CENTRE FOR
INVASIVE SPECIES SOLUTIONS

BEST-PRACTICE MANAGEMENT OF WILD DOGS IN PERI-URBAN ENVIRONMENTS

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pestSMART PUBLICATION

NATIONAL WILD DOG ACTION PLAN

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OVERVIEW

Managing wild dogs in peri-urban regions can be challenging. Many methods of control carry unsuitable risks due to the presence of pets, people or other land uses.

However, there are a variety of **options available** to peri-urban residents that can help them reduce the impacts caused by wild dogs. Local statutory authorities can advise on the permitted control options for managing wild dog impacts in each jurisdiction.

This guide gives you a strategic framework for the **best practice management** of peri-urban wild dogs. To help **effectively manage the impacts** of wild dogs in your area, for the benefit of individual landholders and community members, the guide presents:

- key lessons
- useful approaches
- actions to consider.

Monitoring with camera traps and keeping a record of impacts can determine the extent and frequency of wild dogs using an area, and then appropriate **management strategies** can be considered and put in place.

Management strategies range from **non-lethal to lethal** methods; however, landowners and land managers need to understand the rules and regulations about methods that are permitted, specific to their location (these can differ between states and territories, and other jurisdictions). It is also important to keep well informed about developments in management techniques and approaches because technologies develop and evolve.

You may be able to access **advice and assistance** for managing wild dogs in your local region from organisations such as local government, local land services or your state equivalent. You may also choose to employ a professional pest-animal contractor or seek advice from local landholders and experts.

ABOUT THIS GUIDE

This *Best-practice management for wild dogs in peri-urban regions* is a guide to assist landholders and land managers with strategies to mitigate wild dog impacts in peri-urban, urban or high-risk environments where people and wild dogs frequently interact. These are regions where some control options may be limited or too hazardous to use due to the presence of domestic dogs, native wildlife, proximity to human dwellings or similar.

This document provides a summary of key aspects of the biology and ecology of peri-urban wild dogs, as well as information on their impacts and management. It is important to consider throughout this document:

- Dingo taxonomy is an ongoing debate. In this document, we follow the National Wild Dog Action Plan 2020-2030 stated definition of 'wild dog': all wild living dogs, including dingoes, feral dogs and their hybrids. All can breed with each other.
- Wild dogs are classified as a pest, and under some legislation landowners have a responsibility to control them on their land. Additionally, dingoes may be protected under other legislation. It is important to check the relevant laws that relate to your state or territory and region.

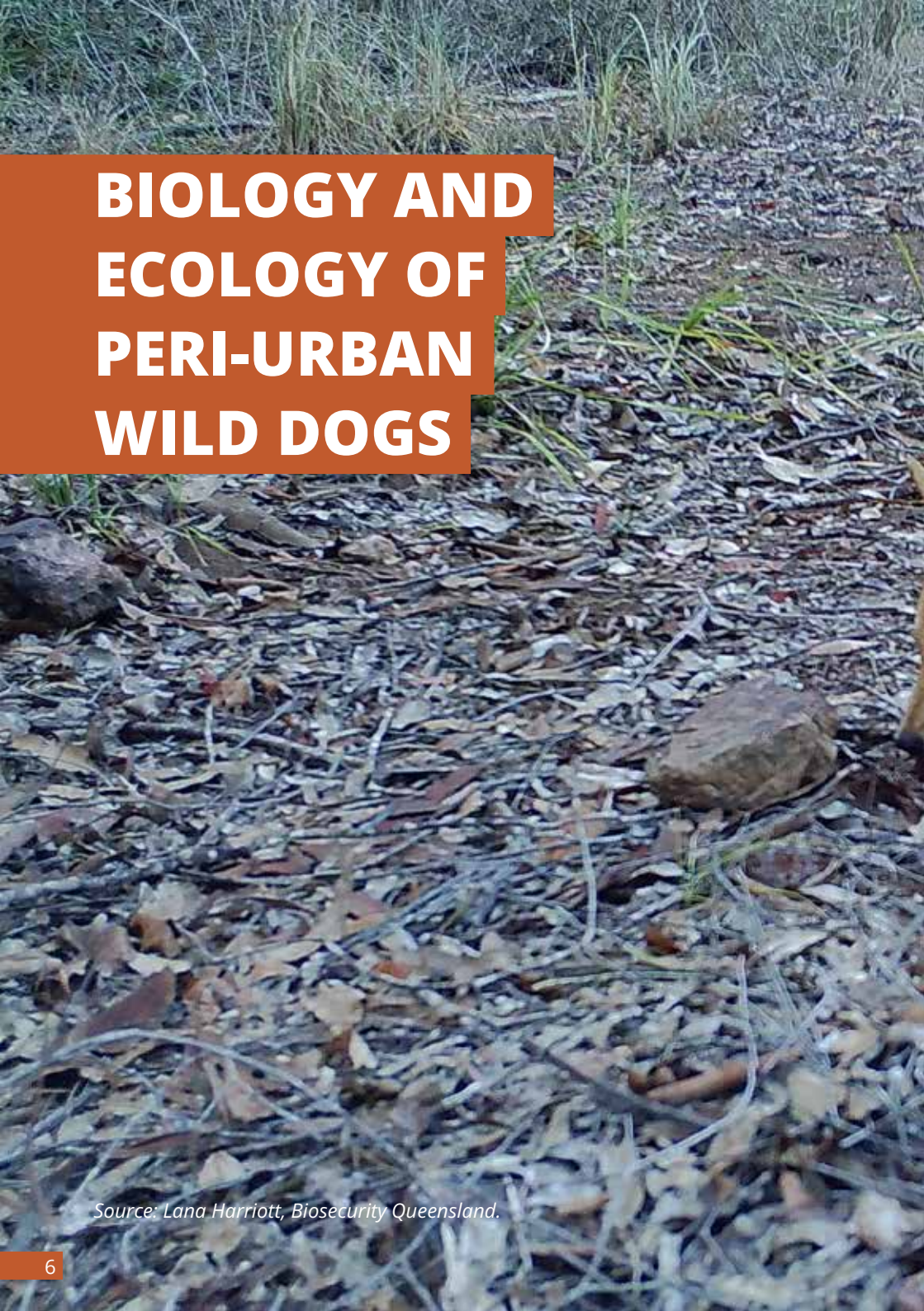
What is a peri-urban environment?

Peri-urban environments are areas adjacent to, and influenced by, urbanised zones. They may comprise a mixture of rural, residential and commercial land uses.

The definition of peri-urban is subjective as there are no set criteria requiring a certain land size, population density or other criteria to distinctly identify these regions. Generally, areas that have a combination of land uses, and serve as a transitional zone between urban and rural environments can be considered peri-urban. Some land tenures (e.g. large undeveloped reserves) could be considered rural in context, but become classified as peri-urban if they are adjacent to highly developed and populated suburbs. This makes it difficult to distinguish inner and outer boundaries for peri-urban zones and, as such, definitions are subjective.

Peri-urban environments are diverse, dynamic and difficult for wild dog management due to legal restrictions or other constraints.

BIOLOGY AND ECOLOGY OF PERI-URBAN WILD DOGS



Source: Lana Harriott, Biosecurity Queensland.

Wild dog genetics cannot be determined by their coat colour

Most wild dogs in peri-urban environments are dingo–domestic dog hybrids, with data suggesting that as urbanisation increases, so too does hybridisation. Very few wild dogs are domestic dogs (less than one percent). Unfortunately, it is impossible to accurately determine the genetics of a wild dog (i.e. hybrid or dingo) by their physical appearance (see figure 1).

The expression of characteristics like coat colour or body size (called a 'phenotype') of an individual animal is determined by a combination of its genetics and the environment. Pure dingoes also express natural variation in phenotypes (such as coat colour) and, as a result, genetic testing is the only reliable method of determining purity.

Wild dogs in peri-urban regions can have small home ranges

Wild dogs living in peri-urban regions generally exhibit much smaller home ranges than those living in rural or arid environments. GPS tracking of peri-urban wild dogs found they travelled, on average, a mean daily distance of 6.9 km (range of 2.1–13.2 km) and had an average home-range size of 17.5 km^2 (range of 0.5–66.0 km^2).

Wild dogs adapt to their environment; readily live close to residential areas; and can occupy small fragments of land, such as along highway easements. They use a wide variety of habitat types including grasslands, rainforests, open woodlands, agricultural lands (crops), tropical savannahs, highly disturbed areas and built-up areas.

Figure 1. Wild dogs captured from peri-urban regions with known dingo percentage: (A) pure dingo, (B) 75% dingo, (C) 55% dingo and (D) less than 50% dingo

CASE STUDY

Peri-urban wild dogs have hundreds of properties within their home range

Wild dog movements and land use varies between individual animals, as demonstrated by the large range of both daily distance travelled and home range size (McNeil et al. 2016). Using the GPS data attained from the same peri-urban wild dogs, researchers selected two individuals to further investigate how they use the landscape and to demonstrate why it is beneficial for neighbours to work together to manage wild dog impacts.

The first wild dog was an adult female on the Gold Coast with a home range of 30.3 km^2 and a mean daily travel distance of 8.2 km. She was monitored for 110 days from 8 March 2014. She visited 319 different properties (figure 2A); however, within her home range there were 8,028 properties – including high-density residential areas, which she also visited on a few occasions.

The second wild dog was an adult male in North Brisbane with a home range of 8.2 km^2 and a mean daily travel distance of 8.5 km. He was monitored for 127 days beginning on 12 December 2013. He visited 136 different properties (figure 2B); however, within his home-range there were 503 properties.

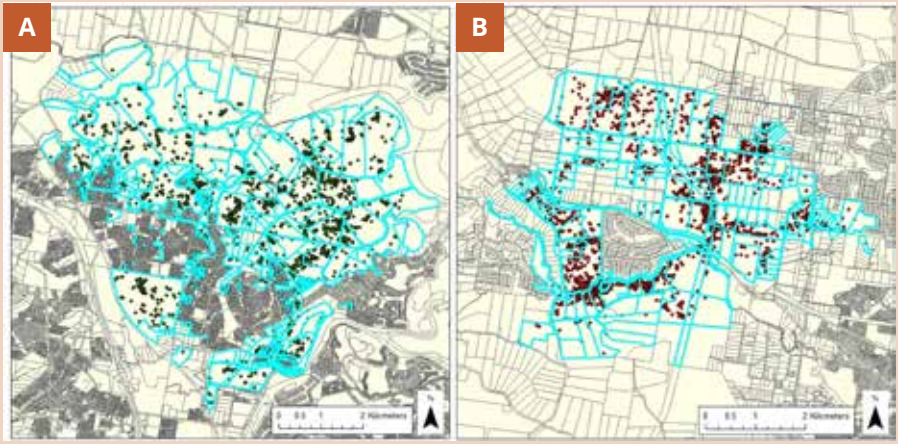


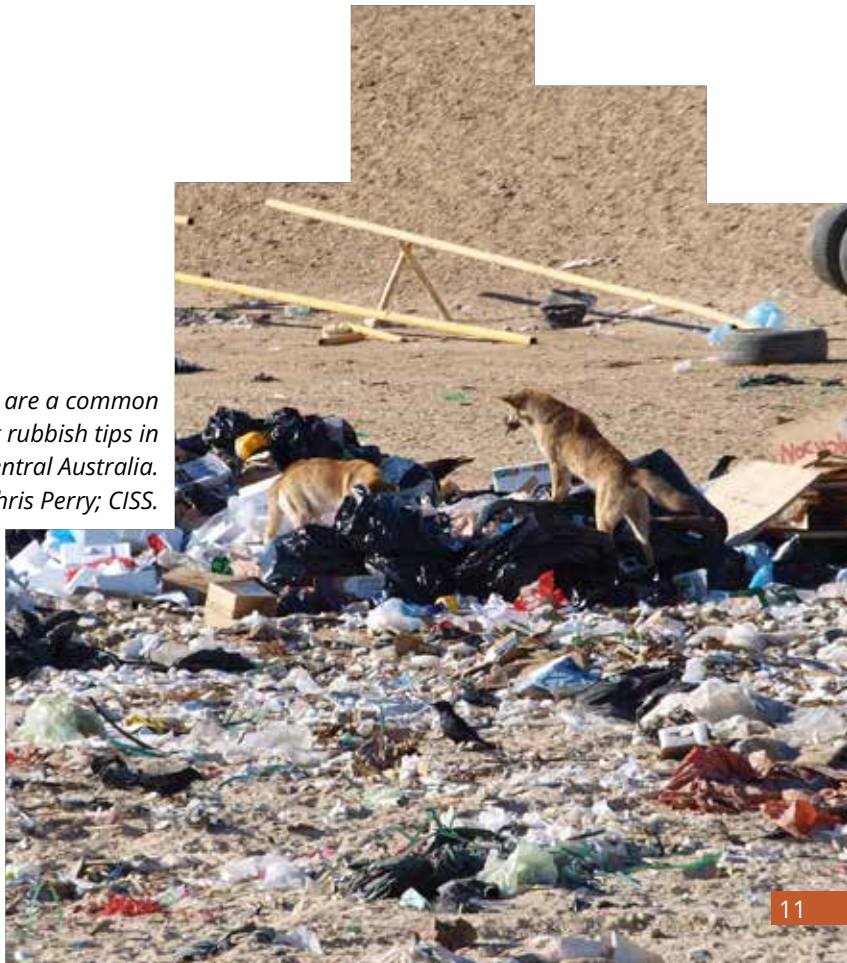
Figure 2. (A) GPS points (green dots) and highlighted property interactions of an adult female wild dog living on the Gold Coast, Queensland. (B) GPS points (red dots) and highlighted property interactions of an adult male wild dog living in North Brisbane, Queensland.

Wild dogs do not rely on human sources of food

Small- to medium-size mammals are the predominant prey consumed by peri-urban wild dogs; however, they will also scavenge vegetables, fruits, other plants and carrion. Other common foods include: wallabies and bandicoots, other dogs (cannibalism), eastern grey kangaroos, deer and birds. Human-sourced food items (rubbish) appear to be uncommon in wild dog diets.

Wild dogs breed only once a year

Peri-urban wild dogs have a single annual breeding season in winter. June to August is the peak period for pups being born; however, births can occur earlier and later in the year on occasion. Most female wild dogs will not breed until their second year. Some may breed in their first year due to favourable conditions in the peri-urban environment, or due to the influence of domestic dog genes.



Wild dogs are a common sight at rubbish tips in Central Australia. Source: Chris Perry; CISS.

WILD DOG IMPACTS IN PERI-URBAN REGIONS

Source: CISS

Wild dogs exhibit a variety of environmental roles, which may be positive, neutral or negative at different times and places.

The resource-rich but fragmented landscapes of peri-urban areas enable wild dogs to live in smaller patches of suitable vegetation near human habitation. This can lead to conflict between wild dogs and people, pets, livestock or wildlife – which can make effective management of these problems difficult. In addition, peri-urban residents have diverse views about the roles of wild dogs in the environment, so people's understanding of the variety of wild dog impacts or the need for considered management may not be shared within a community.

Predation of domestic and native animals is a major impact

Wild dogs can directly attack or prey upon domestic and native animals. Domestic livestock and pets such as cats and dogs can be killed or injured by wild dogs. Without intervention, wild dogs can prevent safe ownership of many animals in peri-urban areas and, in some cases, cause significant economic strain.

Wild dogs threaten the survival of many unique native species in Australia. For example, they are a significant threat to koala populations and are responsible for many koala deaths nationally. Economic impacts can also be caused to livestock producers when their meats are condemned because of transmission of pathogens such as *Neospora caninum*.

Source: Chris Thomas; CISS.

Wild dogs can carry pathogens with human health risks

Wild dogs are known to carry pathogens of public health importance in human-habituated areas. The most important pathogen of concern is Hydatid tapeworm (*Echinococcus granulosus*). Humans become infected through accidental ingestion of eggs in the environment, and develop fluid-filled cysts on vital organs. Detection in humans can be difficult because symptoms may be absent.

To pass it on, domestic dogs need to consume the cyst stage of this parasite, so most urban pet dogs are unlikely to contribute towards the life cycle. In addition, many domestic dogs are wormed and vaccinated, so are therefore not at high risk of contracting other tapeworms or parasites.

There is an array of other viruses, parasites and bacteria that wild dogs can transmit (e.g. hookworms, *Salmonella spp.*), but human awareness, domestic dog immunisation and common hygiene procedures (e.g. handwashing prior to food consumption) can be effective for managing these risks.

The presence of wild dogs can cause stress to landowners

Social stress may result from economic pressures caused by wild dog predation (i.e. loss of income from injury to stock). Alternatively, physiological stress may result from concern about injuries to household pets, hobby animals and stock. Wild dog attacks and injury to people are rare but have been recorded. Nevertheless, the threat or fear of wild dog attack can result in anxiety, a change in human behaviour and loss of social amenity.

ADAPTIVE WILD DOG MANAGEMENT

Source: Yi (Sherry) Zhai

An adaptive approach is recommended to effectively manage wild dogs in peri-urban areas (figure 3). This consists of the following steps:

Plan

1. Assess and understand the problem.
2. Develop a plan and set clear objectives.

Manage

3. Choose and implement management techniques and strategies.
4. Monitor the outcomes.

Improve

5. Evaluate the plan and compare to the program objectives.
6. Modify and repeat as necessary.

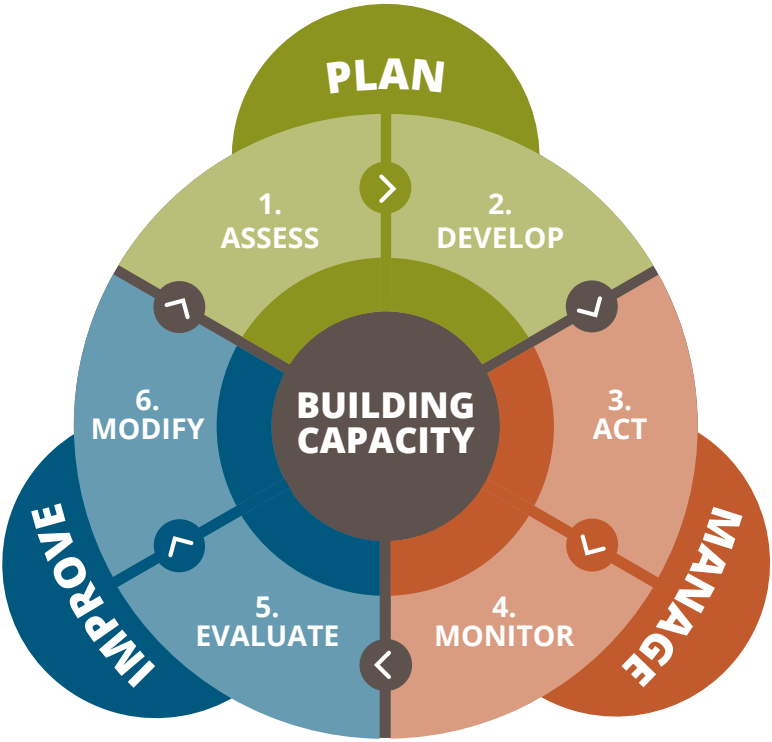


Figure 3. Plan, manage, improve. Image reproduced with permission from the Centre's Glovebox Guide for Managing Wild Dogs (2020).

Plan

Monitor for the presence and impacts of wild dogs

If you can identify when wild dogs are present on your property, this will help you develop a plan to appropriately manage them. There is a range of affordable outdoor cameras that you can use to identify wild dogs and their land-use patterns on your property. (See the guidelines below on how to use camera traps.)

If you keep records of wild dog activity such as howling, sightings and/or impacts, this can assist you to determine patterns of wild dog activity on your property. Record the locations of scats or signs of wild dog activity (footprints, scratchings or prey remains) to identify high-use areas. You can usually distinguish wild dog footprints from fox, quoll or cat footprints by their size and pad placement (see figure 4). For more information about telling tracks apart, use page 10 of the *CISS Glovebox Guide for Managing Wild Dogs* (2020) [PDF, 1.3 MB].

Reporting wild dog sightings and impacts to your local authorities, or in the FeralScan (WildDogScan) app to help monitor wild dog activity. Discussing wild dog activity with your neighbours, other community members and local authorities can help you develop the most effective and efficient management strategies for an individual property or a region.

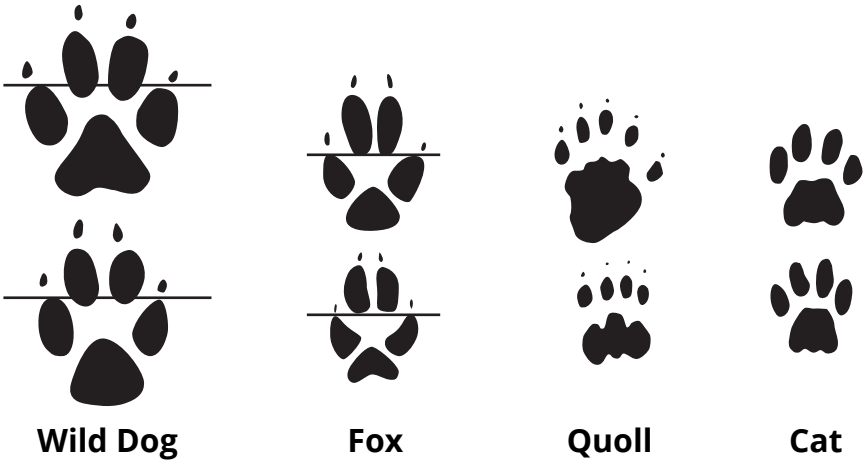


Figure 4. The relative size and shape of wild dog, fox, quoll and cat footprints. The top row shows the front foot, and the bottom row shows the back foot. Reproduced from the Centre's Glovebox Guide for Managing Wild Dogs (2020).

Develop a management plan

There are several considerations when developing a management plan:

- *The objectives of the plan.* You should measure success through reducing the impacts – importantly, **reducing the number of wild dogs may not necessarily reduce wild dog impacts**.
- *The size, scale, and location of the problem.* This will help to determine what options are suitable and available to address the issue. For smaller areas typical of peri-urban landscapes, strategies suited for large rural areas (e.g. baiting) may not be applicable. You might need to focus on outcomes such as removing problem individual dogs or using non-lethal techniques.
- *Behaviour and ecology of wild dogs.* If you can understand wild dog ecology and behaviour in your area, then this provides you with the best opportunity to manage their impacts.
- *Resources and skills.* Assess the skills, time and resources you have available to manage wild dogs to the level required to mitigate the impacts.
- *Partnerships and communication.* Wild dogs do not respect property boundaries, and the small property sizes in peri-urban areas means that problems are not isolated to individual landholders. Working together and discussing issues with others in the community enables the best chance to manage impacts. It also provides opportunities for different interests regarding wild dog management in the community to be acknowledged, and compromises to be reached where needed.
- *Legal restraints.* Wild dog management is regulated and constrained by legislation, and violations can attract serious penalties. Check that the chosen methods are permissible and legal in your jurisdiction with your local statutory authorities.

CASE STUDY

Strategic placement of canid pest ejectors assists wild dog management

Data from 11 GPS-collared peri-urban wild dogs were used to quantify and compare their encounters with three different densities of modelled locations of canid pest ejectors (CPE) – spring-activated devices which propel a toxin into an animal's mouth (Harriott, Allen and Gentle 2021). CPEs were modelled at every 200 metres, 500 metres or at intersections only, within each respective animal's home range. Survival analyses were conducted on each modelled ejector to determine the effect of the three road-based deployment spacings, and the effect of sex and season on the initial encounter.

An active CPE with lamb's wool–lure coated in fish oil. Source: Lana Harriott, Biosecurity Queensland, Department of Agriculture and Fisheries.

Ejector survivability (i.e. encounter) was significantly different between seasons for individual wild dogs, and between male and females. Ejectors placed within female home ranges were found to have significantly less survivorship than those in male home ranges. Ejectors spaced at closer intervals (200 metres) had a greater percentage of days with wild dog encounters. Placing ejectors at intersections provided the highest probability of a wild dog encounter, with the average ejector at this location 1.5 times more likely to be encountered than those at the alternative spacings (200 and 500 metres).

These results show that achieving **the most appropriate ejector placement depends on whether maximum interactions (200 metre spacings), or maximum efficiency (intersections) is desired**, which are important considerations in the short- or long-term deployment of ejectors to manage wild dogs.

These findings assist the development of guidelines for the optimal and efficient placement of ejectors to ensure their safe and effective use in peri-urban environments. They are also equally relevant for understanding where to place other devices to survey (i.e. camera traps) or manage (i.e. traps) wild dogs in peri-urban areas.

How to use camera traps to see wild dog activity

Camera traps provide valuable information that can help determine wild dog activity on your property. They are readily accessible, with no restrictions of their use on personal property (or if landowner permission is provided).

Most cameras use standard AA batteries. Long-term deployment or geographically isolated camera traps should, ideally, use a solar panel to reduce their servicing needs. The length of time the camera will remain functional will depend on the camera settings (e.g. sensitivity, image quality, photo versus video) and the frequency of triggers that cause the camera to activate (i.e. how fast the batteries drain or the memory card fills up).

Wild dogs frequently use roads, trails and tracks to travel throughout their home range. As a result, these are often ideal locations to set up camera traps to monitor activity. The camera should be placed just off the side of the road or trail, and be approximately four to six metres from the targeted capture area. For wild dog monitoring, camera traps are best placed 50 centimetres above the ground. This is because most cameras detect changes in heat (not motion), and this height aligns the sensor to the major heat source of the canine body. Take into consideration the slope of the road (e.g. if the camera is at the top of a hill and the road is sloping downwards, it may need a wedge behind the top of the camera to slightly angle it down). The camera should face in the direction of travel, down the road at about 23° from the road edge (see figure 5).

Placing a lure or bait at the camera trap is not needed to attract animals. Cameras can be attached to trees, fence posts, star pickets or other solid items that will not easily sway in windy conditions. Choose a camera sensitivity setting to suit the environment, and ensure there are no objects in front of the camera that will continually trigger it (e.g. vegetation moving with the wind). Try to avoid setting up camera traps in areas while livestock (especially cattle) are present, as they can disturb and displace (or even damage) the camera. Alternatively, the camera will capture thousands of images of livestock, which can fill up the memory card, drain the batteries and require a lot of wasted time scanning through images. If there are too many 'blank' images captured, the sensitivity settings on the camera can be reduced. Set the camera trap to capture a sequence of photos when triggered, rather than a single photo.

Optimal camera settings will vary across species you are trying to capture. It is also important to check the instruction manual – function and setting recommendations can vary between camera brands. It is a good idea to trial different camera settings around the home before you put them in the field. Test cameras to capture domestic pets first to help determine the most suitable settings. There are further instructional videos on the PestSmart website that can assist with understanding how camera traps work and how to best position them for monitoring predators.

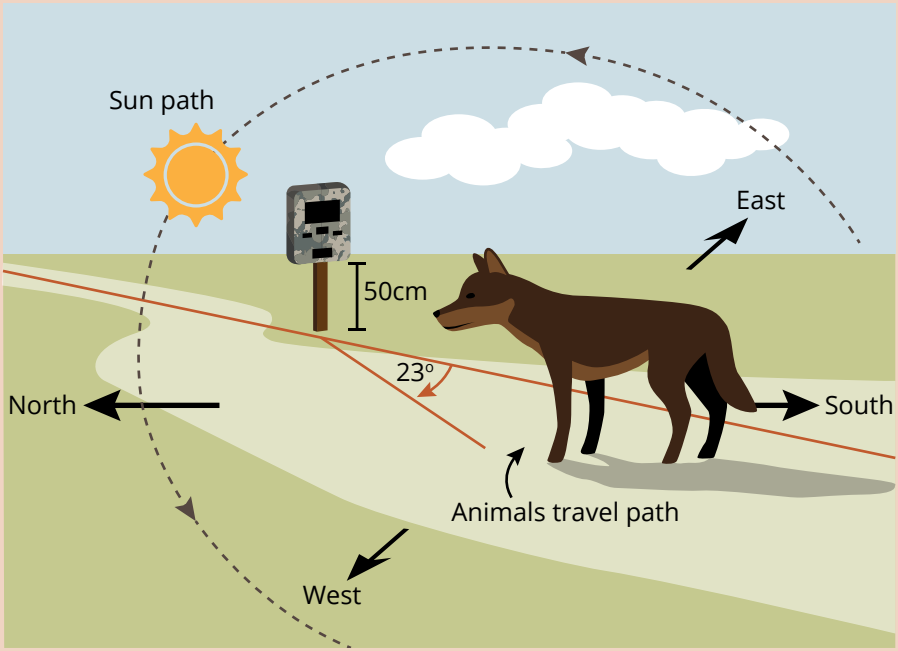


Figure 5. Specifications for placing camera traps on trails for detecting introduced predators. Source: Reproduced with permission from the NSW Department of Primary Industries (see also Guide for camera trapping wild dogs, foxes, and feral cats [PDF, 657 KB]).

How to choose a management technique

Selecting the most appropriate wild dog management technique in peri-urban regions can be a difficult task even for people who are experienced in pest animal control.

In the first instance, you may seek advice from a pest animal management officer from a local authority. This will help you to start a conversation and determine what advice or action might be suitable for your individual circumstance. There is also a range of resources available online, a growing catalogue of professional pest-animal controllers, community members with valuable knowledge and, in some areas, field days and workshops that discuss wild dog issues and teach management techniques to landholders.

Table 1 summarises a variety of options regarding wild dog management. This table is not an exhaustive list, but can represent a starting point in understanding what techniques may be suitable. Discussing these options with pest animal management officers and neighbours can help you develop a targeted plan to best suit individual circumstances.

Source: Gillian Basnett, CISS.

Table 1. Considerations for how to apply different techniques to manage wild dogs

Requirements and considerations	Advantages
Fencing - To protect high-value or key assets (e.g. livestock)	
• experience or availability of a contractor • fencing materials • fencing tools and machinery • (potentially) a vegetation clearing permit • if electric, an energiser and power source (240 V or solar) • ongoing maintenance • ability to eradicate dogs from inside the fenced area.	• can offer a complete protection solution • limited restrictions • fencers are readily available • provide reliable protection and peace of mind • many prefabricated fencing materials available.
Guardian animals - To protect livestock producers or other animals (e.g. hobby animals)	
• a guardian animal (e.g. dog, donkey or alpaca) • time, effort and knowledge to train the guardian animal.	• humane, non-lethal • can be target-specific • minimal to no impact on other wildlife • can be very effective at reducing damage • animals work independently • can have a long working life to provide lasting protection • can also be effective against other predators than wild dogs.

Disadvantages	Standard operating procedures and additional reading
• can be expensive to set up • requires ongoing maintenance • susceptible to damage during extreme weather events • can impact native wildlife and their movements.	Exclusion and cluster fencing options – PestSmart
• can be expensive • can require high level of training • can take a few years for the guardian animal to become effective • peri-urban areas are small, with a risk that the guardian animal may wander • measures required to stop potential of guardian dogs breeding with wild dogs • possibility of injuring animals it is meant to protect.	Guardian animals for livestock protection and wild dog exclusion – PestSmart Best Practice Manual for the use of Livestock Guardian Dogs – PestSmart

Requirements and considerations	Advantages
Trapping - To remove problem individuals from small to large holdings	
• knowledge about trap placement and setting, or be willing to learn or employ a contractor • knowledge of wild dog movements • time and resources to check traps daily • traps and stakes • cage traps • trapping tools and lures • firearms licence and experience • firearm and components • time for ongoing trap maintenance.	• traps and trapping tools are relatively cheap and readily available • commercial lures are available • no authorisation required to use traps other than land ownership or landholder approval • trapped domestic dogs or non-target species can be released • professional pest-animal controllers are available.
Baiting - To reduce impacts within isolated, large-sized private and public lands with low risk of domestic dog interactions	
• fresh meat or commercially manufactured baits • required permits or approvals to lay baits • required neighbour notification • required signage on all property-access points • domestic dogs in baited areas restricted or muzzled.	• affordable • efficient • commercial baits (1080 or PAPP) are available for purchase by landholders (note: check permit requirements) • can coordinate with local authorities to obtain fresh meat baits • local government often assists with baiting programs • neighbours can work together to control wild dogs.

Disadvantages	Standard operating procedures and additional reading
• must be checked daily • requires a high level of knowledge and skill to carry out • very high level of expertise needed for trapping difficult dogs • trapped animals require handling and/or euthanasia (which is usually by firearm) • discharge of firearm in a peri-urban area could be illegal without a special condition on one's licence (note: check your state legislation) • potential for capture of non-target species • often negative social issues with use of traps • poor trapping techniques can lead to trap shy animals that can be very difficult to capture.	Trapping of wild dogs using padded-jaw traps – PestSmart Trapping of wild dogs using cage traps – PestSmart
• very limited areas can be baited in peri-urban areas due to constraints on bait placement (e.g. minimum distances from dwellings and public areas) • (potential) requires permits to use and store poisons • high risk to domestic dogs if safeguards are not followed • measures are required to mitigate bait caching by non-target species • baits may be attractive and lethal to non-target species • weather events (heavy rain) can impact baiting effectiveness.	Ground baiting of wild dogs with sodium fluroacetate (1080) – PestSmart Baiting of wild dogs with para-aminopropiophenone (PAPP) – PestSmart A field guide to poison baiting wild dogs and foxes – PestSmart

Requirements and considerations	Advantages
Canid Pest Ejectors (CPEs) - To reduce impacts within isolated, medium- to large-sized private and public lands in peri-urban areas with low risk of domestic dog interactions	
• CPEs and bait heads • tools to set CPEs • lures for bait heads • capsules (1080 or PAPP) to use in CPEs • relevant authorisation to use PAPP or 1080 on a property • required neighbour notification • required signage on all property-access points • domestic dogs on property restricted or muzzled.	• firearms license not required • relatively high target specificity to canids • non-target species unlikely to receive lethal dose of toxin if accidentally activated • can be easily inactivated when not required • CPEs cannot be moved or cached by wildlife • relatively unaffected by wet weather as toxin is capsulated • targeted control through placing CPEs in high dog-traffic areas • quick and easy to set.
Shooting - To reduce impacts within isolated, medium- to large-sized private and public lands	
• a firearm • firearm licence • competency to handle and shoot the firearm • (potential) approval to discharge in a peri-urban area.	• opportunistic • offending animal can be removed immediately • certain of outcome • target-specific • humane.

Disadvantages	Standard operating procedures and additional reading
• CPE needs to be triggered by wild dog, not just inspected • requires training and authorisation to use toxins • high risk to free-roaming domestic dogs • one is often unsure of a fatal outcome if only a triggered ejector is found • only one dose per CPE is given before resetting required.	Canid Pest Ejectors with sodium fluroacetate (1080) – PestSmart Canid Pest Ejector (CPE) for fox and wild dog control - PestSmart
• limited opportunity in peri-urban landscape • may be difficult to obtain permission to discharge firearms in urban areas • proximity of neighbours (safe discharge of firearm and noise) • precise, accurate shots are required to avoid hitting unintended targets or partially wounding an animal.	Ground shooting of wild dogs – PestSmart

Manage

There are a variety of management practices available to help mitigate the impacts of wild dogs. Some rely on removing problem wild dogs through lethal control, while others rely on altering the environment or management practices to reduce your exposure and the impacts.

This section outlines the types of practices available to peri-urban residents and important considerations to help you choose between methods.

Non-lethal management practices are available as an alternative to lethal control

Both lethal and non-lethal methods are available to manage wild dogs and mitigate their impacts. The use of non-lethal strategies is particularly important when conventional lethal methods of control are, for various reasons, not suitable. In some cases, it may be necessary to modify farming or lifestyle practices to endure the presence of wild dogs. You can implement several non-lethal management practices, either singularly or in combination with other methods.

The home range of wild dogs often encompasses more than one property, particularly in peri-urban environments, so cooperation and communication between your neighbours and the broader community can assist you to develop more effective management solutions.

Report wild dog sightings and impacts to local authorities, or in the FeralScan (WildDogScan) app

Social research identified that reporting wild dog sightings and impacts was a preferred and feasible method that residents could use to improve wild dog management in peri-urban communities. If you can communicate with your neighbours and broader community groups, you can share information regarding wild dog impacts within your region. This information is also useful for local authorities who can then work with your community to provide assistance or advice, and monitor efforts to understand how their management programs are progressing and where they can improve.

Restrict wild dog access using exclusion fencing and housing

Well-constructed fences and animal shelters can exclude or restrict access by wild dogs to negate their impacts. Behavioural research of wild dogs has shown they are more likely to attempt to push through or burrow under a fence than jump or climb over it. Hence, both the initial fence design and ongoing maintenance is important to ensure fence integrity and to minimise exploitation by wild dogs or other animals.

The type of fencing you might use can depend on factors such as terrain, vegetation and climate. In Australia, prefabricated wire-netting fences and variations of electric fencing (or combinations of) are commonly used to exclude wild dogs. Ridged structures or sheds to house poultry or smaller livestock overnight – when wild dogs are usually more active – can also be of great benefit for protection. It is likely that gold-standard fencing methods will continue to evolve over time as new technologies are developed.

Guardian animals can protect stock from wild dog predation

Guardian animals are used around the world to protect livestock, but this technique is less common in Australia. Specific breeds of dogs (e.g. maremmas), donkeys, alpacas or llamas are typically used. Guardian animals work to protect domestic animals by confronting the predator, disrupting the predator's behaviour, or shepherding the domestic animals.

When the correct species/breed is selected and appropriately trained to work as a guardian animal, they can be extremely effective and become highly valuable to landholders. However, there are also potential disadvantages to guardian animals, such as requiring additional care or husbandry practices, potential impacts on native fauna and initial economic cost. To mitigate potential problems, it is best to use well-bred guardian animals. Initial advanced training is required to assist the guardian animal to bond to the species they are protecting, and build appropriate behavioural responses in the guardian animal.

Choose the right stock to reduce the risk of wild dog impacts

It is important to recognise the potential threats to stock from wild animals, including wild dogs. In some cases, it may be difficult to keep certain species of animals without strict protective measures such as fencing. Considering the local environment – such as surrounding land type and land uses – when selecting stock or hobby animals is important to determine potential risks of wild dog encounters and, thus, the steps required to protect domestic animals.

Clean up food and carcasses to avoid attracting wild dogs

It is important that you do not feed wild dogs. It is good practice to ensure all animal carcasses or other potential food sources are buried or removed to avoid attracting wild dogs into an area. It is not recommended to trap around animal carcasses due to the likelihood of also attracting many non-target species.

Avoid wild dog interactions with pets or children around your property

Do not approach a wild dog. Wild dogs are capable of causing serious injury. Closely supervise children in wild dog–prone areas. Providing hobby or domestic animals with a fully fenced, dog-proof outside enclosure is the best way to ensure their safety. Keep pets indoors at night to reduce the chance of wild dog encounters. Do not leave dog food or other sources of food out at night that wild dogs could access.

Keep parks and picnic areas clean to manage disease

Maintaining clean public areas like sporting fields, parks and BBQ areas can provide a defence mechanism against disease transmission – wild dogs can carry human health risks. The community can assist by picking up domestic dog faeces and implementing 'leave no trace' principles when using outdoor spaces (e.g. cleaning up rubbish or food scraps). You should wash your hands with warm soapy water and use hand sanitiser prior to eating or handling food; this is the best defence against accidental transmission of many pathogens.

Trapping is a common, effective tool for managing peri-urban wild dogs

Trapping can be an effective control tool against wild dogs in peri-urban regions. Each state or territory has their own legislation regarding trap use, so it is important to be familiar with your local regulations.

Unmodified serrated steel-jaw traps are illegal. Animal welfare is of paramount concern and – for humane purposes – foot-hold traps with padded rubber jaws and/or offset laminated-steel jaws are mandatory. Cage traps are not usually effective at capturing wild dogs in rural lands but may be considered in urbanised environments if other trap types are unsuitable.

In all cases, using traps should be avoided where there is significant risk of capturing non-target species, including domestic pets.

Trapping can be time- and resource-consuming. Traps must be regularly checked: at least daily, in the early morning. Trapping also requires the ability to safely handle and humanely dispatch the targeted animals once captured. Handling trapped animals requires a high level of skill and care to avoid injury to yourself and to the animals, and there are restrictions on the use of firearms and other euthanasia tools within peri-urban regions. Be sure to contact relevant authorities to clarify if a permit is required. Reputable pest- animal controllers should have the relevant experience, insurance and authority to humanely handle and dispatch animals.

Ideally, the use of foot-hold traps requires suitable training and experience. If you are new to using foot-hold traps, training is recommended and available through various private and public agencies, and online. Some individual wild dogs can be elusive and will require a high level of experience to capture. Seeking assistance or training through an external professional pest-animal controller is recommended. There is also a risk of capturing domestic dogs in the area, so much care is required to choose sites, restrain domestic dogs and notify others (such as neighbours) to ensure domestic dogs do not roam onto trapping sites.

The capture of both target and non-target species can be visually distressing, so be aware of the potential risks and outcomes. Always take care to reduce the potential that you will capture non-target species.

Shooting is restricted by circumstances and local legislation

Under specific circumstances, shooting can be useful for the opportunistic control of wild dogs and can offer a quick, humane and target-specific control method. This method is more suited to larger, more rural areas. However, there may be some safe and permitted locations for shooting in peri-urban environments.

In most instances, it is likely to be illegal to discharge a firearm in a peri-urban area for risk of a misplaced shot, or risk that the resulting noise causes public alarm. Relevant authorities may make some exemptions for the specific control of pest animals, particularly when associated with trapping, but requesting this needs to be undertaken prior to the control operation.

Baiting is not always possible but can be used where legislation permits

While regularly used in rural areas, using toxins to control wild dogs in peri-urban areas can be difficult. There are strict guidelines on the use of toxins that will limit their use in most peri-urban situations. The limiting factors may include distance to residences, waterways or roads.

Most importantly, domestic dogs are affected by toxins in the same way as wild dogs are, so the utmost caution needs to be taken even when deployment is permitted.

In instances where it is appropriate to use toxins on your property, depending on local legislation there are several toxins available for wild dog management; each works slightly differently and has different associated risks and benefits. These toxins include sodium fluroacetate (1080) and para-aminopropiophenone (PAPP). In most cases to be able to use toxins on your property, you will need to work with either with an authorised person and/or apply for a state-based permit. If individual property sizes are too small to bait, some jurisdictions may consider applications for joint baiting programs across adjacent properties.

Canid Pest Ejectors are an alternative to traditional baits

Canid Pest Ejectors (CPEs) are a small, spring-activated device that stake in the ground, leaving only a small attractant (i.e. piece of meat) above the ground surface. When a dog or fox bites and pulls with an upwards force on the attractant, the device activates and ejects the contents of a toxic capsule directly into the animal's mouth.

Capsules containing either 1080 or PAPP are approved for use in CPEs in most Australian states and territories. The use of PAPP is highly encouraged due to its humane method of euthanasia, the availability of an antidote for domestic dogs, no risk of secondary poisoning, and its high selectivity towards target species when used within a CPE.

CPEs are beneficial over standard baiting methods because they cannot be cached or moved by non-target species, so property owners always know the location of toxins on their land. The capsule containing the toxin is also resistant to decay and is unaffected by wet weather conditions, ensuring a suitable dose can be delivered whenever the CPE is pulled.

When implementing a CPE program, you must either work with an approved officer, or hold the appropriate permits to store and deploy toxins. Like baiting, there are strict regulations around toxin placement which need to be adhered to. CPE placement should be at strategic locations, like intersections of roads/tracks, to efficiently target wild dogs. You will need to fulfill neighbour-notification requirements, follow signage protocols, remain cautious and ensure that your own domestic dogs are suitably restrained or muzzled.

National Wild Dog Management Coordinator explaining the use of Canine Pest Ejectors. Source: Gillian Basnett, CISS.

CASE STUDY

A long-term integrated management program decreased wild dog activity and reduced complaints from the community

The area of Hunchy, on the Sunshine Coast hinterland of south-east Queensland, has a long history of suffering from the impacts of wild dogs, particularly livestock attacks. Like many other areas in coastal Queensland, this area has experienced increased urbanisation, evident through a general decrease in property sizes – which limits individual landholders in applying traditional wild dog control options.

Collaboration and coordination of control activities between properties is a strategy that can improve the effectiveness of wild dog control in a region.

Everitt (2021) evaluated whether a long-term predator management program in Hunchy reduced local and landscape-scale wild dog activity and impacts. Four properties (sized 11–65 hectares) participated in a coordinated pest-management program with the Sunshine Coast Council. Between 2018 and 2021, wild dogs and foxes were regularly removed via trapping, CPEs and opportunistic shooting. All four properties were monitored continuously with camera traps to determine wild dog activity over this period. In addition to control efforts in the Hunchy area, trapping and CPEs were also used for wild dog and fox management in the wider area (Flaxton, Mapleton, Montville, West Woombye, Palmwoods and Landers shoot) when required.

As a measure of wild dog activity, camera data was used to calculate the seasonal and annual passive activity index (PAI) in the Hunchy area between 2018 and 2021. As a measure of wild dog impact, researchers compiled community requests for assistance with wild dog control from the Hunchy and wider area (as above), beginning two years prior to the implementation of the control program.

On the four properties at Hunchy, wild dog activity (PAI) decreased significantly (P = 0.04) over the four-year period 2018–2021 (figure 6A). Similarly, community requests for assistance (complaints) to local government from the Hunchy area and surrounding suburbs showed an overall decline between 2016 and 2020 (figure 6B), with a statistically significant difference between 2016 and 2020 (P < 0.001). Additionally, the passive activity index of small macropods, small birds and reptiles increased between 2018 and 2021, suggesting a potential benefit to monitored native species (Everitt 2021).

This evaluation indicates the benefits of coordinating wild dog control activities in peri-urban landscapes, but researchers could not formally compare results because non-treatment sites were not monitored. Nevertheless, the declines in wild dog activity and in community requests for assistance are supportive of this coordinated management approach. This evaluation also highlights the strength of monitoring the outcomes of control programs to inform management approaches.

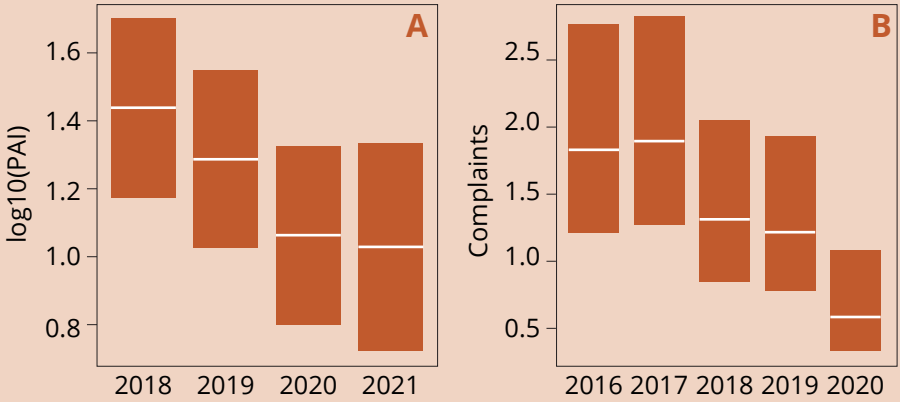


Figure 6. Box plots displaying the (A) decline in wild dog activity (PAI) between 2018 and 2021, and the (B) decreasing trend in community requests 2016–2020.

Improve

It is important for you to evaluate your management program to ensure your objectives have been met – and if not, what modifications you could implement. It is common that plans need to change frequently because wild dog activity and their impacts vary seasonally, annually, across properties and within communities.

You can also use records from the planning and management stages (e.g. camera trapping footage, records of wild dog sightings and impacts) to help evaluate if your plan was successful. You may consider comparing strategies and evaluations with neighbours or other community members to see if you have had similar outcomes.

You can consider:

- Did the plan work? What data/ evidence do I have to show that it worked?
- Did certain aspects of the plan work, but not others?
- Are there areas for improvement?
- Do I need to allocate more time or resources to make it work better?
- How can I simplify the plan?
- What can I change to improve the plan?
- Have my neighbours noticed any changes?

You can also seek assistance from your local biosecurity officer or pest animal management authority to help evaluate your wild dog management plans.

Shrek the guardian donkey protects weaners from wild dog attacks. Source: Peter Garrett.

CASE STUDY

Landholders on the Sunshine Coast trial guardian donkeys to reduce calf losses

Peter Garrett is a grazier from the Maroochy region. He uses his guardian donkey 'Shrek' to protect his weaner herd from the impacts of wild dogs.

The location of Peter's property limits any use of toxins such as 1080 or PAPP, and there are restrictions on the use of firearms (meaning opportunistic shooting is not possible, and foothold trapping is more difficult). He had previously tried cage trapping without much success.

Peter chose to purchase a single donkey, and Shrek now guards around 25 weaners at a time. Introducing new weaners to Shrek gives Shrek the required acclimatisation time in the yards before releasing the weaners into the paddock, as Peter explains that this helps develop a bond between the donkey and the weaners. Shrek receives a worming treatment every three months but is otherwise very independent and easy to manage.

Since Shrek was introduced to the property, Peter says that impacts from wild dogs are no longer a concern despite the fact he can still occasionally hear wild dogs in the hills behind his property.

Peter Wellington has always lived on his property in Belli Park, and for as long as he can remember has had impacts from wild dogs. Most recently he lost five calves in one month to wild dog predation, but has also experienced attacks on his cows. The 1000-acre property is bordered by state forest and several other small properties.

Peter has been able to implement – and has had some success with – annual baiting programs; however, his stock still suffered ongoing impacts. Trapping seemed like a very time-consuming task so his wife proposed the idea of guardian animals. Very recently, they purchased their first two guardian donkeys who are currently being acclimatised at the property.

Donkeys were appealing to the Wellingtons because of their low maintenance requirements in comparison to guardian dogs or llamas. It is too early to know how successful the donkeys will be; however, the Wellingtons already have plans to increase the number of donkeys on their property so they can protect up to four herds of cattle at a time. They also have a plan to implement a CPE program on their property with assistance from council.

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Wild dogs are a significant threat to koala populations and are responsible for many koala deaths nationally.

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