

fox control

IN WILDLIFE HABITAT

history of introduction

The European red fox belongs to the family *Canidae* which includes wolves, jackals and coyotes. The fox was introduced to Australia in the 1860's and 1870's for recreational hunting, and rapidly spread from these first releases around Melbourne. By 1897, the fox had entered southern NSW, reaching the Northern Territory by 1901 and Queensland by 1907. The fox is now widely distributed throughout the southern half of Australia and closely overlaps the distribution of rabbits, their primary prey.

fox habitat

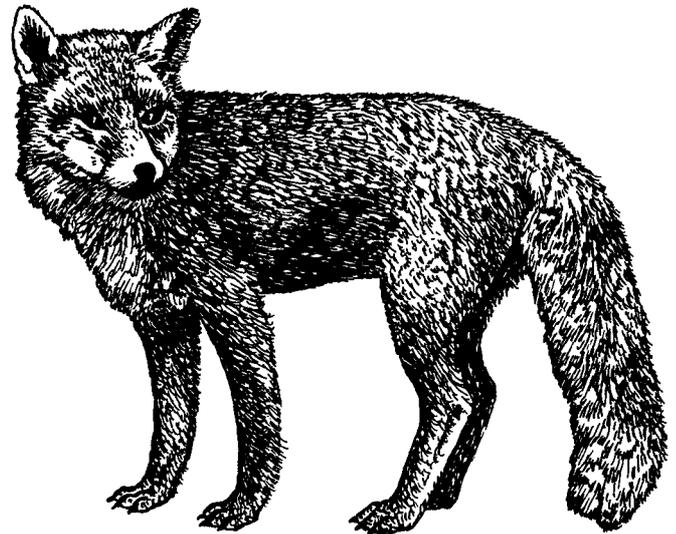
Foxes occur in most habitats including urban areas. They inhabit all mainland areas of NSW from semi-desert to rainforest. Foxes are more prolific in patchy landscapes of native bushland and agricultural land, as these fragmented environments offer a wide variety of cover, food and den sites. Foxes are not as common in more uniform, open environments or areas that are mountainous or heavily forested. They do not seem to live entirely within closed forests but can penetrate some distance into them in search of food (Catling and Burt, 1995). Lack of roads and tracks and heavy understorey of native scrub are likely to inhibit the movement of foxes.

ecology

The fox's range varies with habitat type, food availability and season, but can extend more than five square kilometres. In NSW, population densities vary from one per square kilometre in coastal forest and arid grazing lands of far west NSW and up to seven per square kilometres in temperate grazing lands (Smith and Roberts, 1996). There are as many as 12 adults per square kilometre in urban areas.

Foxes are mainly carnivorous, but they will take a variety of food including live prey, carrion, insects, fruits and berries. Across NSW, sheep (mainly as carrion), mice, rabbits as well as native animals such as the threatened yellow-footed rock-wallaby and possums are consumed by foxes. They even raid rubbish bins in urban areas.

Foxes usually live in family groups with limited overlap of their home ranges. They are generally active at night, dusk and dawn. Females breed only once during



the annual fox breeding season, which runs from July to October in south-eastern Australia. The average litter is four although litters can have up to ten pups. Both sexes become sexually mature at about ten months.

impacts of foxes on native fauna and domestic animals

Foxes have had a significant impact across mainland Australia through predation on both native wildlife and introduced domestic animals.

NATIVE FAUNA

Predation by the fox is considered to be a major threat to the survival of native Australian fauna. Small ground dwelling mammals between 35 grams and 5.5 kg and ground-nesting birds are at greatest risk (Burbidge and McKenzie, 1989). Reptiles, amphibians and invertebrates are also eaten by foxes.

Given the threat that European red fox poses to numerous endangered and vulnerable species, it has been listed as a key threatening process under the NSW *Threatened Species Conservation Act 1995*. Some of these endangered and vulnerable species that the fox poses a threat to include: the malleefowl (*Leipoa*

ocellata), Hastings River mouse (*Pseudomys oralis*), mountain pygmy-possum (*Burramys parvus*), broad-toothed rat (*Mastacomys fuscus*), long-footed potoroo (*Potorous longipes*), little tern (*Sterna albifrons*), yellow-footed rock-wallaby (*Petrogale xanthorpus*), brush-tailed rock-wallaby (*Petrogale penicillata*), and southern brown bandicoot (*Isoodon obesulus*).

DOMESTIC ANIMALS

In some circumstances foxes can kill up to 30% of newly born lambs. Extensive losses by fox predation can be associated with lambs that are already weak from lack of food, poor mothering or bad weather. Foxes can also disturb and kill poultry, goat kids, domestic pets or other farm animals (Saunders, personal communication, 1998).

foxes and rabbits

Because rabbits are the main prey of foxes through most of NSW, there is concern that foxes will switch to or prey more heavily on native animals if rabbit numbers fall rapidly due to control operations or disease outbreak such as rabbit calicivirus disease (RCD). To date there is no clear evidence of this, although studies are being conducted to try to prove or dispose this theory.

foxes as disease carriers

Foxes can carry a number of diseases and parasites including dog mange, hydatids and rabies. However, rabies has not been introduced to Australia. Foxes do not seem to have an important role in the cycling of hydatid disease in rural Australia although the situation in urban areas is less clear (Saunders et al 1995). Foxes readily carry the mange mite and at times it causes major reductions in fox populations. Equally, foxes could assist in transmitting mange to other animals including dogs and wombats.

methods for managing fox damage

The following information outlines some of the steps you can take to manage fox damage on your property. However, it is recommended you seek expert advice from a Rural Lands Protection Board office, a NSW National Parks and Wildlife Service District office or NSW Department of Agriculture before you commence any fox control program.

Effective fox control requires thorough planning and monitoring to ensure that the application is appropriate and that non-target species are not affected. Fox control programs need to be on-going to enable continued protection of wildlife as well as domestic animals. Transient foxes are easily able to re-populate an area if a control program is carried out only once a year.

A “neighbourhood” approach with adjoining properties in the establishment of long term control and

management of foxes can build upon your own efforts, as well as reducing costs for individuals. If your land adjoins a national park it might be beneficial to contact your local District office of the NSW National Parks and Wildlife Service and see if the control programs can be co-ordinated.

Fox management is important in affecting the long term conservation of native animals on private land. Consideration also needs to be given to how fox management and conservation of native wildlife can be integrated into your other farm operations. Pests such as rabbits and feral goats, loss of habitat and habitat fragmentation are also important factors affecting the long term conservation of native animals. It is thought that loss of habitat and habitat fragmentation have probably given foxes better access to native animals living in the bushland remnants.

Ensuring there is a healthy native understorey and a lack of easy access to the closed forest is important in protecting wildlife from foxes. There is evidence that fox predation occurs in open forest as opposed to closed forest with a dense understorey. For example, where possums have to travel across open ground between trees and when they come to the ground to seek water and refuge from extreme heat they are susceptible to predation by foxes. Avoid building tracks through native vegetation as they allow foxes to move more easily. The methods for managing fox damage outlined in this note can be used effectively in bushland areas without the need to make alterations to the habitat itself.

CONTROL METHODS

Poisoning

Sodium monofluoroacetate, commonly known as 1080 is the pesticide used to poison foxes. Fox poisoning with 1080 is regulated in NSW by the Pesticide Act 1978 and can be carried out only under the conditions specified in the current Off-label Permit. Rural Lands Protection Boards prepare and supply 1080 baits for use by landholders.

Protect domestic animals and native wildlife if you are undertaking a baiting program. Bait stations, where non-poisoned baits are buried, will help minimise the risk to domestic animals and native wildlife. A bait station is simply a pad of sand in which free feed baits are buried a depth of 10 cm or more. The bait station encourages animals to visit the site, and provides an indication as to what animals are visiting the station (Murray 1995). Animals are identified by their footprints. To identify what native or introduced animals may be visiting the bait station, the book by Barbara Triggs, *Tracks, Scats and other Traces* is an excellent reference.



Only when foxes are the only animals regularly taking the free feed is a 1080 bait laid in that station. Again, the bait will need to be buried at least 10 cm or more into the ground, and only one bait should be buried in each bait station at any one time. Foxes will readily dig for baits at this depth. Native wildlife such as tiger quolls, bandicoots and potoroos can easily locate and dig for food, including poisoned meat baits if they are not adequately buried (Murray 1998). Known fox tracks (where there is evidence of scat/print marks), near fox dens, walking tracks and edges of roads are all good locations to place baits. Baits should not be located in forested areas, caves, or gullies.

Further details on how to use 1080 baits as well as other fox control methods can be obtained from NSW Agriculture AgFacts and Agnotes, as well as the soon to be realised NSW NPWS "Best Practice Guidelines for Vertebrate Pest Control: Foxes".

Shooting

Shooting is usually done at night from a vehicle with the aid of a spotlight. High powered rifles are the preferred tool as they are more likely to kill instantly minimising needless suffering. Hunters often rely on their ability to lure inquisitive and inexperienced animals into shooting range. However, many of the foxes killed in the manner are yearlings rather than the more experienced foxes. This control method is labour intensive.

Fencing

Effectively excluding the agile fox from large areas with fences is both costly and difficult. Wire netting alone is no barrier to foxes regardless of the height. Electrified fences can be effective providing they are properly designed and maintained. Maintenance costs can be substantial and frequent monitoring of the enclosed area for the presence of foxes is necessary. A Rural Lands Protection Board office can provide more detailed information on appropriate fence designs.

Trapping

Trapping with oversize possum traps is not a useful technique for wide-scale fox control. It is labour intensive and there have been strong objections to their use on animal welfare grounds. Steel-jawed traps have been prohibited in NSW as they are cruel and are not target specific. However, soft-jawed traps are now available.

Fumigation

In NSW a carbon monoxide-producing cartridge called DEN-CO-FUME is registered for the control of foxes in natal dens. The cartridges are sold by Animal Control Technologies. However, this technique is possibly too expensive and time consuming to be suitable as a wide scale fox control technique.

Fertility control/Biological control

Scientists are attempting to develop an agent that will control fox breeding. However, it is still too early to determine if it is likely to be successful. Research is also being undertaken into immunosterilisation as a means of controlling foxes.

Some good news on fox control in Western Australia:

Western Shield, a wildlife recovery program in Western Australia has had great success in reducing fox numbers and increasing native wildlife. Fox baiting has been undertaken over a very large area using dried meat baits which contain sodium fluoroacetate (1080). Native wildlife in WA have a natural advantage in controlling foxes — a group of plants known as poison peas (Bailey 1996). Native wildlife of WA have co-evolved with the 1080 that is present in these native plants, and have a higher tolerance to it than foxes and the native wildlife in the eastern parts of Australia. The 1080 does not occur naturally in the plants in eastern Australia, therefore the use of 1080 in eastern Australia needs to be far more carefully planned and controlled to minimise the risks to eastern Australian wildlife.

Rural communities have participated and been supportive of the *Western Shield* program, with many farmers carrying out several baiting programs throughout the year which compliment the timing for the baiting program of *Western Shield*. Small threatened native mammals in WA which have benefited from the baiting program include the numbat (*Myrmecobius fasciatus*), tammar wallaby (*Macropus eugeii*), woylie (*Bettongia penicillata*), and the western ringtail possum (*Pseudocheirus occidentalis*) (Armstrong 1998).



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