure adherence to the requirements.

This plan is written solely to manage the commercial harvest of Eastern and Western Grey kangaroos in Victoria and does not consider the management of kangaroos beyond this. The provision of commercial harvest arrangements under this plan does not replace the ability for landholders to apply for an Authority to Control Wildlife (ATCW) to control kangaroos for damage mitigation purposes on their own property.

The Department of Jobs, Precincts and Regions (DJPR) and its agents will be responsible for administering the kangaroo harvesting program in line with the requirements of this plan and monitoring and enforcing compliance of program participants. The Department of Environment, Land, Water and Planning (DELWP) will be responsible for maintaining the plan, including managing kangaroo population surveys and quota-setting.

The commercial harvest arrangements are intended to be complementary to the ATCW system that allows landholders to undertake kangaroo control for damage mitigation purposes. Control of kangaroos under the ATCW system is, at present, the only option for Victorian landholders seeking to control kangaroos on their property. By providing an alternative means to have kangaroos taken from a property, the kangaroo harvesting program may replace some control that is currently managed through the ATCW system, though to what extent this might occur is unknown. The ATCW system will remain available to landholders who sit outside harvest zones or who do not wish to engage a harvester.

2. Legislative context

2.1. Victorian legislative context

Relevant Victorian legislation and regulation is described below.

Wildlife Act 1975:

The purposes of the *Wildlife Act 1975* (the Wildlife Act) are:

"(a) to establish procedures in order to promote-

(i) the protection and conservation of wildlife; and

(ii) the prevention of taxa of wildlife from becoming extinct; and

(iii) the sustainable use of and access to wildlife; and

(b) to prohibit and regulate the conduct of persons engaged in activities concerning or related to wildlife."

While commercial use of wildlife is not incompatible with the objectives of the Wildlife Act, any use of wildlife must be undertaken in a sustainable manner and in the context of all the Wildlife Act's purposes.

All Victorian kangaroo species are protected under the Wildlife Act. It is an offence to hunt, take or destroy protected wildlife unless in accordance with a licence or authorisation issued under the Wildlife Act.

Authorisations to take and destroy wildlife can be issued for a range of purposes. One of the purposes is "to support a recognised wildlife management plan" (s28A(1)(h)). This plan is prepared so that it can be treated as a recognised wildlife management plan under which kangaroo harvesters can be authorised to destroy, possess, sell and dispose of kangaroos for commercial purposes.

The Wildlife Act also provides for regulations to establish a licensing framework to enable the legal use of wildlife for a range of purposes. The Wildlife Regulations 2013 prescribe relevant licence categories and their conditions.

Wildlife Regulations 2013

The Wildlife Regulations 2013 prescribe a 'Wildlife Processor Licence', issued and administered by DELWP. While many Wildlife Processors process wildlife only to produce fur, skins or leather, a Wildlife Processor that is also licensed to operate a 'Pet Meat Processing Plant' under the *Meat Industry Act 1993* may process wildlife to produce pet food. Wildlife Processor Licences are subject to conditions, and can be issued annually or 3 yearly. Holders of a Wildlife Processor Licence are required to keep record books and submit them to DELWP annually. DELWP wildlife officers undertake random inspections of all commercial licence holders to monitor compliance with the legislation and licence conditions. For the purposes of this program, processors taking kangaroo carcasses may also be subject to inspections by DJPR or its agents.

Meat Industry Act 1993:

The *Meat Industry Act 1993* (Meat Industry Act) establishes the legal framework for regulation of meat production for human consumption and pet food. It enables the setting of standards for meat production.

Pet food is produced in Victoria through 'Pet Meat Processing Plants' which wholesale, package and/or prepare pet food/meat for sale. These facilities require a licence under the Meat Industry Act, administered by Victoria's meat and seafood safety regulatory body, PrimeSafe. Licences are issued annually, commencing on 1 July of each year, and applicants pay a licence fee. PrimeSafe licensees are required to engage directly a third-party auditor to conduct audits. PrimeSafe also conducts unannounced inspections to ensure compliance with licensing requirements. Further, the Meat Industry Act regulates field depots and harvest vehicles used for the commercial harvesting of game unless these are subject to exemption under the Act.

Pet Meat Processing Plants are required to implement a Food Safety Plan (also known as a Quality Assurance Program) identifying approved suppliers of meat. Licensed pet food processing plants can only

receive carcasses from approved suppliers who have satisfied certain requirements. Approved suppliers are required to undertake training that satisfies national standards. For the purposes of this program, authorisation under the Wildlife Act to act as a field harvester of kangaroos will satisfy these requirements.

Pet Meat Processing Plants food plants must also comply with the *'Standard for the Hygienic Production of Pet Meat (PISC Technical Report 88 – Amended 2009)*', which prescribes outcomes and the methods for achieving those outcomes.

- Prevention of Cruelty to Animals Act 1986*:*

  Under the *Prevention of Cruelty to Animals Act 1986* (POCTA Act) it is an offence if a person does something, or omits to do something, that results in the pain and suffering of any animal – including kangaroos. However, offences under the POCTA Act (except for those in Part 3 – scientific procedures) do not apply to anything done specifically in accordance with the Wildlife Act (refer to section 6(1B) of the POCTA Act). This exemption applies to any activities undertaken in accordance with an authorisation given under the Wildlife Act.

2.2. Commonwealth legislative context

The EPBC Act requires the development and approval of a WTMP before permits can be issued for the overseas export of Australian native wildlife products. While this approval will not be in place at the commencement of Victoria's kangaroo harvesting program, this plan has been prepared to meet the requirements of a WTMP in anticipation of EPBC Act approval being sought in the future.

The EPBC Act states that the Commonwealth Minister responsible for the environment may approve a WTMP for a maximum of five years. The EPBC Act specifies that such approval must only be given if the Commonwealth Minister is satisfied that:

- the plan is consistent with the objects of Part 13A of the EPBC Act
- an assessment of the environmental impacts of the activities in the plan has been undertaken
- the plan includes management controls directed towards ensuring the impacts of the activities covered by the plan are ecologically sustainable
- the activities in the plan are not detrimental to the species to which the plan relates or any relevant ecosystem
- the plan includes measures to mitigate, monitor and respond to the environmental impacts of the activity covered by the plan.

In deciding whether to declare this plan as a WTMP, the Commonwealth Minister must also have regard to whether:

- legislation relating to the protection, conservation, or management of the species to which the plan relates is in force in the State or Territory concerned
- the legislation applies throughout the State or Territory concerned
- in the opinion of the Minister, the legislation is effective.

Animal welfare standards for the commercial harvesting and non-commercial culling of kangaroos are detailed in the *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes* and the *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Non-Commercial Purposes*, respectively (www.environment.gov.au/biodiversity/trade-use/wild-harvest/kangaroo/practice.html). All kangaroos must be killed following these codes or any subsequent relevant nationally-endorsed code(s) that replace these documents.

3. Administrative arrangements

The Secretary, DELWP is responsible for giving authorisations under section 28A(1) of the Wildlife Act. With regard to giving authorisations to harvesters to support this plan, the Secretary has delegated the power to make decisions to senior officers of the Game Management Authority (GMA). The GMA is delivering this function as an agent of DJPR.

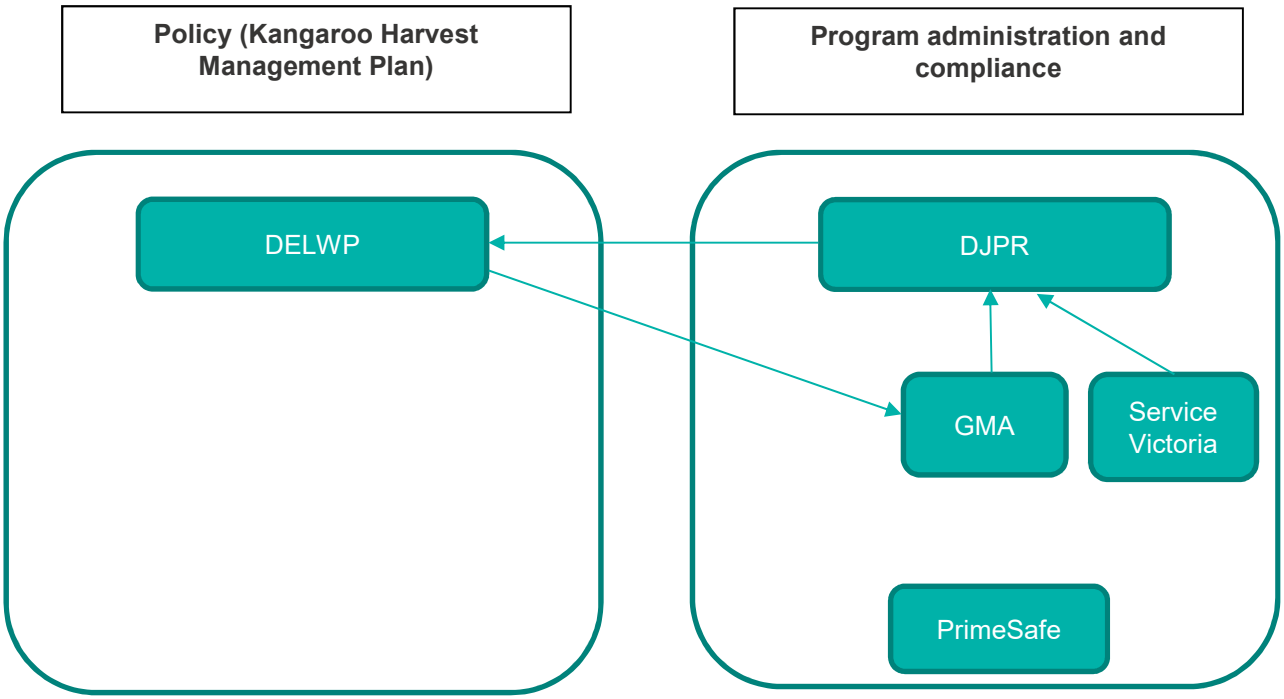
The GMA is accordingly responsible for giving authorisations to harvesters. In order to give an authorisation to a harvester, the delegate must be satisfied that the authorisation is necessary to support this plan. Approval of this plan by the Secretary, DELWP, enables this plan to be treated as a recognised wildlife management plan.

PrimeSafe is responsible for the issuing of licenses to Pet Meat Processing Plants, Field Depots and Harvest Vehicles, where these facilities need to be licensed under the Meat Industry Act. PrimeSafe will monitor compliance with licensing requirements at these facilities and take enforcement action as necessary where breaches of the Meat Industry Act are identified. Field harvesters do not need to be approved or licensed by PrimeSafe for the harvesting of kangaroos for pet food.

Administration of the program, including issuing authorisations, monitoring harvest quotas and linking landholders with harvesters is managed via an online system. Relevant powers of the Secretary, DELWP have been delegated to Service Victoria to enable the operation of the system. Service Victoria is delivering this function as an agent of DJPR.

The appointment of officers of the GMA as authorised officers under the *Conservation, Forests and Lands Act 1987* for the purposes of the Wildlife Act allows the GMA to carry out the compliance functions described in this plan.

The Secretary, DELWP retains responsibility for this plan and for ensuring the sustainability of kangaroo populations via the setting of quotas. DJPR will report on quota allocations and harvest numbers to DELWP on a monthly basis. DELWP will maintain the sustainable harvest model, arrange for population surveys to be undertaken and prepare quota reports each year for the following year. DELWP will also be responsible for decisions to reduce or suspend quotas in any zone as indicated by population threshold models.



4. Goal and objectives

4.1. Goal

The goal of the Victorian Kangaroo Harvest Management Plan is *to provide for the sustainable use of kangaroos in a way that protects animal welfare.*

The goal makes clear that sustainable kangaroo populations and good animal welfare outcomes are the highest priorities.

4.2. Objectives

Seven objectives are described in the Plan to achieve the goal stated above:

1. **Ensure that commercial kangaroo harvesting in Victoria is ecologically sustainable.**

   Removal of kangaroos from the population, whether by commercial harvesting or under the ATCW system, must not reduce kangaroo populations to the extent that normal population dynamics are affected or populations cannot recover. The level of commercial harvesting must be balanced with control by landholders under the ATCW system to ensure that all take of kangaroos remains within sustainable levels. Controls will be placed on harvesting activities based on the best available knowledge of Victorian kangaroo populations and kangaroo population dynamics/breeding biology, to ensure harvesting is undertaken sustainably.

2. **Ensure that commercial kangaroo harvesting in Victoria is humane and animal welfare is protected.**

   To meet legal requirements and community expectations, commercial kangaroo harvesting must be undertaken with the welfare of the kangaroos as the highest priority. Controls will be placed on harvesting activities to ensure harvesters are required to adhere to recognised animal welfare standards, and that they are capable of doing so.

3. **Ensure that commercial kangaroo harvesting and processing activities are appropriately regulated.**

   Regulating the activities of harvest participants via suitable authorisation and licensing regimes will provide a mechanism to manage and monitor risks. This will be achieved through the interaction of this plan with authorisations and the inclusion of appropriate conditions on licences and authorisations.

4. **Effectively monitor and enforce compliance.**

   Compliance with the requirements of the plan by participants in kangaroo harvesting is essential to protect animal welfare, ensure sustainable kangaroo populations, and ensure the community's confidence in Victoria's commercial harvesting program. Compliance can be promoted and achieved through several measures ranging from education and information provision, effective record-keeping and reconciliation, through to proactive audits and enforcement actions including prosecution of alleged offences.

5. **Facilitate adaptive management and research.**

   Establishing a commercial kangaroo harvest provides new opportunities for collecting information for the management of the commercial harvest as well as broader kangaroo management approaches in Victoria. Learning from the outcomes of management approaches and continuously applying improvements will be actively pursued.

6. **Maintain openness, accountability and transparency.**

   A diverse range of stakeholders are interested in kangaroo management. These include landholders, state and commonwealth agencies, pet food processors, kangaroo harvesters, animal welfare

groups and members of the public. Community confidence in the design and implementation of the program, particularly in relation to protecting animal welfare and population sustainability, is essential to maintain social licence for the commercial kangaroo harvest. This is particularly important for Victoria, given that harvesting kangaroos specifically for commercial purposes is a new approach in this state. An important element of ensuring improved community confidence is providing a transparent and open account of the operation and outcomes of the commercial harvest and this plan.

7. **Work with Traditional Owners to provide opportunities for participation.**

   The Victorian Government is committed to supporting and enabling Victorian Aboriginal culture and access to Country, as well as to facilitating opportunities for economic participation where they exist. Some Victorian Traditional Owners have expressed a desire to harvest kangaroos (among other wildlife) for traditional and cultural purposes as well as for meat. Some groups have also expressed an interest in financial and employment opportunities that may arise from program administration and compliance roles in the kangaroo harvesting program. Working together with Traditional Owners to develop specific arrangements to facilitate these opportunities is essential to ensure their needs and aspirations are addressed.

5. Requirements, management actions and targets

A series of requirements with corresponding management actions is described below. The requirements and management actions will guide the activities undertaken under the plan.

Some management actions have corresponding indicators or targets to enable assessment of the effectiveness of the plan in achieving its aims and the overarching goal.

Objective 1. Ensure that commercial kangaroo harvesting in Victoria is ecologically sustainable.

Ecological sustainability of the kangaroo harvest will be managed based on sustainable harvest principles and the best available information about kangaroo populations throughout their Victorian range. Management must ensure that viable populations of kangaroos are maintained throughout their range to achieve this objective.

This plan permits the commercial harvesting of Eastern Grey and Western Grey kangaroos on private land in designated areas of Victoria. The state has been divided into seven harvest zones (shown in Figure 1 and further described in Table 1). The harvest zones are based on groupings of ecologically similar local government areas (LGAs), though this design may change in future. Metropolitan Melbourne is excluded from harvest zones and harvesting may not occur in the metropolitan LGAs that are not named in Table 1. Areas of public land, from which harvesting is excluded under current arrangements, will act as sanctuary zones for the harvested species.

Annual commercial quotas will be set in each harvest zone. For quota purposes, Eastern and Western Grey kangaroos will be treated as “grey kangaroos”, primarily because of the expected difficulty in distinguishing between the two species under harvest conditions. The species both occur in the Mallee, Upper Wimmera and Lower Wimmera harvest zones; the remaining harvest zones only have Eastern Grey kangaroos.

Having a single quota for both species is considered to pose little risk to the sustainability of either species. Both species’ ranges extend well beyond Victoria and both are considered secure in Victoria and nationally. In areas where the two species overlap, harvesting can reasonably be expected to take place at the ratio at which the two species occur, given that there are no significant differences in habitat preference or behaviour between the two that would make it more likely that a harvester would encounter one over the other.

Harvesters will be required to report after harvest on the number of each species harvested. Reported data will be closely monitored to ensure the harvest of each species is aligned with known population ratios in areas where the species overlap. Ground surveys of the two species in 2017 and 2018 provide an indication of ratios at the LGA level and this data will continue to be captured in future surveys. Should it become apparent that one species is being disproportionately harvested, the approach will be changed.

The commercial quota for a zone is the maximum number of kangaroos that may be harvested for commercial purposes in that zone in a given period. While quotas will typically be issued on an annual basis, for the life of this plan they will be reviewed on a quarterly basis to enable close monitoring of take under the commercial program and ATCW systems. Tags allocated to harvesters will not exceed the quota. Once the commercial quota is exhausted, no more tags will be allocated for that zone until the quota is renewed in the following calendar year.

Quotas will be calculated based on population estimates and accepted proportional harvest strategies, used in other kangaroo harvesting jurisdictions. A precautionary approach is being taken given the lack of long-term abundance or demographic data for Victorian kangaroo populations, which limits the ability to construct well-informed stochastic models for assessing the risks of harvest policies. For the initial period of this plan, the total sustainable quota for take of grey kangaroos will be set at 10% of the estimated population; this will include take under both the commercial harvest and the ATCW system. The commercial quota will therefore be less than 10% of the total estimated population. This is necessary given the current high levels of control under the ATCW system – which at current levels accounts for the majority of the proposed sustainable level of take – and the uncertainty around the degree to which commercial harvesting may replace damage mitigation control. The proportion of the population available for commercial harvest may be adjusted in future if a substantial proportion of ATCW control transfers across to the commercial harvest.

Requirements	Management actions	Indicators / targets
Populations of kangaroo species covered by the plan will be estimated annually. Population estimates will be generated from population models developed for the purpose.	- Population models use latest survey data, harvest data, ATCW data and climate variables to estimate kangaroo populations in order to inform quotas.	- Models are created by DELWP for 100% of harvest zones by June 2020 and updated in October each year.
DELWP will undertake aerial and/or ground kangaroo population surveys at regular intervals to inform population models and quota setting.	- DELWP will undertake aerial and ground surveys in all zones during the first year of operation of the program. - In following years, DELWP will undertake surveys according to a survey plan developed alongside Victorian kangaroo population models.	- 100% of survey zones are surveyed in the first year of the program. - A survey plan is created by June 2020 and 100% of surveys are undertaken as per the survey plan.
Harvest quotas will be set annually in each harvest zone. Quotas will be calculated using a proportional harvesting strategy based on sustainable levels of take for grey kangaroos.	- Commercial harvest quotas are set by DELWP each year in accordance with this plan. - Quotas commence at 1 January* each year, and harvest does not exceed allocations as stated in quota reports. - During 2020, quotas will be reviewed on a quarterly basis (March, June, September) and adjusted if control under ATCW exceeds expected levels. - The commercial harvest quota is set at less than 10% of the total estimated population of grey kangaroos. - The commercial harvest quota is set using population estimates generated by DELWP using population surveys and/or population models developed for the purpose. - Commercial harvest quotas for the following year are published in a revised schedule to this plan prior to the end of each year. - Subject to approval of this plan as a WTMP, DELWP advises the Commonwealth of commercial harvest quotas through a quota report for the following calendar year by 30 November each year.	- Commercial harvest quotas are as described in Schedule 1.

	*The exception is the first quota after the program's commencement, which will operate from 1 October-31 December 2019.	
Triggers will be established to suspend harvest or reduce proportional quota allocations if estimated population numbers within a particular harvest zone fall below a predetermined threshold.	- DELWP will determine threshold densities under which harvest in a given harvest zone should be suspended or reduced. - Prior to the development of these thresholds, ATCW and harvest data will be monitored monthly and quota allocation reviewed on a quarterly basis.	- Thresholds / triggers for suspension or reduction of harvest are developed by DELWP for all harvest zones by June 2020. - Following development of thresholds, all relevant quotas are suspended if population estimates fall below the thresholds.
Decisions on allocation of the quota will be made with regard to the precautionary principle.	- Where there is an absence of data or uncertainty in data analysis, a conservative approach is taken to setting quotas to ensure harvest remains at sustainable levels.	

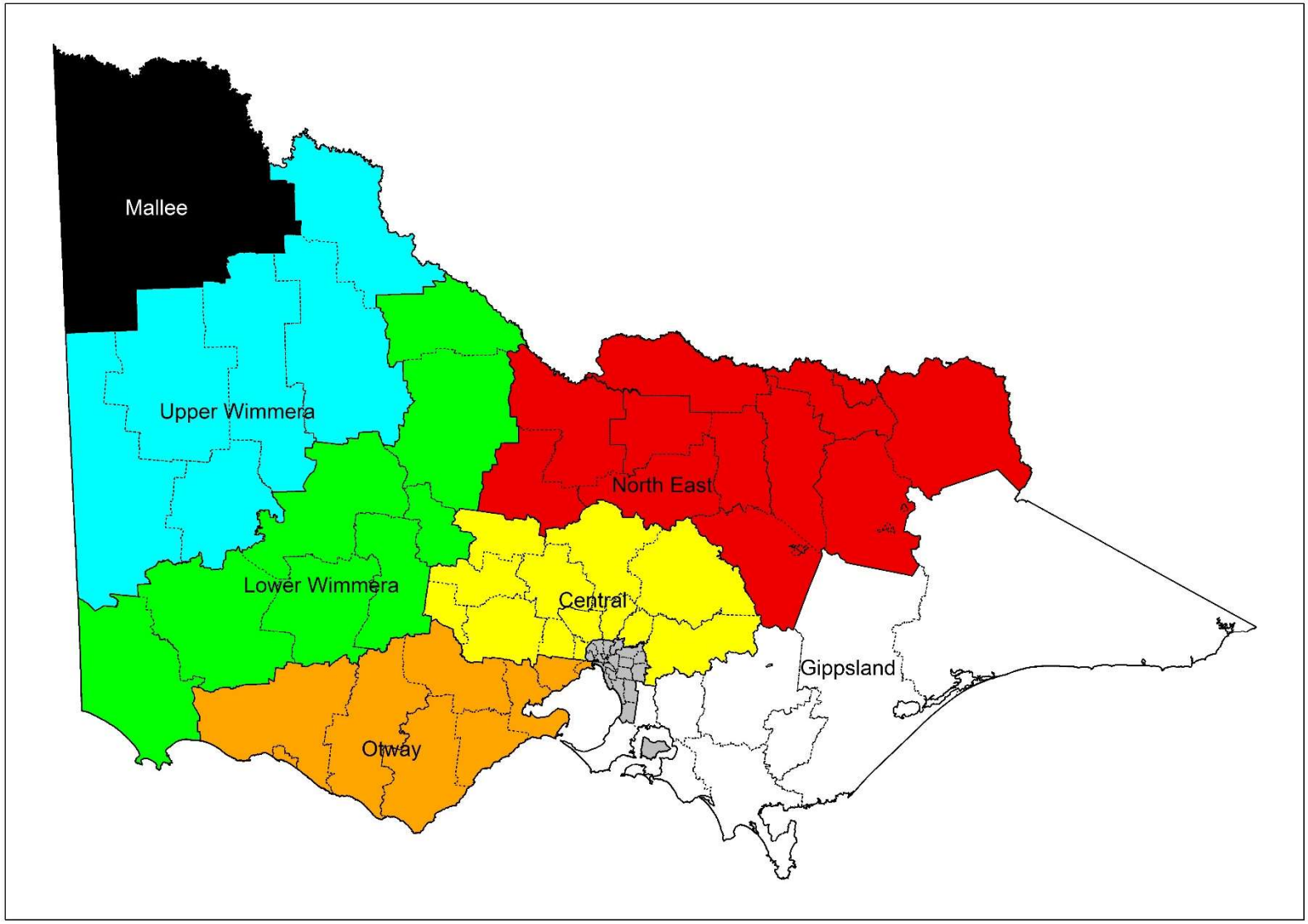


Figure 1. Kangaroo harvest zones for commercial kangaroo harvesting in Victoria.

Table 1. Local Government Areas contained in each kangaroo harvest zone in Victoria.

Zone	LGAs	Zone	LGAs	Zone	LGAs
Mallee	Mildura	**Central**	Ballarat	**North East**	Alpine
			Brimbank		Benalla
Upper Wimmera	Buloke		Hepburn		Campaspe
	Hindmarsh		Hume		Greater Bendigo
	Horsham		Macedon Ranges		Greater Shepparton
	Swan Hill		Melton		Indigo
	West Wimmera		Mitchell		Mansfield
	Yarriambiack		Moorabool		Moira
			Mount Alexander		Strathbogie
Lower Wimmera	Ararat		Murrindindi		Towong
	Central Goldfields		Nillumbik		Wangaratta
	Gannawarra		Whittlesea		Wodonga
	Glenelg		Yarra Ranges		
	Loddon				
	Northern Grampians	**Gippsland**	Bass Coast		
	Pyrenees		Baw Baw		
	Southern Grampians		Cardinia		
			Casey		
Otway	Colac Otway		East Gippsland		
	Corangamite		Latrobe		
	Golden Plains		Mornington Peninsula		
	Greater Geelong		South Gippsland		
	Hobsons Bay		Wellington		
	Moyne				
	Surf Coast				
	Warrnambool				
	Wyndham				

Objective 2. Ensure that commercial kangaroo harvesting in Victoria is humane and animal welfare is protected.

Good animal welfare outcomes are of the highest priority in managing Victoria's commercial harvest.

The nationally-endorsed standard for humane commercial harvest of kangaroos is described in the *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Commercial Purposes* (the National Code). All kangaroo harvesters in Victoria will be required to comply with the National Code and any future standards that might replace it.

Compliance with the National Code will be required through the application of minimum standards as a prerequisite for harvesting authorisation, and the inclusion of related conditions on the authorisation. Noncompliance will be treated as a breach of authorisation condition, with appropriate penalties applied.

Requirements	Management actions	Targets / indicators
Kangaroo harvesters will be required to demonstrate minimum standards of competency set out in the National Code prior to receiving authorisation to harvest under the Plan. Harvesters who have been active in the Kangaroo Pet Food Trial (KPFT) within the past two years and who have been listed as a Preferred Supplier under the Food Safety Plan of a participating Pet Food Processor will be assumed to meet competency requirements for an initial 15-month period (until the end of 2020). After this, they will be required to demonstrate the minimum standards.	- Prior to receiving authorisation, new harvesters demonstrate (via the online platform) that they hold a valid firearms proficiency accreditation. - Prior to receiving authorisation, new harvesters demonstrate (via online platform) that they have completed a recognised Game Harvester competency program*. - Prior to receiving authorisation, harvesters confirm that they hold a firearms licence. - Prior to receiving authorisation, KPFT harvesters either demonstrate that they have achieved the above requirements, or confirm that they are listed in the Food Safety Plan of a Pet Food Processor that participated in the KPFT, and that they have been active in the KPFT within the past two years. - A copy of the National Code is provided to all new applicants with their authorisation and is made available on the website for the harvesting program. *Any accredited Game Harvester competency program that meets the requirements for licensing in	- 100% of new harvesters will hold a valid firearms proficiency accreditation. - 100% of new harvesters have completed a recognised Game Harvester competency program. - 100% of new harvesters confirm that they hold a valid firearms licence. - 100% of existing KPFT harvesters show that they can meet these requirements or commit to obtaining them before 1 January 2021.

	another kangaroo harvesting jurisdiction will be recognised.	
Harvesters will be required to comply with the National Code (and any future iterations).	- Authorisation conditions for commercial harvest of kangaroos will require that harvesters take kangaroos in accordance with the National Code. - Appropriate compliance action is taken when harvesters are found to have breached authorisation conditions in relation to animal welfare.	- 100% of reports of non-compliance are investigated and appropriate action taken where possible.

Objective 3. Ensure that commercial kangaroo harvesting activities are appropriately regulated.

Kangaroo harvesters and processors must hold suitable permissions under both the Wildlife Act and the Meat Industry Act in order to participate in the program. The current legislative basis for the authorisation and licensing arrangements are described in section 2.

Conditions will be applied to licences and authorisations that reflect the requirements set out in this plan.

Participants will be required to adhere to tagging procedures as described in this plan and enacted via conditions.

The authorising environment that determines permission requirements will be reviewed in the first year of the operation of the commercial harvest. If necessary, new or updated arrangements will be put in place.

Requirements	Management actions	Targets / indicators
All participants will be required to hold the appropriate authorisations and licences under relevant Victorian legislation.	- All kangaroo harvesters operating under this plan hold an authorisation under section 28A(1)(h) of the Wildlife Act.	- 100% of harvesters hold an authorisation under the Wildlife Act.
	- All kangaroo harvesters operating under this plan are listed as an Approved Supplier under the Food Safety Plan of a participating Pet Meat Processor.	- 100% of harvesters are listed as a Preferred Supplier.
	- All kangaroo processors operating under this plan hold a Wildlife Processor licence under the Wildlife Act.	- 100% of processors hold a Wildlife Processor licence.
	- All kangaroo processors operating under this plan hold a Pet Meat Processor licence under the Meat Industry Regulations.	- 100% of processors hold a Pet Meat Processor licence.
	- Operators of all field depots operating under this plan hold a Game Meat Processing Facility (Field Depot) licence under the Meat Industry Regulations. (Note, there are currently no licensing requirements for vehicles used for the harvest, processing, storage or transport of pet food.)	- 100% of field depot operators hold a Game Meat Processing Facility (Field Depot) licence.
Conditions will be applied to authorisations and licences that reflect the requirements of this	- Standard conditions reflecting the requirements of this plan are included on	- 100% of authorisation and licence holders are provided with and aware of the conditions of their licence or authorisation.

plan, to ensure that participants are required to conduct their activities consistent with the plan.	authorisation templates and provided to every authorised harvester. - Conditions to facilitate this plan are included on Wildlife Processor licences. - Holders of authorisations and licences are informed in writing of changes to conditions prior to those changes being implemented. - Conditions will be reviewed and updated as required, in response to changes in regulatory arrangements or operational/administrative policies.	- 100% of authorisation and licence holders are advised of changes to conditions before they are implemented.
DJPR or its agent will issue kangaroo harvesters with tags corresponding to an allocation of the harvest quota for each zone. Tags will be restricted based on the quota for a given year for each harvest zone. A tag must be affixed to the carcass of each kangaroo killed by a harvester. The maximum number of tags available to a harvester at any one time will be set by DJPR or its agent, applied in an equitable and consistent way, and the information made available to participants prior to application for a quota allocation.	- The number of tags issued does not exceed the commercial quota for any zone in any year. - DJPR or its agent specifies a maximum number of tags available to a harvester at one time and makes this information publicly available. Tags issued in a single allocation to a harvester do not exceed this number. - Each kangaroo killed by a harvester must have a tag affixed regardless of whether or not the kangaroo is removed from the property for processing. - Tagging is not, however, required for pouch young and young at foot that are euthanised in accordance with the National Code. - No harvester receives a new allocation of tags until their previous allocation is exhausted.	- 100% of kangaroos killed by a harvester have tags affixed (except pouch young and young at foot).
Reporting systems will enable geotagging of harvest locations to ensure harvesting is occurring only where permitted and that tags are being used in the correct zones.	- Tags are barcoded and the (administrative/reporting platform) enables scanned tags to be automatically geotagged.	- 100% of scanned tags are being used in the correct zone. - 100% of scanned tags are being used only where permitted (i.e. on private land).

Objective 4. Effectively monitor and enforce compliance.

Compliance activity will be based on a compliance framework that identifies risks associated with the harvesting system and describes actions to mitigate those risks. Tracking and reporting for compliance purposes will be enabled via effective information systems.

DJPR is responsible for supporting, monitoring and enforcing compliance with the requirements of this plan; the GMA will act as an agent of DJPR to deliver these functions in its behalf. Where it is unclear whether a suspected or detected offence is arising from the commercial harvest or outside it, the GMA and DELWP will work together in the first instance to determine responsibility for further action. PrimeSafe is responsible for ensuring compliance with the Meat Industry Act.

Requirements	Management actions	Targets / indicators
DJPR will produce educational material outlining the requirements of this plan, as reflected in authorisation and licence conditions, and distribute to all participants.	- Suitable educational material is prepared prior to the commencement of the commercial harvest program. - Educational material is distributed to authorised harvesters upon giving the authorisation. - Educational material is made available on the website for the harvesting program.	- 100% of harvesters receives educational material when given an authorisation.
DJPR will facilitate the delivery of relevant local training opportunities in Victoria to ensure all participants can meet the pre-requisites for authorisation and their obligations under the National Code.* *As noted in Objective 2, until local training opportunities are in place, any accredited Game Harvester competency program that meets the requirements for licensing in another kangaroo harvesting jurisdiction will be recognised. For KPFT harvesters, this requirement will not be in place until January 2020.	- Suitable training providers are engaged with by the end of 2020 to plan for the delivery of appropriate local training opportunities.	- Suitable training is made available locally to harvesters and potential harvesters by the end of 2020.
DJPR or its agent(s) will undertake risk-based compliance activity to monitor compliance with the requirements of this plan.	- DJPR or its agent prepares, and provides to DELWP, an annual compliance plan that describes planned compliance activity under the Wildlife Act. The plan includes identification	- A Wildlife Act compliance plan for the following year is provided to DELWP by DJPR or its agent(s) by November each year.

	of compliance priorities, and planning for unannounced and programmed field inspections, records audits and processor inspections. - Compliance with the Meat Industry Act is monitored and enforced in line with existing compliance requirements and protocols under that Act.	- 100% of pet meat processing plants are audited four times per year for compliance with Meat Industry Act requirements. - 100% of licensed field depots and harvest vehicles are audited once every year for compliance with Meat Industry Act requirements.
Where activity that does not meet the requirements of this plan is detected or suspected, it will be investigated and appropriate compliance action taken, if necessary.	- DJPR or its agent will develop a compliance matrix that establishes a consistent approach to decisions about compliance/enforcement activities. - Reports of activities in breach of authorisation and licence conditions are investigated to the fullest extent possible and, where appropriate, offenders are issued with official warnings or prosecuted, or action taken in respect to their licence or authorisation, as appropriate.	- 100% of reports of non-compliance will be investigated.
The accuracy of industry returns will be monitored and discrepancies investigated.	- DJPR or its agent will monitor industry returns and undertake regular audits to detect discrepancies.	- 50% of harvester returns per year are audited.
Intelligence and information relevant to the commercial harvesting of kangaroos in Victoria will be shared between DJPR (including its agents) and DELWP, in accordance with the requirements of the *Privacy and Data Protection Act 2014*.	- Agreements for the sharing of information and intelligence relating to commercial kangaroo harvesting are established between DELWP and DJPR (including its agents). - Compliance records are maintained in a database and compliance information shared with other agencies as agreed or requested. - Compliance performance reporting by DJPR to DELWP is undertaken on a quarterly basis.	- Agencies share all relevant information with other agencies as agreed or requested. - DJPR or its agent provides compliance reporting to DELWP on a quarterly basis.

Intelligence and information relevant to the commercial harvesting of kangaroos in Victoria will be shared between Victoria and neighbouring states (NSW and SA).	- The development of cross-border agreements for the sharing of intelligence and information is pursued.	

Objective 5. Facilitate adaptive management and research.

This plan and the requirements it outlines will be updated on a regular basis as lessons from its application are recorded and applied. It is expected that this will particularly be the case within the first year of the operation of the commercial harvest.

Research into particular aspects of kangaroo ecology, harvest management or land use practices can also assist in ensuring that the commercial harvest is sustainable over the long term. While there is a large body of research on the ecology and management of kangaroos, there are information gaps which, when filled, may lead to improved management of the commercial harvest.

Requirements	Management actions	Targets / indicators
A review of the operation of this plan will commence six months after the commencement of this program. Thereafter the operation of the plan will be reviewed on an annual basis by DELWP.	- The following will be considered in each review: - all relevant data from the review period, including harvest data, ATCW data, harvester numbers, compliance data - the effectiveness of arrangements in achieving the objectives of the plan - the efficiency of administrative arrangements.	- A programmed review commences in or around March 2020. - A programmed review is undertaken each subsequent year by DELWP.
Changes to program arrangements will be captured by DELWP or DJPR as they are identified, and actioned as required to improve efficiency and effectiveness.	- Issues with program arrangements and the requirements of this plan are captured as they become apparent. - Program arrangements and the requirements of this plan are amended in a timely way where necessary improvements are identified.	
Changes will be made to this plan and the program annually, by DELWP, DJPR and the GMA, as needed.	- Any changes made are communicated to participants and other relevant stakeholders prior to their implementation. - A range of communication methods will be used, e.g. letters, email, website communication.	- 100% of changes will be communicated to participants and other stakeholders.

DELWP will use kangaroo population survey data to build a long-term population data set for Victorian kangaroos to inform future management of kangaroos.	- Population survey data gained from regular surveys is compiled and used to inform future decision-making.	- 100% of population survey data is included in the data set.
Sustainable harvest models will be regularly updated and refined by DELWP using data from kangaroo population surveys and harvest returns, ATCW information and other relevant data sources. This data will be used to inform the next year's quotas.	- Sustainable harvest models are updated on an annual basis, using data collected over the previous year from all relevant sources.	- 100% of relevant data is fed into sustainable harvest models.
Research opportunities and collaboration with research institutions, stakeholders and other jurisdictions that have commercial kangaroo harvesting will be actively pursued by DELWP, to fill existing knowledge gaps and conduct adaptive management experiments (e.g. biology, ecology, disease, genetics, behaviour, survey techniques, processing practices, etc.).	- As knowledge gaps are identified they will be captured in a spreadsheet or database kept for the purpose. - Research opportunities are identified and pursued based on identified knowledge gaps.	
Information-and knowledge-sharing opportunities are actively pursued by DELWP.	- DELWP will participate in forums, conferences etc as opportunities arise.	

Objective 6. Maintain openness, accountability and transparency.

Transparency and accountability will be achieved through openly sharing current information and data about the commercial kangaroo harvest. In many cases this can be achieved by making reports and data available online. Responsiveness to media requests will also play a role.

Community feedback will be invited at any time via dedicated channels.

Requirements	Management actions	Targets / indicators
DELWP and DJPR will make relevant documents available online to ensure information about the requirements of this plan and the operation of the program are accessible to all interested parties.	- The most up-to-date versions available of all relevant documents are made accessible via the website for the harvesting program. Relevant documents include: - the current version of this plan - a summary of harvest return data on an annual basis - quota reports for the following year, within two weeks of their finalisation and submission to the Commonwealth - information on the total take of kangaroos across both the commercial harvest and the ATCW system, on an annual basis	- 100% of relevant documents are made available online.
A designated avenue for community feedback on the program and this plan will be made available and clearly communicated to members of the public and interested stakeholders.	- A dedicated website for the harvesting program is developed and communicated via relevant channels. - The Customer Contact Centre details are provided via the website for the harvesting program, and in relevant media and communications material. - Knowledge Articles are prepared by DELWP and DJPR and provided to the Customer Contact Centre, along with relevant contacts for further information.	- Customer Contact Centre details are included in 100% of relevant media and communications material.

Relevant officers from DELWP, DJPR or DJPR's agent, as appropriate, will respond to media requests, including participating in media interviews.	- Responses to media requests are prepared where directed to do so.	
The review process for the program will provide opportunity for stakeholders to provide feedback for consideration during the review.	- An opportunity for key stakeholders to provide feedback is built in to the review process.	
Pending approval of this plan as a WTMP, an annual report on the operation of this management plan will be prepared by DELWP for submission to the Commonwealth.	- Reporting requirements to the Commonwealth are undertaken in accordance with the requirements of the EPBC Act.	- An annual report on the operation of this plan for the previous year is submitted to the Commonwealth by 31 March each year.
Scientific approaches, including survey methods and the sustainable harvest model developed for Victoria, will be subjected to peer review.	- Peer review of updated survey methods and the sustainable harvest model is sought by DELWP through universities or government agencies.	

Objective 7. Work with Traditional Owners to provide opportunities for participation.

Participation opportunities for Traditional Owners will be pursued according to the expressed aspirations and interests of Victorian Traditional Owners. This will be informed by conversations with Traditional Owner groups and other Aboriginal Victorians. These opportunities will not be in place at the commencement of the program but their identification and implementation will be made a priority during the first year of the program.

Requirements	Management actions	Targets / indicators
DELWP and DJPR will work in partnership with Traditional Owners to identify and action opportunities for participation in the kangaroo harvesting program. Opportunities may be as program participants (harvesters or processors), in administration and compliance for the program, or in other forms identified by Traditional Owners themselves.	- DELWP and DJPR will meet with interested Traditional Owner groups to understand their interests and aspirations regarding kangaroo harvesting program participation. - Where possible, DELWP and DJPR will provide opportunities for participation in line with Traditional Owner aspirations.	- All Victorian Traditional Owner groups who hold a Recognition and Settlement Agreement under the *Traditional Owner Settlement Act 2016* or native title recognition under the *Native Title Act 1993* are invited to discuss kangaroo harvesting program opportunities with DELWP and DJPR by June 2020.
DELWP will work in partnership with Traditional Owners to identify opportunities for access to kangaroos for traditional or cultural purposes that sit outside the kangaroo harvesting program. In some cases, aspirations relating to kangaroos can be realised through existing processes provided for under the *Traditional Owner Settlement Act 2016*. Where this is not the case, alternative mechanisms may be explored.	- DELWP and DJPR will meet with interested Traditional Owner groups to understand their interests and aspirations regarding access to kangaroos outside the kangaroo harvesting program. - Where possible, DELWP will explore ways to facilitate opportunities for access to kangaroos within or outside of existing processes.	

6. Managing the kangaroo harvesting program alongside the ATCW system

The commercial harvest arrangements are in addition to the ATCW system that allows landholders to undertake kangaroo control for damage mitigation purposes. The ATCW system will remain available to landholders who do not wish to engage a harvester or who are unable to access a harvester.

However, a key purpose of establishing Victoria's kangaroo harvesting program is to provide landholders with an alternative to undertaking their own legal kangaroo control. The administrative arrangements for the program will accordingly include a process to link landholders with harvesters who are operating in their zone. The online system for administering the kangaroo harvesting program will include a portal that enables landholders to identify harvesters within their zones and provides them with harvester contact details.

As noted under Objective 1, the level of kangaroo control under the damage mitigation system is traditionally quite high in Victoria, accounting for a majority of the recommended 10% total take of grey kangaroos per annum. Over time, some of this is expected to be replaced by commercial harvesting under the kangaroo harvesting program; however, the extent to which this might occur is currently unknown.

Given that there are no plans to impose a quota on ATCW numbers, ensuring the total take remains at sustainable levels, within the recommended quota, relies on limiting take under the commercial harvesting program. However, replacing some control under ATCWs with commercial harvesting may have a range of benefits, including improved animal welfare outcomes resulting from the participation of professional harvesters (as opposed to landholders undertaking their own control), and better confidence in the sustainability of kangaroo populations through increased management via quotas. Therefore, in certain circumstances, it may be appropriate to suggest to landholders who are seeking an ATCW that they consider engaging a commercial harvester instead.

7. Review and evaluation

This plan covers the period 1 October 2019 to 31 December 2019. A substantially similar plan will be in place from 1 January 2020 – 31 December 2020, with new quotas applied for that period.

Between 1 October 2019 and 31 December 2020, a review of Victoria's authorising environment to enable commercial kangaroo harvesting will be undertaken. If required, amendments may be proposed to legislative or regulatory arrangements to improve the effectiveness and efficiency of administrative arrangements and further support achievement of goals and objectives. This review may include, but won't necessarily be limited to, licensing arrangements and cost recovery provisions.

Alongside the review of regulatory arrangements, this plan will be measured against its indicators and targets and further changes to arrangements will be made as indicated by the outcomes of that review.

A new plan will be developed to reflect the new arrangements from 1 January 2021.

In the longer term, in addition to improving management of kangaroo populations and harvest management approaches through applying lessons learned, structured evaluations that gauge the effectiveness of the plan in achieving its objectives, as well as the efficiency of the management arrangements in place, should be undertaken regularly. Reporting on the findings is essential in order to make improvements to the program and plan where required.

The kangaroo harvesting program will be regularly evaluated to assess its effectiveness (the impact of the program and success against its goals and objectives) and its efficiency (how processes, including governance and decision-making, are operating, and other measures such as costs and benefits).

The EPBC Act approval of the WTMP will require an annual report to the Australian Government. An evaluation of those aspects of the program that sit outside the EPBC Act approval (e.g. cost benefit analysis, effectiveness of governance arrangements, and administrative efficiency) will also occur on an annual basis.

Renewal of the plan and the EPBC Act approval is typically required after five years. This will provide an opportunity for a comprehensive, rigorous evaluation of the operation of the program over the previous five years.

An assessment of the viability of the program and the kangaroo industry in Victoria will be undertaken on a regular basis to inform future planning.

Appendix 1 – Biology, ecology and conservation of Victorian kangaroos

Distribution and conservation status

Eastern and Western Grey kangaroos are both considered secure in Victoria and nationally. The International Union for the Conservation of Nature (IUCN) regards both species as species of 'Least Concern' due to their wide distribution (see Figures 1 and 2), large populations, occurrence in a number of protected areas, lack of major threats and lack of observable declines.

Since European settlement, macropod populations have dramatically increased. This is thought to be mainly due to the removal of natural predators, an increase in improved pastures across the landscape through the clearing of forests for pasture and grazing, and the proliferation of reliable water sources in previously arid and semi-arid areas (Calaby and Grigg 1989, Pople and Grigg 1999).

Eastern Grey kangaroo

Figure 1: Eastern Grey kangaroo distribution in Victoria

Western Grey kangaroo

Figure 2: Western Grey kangaroo distribution in Victoria

Biology

The Eastern Grey kangaroo is found across the east coast of Australia from northern Queensland to the south-eastern corner of South Australia, and down to Tasmania (Figure 1). It is thought that the development of improved pastures has resulted in an increase in the abundance of Eastern Grey kangaroos and an increase in their range inland westwards due to the increase in watering points for sheep and cattle (Tyndale-Biscoe 2005).

The Eastern Grey kangaroo is an abundant species that occupies a range of habitats including semi-arid mallee scrubs, shrub woodlands and forests (Poole 1982). They are a large kangaroo with grey fur apart from their lighter bellies. Males can reach weights of over 70kg, while females rarely exceed 35kg (Dawson 2012).

In Victoria, the Western Grey kangaroo is found in the western third of the state (Figure 2). It has a lower abundance than the Eastern Grey kangaroo, and although its range seems to have increased in recent times the extent of this increase is unknown (Dawson 2012). The species occurs in a range of habitats including sclerophyll forest, woodland (including mallee), shrubland, heathland and farmland with remnant native vegetation (Coulson 1990, 1993).

Western Grey kangaroos were only recognised as a separate species in the 1970s (Kirsch and Poole 1972), however they are usually browner and slightly more slender in appearance than Eastern Greys (Dawson 2012). They are thought to have diverged from a common ancestor relatively recently (i.e. sometime in the Pleistocene epoch) (Dawson 2012) and as such, differ little in their ecology and biology.

The reproductive biology of Western and Eastern Grey kangaroos has been extensively studied (Tyndale-Biscoe and Renfree 1987); they are seasonal breeders with oestrus and births occurring between September and March and lactational anoestrus (sexual inactivity) between April and August (Poole 1973, 1976). Post-partum ovulation does not occur in either species and, unlike other large macropod species like the Red kangaroo, they do not generally carry dormant embryos in the uterus (known as diapause) (Tyndale-Biscoe 2005). While there is the potential for diapause in Eastern Grey kangaroos (albeit rarely) the function has been completely lost in Western Grey kangaroos (Poole 1975).

These species are gregarious (Southwell 1984a) and occur in mobs that can range from only a few to hundreds (Fletcher 2006). The size of these groups has been found to be positively correlated to the population density in the area (Taylor 1982, Southwell 1984a, Jarman and Coulson 1989) and is also affected by habitat, with groups in dense woodland areas smaller than those at equivalent densities in open cleared pasture habitat (Coulson and Raines 1985, Heathcote 1987, Jarman and Coulson 1989).

Eastern Grey kangaroos are thought to occupy small overlapping home ranges which they show high fidelity to (Jarman and Taylor 1983). These home ranges have been found to be large in cleared agricultural areas (Jarman and Taylor 1983) and in semi-arid areas (e.g. 430 and 528 ha respectively) as compared to areas of mixed woodland and adjacent farmland (e.g. 27 to 158 ha) (Moore, Coulson and Way 2002). Home ranges of Eastern Grey kangaroos in areas of woodland with adjacent farmland may be influenced in their size by disturbance through control by farmers, dogs and domestic stock, with kangaroos remaining close to cover to avoid these disturbances (Moore, Coulson and Way 2002, Viggers and Hearn 2005).

Appendix 2 – Threats and assessment of impacts

Threats

The EPBC Act requires all threats that could negatively impact kangaroo populations or the sustainability of kangaroo harvesting to be summarised in this plan in order to achieve approval as a WTMP. These threats are described in the table below.

Threat	Comments	Selected References
Climate change	The average global temperature is predicted to rise 2-3°C by the end of the century, placing approximately 20-30% of the world's species at risk of extinction. The possible impacts on Victorian kangaroo populations are not well understood, but these could include changes in food availability, fertility, species distribution, and heat-related die-offs.	Ritchie and Bolitho 2008; Dunlop and Brown 2008; Jonzen et al. 2010; IPCC 2007.
Disease	Kangaroos are susceptible to a variety of diseases and parasites. Long-term population monitoring indicates that populations are not significantly impacted by them.	Pople and Grigg 1999
Drought	There is a clear correlation between kangaroo numbers and increases in plant biomass and productivity, influenced by rainfall. Consequently, droughts can dramatically reduce kangaroo numbers. However, kangaroos are well adapted to variable rainfall patterns, with their reproductive patterns enabling populations to recover quickly after drought conditions end. Drought-related mortality has been viewed as intrinsic to kangaroo ecology, with droughts helping to remove less viable individuals from the gene pool.	Caughley et al. 1985, Bayliss 1987; Caughley and Sinclair 1994; McCarthy 1996; Ampt and Baumber 2006; Descovich et al. 2016; Boyle and Hone 2014.
Flood	A study of the short-term effects of flooding on kangaroo populations found they are able to successfully move to higher ground when their usual habitat is flooded. Floods are occasionally associated with localised epizootic disease outbreaks but these are not considered a long-term threat to kangaroo populations.	Olsen and Braysher 2000; Hale 2004.
Habitat loss and modification	Overall, habitat modification has improved conditions for kangaroos. Despite the associated clearing and habitat change, Eastern and Western Grey kangaroos are believed to have increased in numbers since European settlement of Australia. Kangaroo populations benefit from pastoralism but are disadvantaged by intensive agriculture, over-clearing and urbanisation. Predator control and the increased availability of water	Caughley et al. 1984; Archer et al. 1985; Calaby and Grigg 1989; Pople and Grigg 1999; Olsen and Low 2006; Descovich et al. 2016.

	associated with human settlement have also benefitted kangaroos. Habitat loss and modification are not believed to threaten the conservation status of kangaroos.	
Harvesting (genetic impacts)	There is concern that commercial kangaroo harvesting could affect species fitness and evolutionary potential if the harvest selects for fitness traits. In particular, prioritising large kangaroos for their yield is sometimes speculated to affect species fitness. However, comparisons of harvested and unharvested populations do not demonstrate any loss of gene diversity as a result of harvesting. Fitness in large adult males is unlikely to be greater than small adult males, as all will have been subject to viability selection (e.g. through drought, predators and disease) before they are mature enough to breed. Given fluctuations in food availability, the fittest kangaroos are unlikely to be the largest. Additionally, there is limited evidence that shooters specifically target the largest kangaroos. Finally, harvest numbers are too low to remove alleles from the population. The likelihood that kangaroo harvesting has long-term genetic consequences is limited.	Hale 2004; Pople and Grigg 1999; Pople 2006.
Human predation	Despite concern that harvesting could reduce the viability of kangaroo populations, longstanding programs in other Australian states have not had this impact. Changes in the relative value of kangaroo meat, or the extent to which kangaroos are considered a valuable resource, could impact the proportion of the kangaroo harvesting quota that is taken. However, harvest quotas in Victoria will be set conservatively to ensure kangaroo harvesting operates at levels that are considered sustainable. As an additional safeguard, commercial kangaroo harvesting is capable of a significant degree of self-regulation, since the industry is not viable at kangaroo densities that are low enough to threaten the species' viability. Damage mitigation control also poses a risk to kangaroo populations, but kangaroo control undertaken under ATCWs will be counted as part of Victoria's overall sustainable kangaroo harvesting quota and commercial harvest quotas set more conservatively to allow a buffer for ATCW control. Hunting of kangaroos by Victorian Traditional Owners on country is another form of human predation on kangaroos. At present only a small number of Traditional Owner groups have agreements in place that provide for hunting of wildlife for traditional purposes and the impact on kangaroo populations is likely to be negligible.	Pople and Grigg 1999; Dawson et al. 2004; Grigg and Pople 2001; Olsen & Low 2006; Cooney et al. 2012; Lunney 2010; Ampt and Baumber 2006; Hacker et al. 2004.

Predation	Dingoes are considered the only significant non-human predators of mature kangaroos, but foxes and possibly wedge-tailed eagles have been known to prey on young kangaroos. In pastoral areas, it is likely that dingoes would prefer sheep to kangaroos as prey. Victorian dingo populations are small and unlikely to have a meaningful impact on the state's kangaroo population.	Robertshaw and Harden 1989; Marchant and Higgins 1993.
Vehicle collisions	Macropods are not migratory, but have large home ranges and road crossings are frequent. Collision rates are highest at roads with medium traffic volumes, which are low enough not to deter crossing attempts but high enough to present a collision risk. Factors that have been linked with higher macropod road-kill rates include flightiness, which is highest for red and grey kangaroos; drought; and road attributes, such as sharp bends or obstructions that reduce drivers' visibility. Although roads may play a significant role in decreasing the viability of vulnerable and endangered macropod populations, such as the Brush-tailed Rock wallaby, these species will not be harvested.	Bond and Jones 2014; Lee et al. 2010; Lee 2006.

Impacts of harvesting

Repercussions for species, habitats and ecosystems that result from actions outlined in this management plan are not expected to be significant. In some cases, they are likely to be positive.

Impact on kangaroos (individuals or populations)

Overharvest

Although Moloney, Ramsey and Scroggie (2019) found little change in Victoria's kangaroo population between 2017 and 2018, the KPFT Evaluation Report identified overharvesting as one potential threat to kangaroos' sustainability. Victoria's new kangaroo harvesting program is partly an attempt to address this risk. Similar commercial kangaroo harvesting programs have long been established in other Australian states, with research and population monitoring conducted in these jurisdictions demonstrating that harvesting is sustainable if appropriate precautions are taken (see, e.g. Olsen and Low 2006; Pople and Grigg 1999; Cooney et al 2012; Wilson and Edwards 2019). In Victoria, overharvesting will be prevented through regular population monitoring, applying proportional harvest quotas that respond to fluctuating populations, and employing the precautionary principle where appropriate. A harvest quota of 10-20% of the population is generally considered ecologically sustainable, and Victoria's quotas will be set within this range (Caughley et al. 1987; Hacker et al. 2004; Moloney et al. 2019). Historically it has been rare for kangaroo harvesting in Australia to come close to reaching full quotas. For instance, in 2018 the combined commercial harvest for all Australian states amounted 19% of their sustainable quotas (see summary statistics accessible via https://www.environment.gov.au/biodiversity/wildlife-trade/natives#a3).

Potential negative effect mitigated by:

- Regular monitoring and quota-setting to respond to population fluctuations.
- Proportional harvest strategy that sets quotas at levels that are sustainable for kangaroo populations, and allows for uncertainty in population estimates (Milner-Gulland et al. 2001; Caughley 1987).
- If kangaroo populations fall below specified thresholds, harvesting will be suspended or reduced as necessary.
- Population estimates will be based on aerial survey data, which is generally believed to underestimate kangaroo abundance (Pople 2004).

Population demographics

The genetic diversity of species can be influenced by the selective removal of individuals that display specific traits, potentially reducing the species' fitness (Hale 2004; Markert et al. 2010). This could become a risk if harvested kangaroos are selected for specific traits, in numbers that are high enough to have long-term genetic impacts.

Potential negative effect mitigated by:

- Monitoring the sex and size of harvested kangaroos.

Poor animal welfare outcomes

When kangaroos are shot, there is a risk that it will not be done humanely. There are also welfare issues associated with harvesting female kangaroos that are responsible for pouch young or young-at-foot. However, professional harvesting under the kangaroo harvesting program would result in improved animal welfare outcomes compared to drought-induced starvation or relatively unregulated damage mitigation control (Wilson and Edwards 2019). Raising commercial harvesting rates when kangaroo populations peak, through the use of proportional harvest strategies, could also prevent precipitous troughs in less favourable seasons, resulting in better animal welfare outcomes (see, e.g. Hayward et al 2019; Hacker et al. 2004).

Potential negative effect mitigated by:

- The requirement for all kangaroos harvested under Victoria's Kangaroo Harvest Management Plan to be humanely killed in accordance with the Commercial Code.
- The requirement for harvesters to demonstrate firearms proficiency before being authorised

- Providing the Commercial Code to all authorised harvesters; in addition, replicating key requirements from the Commercial Code in harvester authorisation conditions
- Compliance checks and audits on field harvesters to monitor compliance with animal welfare requirements

Impact on habitats and ecosystems

Commercial kangaroo harvesting would have both positive and negative impacts on habitats and ecosystems.

Impacts on habitats are likely to be positive overall, with biodiversity benefits resulting from grazing pressure management (Choquenot et al. 1998). High kangaroo densities have been associated with reduced occurrence, height and seeding rates of some native grasses; reduced habitat quality for some ground-nesting birds; and reduced habitat quality for eastern barred bandicoots (Neave and Tanton 1989; Winnard and Coulson 2008). Grazing trials in south-west Queensland found that kangaroo grazing pressure limits regeneration of native grasses in areas that have been excluded from livestock grazing (Page and Beeton 2000). Kangaroo harvesting allows grazing pressure to be managed, potentially resulting in the regeneration of native vegetation and a reduction in the spread of non-palatable weed species. It is also possible that reduced competition from kangaroos would benefit introduced herbivores, but Victoria's ongoing invasive species control measures and the relatively small number of kangaroos harvested are likely to limit the extent of this impact.

Commercial kangaroo harvesters could negatively impact habitats by introducing or dispersing invasive weeds. However, there is no evidence that commercial kangaroo harvesters contribute to the introduction and/or spread of invasive weeds more than other land users. Further, commercial harvesters are unlikely to cause erosion or land degradation as they generally operate on existing tracks and are reluctant to risk damage to their vehicles by venturing off-road (Wilson and Read 2003).

If offcuts produced when field processors dress carcasses at the site of shooting are left behind by shooters, it could provide a food resource for predators such as foxes, wild dogs or raptors (Read and Wilson 2004). If artificially high predator populations are maintained, this could threaten their prey, potentially including endangered fauna. The effect may be limited by the status of red foxes and wild dogs as established pest animals under Victoria's *Catchment and Land Protection Act 1994,* which imposes a responsibility on landowners to take all reasonable steps to prevent the spread of, and as far as possible eradicate, established pest animals from their land. Positive effects of kangaroo offcuts could include providing sustenance for native scavengers and improving soil quality.

Potential negative impacts of kangaroo harvesting on habitats and ecosystems are managed by:
- Minimising the presence of offcuts in ecosystems, including by mandating full carcass shooting (i.e. not permitting a skin-only trade) and requiring carcasses not taken from the harvest property to be buried.
- Continuing to manage introduced predators, such as foxes.

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Schedule – Quota report for the period 1 October 2019 – 31 December 2019*

Quotas for commercial take for the period 1 October 2019 to 31 December 2019 are presented in **Table 1**.

Table 1. Commercial quotas for grey kangaroos in each Victorian harvest zone for the period 1 October – 31 December 2019.

Harvest Zone	Commercial quota
Mallee	485
Upper Wimmera	945
Lower Wimmera	4,115
Central	2,810
Otway	1,865
North East	2,945
Gippsland	925
Statewide commercial harvest total	**14,090**

These quotas are calculated from an estimate of total sustainable harvest of Victorian grey kangaroos that accounts for both ATCW and commercial harvesting allocations (**Table 2**). Total rates of take are 10% of the estimated population per annum (divided by four to allow for this being an interim quota for the final quarter of 2019), to give an effective rate of take of 2.5% of the estimated total population during this period.

Table 2. Recommended total levels of take in each Victorian harvest zone for the period 1 October – 31 December 2019.

Harvest Zone	Total take
Mallee	1,187
Upper Wimmera	2,308
Lower Wimmera	10,062
Central	6,874
Otway	4,563
North East	7,202
Gippsland	2,268
Statewide total	**34,465**

Given that there are no plans to cap ATCW numbers, ensuring the total take remains at sustainable levels, within the recommended quota, relies on further limiting take under the commercial quota.

The commercial quotas for this period have been calculated based on an assumption that levels of control under ATCW will occur at a similar rate to the past four years. Basing the assumption on only the previous four years of data, rather than a longer-term dataset, is appropriate given that numbers of kangaroos approved for control to date in 2019 are equivalent to the same time in the previous four years (i.e. higher than is typical for this time of year compared to longer-term numbers).

*This schedule will be replaced in the *Victorian Kangaroo Harvest Management Plan 2020* with a schedule containing commercial quotas for 2020.

The commercial quota calculations assume that additional ATCW control that was driven by the Kangaroo Pet Food Trial (KFPT) over the past four years will largely transfer across to the harvesting program.

The proportion of the total quota allocated as commercial harvest quota may change in future once more is learned, through implementation, about transfer from the ATCW system to the harvest system. As noted under Objective 1, quotas will be monitored (and potentially adjusted) at quarterly intervals between October 2019 and December 2020.