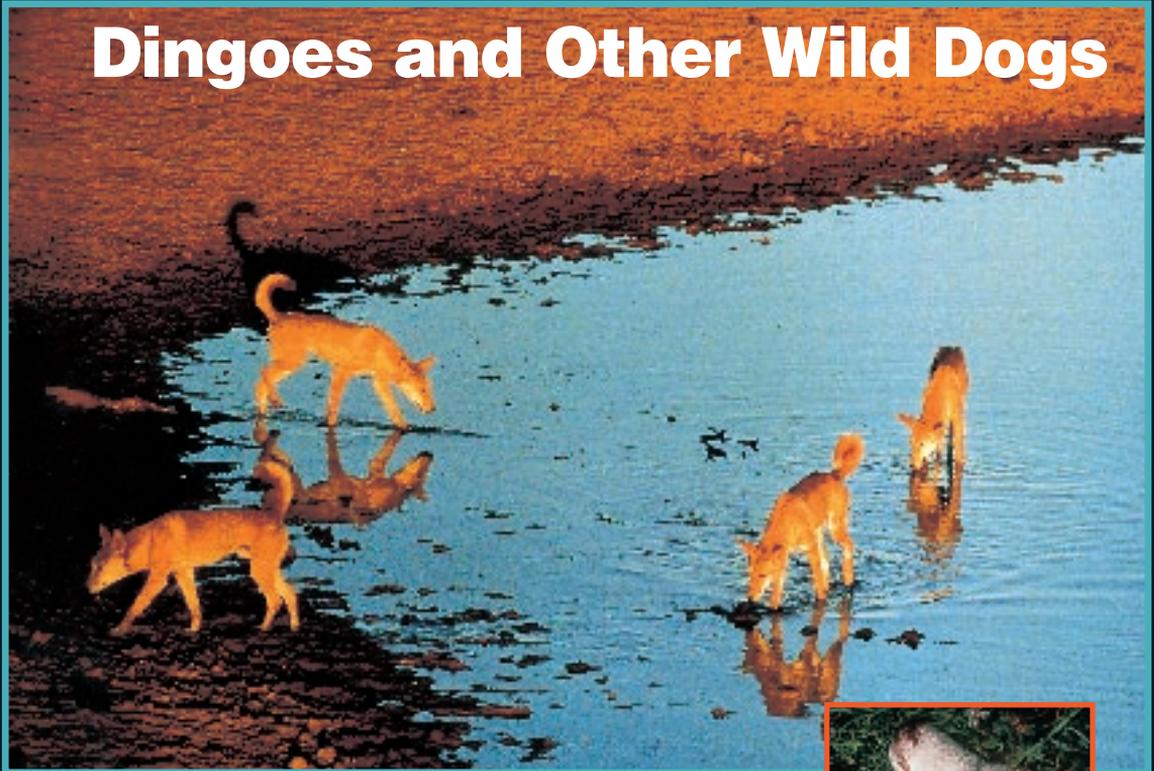




Natural Heritage Trust  
*Helping Communities Helping Australia*

Managing the Impacts of

# Dingoes and Other Wild Dogs



# **Managing the Impacts of Dingoes and Other Wild Dogs**

**Peter Fleming, Laurie Corbett,  
Robert Harden and Peter Thomson**

Scientific editing by Mary Bomford

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The Bureau of Rural Sciences is a professionally independent scientific bureau within the Department of Agriculture, Fisheries and Forestry — Australia. Its mission is to provide first-class scientific research and advice to enable the department to achieve its vision — rising national prosperity and quality of life through competitive and sustainable agricultural, fisheries and forestry industries.

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Wild dogs, which include feral domestic dogs, dingoes and their hybrids, are a problem in Australia because their predation and harassment of stock causes millions of dollars worth of losses to sheep, cattle and goat producers each year. There are also opportunity costs in areas where sheep are not grazed because of the high risk of wild dog predation. Yet dingoes are also valued as a native species and their conservation is important to many people. The survival of pure dingoes on mainland Australia is threatened by hybridisation with feral domestic dogs.

There is little reliable information about the cost of wild dog predation or the benefits of wild dog control. The relationship between dog abundance and livestock predation is often complex and variable and sometimes stock losses can be high even when wild dog numbers are low. Although spending on pest control should be justified in terms of economic returns on such investments, this is clearly difficult when changes to livestock productivity in response to dog control are often poorly quantified. This can be further complicated where pastoral properties abut government lands where dingo conservation is a management objective and dogs move between these areas.

This book is one in a series produced by the Bureau of Rural Sciences as part of the National Feral Animal Control Program — a Natural Heritage Trust initiative. Others in the series include guidelines for managing feral horses, rabbits, foxes, feral goats, feral pigs, rodents and carp. The principles underlying the strategic management of vertebrate pests have been described in *Managing Vertebrate Pests: Principles and Strategies* (Braysher 1993) and in *Australia's Pest Animals: New Solutions to Old Problems* (Olsen 1998). 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 economic or conservation benefits.

To ensure the guidelines are accepted as a basis for wild dog management, comment has been sought from State, Territory and Commonwealth Government agencies and from land managers and community and research organisations. The Standing Committee on Agriculture and Resource Management has endorsed the publication of these guidelines.

These guidelines provide natural resource users, managers, advisers and funding agencies with 'best practice' national guidelines for managing the economic and environmental damage caused by wild dogs. They will help land managers reduce harm to livestock caused by wild dogs and assist in the conservation of pure dingoes through the use of scientifically based management that is humane, cost-effective and integrated with ecologically sustainable land management.

Peter O'Brien



Executive Director

Bureau of Rural Sciences



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  - Standing Committee on Agriculture and Resource Management
  - Standing Committee on Conservation
  - Vertebrate Pests Committee
- We thank these groups and hope that this document will facilitate their involvement in more strategic management of wild dog impacts.
- Animals Australia
  - Australian Conservation Foundation
  - Australian Veterinary Association
  - Central Land Council
  - Commonwealth Department of Agriculture, Fisheries and Forestry
  - CSIRO
  - Land and Water Resources Research and Development Corporation
  - National Consultative Committee on Animal Welfare
  - National Farmers' Federation



## Summary

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Wild dogs are widely distributed throughout Australia and are pests in agricultural areas, particularly in areas dominated by sheep enterprises. Predation of sheep and cattle threatens the economic viability of some properties and the costs of wild dog control can be substantial. At the same time, in unoccupied lands and areas of extensive cattle grazing wild dogs are often tolerated and dingoes are actively conserved in parts of their range.

These guidelines are a comprehensive review of the origins of dingoes and other wild dogs in Australia, their biology and ecology, the damage they cause, and past and current management. The attitudes of various community groups to wild dogs and the damage they cause through predation of livestock, and to the conservation of dingoes were sought during the production of these guidelines. A strategic approach to management is recommended to reduce predation on livestock by wild dogs and to allow conservation of dingoes. This approach is illustrated by case studies. Deficiencies in knowledge, management and legislation are identified.

These guidelines have been prepared primarily for State and Territory management agencies as a basis on which to consult with land managers and relevant interest groups and to prepare state, regional and local strategies for managing wild dogs and reducing the damage they cause to livestock industries. Their purpose is to assist in developing the most cost-effective strategies to reduce wild dog damage to production. Ideally, such strategies are based on reliable quantitative information about the damage caused by dogs, the cost of control measures and the effect that implementing control has on reducing damage. In developing these guidelines the authors have used all such available information. In some instances, however, where reliable information is not yet available, land managers responsible for wild dog management will still have to make assumptions about impacts and the efficacy and cost-effectiveness of control techniques.

## Biology, ecology and taxonomy

The wild dog population comprises two subspecies of canid, dingoes (recommended nomenclature, *Canis lupus dingo*) and feral dogs (recommended nomenclature, *C. l. familiaris*) and hybrids of the two. Dingoes were first introduced to Australia some 4000 years ago and domestic dogs have been present since first European settlement in 1788. Dingoes and other wild dogs are widely distributed throughout the country and are present in most environments. However, dingoes and other wild dogs have been removed from much of the agricultural zone over the past 200 years and hybridisation between the subspecies over that time has resulted in a lesser proportion of pure dingoes, especially in south-eastern Australia.

The average adult dingo in Australia weighs 16 kilograms and, although feral dogs and hybrids may weigh up to 60 kilograms, most are less than 20 kilograms. Pure dingoes are distinct from similar-looking domestic dogs and hybrids because they breed once a year and have some different skull characteristics. The present distribution of dingoes and other wild dogs covers most of the mainland, except for the sheep and cereal growing areas of south-eastern Australia. Wild dogs live in small groups or packs in territories where the home ranges of individuals vary between 10 and 300 square kilometres. Packs are usually stable but under certain conditions some wild dogs, usually young males, disperse.

Although wild dogs eat a diverse range of foods, from insects to buffalo (*Bubalus bubalis*), they focus on medium and large vertebrates. Hunting group size and hunting strategies differ according to prey type to maximise hunting success. Larger groups of wild dogs are more successful when hunting large kangaroos (*Macropus* spp.) and cattle and solitary animals are more successful when hunting rabbits and small macropods.

Female dingoes become sexually mature by two years and have only one oestrus period each year, although some do not breed in droughts. Female feral dogs of a similar size to dingoes have the potential to have two litters each year but this is rarely achieved because of the high nutritional demands of raising young. Litters average five pups and are usually whelped during winter.

## **Agricultural impacts**

Wild dogs prey on livestock and predation on sheep and cattle can threaten the economic viability of properties in some areas. Sheep are the most commonly attacked livestock, followed by cattle and goats.

Some individual wild dogs cause far more damage than others, although many individuals will attack or harass sheep, sometimes maiming without killing. Wild dogs sometimes chase sheep without attacking them. Even when wild dogs kill sheep, they often leave carcasses uneaten. Wild dogs that frequently kill or maim sheep often eat other prey, indicating that predation of livestock may be independent of the abundance of other prey. Surplus killing, where more sheep are killed than are needed for food, means that stock losses can be high even when wild dogs are at low densities.

Wild dogs are implicated in the spread of hydatids, a risk to human health and the cause of losses of production associated with hydatidosis (causal agent *Echinococcus granulosus*) in cattle and sheep. They also provide a reservoir for heartworm (*Dirofilaria immitis*) infection and dog diseases such as parvovirus (causal agent Parvovirus). Wild dogs pose the greatest potential risk of maintaining and spreading dog rabies (Rhabdoviridae) if it were to be introduced to Australia.

## **Conservation of dingoes**

The dingo is usually considered a native Australian mammal. Dingoes are an intrinsic part of natural ecosystems and they also have aesthetic value. There is some public expectation that dingoes should be conserved and dingoes are legally protected in some States and Territories. In Australian wildlife communities, wild dogs are top

order predators, and as such probably have a major influence on the abundance of the species they compete with or prey on. The interactions between wild dogs and foxes (*Vulpes vulpes*) are not well understood. It is unknown whether the presence wild dogs reduces fox abundance and hence whether wild dogs reduce the impact of foxes on native animal prey.

The greatest threat to the survival of dingoes as a protected sub-species is hybridisation with other dogs. In the more settled coastal areas of Australia and increasingly in out-back Australia, the barriers to mating between domestic dogs (feral and owned) and dingoes are rapidly being removed. Hence hybridisation is becoming more common and the pure dingo gene pool is being swamped. In south-eastern Australia, more than half the wild dogs are hybrids. Changes to policies on wild dog management and people's attitudes would be needed to prevent the extinction of pure dingoes on the mainland. The main hope for conservation is to educate people about the plight of dingoes and to manage pure dingoes on large islands such as Fraser Island and Melville Island.

## **Community attitudes affecting management**

Opinions vary as to the pest status of dingoes and other wild dogs. People in the agricultural sector often view wild dogs as a pest to be removed from the environment. In contrast, Aboriginal peoples, urban people and conservationists often view dingoes as native wildlife that should be conserved. Public opinion influences not only the type of management strategies that are developed but also the type of control methods that are used. Wider public attitudes rightly demand that the techniques used for wild dog control be as humane as possible and minimise risks to non-target animals and other environmental values. Management strategies that do not address or acknowledge broad community attitudes are susceptible to disruption or interference.

## Past and current management

In the past, legislation for the management of wild dogs has included punitive Acts and Acts dealing with the conservation of wildlife. Management of wild dogs relied heavily on labour-intensive techniques, such as trapping, shooting, and ground baiting, with bounty payments being offered as an incentive to kill dogs. Much of the control work was reactive, dealing with problems as they arose. Nevertheless, some strategic, preventative control was carried out including the construction of district-wide exclusion fences.

The dingo is extinct in much of the sheep and cereal production zones of eastern and southern Australia because of habitat modification and the success of early poisoning campaigns. The areas that are largely without wild dogs are separated from areas where they are still present by dog-proof fences that were erected around the turn of the century and are still maintained.

In most States and Territories, there is a legal requirement to destroy wild dogs in sheep and cattle grazing zones. Poisoning programs form the basis of lethal control efforts although trapping and shooting are also important.

Current management strategies focus on the objective of minimising the impact of wild dog predation on livestock, not just on killing wild dogs. Aerial baiting with 1080 (sodium fluoroacetate) baits forms a major part of most management programs and is primarily targeted at limited zones adjacent to livestock grazing areas. Large coordinated campaigns have generally been adopted, being more efficient and effective than small localised efforts. Bounty payments have not been successful in reducing predation by wild dogs and are subject to abuse.

Policy and legislation to encourage the conservation of pure dingoes is required in some States and Territories and a concerted nation-wide effort is needed to ensure that dingo conservation is not thwarted by conflicting legislation. Simultaneously, the control of wild dogs, including dingoes, must be permitted where predation of livestock occurs.

## Techniques to measure and manage impact and abundance

To formulate wild dog management plans, it is necessary to measure the level of predation inflicted by wild dogs and to measure changes in wild dog abundance. These two measures enable an assessment of when wild dog control is required and how effective it is.

The principal techniques to control wild dogs are exclusion fencing, shooting, trapping and poisoning. Poisoning using 1080 is the most cost-effective means of reducing populations of wild dogs over large areas of remote or inaccessible country. Various bait types are used and methods of placement range from burying individual baits to dropping baits from aircraft. Trapping is still used for wild dog control and will probably always be needed to target particular dogs that cannot be removed by other means. New techniques such as the use of livestock-guarding dogs, poison ejecting devices and toxic collars have been suggested as alternatives to current methods.

## Strategic approach to management

The strategic approach to wild dog management allows improvements at both the local and regional scale. The strategic approach has four components: defining the problem; developing a management plan; implementing the plan; and monitoring and evaluating progress and outcomes.

Defining the problem involves the identification of who has a wild dog problem, what harm the dogs cause, where, when and why damage occurs and how much it costs.

The development of a management plan requires setting management objectives that should include interim and long-term goals, a time frame for achieving them and indicators for measuring performance. Options for wild dog control include local eradication, strategic management, reactive management or no dog control.

Economic frameworks are needed for assessing the value of alternative strategies to manage wild dogs. In some situations, management plans that include conservation strategies

for dingoes are required so that potentially conflicting goals can be encompassed. Consultation between stakeholders and clear identification of the goals is critical for avoiding potential conflicts between stakeholder groups with different legal obligations and objectives.

Wild dogs have large home ranges and often traverse boundaries between lands managed by different stakeholders. Action by groups, including government agencies, is therefore an essential element of planning and implementation. By pooling resources, wild dog control groups and boards have been better able to manage wild dog problems. Management programs must be flexible enough to account for the different objectives of stakeholders.

Monitoring and evaluation occur at different levels throughout the implementation and on completion of actions. Operational monitoring records and reviews the costs of actions during the program and ensures that the management plan is executed in the most cost-effective manner. Performance monitoring assesses the effectiveness of the management plan in meeting the agricultural production or conservation objectives that were established initially. Evaluation of data from both forms of monitoring enables the continuing refinement of the management plan. Strategic management of wild dogs is based on the concept of adaptive management, in which the management plan is flexible, responding to measured changes in

economic, environmental and pest circumstances. By adopting the strategic approach, predation by wild dogs should be minimised while the conservation of the dingo proportion of the wild dog population will be enhanced. Under such an approach, limited resources will be better allocated and the scale of management will be more appropriate for wild dog problems.

### **Deficiencies in knowledge and practice**

Although there is much knowledge about the ecology, behaviour and effects of predation by dingoes and other wild dogs, some topics require further research to enable best practice management to be implemented. These include better definition of the agricultural impacts of wild dogs and control programs for different enterprises in different regions, study of the interactions between the control of rabbits and wild dog predation of livestock and the effects of wild dog control on the abundance of kangaroos and wallabies (*Macropus* spp.), and the effects of this on agriculture and forestry. There are also knowledge deficits relating to the conservation of dingoes, the effects of wild dog control programs on persistence of pure dingoes, the interactions between predation by wild dogs and the conservation status of non-target animals, and the interactions of wild dogs with feral cats, foxes and native carnivores.

These guidelines for managing the impacts of dingoes (*Canis lupus dingo*) and other wild dogs (*C.l. familiaris*) are the eighth in the Managing Vertebrate Pests series being published by the Bureau of Rural Sciences (BRS) in cooperation with the Vertebrate Pests Committee of the Standing Committee on Agriculture and Resource Management (SCARM). These guidelines were funded under the agricultural component of the National Feral Animal Control Program (NFACP) of the Natural Heritage Trust (NHT). A fundamental difference between these guidelines and the preceding publications exists because dingoes hold a legal position unique amongst Australian mammals. Unlike most of the other species addressed by the series, dingoes are simultaneously a protected native species and declared vermin. The dingo and some native birds and rodents are both protected and declared according to their occurrence and situation.

Other guidelines in the series include those for managing feral horses (Dobbie et al. 1993), rabbits (Williams et al. 1995), foxes (Saunders et al. 1995), feral goats (Parkes et al. 1996), feral pigs (Choquenot et al. 1996), rodents (Caughley et al. 1998) and carp (Koehn et al. 2000). A companion volume, *Managing Vertebrate Pests: Principles and Strategies* (Braysher 1993), which explains the principles on which best practice pest management is based, can be read in conjunction with all of these guidelines. There is also an overarching publication (Olsen 1998), designed for general reading, which reviews past management of pest animals in Australia and promotes a more strategic approach for future management. The benefits of focusing on the damage caused by a pest and not the pest itself are explained. Olsen (1998) also explains the need to take into account the links between different feral animal species and other aspects of land management, consistent with the holistic approach advocated under the Ecologically Sustainable Development (ESD) Strategy and Landcare.

A single publication considering the main vertebrate pests would be desirable and consistent with the holistic approach to land management advocated under the ESD Strategy and Landcare objectives. Such a publication would take into account links between pests and links between pests and other aspects of land management. However, the complexities posed by such an approach and current limited knowledge of interspecific interactions has made this impractical. All the guidelines, including these, consider interactions between species and the relationships with other aspects of land management.

These guidelines are principally for State and Territory land management agencies, to assist them to better coordinate, plan and implement regional and local programs that can more effectively manage adverse impacts of wild dogs. The Commonwealth Government has an interest in improving strategies, techniques and approaches to manage the damage caused by wild dogs, both through its responsibilities as a manager of Commonwealth lands and resources, and through programs such as NFACP and the National Landcare Program (NLP) of the NHT, and the National Strategy for the Conservation of Australia's Biological Diversity (Commonwealth of Australia 1992).

### **Vertebrate pests in Australia: species or situations?**

The definition of pest status can be contentious. Some species are regarded as pests all the time in all situations because of their current detrimental impacts or their potential adverse impacts, given their biology, behaviour and historical performance as pests in similar or other habitats. Other animals are generally regarded as having either beneficial or neutral net impact in most situations. Some species, such as the dingo and the feral goat, may be both a significant pest and a significant conservation or economic resource. Perhaps the most useful criterion for evaluating the status of an animal is to

evaluate it in terms of its value in a particular situation. For example, cats are valued highly as pets by many people and some pedigree cats have a high market price. Conversely, predation by feral cats is regarded as a process threatening some endangered native vertebrates with extinction (Dickman 1996).

## **The National Feral Animal Control Program**

NFACP is working with State, Territory, and local governments to reduce damage by pest animals to agriculture and the environment. The agricultural component of NFACP is administered by BRS; the environmental component by Environment Australia.

Under its component of NFACP, BRS is producing these national management guidelines for the main pest species of agricultural production and supporting projects to address the information, management and extension deficiencies they identify and to demonstrate the strategic management approaches they advocate.

Applying a strategic approach to the management of the impacts of wild dogs involves the establishment of four essential components (Figure 1) This approach has been adopted in the development of each set of national guidelines.

## **The strategic management approach**

### ***Problem definition and planning of management strategies***

There are two problems requiring management. The first problem is predation of livestock by dingoes and other wild dogs. Although there are no estimates of the Australia-wide losses to livestock production caused by wild dogs (including dingoes), the estimated annual expenditure on control activities of \$7 million is second only to that for rabbits. The historical threat of predation by wild dogs has largely determined the distribution of sheep and cattle in Australia. A barrier fence stretching from the Great Australian Bight through South Australia and Queensland and ending in north-eastern New South Wales has been built and maintained by

government agents and graziers to exclude wild dogs from sheep grazing lands.

Secondly, the dingo has been in Australia long enough to be regarded as part of the native fauna. The existing dynamics of Australia's fauna have evolved with the dingo and the conservation of dingoes within non-agricultural environments is a legitimate aim. Since European settlement, the increasing presence in the population of genes from feral and domestic dogs has reduced the dingo population's integrity. If this trend continues it is predicted that the increasing occurrence of domestic dog genes in wild populations will effectively lead to the extinction on the mainland of the dingo as a subspecies by 2100 (Corbett 1995a).

Strategies to conserve pure dingoes can conflict with strategies to control wild dogs to reduce their impacts on livestock enterprises. Developing approaches to satisfactorily address both problems requires clarification of issues and knowledge of the biology and status of dingoes and other wild dogs. Thus, Chapter 1 discusses the taxonomy of dingoes and other wild dogs, and details their origins, distribution and abundance, and Chapter 2 reviews their biology and ecology. In Chapter 3, the impacts of wild dogs on human activity and environments are discussed. Public attitudes can strongly influence the perceived nature of dingoes and other wild dogs as a resource or as a problem, and these issues are addressed in Chapter 4. The legal status of dingoes and other wild dogs, and past and current management practices, are reviewed in Chapter 5.

The objective of the national guidelines is to stimulate a widespread change in approach to the management of dingoes and other wild dogs from ad hoc measures to a strategic management approach based on cooperative action and the most recent knowledge. An integrated approach on a regional or total catchment scale is advocated because the problems associated with dingoes and wild dogs usually extend past the boundaries of individual land holdings.

The primary aim of a land manager is to meet their desired conservation and/or agricultural production goals using practical and cost-effective means. This must be done as humanely as possible and without degrading other natural resources on which the long-term sustainability of agriculture and biodiversity depend. There is great variability within and between the environments in which wild dogs occur and this influences management activities. The factors that affect the desired outcomes include fluctuating commodity prices, legal constraints, climatic variability including drought, interactions of wild dogs with prey, grazing pressure, livestock genetics, conservation objectives, animal welfare considerations and social factors.

Legislative constraints and the extensive nature of wild dog predation problems have resulted in a strategic approach being manifest in many areas. These guidelines will have achieved their purpose if the advocated strategic approach is widely accepted and implemented. Strategic management requires the measurement of the impacts and abundance of wild dogs, and this can be achieved in a number of ways which are detailed in Chapter 6. Many people and agencies, including governments and community groups, jointly own wild dog problems and need to work cooperatively to find strategic solutions (Chapter 4 and Chapter 7). In some cases, inadequacies in available knowledge may prevent identification of the best strategy. A flexible approach, where the implementation of management actions are continually monitored and evaluated and modified if necessary ('learning by doing' or 'adaptive management') is often the best approach. Strategic approaches to the management of dingoes and other wild dogs are described in Chapter 7.

### **Implementation, monitoring and evaluation of strategic programs**

A group approach to the implementation of management programs reflecting cooperation between individuals and agencies at the local and regional level is encouraged throughout the guidelines and Chapter 7 outlines features to aid the implementation of management plans. A group approach

involves all affected landholders and others with a significant interest in the management and conservation issues associated with dingoes and other wild dogs from early planning stages through to implementation, monitoring and evaluation.

At a national level, such an approach requires that the various roles and responsibilities of government agencies, individuals and interest groups are taken into account and integrated. State and Territory governments provide the legislative and regulatory infrastructure, and conservation and pest control agencies administer the appropriate Acts and regulations. Responsibility for local management of wild dogs rests with the owners and occupiers or administrators of land. The active participation of the Vertebrate Pests Committee (VPC) and all associated government agencies in developing these guidelines is thus important in obtaining their acceptance and support for implementation by both agricultural and conservation interests.

For a strategic management program to be successful, it must be continually monitored and evaluated so that modifications and improvements can be incorporated. Such monitoring, evaluation and re-evaluation is an ongoing process and techniques for assessing impacts and monitoring management practices and programs are detailed in Chapter 6.

### **Strategic management at the local and regional level**

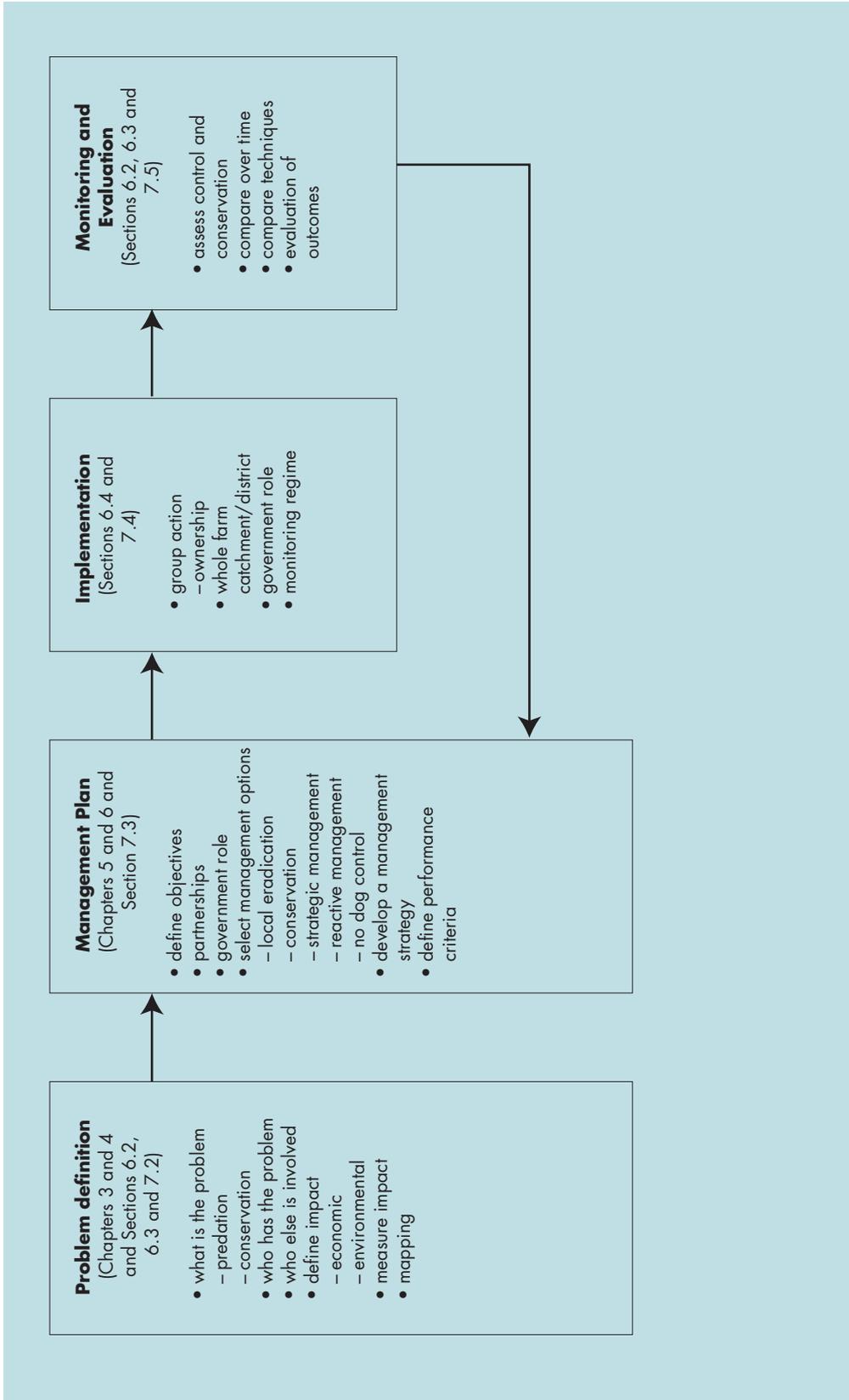
The management of wild dogs is a complex issue because the pest status and conservation status of the species must be balanced. This document presents the best practices for the management of dingoes and other wild dogs. Management must attempt to reduce the adverse impacts of wild dogs while maintaining viable populations of genetically pure dingoes and these guidelines amalgamate the best available information on effective approaches. These guidelines consider the conservation values of dingoes and the influence of hybridisation on their genetic integrity. Conservation priorities affect management decisions for wild dogs, particularly at the

interface of developed agricultural lands and land managed for conservation. The emphasis in these guidelines is therefore to concentrate on managing the impacts of wild dogs on agricultural and environmental resources while conserving the dingo as a sub-species. At the local and regional level, land managers need to use the information in the book to develop and apply their own strategies. Examples of successful strategic approaches, both hypothetical and real, involving private and government land managers are given in Chapter 7.

These guidelines outline best practices based on present knowledge. A number of deficiencies in that knowledge are identified in Chapter 8. It is expected that best practices

will evolve through adaptive management and that community-based groups will become more involved in the strategic management of wild dogs. These guidelines allow local groups to own the pest or conservation problem as well as management strategies derived from the guidelines. It is intended that these guidelines will also assist State and Territory governments in their role of providing legislative, technical and policy support for the management of dingoes and other wild dogs.

**All dollars have been converted to 1999–2000 Australian dollars unless otherwise stated in the text.**



**Figure 1:** Strategic approach to managing the impacts of wild dogs (after Braysher 1993).

