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Bureau of Resource Sciences

Managing Vertebrate Pests: Foxes

Glen Saunders, Brian Coman,
Jack Kinnear and Mike Braysher

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Canberra

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The Bureau of Resource Sciences is a professionally independent Bureau established in October 1992 in the Department of Primary Industries and Energy. Its role is to enhance the sustainable development of Australia's agricultural, mineral, petroleum, forestry and fisheries resources and their industries by providing scientific and technical advice to government, industry and the community.

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FOREWORD

This publication, which is one in a series, provides land managers with 'best practice' national guidelines for managing the agricultural and environmental damage caused by foxes. Others in the series include guidelines for managing feral horses, rabbits, feral goats, feral pigs and rodents. The publication was developed and funded by the Vertebrate Pest Program in the Bureau of Resource Sciences. Production of the fox guidelines was aided by financial assistance from the Australian Nature Conservation Agency's Feral Pests Program.

To ensure that the guidelines are widely accepted as the basis for fox management, comment has been sought from state, territory and Commonwealth government agriculture, environmental and resource management agencies. Comments were also sought from land managers and community and other organisations, including the Australian Conservation Foundation, the National Farmers' Federation, the National Consultative Committee on Animal Welfare, the Anangu Pitjantjatjara Aboriginal Land Council and the Northern Land Council. The Standing Committee on Agriculture and Resource Management has endorsed the approach to managing fox damage set out in these guidelines.

Foxes are widely perceived by the wider community and by scientists and conservationists as a threat to native species due to their role as predators. Despite this perception, there is little reliable information on the effects of fox predation on prey populations or of the effect of fox control on the recovery of prey species. The exception is in Western Australia, where some field experiments have shown that fox control can lead to the recovery of native species, including rock-wallabies, bettongs and numbats. Foxes may also detrimentally affect native species such as birds of prey and large reptiles by competing with them for food, but such impacts are speculative as no studies have been conducted.

Less is known about the agricultural impact of foxes, although there is increasing evidence that foxes may inflict severe levels of lamb predation which were previously unrecognised. Foxes are also implicated in deaths and injuries to calves and dairy cattle, although this impact has not been quantified. There is also a small risk that foxes could have a role in the spread of exotic diseases, such as rabies, should such diseases enter Australia.

There are diverse views about fox management. While economists would argue that spending on pest control should be justified in terms of the economic returns on such investments, this is clearly difficult when the impacts of foxes for both conservation and agricultural values, and the

responses of prey populations to fox control, are poorly quantified. Those with an interest in conservation place a high value on the protection of native species and often consider fox control to be a priority for endangered species protection. People interested in hunting foxes for commercial use or recreation want to retain foxes as a resource. The crash of fox pelt prices resulting from the actions of the anti-hunting lobby in Europe has reduced interest in fox harvesting in recent years. People concerned with animal welfare hope to ensure that fox control or harvesting is conducted using humane techniques. The authors have attempted to take all these divergent views and values into account in compiling the guidelines.

The principles underlying the strategic management of vertebrate pests have been described in *Managing Vertebrate Pests: Principles and Strategies* (Braysher 1993). The emphasis is on the management of pest damage rather than on simply reducing pest density. The guidelines recommend that wherever practical, management should concentrate on achieving clearly defined conservation or agricultural production objectives.

These guidelines will help land managers reduce damage to agriculture and native fauna caused by foxes through the use of scientifically-based management that is humane, cost-effective and integrated with ecologically sustainable land management.

Peter O'Brien
Acting Executive Director
Bureau of Resource Sciences

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The draft manuscript was circulated to the following organisations for comment:

- Commonwealth Department of Primary Industries and Energy
- Standing Committee on Agriculture and Resource Management
- Australia and New Zealand Environment and Conservation Council
  - Standing Committee on Conservation
  - Standing Committee on the Environment
- Land and Water Research and Development Corporation
- Meat Research Corporation
- Rural Industries Research and Development Corporation
- International Wool Secretariat
- Australian Conservation Foundation
- National Consultative Committee on Animal Welfare
- National Farmers' Federation
- Murray Darling Basin Commission
- Australian Veterinary Association
- Anangu Pitjantjatjara Land Council

We wish to thank all these groups for their contributions. Many other people, too numerous to acknowledge individually, also gave us the benefit of their experiences by commenting on drafts of the manuscript. The Australian Nature Conservation Agency provided financial assistance.

ACRONYMS AND ABBREVIATIONS

ANCA	Australian Nature Conservation Agency
ANZFAS	Australian and New Zealand Federation of Animal Societies
APB	Agriculture Protection Board (Western Australia)
APCC	Animal and Plant Control Commission (South Australia)
AUSVETPLAN	Australian Veterinary Emergency Plan
AVA	Australian Veterinary Association
BRS	Bureau of Resource Sciences
CALM	Department of Conservation and Land Management (Western Australia)
CCNT	Conservation Commission of the Northern Territory (now Parks & Wildlife Commission of the Northern Territory)
CRC	Cooperative Research Centre for Biological Control of Vertebrate Pest Populations
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCNR	Department of Conservation and Natural Resources (Victoria) (now Department of the Natural Resources and the Environment)
DEST	Department of Environment, Sport and Territories
ERIN	Environmental Resources Information Network
ESAC	Endangered Species Advisory Committee
FPP	Feral Pests Program (ANCA)
GIS	Geographic information system
HCAV	Hunt Clubs Association of Victoria
HIPD	Hunting indicator of population density
Landcare	Commonwealth Landcare Program
LandCare	Victorian Landcare Program
MAFF	Ministry of Agriculture, Fisheries and Food (United Kingdom)
NLP	National Landcare Program (now part of the Natural Heritage Trust)
PMIS	Pest management information system
RLPB	Rural Lands Protection Board
RSPCA	Royal Society for the Prevention of Cruelty to Animals
SCARM	Standing Committee on Agriculture and Resource Management
VPP	Vertebrate Pest Program (BRS) (now National Feral Animal Control Program)

GLOSSARY

abortifacient: a chemical used to induce abortion

ad hoc measures: specially arranged for the purpose

anticoagulant: a substance that slows or prevents blood clotting. Anticoagulants may be used as poisons to kill pest animals.

attenuated strains: a weak strain of an infectious organism

biltong: strips of sun-dried, lean meat

biocontrol/biological control agent: a living organism (or a virus) used to control the population density of another species

brittilised capsule: a capsule for oral dosing of animals that has been made brittle so it will easily shatter when eaten but is safe to carry

cadastral information: usually includes property boundaries, land tenure and roads

Canidae, canids: the family of animals that includes dogs, foxes and wolves

carcinogenic: cancer causing

carrying capacity: the maximum number of animals that the resources available in an area of land can support

chenopod: plant of the family Chenopodiaceae. In arid areas of Australia chenopods are mostly salt-tolerant shrubs such as blue bush and salt bush.

crepuscular: animals active at dawn and dusk

dasyurids: animals in the family of carnivorous marsupials Dasyuridae, including quolls, dunnarts, antechinuses, planigales, ningauis and the Tasmanian devil

diurnal: animals active during the day

dystocia: difficult birth

endangered species: species in danger of extinction and whose survival is unlikely if the causal factors leading to their decline continue to operate

endocrine function: the release, distribution and effects of hormones in an animal's body

endoparasite: animals that live inside another animal's body, such as tapeworms and the bacteria in the digestive tract

enzootic areas: areas where a disease occurs in wildlife

European rabbit flea: a flea introduced to assist the spread of myxomatosis

family group: occupants of a fox territory, usually composed of a monogamous adult pair and their offspring from the previous breeding season; a dominant adult pair, subordinate adults and offspring, or other common combinations

forb: a soft herb-like plant with a non-woody stem, especially a pasture plant that is not a grass

geographic information system (GIS): acomputer-based system for displaying, overlaying and analysing geographic information such as vegetation, soils, climate, land use and animal distributions

gestation: pregnancy

home range: the area an animal ranges over during its normal daily activities

immunosterility: causing an animal to become sterile by immunising it against one of the proteins or hormones involved in the reproductive process

index, indices: a measure which is correlated with a value but is not an actual estimate of that value. For example spotlight counts give an index of fox numbers but do not give an estimate of total numbers.

intraperitoneal: into the abdominal cavity

intubation: to insert a tube into

LD_{50}: the quantity of poison or lethal dose that will kill 50% of treated animals

macropods: animals in the Macropodidae superfamily which includes kangaroos, wallabies, bettongs, rat kangaroos, potoroos, pademelons and tree kangaroos

minimum convex polygon: a simple method for calculating the area enclosed by an animal's home range. It involves drawing the smallest possible convex polygon around the outermost locations or sitings of the animal.

monoestrus: become reproductively receptive only once per year

neophobia: fear of new things

nocturnal: animals active at night

one-shot oats: technique for poisoning rabbits using 1080 and oats whereby only one in one hundred oat grains contain 1080 poison, sufficient to kill an adult rabbit

oral delivery: a dose swallowed in food or drink

parturition: birth

pelt: the skin and fur, either raw or dressed

population turnover: the average time it takes to replace a generation

RD_{50}: the concentration of a sensory irritant which produces a 50% decrease in an animal's breathing rate

recombinant virus: a virus which has been modified by artificial genetic manipulation

relict population: a small isolated population of a species that was once more widespread and abundant

scat: faeces

secondary poisoning: intoxication or death of animals caused by ingestion of other poisoned animals

spotlight traverse: a fixed line of travel over which animals in a spotlight beam are counted

sylvatic: involving one or more wildlife species

tarbaby: a technique for killing foxes where 1080 poison in grease is squirted into a fox den. The fox dies from ingesting the poison grease from fur and paws.

territory: the area an animal or group of animals defends from intruders

tetanic spasms: violent generalised muscular contractions with flailing limbs

transect: a rectangular plot in which data collection occurs

translocation: moving a species to a different place or habitat

ultrasound scanning: use of low frequency sound to investigate the internal structure of an animal without surgery, used for counting foetuses

vectors: organisms or substances that are vehicles to spread a biocontrol agent or disease among animals. For example, mosquitoes are vectors of myxomatosis.

vulnerable species: species believed likely to become endangered in the near future if the causal factors continue to operate

Note: All money values throughout the guidelines are in 1993-94 Australian dollars.