Restricted invasive animal

European fox

Vulpes vulpes

The European fox was deliberately introduced into Australia for hunting purposes. Foxes quickly became established following releases in the 1870's in southern Victoria. Foxes colonised rapidly; by 1893, foxes were a nuisance in north-eastern Victoria and by 1930 they occupied most of southern Australia. Foxes are a major invasive species in Australia that threaten agricultural and native species alike.

The most common and widespread of the world's many fox species is the European fox. Foxes are a major invasive species in Australia that threaten agricultural and native species alike. Foxes have pointed muzzles, flattened slender skulls, large ears and long bushy tails. Adult male foxes weigh around 6 kg, while females weigh about 5 kg.

Queensland Government

Legal requirements

The European fox is a category 3, 4, 5 and 6 restricted invasive animal under the *Biosecurity Act 2014*. It must not be moved, kept, fed, given away, sold, or released into the environment. The Act requires everyone to take all reasonable and practical measures to minimise the biosecurity risks associated with invasive animals under their control. This is called a general biosecurity obligation (GBO). This fact sheet gives examples of how you can meet your GBO.

At a local level, each local government must have a biosecurity plan that covers invasive animals in its area. This plan may include actions to be taken on certain species. Some of these actions may be required under local laws. Contact your local government for more information.

Description

The most common and widespread of the world's many fox species is the European fox.

Foxes are small, active canids with a reddish-brown coat above, with white underparts except for a black tipped nose and lower legs. It also has a large, very noticeable, bushy tail that is white tipped.

Depending on geographic location they can vary in size, as body length can range from 45 to 90cm, tail length from 30 to 55cm and body mass from 3 to 14kg. Usually adult male foxes weigh around 6 kg, while females weigh about 5 kg.

Diet

Foxes in Queensland are primarily carnivorous (meat-eating) scavengers and predators. However, foxes are opportunistic feeders and can consume an enormous variety of animal and plant material, such as rabbits, rodents, frogs, birds, insects and even fruit, vegetables and grain. This ability is key to the success of foxes to utilize a variety of habitats and climates in Australia. It also means that foxes can impact on a range of wildlife and agricultural species.

Fox predation is considered the greatest threat to the long-term survival of many small marsupial species in Australia. Long-term studies have shown that rock wallaby and malleefowl populations are probably regulated by fox predation.

Life cycle

Foxes breed once a year in winter with cubs born in spring. The fox's gestation period is 51–53 days. Cubs are generally born in burrows (dens) but litters have been found in hollow trees, rock crevices, under houses or in log piles. Litter size ranges from 4–10.

Foxes have generally been considered monogamous, communal denning as well as the presence of 'helpers' at the den has been recorded.

Australian studies suggest there are very few non-breeding females in fox populatons.

As a result, fox populations can withstand high yearly mortality rates (~65%) and recover to pre-control population levels. Recovery rates are dependent on immigration rates and breeding success.

Mortality of young foxes is generally high, with up to 80% dying in the first year. Poisoning, hunting, roadkills, disease, predation, food shortage and social factors contribute to mortality. Foxes in Australia have few natural predators, birds of prey and dogs in particular can kill foxes, particularly cubs.

Most foxes live less than four years, although eight-yearold foxes in the wild have been reported. Mange and distemper are thought to be important causes of mortality in wild fox populations; however, little is known about their role in regulating Australian fox populations.

Social behaviour

Foxes communicate by sound as well as by scent marking and body language. Young foxes use aggressive yapping and a resonant howl during the winter mating season. Vixens and pups will bark and whimper softly. Adult foxes also make vocalisations that can sound like screaming.

Habitat and distribution

Next to wild dogs, the fox is the largest land-dwelling carnivorous mammal in Australia. Foxes are well-adapted to a variety of different habitats, ranging from deserts to urban environments. However, foxes are not found in tropical Australia. Climatic preferences and food supply most likely determine their northern distribution.

Foxes generally disperse from where they were born in autumn at 6–9 months of age. Dispersal behaviour varies between males and females and between individuals of the same litter. Males typically disperse further than females and distances of 300 km have been recorded.

Faeces and urine are used to define territories by scent marking conspicuous landmarks like tussocks of grass and rabbit warrens. These scent marks are distributed throughout the fox's range, especially in places that are visited often.

Foxes are solitary hunters, but evidence suggests that fox family groups occupy well-defined home ranges. Family groups usually consist of a male and female fox with cubs, but non-breeding, subordinate females may also be present. Rural home ranges in Australia are about 500 ha; however, this can vary widely and depends on resource availability.

Foxes are most active from dusk till dawn and usually rest during the day in an earth den (often an enlarged rabbit burrow), thicket, hollow log or log pile. Foxes may also hunt and scavenge during the day.

Impacts

Predation on livestock

In some circumstances foxes may kill lambs and goat kids. Fox predation on healthy, viable lambs is generally less than 5%; however, this varies between properties. Individual 'rogue' foxes can cause high stock losses. Foxes

are noted for 'surplus killing' and can kill multiple easy prey animals despite an abundance of available food.

Foxes usually attack the throat of lambs and kids, although some are killed by multiple bites to the neck and back. Foxes do not have the size and strength to hold and immobilise large prey like adult sheep or goats, or to crush large bones; therefore, repeated bites may be required to subdue prey.

Foxes generally prefer large internal organs and begin feeding through an entry behind the ribs. However, some individuals develop certain preferences and can target the nose and tongue and may consume the head of small prey. Foxes are noted for carrying small carcases back to their dens to feed their young, which may account for some poultry, lambs and kids that disappear and are never found. Some food can also be cached, or buried or hidden elsewhere, for later consumption.

One way to distinguish fox attacks from wild dog attacks is that foxes rarely cause severe bone damage to stock. Poultry or other small prey can, however, be badly damaged through fox attacks.

Urban foxes

Both in Australia and overseas, foxes readily survive and prosper in urban environments. Fox densities in Melbourne are reported to be as high as 16 per km^2 compared to densities generally less than 2 per km^2 in most semi-arid grazing areas.

The distribution of urban foxes depends on the availability and distribution of suitable shelter and food. While foxes in urban areas are generally found in remnant bushland or parks, foxes can find refuge under railway platforms, houses or sheds, or in quiet gardens. Bushland areas in and around cities provide ideal shelter.

In urban areas, foxes eat a diversity of food types including small birds, worms, insects, fruit and pet or other food put out by residents.

Urban foxes will rarely attack people. However, any urban fox is a wild animal and should be treated as such.

Urban foxes can be a nuisance by:

- attacking poultry and livestock in people's yards
- raiding garbage bins scavenging for food
- digging holes in lawns while scavenging for food
- causing domestic dogs to bark
- defecating on lawns.

Disease threat

Foxes, along with other feral animals, have the potential to spread diseases such as rabies, should such diseases ever be introduced into Australia. They would also provide a reservoir of infection, making rabies almost impossible to eliminate.

Rabies is a contagious disease of virtually all mammals, including humans. Once symptoms of rabies appear, the virus is almost always fatal to both humans and animals.

This deadly virus is not established in Australia but is present in Asia.

We should not be complacent about the rabies issue. Foxes are capable of contracting and spreading rabies. In the Northern Hemisphere foxes are the principal vectors and victims of the disease. Overseas, millions of foxes have been culled or vaccinated in attempts to control the disease.

Control

Managing European foxes

The GBO requires a person to take reasonable and practical measures to minimise the biosecurity risks posed by foxes. This fact sheet provides information and some options for controlling foxes.

Current options available for control of foxes in Queensland include poisoning, trapping, shooting, guard animals and exclusion fencing. The choice of control method should suit the individual circumstances.

Exclusion fencing

Exclusion fencing for foxes is expensive. Fences must be well constructed and maintained due to the climbing agility of foxes and their ability to squeeze through small holes. As a result, fencing is most often used to protect high value stock, poultry or wildlife from fox predation in areas where other control methods cannot be used (i.e. in closely settled areas). Secure poultry runs and yards for small livestock should be considered in areas where foxes are a problem. Foxes can dig and climb so runs and yards need to be constructed with this in mind.

Trapping

Trapping is time consuming, labour intensive and generally ineffective for the broadscale reduction of fox populations. The success of trapping (using soft-catch traps and snares, not the illegal unmodified serrated steel-jawed traps) depends on the skill of the operator. Trapping is predominantly used in urban areas where poisoning and shooting are restricted, where there is high risk to native species, or for live-capture research purposes.

Shooting

Shooting of foxes is a highly selective and used in rural Australia. Fox shoots are normally carried out at night from a vehicle using a centrefire rifle (e.g. .223 calibre) with the aid a spotlight. Although the success of this method varies, depending on the shooter's marksmanship and the wariness of the foxes, the technique is still considered ineffective for broadscale or long-term reductions of fox populations. Furthermore, the practice is biased towards young unwary juveniles and may do little to reduce the impact of foxes on lambs or wildlife. Shooting is best done in addition to other control techniques.

Guard animals

Guard animals, primarily maremma dogs, and alpacas are used to protect sheep and goats from fox predation in numerous countries, including Australia. The effectiveness of guard animals in reducing fox predation on lambs and goat kids is primarily unknown. Consequently, guard animals should supplement rather than replace other control techniques until proven successful.

Although dogs have traditionally been used for guarding, alpacas have the added advantage of being herbivores and therefore do not require additional feeding. They are also less likely to wander and become problem animals themselves. This control technique is most suited to small properties on the urban fringe.

Poisoning

Presently there are three poisons legally available for fox control in Queensland—sodium fluoroacetate (1080) strychnine and para amino propiophenone (PAPP).

1080 and PAPP poison baits are economical and effective method of controlling foxes. Only authorised persons can supply 1080 or PAPP baits to landholders. PAPP is only supplied as a manufactured bait. 1080 comes in manufactured or fresh meat baits.

1080 baits are best be placed along track and fence lines 200–500 m apart, 8–10 cm underground and covered with loose soil. Burying baits has the advantages of reducing non-target bait take (more baits for foxes) and protecting baits from insect consumption (e.g. ants). All property neighbours should be notified at least 72 hours prior to baiting, and baiting signage should be erected at every property entrance and left for at least one month after baiting. Based on fox biology, the optimum time to bait is in Spring followed by June/July when food demand is highest (this coincides with lambing on many properties). Foxes are also often killed by 1080 baiting programs that are designed primarily to control wild dogs or feral pigs.

Ejectors are a new tool in the delivery of 1080. They require a fox or wild dog to pull the ejector head to be activated. This is done by attaching a lure reward to the ejector head. A capsule of lethal dose 1080 is burst into the foxes or the dog's mouth. Ejectors are fixed in one stop and are only able to be activated by foxes and dogs.

PAPP is a new poison and for advice on most effective way to use it consult your local government officer. Manufactured or meat baits can only be obtained through a person approved under the Health (Drugs & Poisons) Regulation 1996.

A Queensland Health permit is necessary to purchase strychnine. Baits can be selectively positioned or tethered to avoid access by native non-target species. This is particularly important in areas containing native carnivores such as quolls. A fox's keen sense of smell enables it to find baits intentionally buried or otherwise hidden.

To effectively reduce the short- and long-term impact of foxes, it is highly recommended that baiting activities be coordinated among adjoining properties. Baiting of individual properties will only provide short-term success due to the high mobility of foxes resulting in rapid re-invasion.

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland on 13 25 23 or visit biosecurity.qld.gov.au.

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