NSW NATIONAL PARKS & WILDLIFE SERVICE

Environmental Risk Assessment

Aerial baiting with sodium fluoroacetate (1080) for wild dog and fox control 2022–2027

Cover photo: Aerial photo of Mutawintji National Park. John Spencer/DPIE

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Environment and Heritage
Department of Planning and Environment
Locked Bag 5022, Parramatta NSW 2124
Phone: +61 2 9995 5000 (switchboard)
Phone: 1300 361 967 (Environment, Energy and Science enquiries)
TTY users: phone 133 677, then ask for 1300 361 967
Speak and listen users: phone 1300 555 727, then ask for 1300 361 967
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

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Contents

Summary

Wild dogs and foxes are listed as priority pests in all regions of New South Wales, which places a duty on private landholders and public land managers under the *Biosecurity Act 2015* to minimise the negative impacts of these species on their land and neighbouring lands.

The effective control of foxes is also imperative because foxes have been one of the major drivers of mammal extinctions in Australia and have been identified as having an ongoing impact on more than 100 threatened species in New South Wales. Failure to control foxes will result in ongoing declines and potentially local extinctions of native fauna. The impact of foxes is likely to be exacerbated by the effect of the 2019–20 bushfires.

This environmental risk assessment (ERA) evaluates the proposed aerial baiting of wild dog and fox populations using sodium fluoroacetate (1080). The proposed aerial baiting program will be implemented over a 5-year period from 2022 to 2027 by the NSW National Parks and Wildlife Service (NPWS), across NPWS estate and landowner-approved neighbouring public and private lands.

The use of 1080 reflects the fact that wild dogs and foxes are significantly more susceptible to sodium fluoroacetate (1080) than native wildlife. Aerial baiting with 1080 is currently the only cost-effective method for landscape control of foxes and wild dogs.

This risk assessment concludes that the proposed aerial baiting program:

- will be carried out in a manner consistent with all relevant legislation
- involves an increase in overall baiting effort across New South Wales compared to pre-2020 because it now occurs across a broader geographic area
- is consistent with the previous 2 years (2020 and 2021) and the available baiting prescriptions remain consistent (up to 40 baits per kilometre for wild dogs and up to 10 baits per kilometre for foxes)
- is the only viable method for landscape-scale control of foxes and wild dogs
- gives effect to the statutory obligation on NPWS under the Biosecurity Act in relation to the control of wild dogs and foxes
- delivers 1080 baits in a manner that will not have an adverse impact on native wildlife populations
- will reduce fox densities and improve the prospects for survival of native wildlife including threatened species
- will reduce the economic impact of wild dogs and foxes on landholders
- will avoid impacts on wild dogs in selected parts of the NPWS estate where baiting will not occur, to allow wild dogs to fulfil the ecological role of the dingo in those locations
- is unlikely to lead to any increase in feral cat impacts.

The ERA has been prepared to review the potential impacts on native wildlife and to identify appropriate risk controls to avoid or minimise these impacts. It replaces the previous conservation risk assessment prepared in 2020.

Implementation of the baiting program is subject to ongoing review and, if required, revision. This will be reflected as necessary with updates to this ERA.

This ERA should be read in conjunction with the relevant legislative and NPWS policy documents (as listed within the ERA). Each aerial baiting operation must be preceded by a specific risk assessment conducted by an NPWS Authorised Control Officer, of the form given in Appendix A of this ERA, which must be reviewed and approved by an Authorised Control Officer employed by NPWS.

1. Introduction

1.1 Background

Under the *Biosecurity Act 2015*, the NSW National Parks and Wildlife Service (NPWS) has a general biosecurity duty to manage pest animals such as foxes (*Vulpes vulpes*) and wild dogs (*Canis lupis* subspp.). This duty requires the occupier of land (both public and private), to ensure that, so far is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised. As a public land manager with responsibility for the care and control of over 9% of New South Wales (NSW), NPWS carries out control programs for these pests – often with the cooperation of neighbours including wild dog associations, Local Land Services (LLS) and other land management agencies. The methods used include baiting, using sodium fluoroacetate (1080) as the toxin.

1080 is an odourless, tasteless white powder that is diluted with water to concentrations specific for the species being targeted. Many Australian native animals have a high tolerance to 1080 because the synthetically manufactured chemical used in baits is the same as the natural sodium fluoroacetate poison found in over 30 Australian native plants. It is highly soluble and biodegradable, breaking down in soil and carcasses. All Australian states and territories endorse 1080 baiting as part of an integrated approach to pest animal management. In Australia, 1080 supply and use is highly regulated. It is a restricted chemical product and can only be supplied to persons who are authorised to use the product under the laws of a state or territory (PestSmart 2017).

Aerial baiting with 1080 is one of a range of methods employed to meet the objectives of NPWS wild dog and fox control programs. It is currently the safest, most efficient and cost-effective technique available to reduce wild dog and fox abundance, particularly in areas where vehicle/ground access is limited. Baiting operations can be conducted over multiple tenures to achieve effective control across the landscape. The term ‘wild dog’ refers to dingos (*Canis lupis dingo*), feral dogs (*Canis lupis familiaris*) and their hybrids. Most wild dogs in NSW are hybrids. The *NSW Wild dog management strategy 2022–2027* (DPI 2017) promotes a balance between managing wild dogs in areas where they have negative impacts and preserving the ecological role of the dingo. Consistent with the wild dog management strategy, NPWS aerial baiting operations that target wild dogs focus on reducing negative impacts to neighbours’ livestock, and are not generally undertaken in parts of the NPWS estate away from livestock production areas, to allow wild dogs to fulfil the natural ecological role of the dingo in these locations.

The effective control of foxes is also imperative. Foxes have been one of the major drivers of mammal extinctions in Australia and have been identified as having an ongoing impact on more than 100 threatened species in NSW. Failure to control foxes will result in ongoing declines and potentially local extinctions of native fauna. Foxes also have significant negative impacts on livestock.

This environmental risk assessment (ERA) has been prepared to review any potential risks to native wildlife from NPWS aerial baiting programs and to identify appropriate risk controls to avoid or minimise impacts. It replaces the 2020–2022 conservation risk assessment (DPIE 2020) and includes updated information from recent research and the monitoring of baiting operations conducted during the past 5 years. This ERA is valid for 5 years and will be reviewed and revised as necessary following any changes to the guiding regulatory and policy documents listed in Section 1.2.

The use of pesticides, including aerial baiting, is not considered an ‘activity’ for the purposes of Division 5.1 of the Environmental Planning and Assessment Act 1979 and, in some circumstances, may be considered ‘exempt development’. This means a statutory

environmental impact assessment under NSW legislation is not required. Pesticide use in NSW is extensively regulated by the Australian Pesticides and Veterinary Medicines Authority (APVMA) and the NSW Pesticides Act 1999 (including relevant pesticide control orders [PCOs] issued by the NSW Environment Protection Authority). Under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), approval from the Australian Minister for the Environment is required if an action has, will have, or is likely to have a 'significant impact' on a matter of national environmental significance. The south-eastern mainland population of the spotted-tailed quoll (*Dasyurus maculatus maculatus*) is listed as endangered under the EPBC Act and, as such, is a matter of national environmental significance. In determining that NPWS aerial baiting programs do not require Ministerial approval, (i.e. because they are not likely to have a significant impact on the spotted-tailed quoll), the Australian Government relied on such operations being undertaken in compliance with the state's best practice guidelines, the preparation of a risk assessment, and clear documentation of appropriate mitigation measures to avoid impacts on spotted-tailed quoll populations. In addition to this ERA, each aerial baiting operation must be preceded by a specific risk assessment, of the form given in Appendix A of this ERA, which must be reviewed and approved by an Authorised Control Officer (ACO) employed by NPWS.

The implementation of the aerial baiting program as set out in this ERA is not likely to have a significant impact on a matter of national environmental significance.

1.2 Scope

This ERA has been prepared in accordance with NPWS policy. Its purpose is to define and communicate the methods and details of the NPWS aerial baiting program and address the requirements of applicable legislation, as well as identify mitigation measures to avoid or minimise potential environmental impact risks.

The scope of activities covered by this ERA is:

- aerial baiting activities undertaken by NPWS:
  - across NSW NPWS estate (as well as within neighbouring public and private lands where agreement from the respective adjoining land manager is obtained and where baiting is part of a cooperative, cross-tenure baiting program)
  - targeting wild dogs and foxes
  - utilising both rotary and fixed-wing aircraft
  - using the legally prescribed dose of sodium fluoroacetate (1080) in meat baits
  - at a pre-determined rate, consistent with regulatory requirements
  - at any time of the year, for a period of 5 years from 2022
  - in accordance with the framework of legislation, procedures and guidelines that direct the management, oversight and conduct of aerial baiting programs by NPWS.

1.3 Regulatory and guiding documents

This ERA forms part of the framework of legislation, procedures and guidelines that direct the conduct of aerial baiting programs by NPWS. Vertebrate pesticides programs carried by NPWS are done so with authority given under section 171 of the National Parks and Wildlife Act 1974.

All NPWS aerial baiting will be carried out in accordance with the controls imposed through requirements of the following documents (these should be read in conjunction with this ERA):

- *Pesticide control (1080 bait products) order 2020* (the PCO) (EPA 2019)
- *Guidelines for undertaking wild dog and fox aerial baiting on National Parks and Wildlife Service estate* (NPWS 2020)
- Minor use permit – PER83516 – issued by the APVMA for aerial baiting of wild dogs at a rate higher than that specified on the label (APVAM 2018)
- *NPWS Vertebrate pesticides standard operating procedures* (NPWS 2019)
- *Pesticide use notification plan* (DPE 2022)
- Department of Primary Industries' *Vertebrate pesticides manual* (DPI 2020)
- *Pesticides Act 1999*
- Pesticides Regulation 2017
- *Biosecurity Act 2015*
- *NSW Wild dog management strategy 2017–2021* (DPI 2017).

2. Program objectives

Wild dog and fox control on NPWS estate is part of a strategic and integrated approach to reduce the negative impacts of these pests. The primary impact of wild dogs is their effect on agricultural productivity. Foxes have negative impacts on both agriculture and the environment. The objectives of the statewide aerial baiting program are:

- broadscale reduction in fox populations
- targeted reduction in wild dog populations
- maintenance of, or an increase in, the relative abundance of native fauna due to a reduction in predation
- no negative impact on native fauna populations
- improved ecosystem condition
- a reduction in the economic costs to primary producers because of stock losses caused by wild dogs and foxes.

Wild dog control operations are normally undertaken cooperatively over multiple tenures in accordance with the relevant wild dog management plans. Fox control for the protection of agriculture can be undertaken concurrently with wild dog control as part of wild dog management plans, as the same techniques can be used to achieve control of both species at the same time.

The primary reason NPWS undertakes fox-specific control programs is to protect native wildlife, however, NPWS does undertake some dedicated fox control programs to protect livestock on neighbouring properties.

Aerial baiting is a well-refined technique which has been widely employed by NPWS and other land management agencies for more than 20 years. The NPWS aerial baiting program, using helicopters and/or fixed-wing aircraft, involves operations using the following prescriptions:

- aerial baiting with fox baits at up to 10 baits per linear kilometre
- aerial baiting with fox baits at up to 10 baits per linear kilometre and lines approximately 1 kilometre apart
- aerial baiting with wild dog baits at up to 10 baits per linear kilometre and lines approximately 1 kilometre apart
- aerial baiting with wild dog baits at up to 40 baits per linear kilometre in strategic areas such as known wild dog paths in those regions included in the APVMA off-label permit.

The precise areas to be baited, and the baiting prescription in each area, is determined by NPWS specialist staff, often in consultation with threatened species staff, relevant wild dog control groups and NPWS park neighbours.

It is estimated that the aerial baiting program will be approximately 30,000 kilometres of baiting per year.

Aerial baiting is normally only one element of an integrated pest control program that includes ground baiting, trapping and shooting. Although aerial baiting can remove over 90% of wild dogs and foxes in the landscape (Fleming et al. 2014), the remaining pest animals can still cause significant problems and often need to be removed by these other techniques. All NPWS aerial baiting operations are preceded by the completion of an operation-specific risk assessment, to be reviewed and approved by an ACO employed by NPWS. An example of the proforma used for this risk assessment is included as Appendix A. The risk matrix is used as per the NSW Department of Primary Industries (DPI) *Vertebrate pesticide manual* (DPI 2020). Following completion of the risk assessment the relevant NPWS Park Operations Director must then approve the aerial baiting operation before it can proceed, as per the NPWS aerial baiting guidelines for wild dogs and foxes (NPWS 2020) and the NPWS *Pesticide Use Notification Plan* (DPE 2022).

3. Program justification

Wild dogs and foxes have been identified as priority pest animals by all 11 regional pest animal committees (RPACs) in NSW (LLS 2018a–k). NPWS is represented on all 11 RPACs and conducts wild dog and fox control for the following reasons:

- **To address our biosecurity duty** – Under section 22 of the Biosecurity Act, NPWS has a general biosecurity duty to manage pest animals such as foxes and wild dogs. This duty requires the occupier of land (both public and private) to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised. Wild dogs and foxes meet the definition of 'pest' as defined in the Biosecurity Act (section 15) and have the potential to give rise to an adverse effect on the economy, the environment or the community. Accordingly, NPWS is required to minimise the impact of wild dogs and foxes. Aerial baiting as defined in this ERA is a key element of the NPWS response to the duty imposed under the Biosecurity Act.
- **To reduce the economic impact of wild dogs and foxes** – Across NSW, wild dogs and foxes regularly prey on livestock. This results in significant financial loss for individuals and communities. It has been estimated that the statewide annual production losses associated with wild dogs is $17.16 million, and $11.66 million for foxes (in 2013–14 dollar terms), excluding control costs (McLeod 2016). This impact can also take an (incalculable) emotional toll on individuals, families and communities. NPWS works closely with LLS, other public land managers and neighbouring private landholders to implement appropriate control programs to minimise the economic impact, and the social impact, of wild dogs and foxes.
- **To conserve native biodiversity** – A fundamental objective of the NSW system of national parks and reserves is the conservation of native biodiversity. In NSW, introduced pests, especially foxes and cats, have the greatest negative impact on native fauna (Cresswell and Murphy 2017), and it is critical that actions are taken to reduce the impact of these predators. Predation by the European red fox is listed as a key threatening process (KTP) under Schedule 4 of the *Biodiversity Conservation Act 2016*. The NSW Scientific Committee final determination of the KTP listing noted predation by the fox is a major threat to the survival of native Australian fauna, with non-flying mammals weighing between 35 and 500 grams and ground-nesting birds thought to be at greatest risk. Foxes impact on at least 110 threatened species in NSW (Coutts-Smith et al. 2007), they inhabit more than 98% of the State and are abundant in all regions (West and Saunders 2006). Fox densities vary greatly across vegetation types and locations, with published estimates in different locations ranging from as low as 0.2 foxes per square kilometre to as high as 7.2 per square kilometre (Saunders et al. 1995).

  Priorities and actions for the control of foxes to protect threatened species are documented in the NPWS regional pest management strategies, which are consistent with the statewide approach outlined in the NSW *Saving our Species* (SoS) program. The SoS program has been established to maximise the long-term security of threatened species and threatened ecological communities and to minimise the impacts of KTPs on biodiversity and ecological integrity. Priorities for fox management are included within individual SoS threatened species projects as well as the KTP strategy addressing predation by the European red fox.
- **To manage NPWS estate effectively** – Under the National Parks and Wildlife Act, plans of management for parks must consider the identification and mitigation of threatening processes such as pest animals and weeds. These plans must also consider the social and economic context of the park to ensure, for example, that the impacts of pest species in the park do not impact neighbouring lands, and that control programs are coordinated across different tenures.

4. Consideration of alternative control options

Alternative control options to 1080 aerial baiting are considered below.

Options	Assessed likely outcome
Do nothing	Fox populations will increase, resulting in increased predation of native fauna and localised declines and possible extinctions. NPWS may be in breach of the Biosecurity Act.
Do not bait for wild dogs	Wild dog populations will increase. Neighbouring stock losses will increase, resulting in increased financial and social costs to the agricultural sector and rural communities. NPWS may be in breach of the Biosecurity Act.
Reduce geographic coverage of fox baiting	Fox populations will increase, resulting in increased predation of native fauna and localised declines and possible extinctions.
Reduce geographic coverage of wild dog bating	Consistent with the *NSW Wild dog management strategy* (DPI 2017) this technique is already being employed. NPWS aerial dog baiting operations will focus on areas adjacent to livestock production, leaving wild dogs to fulfil the natural ecological role of the dingo in the more remote parts of the NPWS estate.
Alternative toxins	Para-aminopropiophenone (PAPP) is another toxin registered for wild dog and fox control. Commercially available wild dog baits contain 1000 milligrams (mg) of PAPP. A range of native fauna are susceptible to PAPP at this dose rate. Lace monitors (*Varanus varius*) have an LD_{50}* of 12.9 mg (Frappell 2007), southern brown bandicoots (*Isoodon obesulus*) 5.4 mg and spotted-tailed quolls (*Dasyurus maculatus*) 124 mg (NWR 2006). As a result, PAPP poses an unacceptable risk to native species and cannot be considered as an alternative to 1080 for wild dog and fox aerial baiting programs.
Ground bait only	Due to the inaccessible nature of much of the NPWS estate, ground baiting on its own cannot achieve the landscape coverage required for effective control. Ground baiting is used in conjunction with other pest control techniques to complement aerial bating and optimise results.

* LD_{50} is the lethal dose of a toxin required to kill 50% of a test population.

5. Program details

Program details	
Program timeframe	2022 to 2027
NPWS estate to be targeted	This ERA applies to all lands managed by NSW NPWS (i.e. the NPWS estate). The precise areas to be baited and the baiting prescription in each area are determined by NPWS specialist staff, often in consultation with threatened species staff, relevant wild dog control groups and NPWS park neighbours.
Target species	Wild dogs and foxes
Vertebrate pesticide to be used including bait type(s)	1080 vertebrate pesticide, using fresh meat baits*
Application/Distribution method(s)	Aerial baiting using both rotary and fixed-wing aircraft
Application rates	See Section 5.1

* Only fresh meat baits will be used for wild dog control during NPWS aerial baiting. Fresh baits are preferred for foxes, however, other baits permitted by the current PCO or the DPI *Vertebrate pesticide manual* may be used for aerial baiting of foxes, as per the guidelines for undertaking wild dog and fox aerial baiting on NPWS estate.

5.1 Aerial baiting application rates

NPWS has considered available literature, including recent research and associated reports submitted by NSW DPI to the APVMA, regarding field trials that compare the efficacy of 1080 aerial baiting for wild dogs at zero, 10 and 40 baits per linear kilometre (Ballard et al. 2020; DPI 2018; Fleming and Ballard 2014). This research recommends aerial baiting be carried out at rates of 40 baits per kilometre rather than 10 baits per kilometre to maximise wild dog mortality in strategic areas in eastern NSW.

Baiting at the higher rate is important if the objective is to effectively reduce wild dog numbers and their impacts. In response to this research, the APVMA issued an off-label permit for the use of 40 wild dog baits per kilometre in sections of eastern NSW (APVMA 2018).

To ensure that grid baiting does not exceed the ground baiting density requirements, NPWS will implement grid pattern baiting at 10 baits per kilometre along parallel lines approximately 1 kilometre apart. Similarly, the spacing of 40 baits per kilometre on strategic baiting lines targeting areas such as known wild dog paths (e.g. ridge lines), will be designed to not exceed these ground baiting density requirements. The various aerial baiting options and relevant prescriptions are as set out in Table 1.

Table 1 Prescriptions for fresh meat baits for aerial baiting of foxes and wild dogs

Target	Bait weight* / 1080 dose	Rate	Application
Fox	80 g / 3 mg	10 baits per km	The locations of bait lines will target areas where they will reduce the impact on livestock and wildlife from foxes.
Fox	80 g / 3 mg	10 baits per km (linear) and lines approx. 1 km apart	The locations of bait lines will target areas where they will reduce the impact on livestock and wildlife from foxes.
Wild dog / Fox	200 g / 6 mg	10 baits per km (linear) and lines approx. 1 km apart	The locations of bait lines will target areas where they will reduce the impact of livestock and wildlife from wild dogs and foxes.
Wild dog	200 g / 6 mg	40 baits per km	Targeted areas of focused wild dog control along linear routes such as known wild dog paths (e.g. ridge lines). Primarily used for areas interfacing with agricultural production or neighbouring public and private lands (with agreement from respective adjoining land manager where part of a cooperative, cross-tenure baiting program).

* Minimum post-drying weight in grams (g).

All aerial bait lines will be developed in consultation with NPWS Operations Branch staff and be mapped on a geographic information system (GIS), consistent with the prescriptions outlined in Table 1. Each baiting program must have its own, individual application approved by the relevant Park Operations Director. All aerial baiting applications will be checked by the Feral Animal and Weeds Unit prior to the Park Operations Director approving the application.

5.1.1 Modifications to lower bait rates

When targeting wild dogs, the rate identified in Table 1 will be modified to a lower bait rate where one or more of the following applies:

- the ACO risk assessment determines there is an unacceptable level of risk at the maximum rate and the ACO prescribes an alternative, lower rate
- an efficient, integrated control program is already providing effective results
- a more efficient aerial bait rate provides greater spatial coverage within the control area. For example, for the same cost, a program can cover a larger area by aerial baiting 100 kilometres at 30 baits per kilometre as opposed to 75 kilometres at 40 baits per kilometre.

Where possible, the NPWS ACO's risk assessment of the on-park baiting rate will consider the desirability of bait rates consistent with those being applied on other adjacent tenure/s as part of any cooperative baiting program. Where the bait rates are not consistent across tenure boundaries, the reasons will be stated in the application to be considered by the NPWS Park Operations Director.

6. Consideration of impacts

6.1 Threatened species and native wildlife

1080 baiting programs, using meat baits, as carried out in accordance with requirements set out in the current PCO have been demonstrated to have minimal impact on native wildlife, including threatened species. The use of 1080 reflects the fact that wild dogs and foxes are significantly more susceptible to sodium fluoroacetate (1080) than native wildlife (McIlroy 1986).

After an extensive series of targeted research projects, McIlroy (1999) found there is no definitive evidence of any populations of common native animals in NSW at population-level risk from 1080 meat baiting programs. The susceptibility of a species to 1080 baiting with fresh meat baits varies according to a combination of their susceptibility to 1080, their ability to locate and consume sufficient poisoned bait material, and their ecological characteristics. For example, although carnivorous native species such as goannas and raptors are known to consume fresh meat baits, they are highly tolerant to 1080. Wedge-tailed eagles (*Aquila audax*) are at least 85 times more tolerant than wild dogs (McIlroy 1984), and lace monitors are at least 900 times more tolerant of 1080 than wild dogs (McIlroy et al. 1985).

Spotted-tailed quolls were the only species identified by McIlroy (1999) as being potentially at risk from aerial baiting in selected NSW national parks. This species is 17 times more tolerant to 1080 than wild dogs (McIlroy 1981b).

The impact of aerial baiting with 1080 meat dog baits on spotted-tailed quolls has been investigated in 4 separate studies in NSW:

- Claridge and Mills (2007)
- Körtner (2007)
- Körtner and Watson (2005)
- Claridge et al. (2021).

The results of these investigations and subsequent research papers were taken into consideration by the NSW Scientific Committee established under the former Threatened Species Conservation Act (now Biodiversity Conservation Act). In 2008, the committee determined that in relation to 1080 poison baiting used for the control of vertebrate pest animals:

> *there is currently no substantive evidence that, in NSW:*
>
> *a. it (1080) adversely affects threatened species, populations, or ecological communities, or*
>
> *b. could cause species, populations, or ecological communities that are not threatened to become threatened.*

6.1.1 Quoll research findings

In a study in a rainshadow woodland in southern NSW, local quolls were radio-collared and monitored. Aerial baiting at a rate of 10 baits per kilometre showed no observable impact on these quolls (Claridge and Mills 2007). During this study, it was confirmed that several quolls were exposed to 1080 baits, however none died as a result. Similar findings were recorded by Körtner and Watson (2005) and Körtner (2007) in northern NSW, where baiting rates varied from 10 baits per kilometre up to 40 baits per kilometre. In both studies, quolls were again found to encounter and ingest baits, and survived after the program. Although a small number of individual quolls died during these studies, no mortalities could be directly

attributed to 1080, whereas a number of observed quoll deaths were directly attributed to predation.

A recent synthesis of quoll research suggests that lethal control of wild dogs and foxes through baiting programs has likely benefited the persistence of quoll populations in NSW and south-east Queensland (Fleming and Ballard 2019).

In his independent review for the Australian Government on the effect of large-scale 1080 baiting programs for wild dogs and foxes on the spotted-tailed quoll, McIlroy (2007) concluded that aerial baiting up to 40 baits per kilometre is unlikely to have a significant impact on most spotted-tailed quoll populations, but noted the viability of small fragmented populations was uncertain. However, improved knowledge of quoll distribution has since identified that there are no known small fragmented populations of quolls on NPWS estate in NSW. As shown in Figure 1, there are a large number of records of the species in the eastern third of the State, and the contiguous nature of those records in geographic space represents a single closely linked interbreeding meta-population.

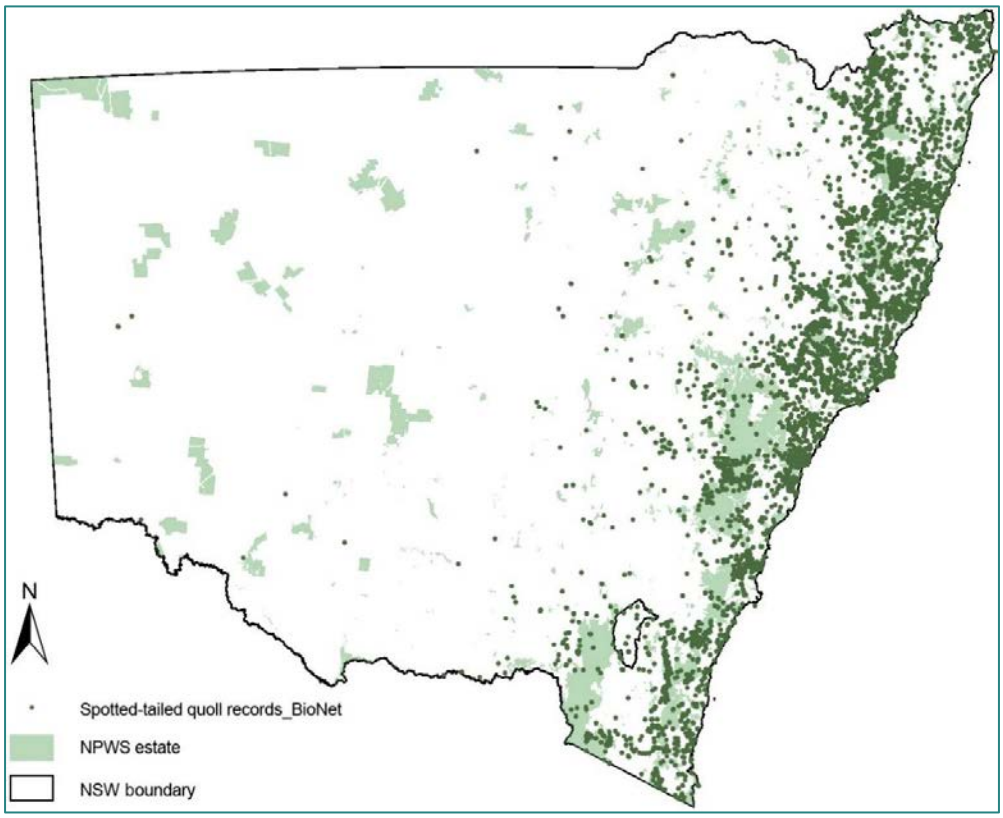

Figure 1 NSW BioNET Atlas records of the spotted-tailed quoll (*Dasyurus maculatus*) across the State

The record distribution highlights the widespread occurrence of the species across the eastern third of the State, with concentrations of records either side of the Great Dividing Range and Coastal Escarpment.

During the spring breeding of 2016, Claridge et al. (2021) live-trapped, radio-tracked and followed the fate of adult female quolls and their pouch young through aerial baiting programs in northern and southern NSW. Despite being exposed to aerially delivered 1080 injected meat baits at a rate of 40 baits per kilometre, no collared adults died, and juvenile recruitment was normal. The implications of these findings show that aerial baiting can also be carried out during spring breeding months without negative impacts on quolls.

A table describing native wildlife at significant risk without predator control can be found in Appendix B.

6.2 Landslide and rockfall

No landslide or rockfall hazards are associated with the implementation of 1080 aerial wild dog and fox baiting as described in this ERA and carried out in accordance with the requirements of the relevant guiding and regulatory documents as set out in Section 1.3.

6.3 Soil and erosion

No soil and or erosion hazards are associated with the application of 1080 aerial wild dog and fox baiting as described in this ERA and carried out in accordance with the requirements of the relevant guiding and regulatory documents as set out in Section 1.3.

6.4 Aboriginal cultural heritage

Sites or items of Aboriginal cultural heritage can be found across the NPWS estate. Due to the statewide scope of this ERA, it is not possible to provide a comprehensive list of all cultural heritage places or item locations. 1080 aerial baiting, carried out in accordance with the PCO and related guiding documents, is not likely to have any impact on these sites or heritage items. However, the *Due diligence code of practice for the protection of Aboriginal objects in New South Wales* (DECCW 2010) needs to be considered to minimise the risk of impacting on Aboriginal cultural heritage values, particularly in areas of known significance to the Aboriginal community.

Ground disturbance (i.e. for 1080 disposal/burial pits) will not occur until an ACO risk assessment identifying a suitable location is completed and approved. Unexpected heritage finds will be managed in accordance with the NPWS policies and cultural heritage protocols.

Areas of known cultural connection should be considered when identifying areas of control in the development of wild dog management plans.

6.5 Historic heritage

No negative impacts to historic heritage sites or items are associated with the implementation of 1080 aerial wild dog and fox baiting as described in this ERA and carried out in accordance with the requirements of the relevant guiding and regulatory documents as set out in Section 1.3

6.6 Matters of national environmental significance

Under the Commonwealth EPBC Act, approval from the Australian Minister for the Environment is required if an action has, will have, or is likely to have a ‘significant impact’ on a matter of national environmental significance. The south-eastern mainland population of the spotted-tailed quoll is listed as endangered under the EPBC Act and, as such, is a matter of national environmental significance. In determining that NPWS aerial baiting programs do not require Ministerial approval, (i.e. because they are not likely to have a significant impact on the spotted-tailed quoll), the Australian Government relied on such operations being undertaken in compliance with the state’s best practice guidelines, the preparation of a risk assessment, and clear documentation of appropriate mitigation measures to avoid impacts on spotted-tailed quoll populations. As per Sections 6.1 and 6.1.1 of this ERA, this program is not likely to have a significant impact on a matter of national environmental significance.

6.7 Wilderness

No negative impacts to wilderness values are likely to occur as a result the implementation of 1080 aerial wild dog and fox baiting as described in this ERA and carried out in accordance with the requirements of the relevant guiding and regulatory documents as set out in Section 1.3.

6.8 Coastal wetlands and littoral rainforests

There are no identified hazards or negative impacts to coastal wetlands or littoral rainforests associated with the implementation of 1080 aerial wild dog and fox baiting as described in this ERA and carried out in accordance with the requirements of the relevant guiding and regulatory documents as set out in Section 1.3.

6.9 Sensitive coastal areas

There are no identified hazards or negative impacts to sensitive coastal areas associated with the implementation of 1080 aerial wild dog and fox baiting as described in this ERA and carried out in accordance with the requirements of the relevant guiding and regulatory documents as set out in Section 1.3.

6.10 Water courses and water bodies

The PCO requires that any 1080 disposal pit must be clear of waterways (permanent or ephemeral), and minimum baiting distance restrictions require that baits are not applied in areas where they can be washed into or contaminate surface or ground waters.

The PCO requires that 1080 wild dog and/or fox baits must not be laid:

- within 20 metres of a domestic water supply by helicopter, or
- within 100 metres of a domestic water supply when using a fixed-wing aircraft.

Water courses and water bodies will not be impacted by the implementation of 1080 aerial wild dog and fox baiting programs as described in this ERA and carried out in accordance with the requirements of the PCO and other relevant guiding and regulatory documents as set out in Section 1.3.

6.11 Amenity

6.11.1 Air

Packaging that has contained 1080 or other ancillary items used in the preparation of 1080 meat baits or cleaning of preparation areas, may be burnt under the Clean Air Approval (Burning of 1080 packaging and ancillary items) (New South Wales Government Gazette No 270). The PCO contains strict provisions on burning requirements, to minimise any impacts to air quality. This includes ensuring that any burning is carried out at least 500 metres from any habitation.

The location of disposal sites, including for burning, are determined through an ACO risk assessment, requirements of that risk assessment must be met.

6.11.2 Noise

Aircraft noise is considered during program planning. Aerial baiting programs adjacent to populated areas will consider the impacts of aircraft activity, and where necessary aircraft will be selected to minimise these impacts (e.g. fixed-wing over rotary blades).

6.12 Waste management

Any waste generated by the program will be disposed of as per the requirements of the PCO and the associated approved ACO risk assessment.

As described in Section 6.11.1, approved 1080 waste disposal methods include burning in compliance with the PCO, ACO risk assessment and burning approval.

Burial of waste is also allowed under the PCO requirements. The location of burial pits will be determined through the ACO risk assessment to ensure no impact to potential heritage sites or sensitive environmental areas (see Section 6.4).

6.13 Social or economic impacts

Across NSW, wild dogs and foxes regularly prey on livestock. This results in significant financial loss for individuals and communities. It has been estimated that the statewide annual production losses associated with wild dogs is $17.16 million and foxes $11.66 million (in 2013–14 dollar terms), excluding control costs (McLeod 2016).

This impact can also take an emotional toll on individuals, families and communities. NPWS works closely with LLS, other public land managers and neighbouring private landholders to implement appropriate control programs to minimise the economic impact and social impact of wild dogs and foxes.

6.14 Park management

Notification of baiting programs to neighbouring landholders and the general public will be carried out in accordance with the requirements of the PCO and the *Pesticide use notification plan for NSW National Parks and Wildlife Service* (OEH 2015).

The approved ACO risk assessment will assess and determine appropriate park management measures, which are in addition to those in the PCO and *Vertebrate pesticide manual*. For example, monitoring for illegal access to baiting locations, which may show a greater likelihood of domestic animal presence, may result in additional patrols or increasing baiting distance buffer zones etc.

7. Monitoring and research

7.1 Monitoring

The activity of dogs, foxes and cats on vehicle tracks and other trails is being monitored at sites on NPWS estate across eastern NSW (Figure 2). Typically, 20–30 passive infrared cameras have been deployed at about 1-kilometre spacing across each site. Cameras are deployed continuously and without lures. The aim is to monitor activity of predators relative to the size of their home range. Approximately 20 sites are maintained by NPWS and a further 10 sites by the DPI Vertebrate Pests Research Unit (VPRU).

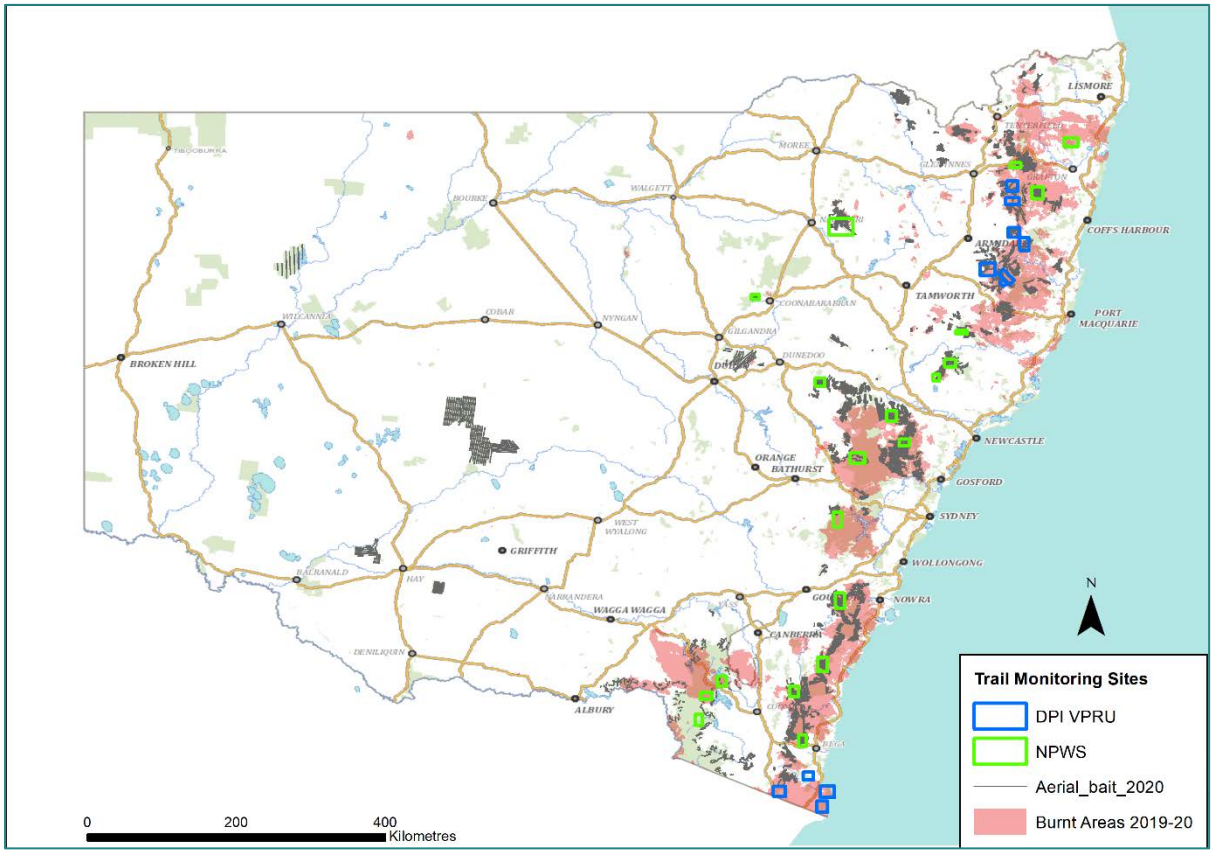

Figure 2 Monitoring sites for vertebrate pests on vehicle tracks and trails on NPWS estate in eastern NSW

Most of the sites were initially established to measure the activity of introduced predators on burnt and adjacent parks and reserves following the widespread wildfires in 2019–20. In particular, sites were selected to provide geographical representation of parks impacted by fire. Some of the sites expanded on existing work for threatened species, while others are linked to long-term vertebrate pest research. At a fine scale, sites were selected based on the availability of trail networks, risk of camera theft and the value of the data to management.

However, sites were not selected to provide an optimal experimental design to measure the effects of aerial baiting (e.g. paired sites). An expanded program of aerial baiting in response to the 2019–20 fires was still being planned and hence the footprint of aerial baiting was not known when monitoring sites were established. Nevertheless, the established network

should provide sufficient baited and unbaited sites to measure the effects of aerial baiting on introduced predators across a range of environments in eastern NSW.

Less monitoring of introduced predators has been established in western NSW (Figure 3). In part this is because the area was not impacted significantly by the 2019–20 fires and in part because there has been limited aerial baiting on park in western NSW to date (with notable exceptions being Central Mallee, Oolambeyan and the Warrumbungles). Nevertheless, many native fauna species in western NSW are likely to be impacted by introduced predators and hence robust management and monitoring is warranted. Additional monitoring sites are planned.

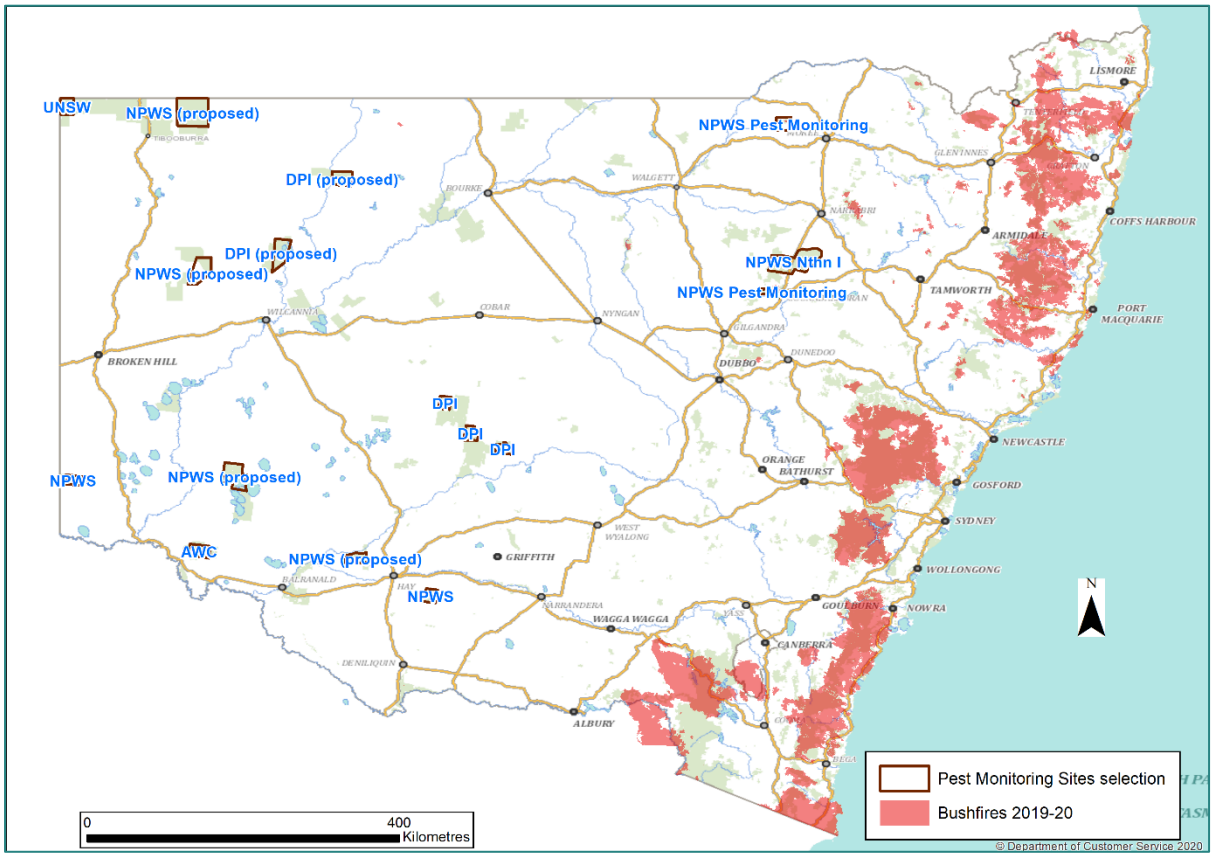

Figure 3 Current and proposed monitoring sites for vertebrate pests on vehicle tracks and trails on NPWS estate in western NSW

Targeted monitoring of introduced predators and other vertebrate pests in threatened species refugia has been established at many sites in eastern NSW, especially for the brush-tailed rock wallaby (*Petrogale penicillata*) and broad-toothed rat (*Mastacomys fuscus*) (Figure 4). Here the aim is to deploy a high density of passive infrared cameras to estimate the frequency of incursion of vertebrate pests into important patches of threatened species habitat. Specifically, 10 cameras set on animal pathways and without lures are used to estimate the proportion of pests present at night within a 5-hectare sampling unit. While the areas monitored are small, these data provide a precise measure of risk of impacts in key areas.

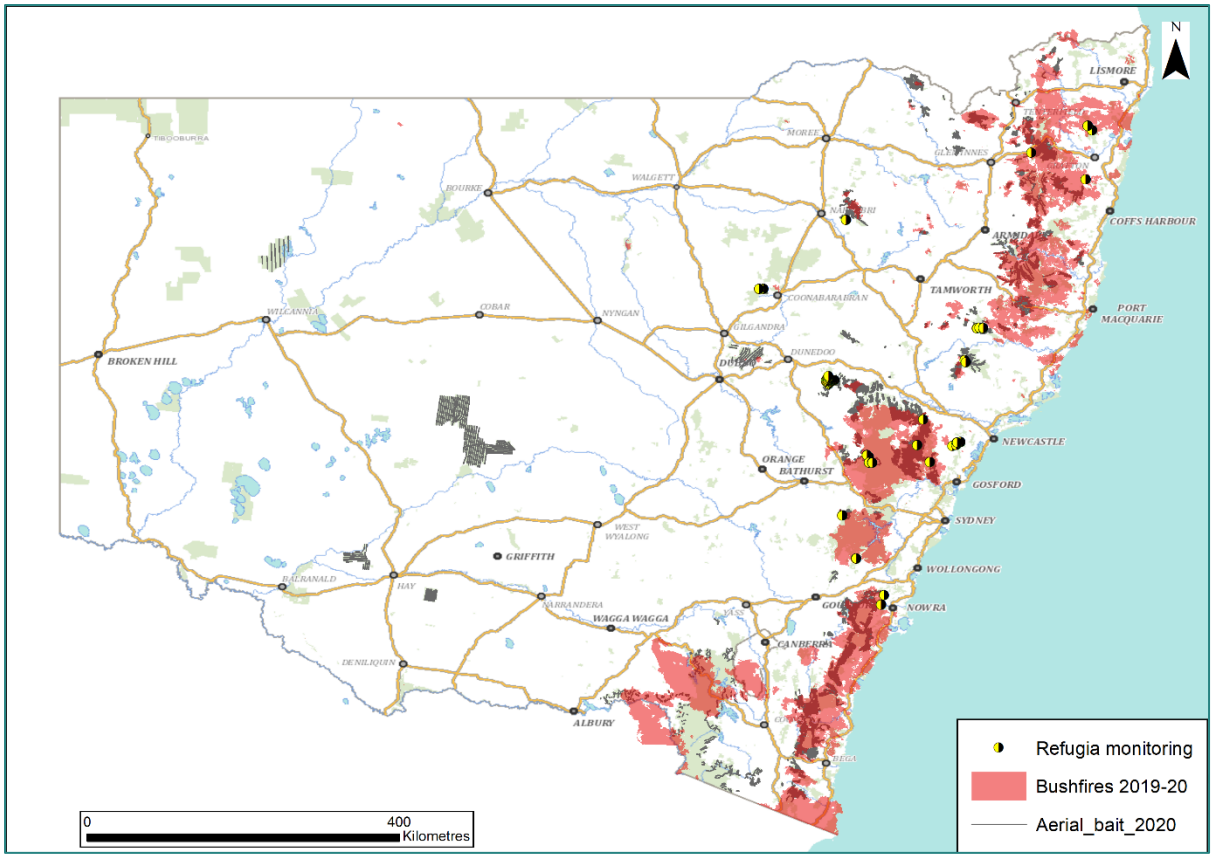

Figure 4 Monitoring of vertebrate pests in important patches of threatened species refugia

While cameras deployed to monitor pest activity on trails and in threatened species refugia may not be set optimally to detect and sample the habitat of various native faunas, they will still provide a significant dataset to examine the response of native fauna to aerial baiting. Data from selected SoS monitoring sites will also be analysed (e.g. for the spotted-tailed quoll).

8. Conclusion

The proposed 1080 aerial baiting program, as described in this ERA:

- will be carried out in a manner consistent with all relevant legislation
- is the only viable method for landscape-scale control of foxes and wild dogs
- gives effect to the statutory obligation on NPWS under the Biosecurity Act in relation to the control of wild dogs and foxes
- delivers 1080 baits in a manner that will not have an adverse impact on:
  - native wildlife populations including threatened species, or
  - Aboriginal cultural heritage or historic heritage items or places
- will reduce fox densities and improve the prospects for survival of native wildlife including threatened species
- will reduce the economic impact of wild dogs and foxes on landholders
- will avoid impacts on wild dogs in selected parts of the NPWS estate where baiting will not occur, to allow wild dogs to fulfil the ecological role of the dingo in those locations
- is unlikely to lead to any increase in feral cat impacts.

Implementation of the baiting program is subject to ongoing review and, if required, revision. This will be reflected as necessary with updates to this ERA.

Appendix A: Example ACO risk assessment

ACO Risk assessment for aerial baiting programs

Park(s)		Authorised Control Officer		Assessment date	
Program name				Equipment ID	
Pesticide	1080	Target species	Foxes/Dogs	CM9 ref.	
Bait type	Fresh meat – red meat				
Disposal				Disposal CM9 ref.	

Hazards / risks	Yes	No	N/A	Risk level	Description of hazard or risk	Recommended control measures	New risk level	Detail how control measures will be implemented and any additional controls
Not complying with distance restrictions	☒	☐	☐	M	Risk to neighbour's working dogs. Risk of domestic waterpoint contamination. Risk of human poisoning from 1080 exposure.	Baiting location to be mapped and attached to this risk assessment. Bait lines to be mapped and establish all distance restrictions are met as per current PCO. Neighbours to be notified of the presence of baits as per notification requirements in the PCO, and signs placed at all entry points. Operation staff to be aware of distance restrictions required.	L	Staff to review this risk assessment and map during operation briefing. Baiting transects are planned with buffers of xx metres, exceeding the 100 m PCO requirement. A qualified air observer (or equivalent) will be used for navigation. Two systems of GPS will be used for navigation, and track log of bait deployment must be recorded, including start and finish points. Baiting will cease if environmental conditions are marginal. Staff to maintain current AQF3 (chemical training) and NPWS 1080 awareness for operation duration and utilise PPE as outlined in the Job Safety Analysis.

Hazards / risks	Yes	No	N/A	Risk level	Description of hazard or risk	Recommended control measures	New risk level	Detail how control measures will be implemented and any additional controls
Presence of domestic pets	☒	☐	☐	M	Death of domestic dogs from neighbouring properties entering the park, or neighbours bringing working dogs on to park as part of grazing management, or illegal hunters using dogs on park.	Bait lines to be mapped and establish all distance restrictions are met as per the current PCO. Baits not to be laid within 1,000 m of habitation (if by fixed wing). Warning signs indicate risk to domestic animals. Unused baits to be disposed of as per PCO.	L	No domestic animals permitted within these parks, and signage indicates no domestic animals allowed on park. Warning signs to be mapped and checked prior to baiting commencement. Conduct neighbour notification as per PCO, and record in program CM9 location. Baits are not to be laid within xxx m of points where high illegal visitation by domestic animals may be likely. These points are mapped with these buffers applied. Musterers are to be given specific warnings not to operate on park during and immediately after 1080 delivery. Warnings must include advice that 1080 can kill their working dog, and working dogs must be muzzled when operating on park.
Presence of livestock	☒	☐	☐	L	Livestock may enter due to fencing failure.	Pesticide concentration will not be at levels that could affect livestock. Bait form is unpalatable to livestock. Dose rate will not affect livestock.	L	Neighbours will be notified of baiting program and briefed on removal of stock if required. Regular checks of boundary fencing where required.

Hazards / risks	Yes	No	N/A	Risk level	Description of hazard or risk	Recommended control measures	New risk level	Detail how control measures will be implemented and any additional controls
Presence of susceptible native animals	☒	☐	☐	M	Death of non-target species.	Amount of 1080 and bait matrix will rarely affect native animals. 1080 solution injected into centre of baits. Follow PCO and NPWS guidelines for aerial baiting on park estate. Follow recommended application rates in NPWS guidelines.	L	Monitor for non-target impacts and amend baiting strategy to further reduce off-target consumption. Unused baits to be collected and disposed of as per disposal instructions. Quolls have been recorded in this area and may occur on park. An NPWS ERA for this activity has concluded that there is no significant risk to quolls when using bait rates of less than 40 baits/km. The bait rate used for this operation will be 10 baits/km.
Proximity to urban areas and townships	☐	☒	☐		Baiting site is more than 4 km from closest township.			Baiting transects exceed PCO requirement for boundary buffers and are at considerable distance from nearest township.
Risk to domestic or town water supplies	☒	☐	☐	M	Contamination of domestic water supply with 1080.	Waterpoints to be identified on map. Bait transects to be placed no closer than xx m to waterpoint (exceeds PCO).	L	Waterpoints within the baiting location have been identified and mapped. Baits not to be dropped within xx m from a waterpoint, exceeding PCO requirements.
Contamination of waterways from 1080 baits	☒	☐	☐	M	1080 contaminating waterways.	Bait transects to be placed no closer than 100 m to any non-ephemeral waterway.	L	Ephemeral creeks have been mapped as part of planning process, and map attached to this risk assessment. Baiting transects have been planned via GIS to ensure baits will not to be dropped within xxx m of waterways. A qualified air observer (or equivalent) will be used for navigation. Two systems of GPS will be used for navigational accuracy. Unused bait will be disposed as per disposal instructions above.

Hazards / risks	Yes	No	N/A	Risk level	Description of hazard or risk	Recommended control measures	New risk level	Detail how control measures will be implemented and any additional controls
Researchers, special interest groups visiting the park	☒	☐	☐	L	Human poisoning from 1080.	Visitors to be briefed by park ranger or delegate prior to arrival. Signs placed as per PCO.	L	Briefing to be provided to all groups for 4 weeks after bait application. Unused bait will be disposed as per disposal instructions.
Illegal access – exposure to 1080 by hunters and their dogs	☒	☐	☐	M	Death of non-target animals, human poisoning from 1080.	Monitor for illegal access. Notification and signs as per PCO.	L	Conduct compliance programs where illegal dog access is suspected prior to commencement of baiting program. Signs to be placed/checked prior to program commencement. Media notification to be undertaken prior to this operation.
Disposal of baits	☒	☐	☐	M	Death of non-target animal, human poisoning from 1080 and contamination of the environment.	All unused baits must be disposed of as per the PCO.	L	The bait disposal location for this program is within XXXX NP and is identified on attached map. Officer In Charge (OIC) to confirm with ACO that all baits have been appropriately disposed of.
Human poisoning from injecting and/or deploying 1080	☒	☐	☐	M	Human poisoning from 1080.	Staff preparing 1080 bait must be a currently accredited ACO. Baits to be prepared in an approved 1080 preparation facility. Operational staff to be trained to NPWS requirements and undertake JSB before commencing operation. All staff are to use appropriate PPE for the preparation and/or placement of 1080 baits.	L	All staff handling 1080 baits must have current AQF3 training and be current in 1080 awareness. All operational staff to comply with this risk assessment, JSA for this program, PPE and first aid requirements. All containers used for storing and transporting 1080 baits must be clearly labelled with ‘1080 Poison’ in red lettering.

Hazards / risks	Yes	No	N/A	Risk level	Description of hazard or risk	Recommended control measures	New risk level	Detail how control measures will be implemented and any additional controls
Compliance risk	☒	☐	☐	L	Breach of legislation.	Program manager is responsible for ensuring compliance and record keeping.	L	Program manager to use 1080 planning checklist during program planning and record in program CM9 location. All staff must have an AQF3 chemical accreditation and attended/complete 1080 awareness training.
Human contact with 1080	☒	☐	☐	L	Human poisoning from 1080.	Warning signs to be mapped and checked prior to baiting commencement. Wild dog and fox baits are unpalatable to humans and contain an insufficient amount to poison a human.	L	All thoroughfares to be mapped as part of planning process, with buffers in place on main thoroughfares, and map attached to this risk assessment. Points of higher visitation within the park have been mapped, and baits are not to be laid within xxx m. These points are mapped with these buffers applied. Baiting program to be recorded in xxx Area Pesticide Use Register per *Pesticide Use Notification Plan* and identified on Elements.
1080 poison poses an increased risk to native predators such as quolls and varanids, where food is scarce post fire event	☒	☐	☐	L	Carnivores and varanids consuming 1080 baits.	Appropriate bait rate will be used as endorsed by the APVMA and PCO and outlined in the *Vertebrate pesticide manual*. Red meat baits will be used.	L	Extensive research has shown there is minimal threat of 1080 to native wildlife populations when conducting aerial baiting with red meat baits at rates of up to 40 baits/km. Varanids have a tolerance to 1080 that is significantly higher than foxes. Although spotted-tailed quolls have a tolerance that is only 17 times higher than foxes, research conducted in both the Northern Tablelands and Southern Ranges of NSW found that quolls that did ingest 1080 baits did not suffer a fatal outcome. One quoll that was trapped had encountered and at least partially consumed 6 wild dog baits, with no observable impact.

Hazards / risks	Yes	No	N/A	Risk level	Description of hazard or risk	Recommended control measures	New risk level	Detail how control measures will be implemented and any additional controls
								The program will be implemented using the same bait rates as used in this research; up to 10 baits/km and up to 40 baits/km.
Risk of baiting to dingos/wild dogs	☒	☐	☐	M	Wild dogs which are not currently having a negative impact are controlled as part of the program.	Wild dogs will be targeted in areas where they are negatively impacting on livestock, at a rate of up to 40 baits/km. Foxes will be targeted where they are having negative impacts on native wildlife species, with fox baits at a rate of up to 10 baits/km. Aerial baiting will only be undertaken where there is a risk of negative impacts from wild dogs and or foxes. Where there is no risk, aerial baiting will not occur, to allow wild dogs to fulfil the natural ecological role of the dingo.	L	Baiting transects have been carefully planned to identify areas where wild dogs will be targeted, areas where foxes will be targeted, and areas where no aerial baiting will be undertaken to allow wild dogs to fulfil the natural ecological role of the dingo.
Increased level of 1080 baits in the environment	☒	☐	☐	L	Consumption of 1080 baits by non-target species.	Baiting operations at each location will be undertaken at the rate allowed by the PCO. The number of locations will be greater than in previous programs, and therefore the total number of baits statewide will be greater, the rate at any location will be the standard rates of either up to 10 baits/km or up to 40 baits/km.	L	Baiting transects have been carefully planned such that bait rates are consistent with previous programs, at either up to 10 baits/km or up to 40 baits/km with 1080 meat baits. At these rates, previous research has clearly demonstrated that there is no risk to non-target species, and they are permitted by the PCO. 1080 breaks down quickly, by microbial action in the environment.

Appendix B: Native species at risk without predator control

Native species	Without predator control, what's at risk?
Spotted-tailed quoll (*Dasyurus maculatus*)	The average weight of an adult male is about 3,500 grams (g) and an adult female about 2,000 g. It has rich-rust to dark-brown fur above, with irregular white spots on the back and tail, and a pale belly. The range of the spotted-tailed quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-east Queensland, and Tasmania. Only in Tasmania is it still considered relatively common. **Conservation status in NSW: Vulnerable**
Brush-tailed rock-wallaby (*Petrogale penicillata*)	The brush-tailed rock-wallaby has a characteristic, long and bushy, dark rufous-brown tail that is bushier towards its tip. This wallaby is highly agile and can move swiftly and confidently through rugged and precipitous areas. The average weight of this species is about 8 kilograms (kg) for males and 6 kg for females. The range of the brush-tailed rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. However, the distribution of the species across its original range has declined significantly in the west and south and has become more fragmented. **Conservation status in NSW: Endangered**
Long-nosed potoroo (*Potorous tridactylus*)	Adult long-nosed potoroos weigh up to 1.6 kg and have a head and body length of about 360 mm and a tail length between 200 and 260 mm. Its fur is greyish-brown above and light grey below. The long-nosed potoroo is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range. **Conservation status in NSW: Vulnerable**
Mountain pygmy-possum (*Buramys parvus*)	Mountain pygmy-possum adults average 40 g. Of the total length of 250 mm, over half is tail. The fur is dense and fine, grey-brown above and creamy to bright fawn under the body. The mountain pygmy-possum lives only in alpine and subalpine areas on the highest mountains of Victoria and NSW. In NSW, the entire range is in a 30 km by 8 km area of Kosciuszko National Park between Thredbo and Kerries Ridge, where it occupies less than 4 km^2 of habitat. The total population size is fewer than 500 adults. **Conservation status in NSW: Endangered**
Broad-toothed rat (*Mastacomys fuscus*)	A tubby, compact rodent, chubby-cheeked, with a short, wide face and ears, and long, dense, fine fur. It is brown above, with attractive, rufous highlights. In NSW, the broad-toothed rat occurs in 2 widely separated areas: the wet alpine and subalpine heaths and woodlands in Kosciuszko National Park, and on the Barrington Tops north-west of Newcastle. **Conservation status in NSW: Vulnerable**
Smoky mouse (*Pseudomys fumeus*)	The smoky mouse is similar in size to a small rat, with a head and body length averaging about 90 mm and a tail averaging 140 mm. The average adult weight is 52 g. The fur is fine, soft, pale-grey to bluish-grey above, with a grey to white belly and a ring of dark hairs around the eye. The smoky mouse is currently limited to a small number of sites, including in south-east NSW and the ACT.

Native species	Without predator control, what's at risk?
	Conservation status in NSW: Critically endangered
Superb lyrebird (*Menura novaehollandiae*) Albert's lyrebird (*Menura alberti*)	There are 2 species in the family of lyrebirds – the superb lyrebird and Albert's lyrebird. The male superb lyrebird is 80 to 100 cm long, including his 55 cm long tail. He is dark brown on the upper part of his body and lighter brown below, with red-brown markings on his throat. His tail feathers are dark brown above and silver-grey below. Females of the species are smaller than the males, with similar colouring but without the lyre-shaped tail. The Albert's lyrebird is similar in appearance to the superb lyrebird, but is smaller and darker, with a rich chestnut colour. The male does not have the outer lyre-shaped tail feathers of the superb lyrebird. **Conservation status in NSW: Vulnerable (Albert's lyrebird)**
Eastern bristlebird (*Dasyornis brachypterus*)	Eastern bristlebirds are medium-sized, long-tailed, brown and rufous birds. They are shy and cryptic and mostly occur in dense, coastal vegetation. The plumage of the eastern bristlebird is dull brownish above and lighter grey below, with rufous wings. The distribution of the eastern bristlebird has contracted to 3 disjunct areas of south-eastern Australia. There are 3 main populations in NSW: northern NSW, around Jervis Bay National Park, and in the south at Nadgee Nature Reserve. The estimated population is fewer than 2,000 individuals occupying a total area of about 120 km^2. **Conservation status in NSW: Endangered**

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