NSW National Parks and Wildlife Service

South West Slopes Region

DRAFT

Pest Management Strategy

2008-2011

Department of Environment & Climate Change NSW

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The New South Wales National Parks and Wildlife Service (NPWS) is now part of the Department of Environment and Climate Change (DEC). Throughout this strategy, references to "NPWS" should be taken to mean the NPWS carrying out functions on behalf of the Director General and the Minister of DEC.

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1. Introduction

Pest species are animals (including invertebrates) and plants that have negative environmental, economic and social impacts. In this document they are collectively referred to as pests. Pests are most commonly introduced species, though native species can become pests. In parks, pests may have impacts across the range of park values, including impacts on biodiversity, cultural heritage, catchment and scenic values.

Pests are among the greatest threats to biodiversity throughout Australia. In New South Wales, they have been identified as a threat to 657 of 945 (70%) species, populations and communities listed under the *Threatened Species Conservation Act 1995*; more than any other process except the destruction and disturbance of native vegetation. Minimising the impacts of pests on biodiversity is thus the main objective of NPWS pest management.

Pests can also have significant impacts on economic values of neighbouring lands. The NPWS seeks to address these impacts when setting management priorities and significant resources are committed towards landscape wide pest programs, including wild dogs.

The control of pests outside of parks is the responsibility of private landholders and other agencies such as rural lands protection boards, local councils, the Department of Primary Industries and the Department of Lands. The NSW Invasive Species Plan provides the framework for the coordinated management of pests that occur over varying land tenure. NPWS is a committed partner to the implementation of this plan.

Many pests are distributed widely across Australia and eradication is not possible in the foreseeable future. They occur in most environments and across all land tenures. Pests often spread quickly and have high reproductive rates, allowing them to re-establish rapidly following control. In recognising that eradication of widespread pests across large areas is an unrealistic goal, NPWS prioritises control effort to focus on areas where impacts are greatest. Resources can then be directed to ensure that the resultant control programs are effective in reducing these impacts. It is the responsibility of all land managers to work together to control pests where significant impacts have been identified.

In New South Wales, the main pest management priorities for the conservation of biodiversity are focussed on threatened species and endangered ecological communities, and are identified in the Threatened Species Priorities Action Statement (PAS), individual threat abatement plans (TAPs) and park plans of management. Pest programs are also integrated with other park management programs such as fire management.

2. Purpose of the Strategy

The development of Regional Pest Management Strategies (RPMS) provides NPWS with a strategic approach to pest management across NSW. The RPMS developed for each region provides a tool to broadly identify pest distribution and their associated impacts across the park system. It details priorities for each Region, including actions listed in the PAS and TAPs as well as other actions such as wild dog and feral pig control to protect neighbouring properties and site-based weed control and allows resources to be allocated to high priority programs. The RPMS also identifies the requirement for other plans or strategies, such as Wild Dog Plans or Bush Regeneration Plans, that provide a more detailed approach.

New pest species continue to establish in the environment either through the importation of new species into Australia or the escape of domestic plants and animals. Prevention and early detection followed by eradication is the most cost-effective way to minimise the impacts of new pests. The NPWS works with other agencies to prevent the introduction of new pests into the wild and to respond rapidly when new incursions occur. The response of NSW government agencies to new pests will be coordinated through the NSW Invasive Species Plan.

In this strategy, the generic term “parks” is used to refer to any lands managed by NPWS including national park, nature reserve, aboriginal area, historic site, state conservation area and regional park amongst others. This strategy has a four year life span. In the final year of the strategy, it is intended that the strategy will be reviewed and updated.

3. Legislation and Policy

The NPWS has a number of statutory responsibilities in relation to pest management.

National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) vests the care, control and management of national parks, nature reserves, historic sites and Aboriginal areas with the Director-General of the NPWS. Key management objectives include conservation, provision of appropriate scientific and educational opportunities, and management of fire and pest species. These are achieved through the preparation and implementation of plans of management for each reserve, which identify pest species present, control strategies and priorities for that reserve.

Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) lists threatened species, endangered populations and endangered ecological communities. The *TSC Act* also lists key threatening processes (KTPs), which are identified as having significant impacts on the conservation of native flora and fauna. As of August 2006, 18 pests have been listed as KTPs e.g. *Predation by the Red Fox*, *Invasion of Native Plant Communities by Bitou Bush and Boneseed*. The NSW Threatened Species Priorities Action Statement (PAS) outlines the strategies for ameliorating threats listed under the TSC Act including the preparation of threat abatement plans. For each of these strategies the PAS lists one or more detailed actions which aim to protect threatened species by reducing the impact of listed threats.

Rural Lands Protection Act 1998

The pest animal provisions of the *Rural Lands Protection Act 1998* (RLP Act) outline the conditions under which animals, birds and insects are "declared" pests and provides for the control of such pest species. Gazettal of pest species occurs through Pest Control Orders that allow the Minister for Primary Industries to specify pest species on a state wide or local basis and the conditions or factors that apply to the control of each pest. Rabbits, wild dogs and feral pigs have been declared pest animals throughout NSW.

The RLP Act binds the Crown for the control of pest animals declared under the Act. Public land managers such as the NPWS are required to eradicate (continuously suppress and destroy) pest animals "…to the extent necessary to minimise the risk of the pest causing damage to any land" using any lawful method or, if the Order specifies a method to be used, by the method specified.

An approach to balance the conservation of dingoes with the need for wild dog control has been incorporated into the RLP Act through the Pest Control Order for Wild Dogs. This order allows for the general destruction obligation for lands listed in Schedule 2 of the order to be satisfied through wild dog management plans with both control and conservation objectives.

Noxious Weeds Act 1993

The *Noxious Weeds Act 1993* provides for the identification, classification and control of noxious weeds in New South Wales. The Act aims to identify noxious weeds and their respective control measures, as well as the roles and responsibilities for their control for both public and private land managers/owners.

Amendments to the Noxious Weeds Act in 2005 repealed the NSW *Seeds Act 1982* and introduced a new classification system of weed control classes based on the degree of threat and the distribution of the introduced plant within the state. These new control classes are:

Control Class 1 – State Prohibited Weeds
Control Class 2 – Regionally Prohibited Weeds
Control Class 3 **–** Regionally Controlled Weeds
Control Class 4 **–** Locally Controlled Weeds
Control Class 5 **–** Restricted Plants.

Under this new classification system, Control Classes 1, 2 and 5 noxious weeds are referred to as notifiable weeds.

Pesticides Act 1999

The *Pesticides Act 1999* and the Pesticides Regulation 1995*,* regulate the use of all pesticides in NSW, after point of sale, and includes specific provisions for record keeping, training and notification of use.

Specific requirements have been included under the Pesticides Regulation in relation the following.

Pesticide Record Keeping: Records must be kept by all people who use pesticides for commercial or occupational purposes such as on farm or as part of their occupation or business. There are also specific record keeping provisions for persons who aerially apply pesticides under both the Act and regulations.

Pesticides Training: People who use pesticides in their business or as part of their occupation must be trained how to use these pesticides. Any person employed or engaged by NPWS to use pesticides must also be trained.

Pesticide Notification: Notification requirements apply to pesticide applications by public authorities in public places (including NPWS managed park lands). The NPWS Pesticide Use Notification Plan sets out how the Department will notify the community about pesticide applications it makes to public places.The NPWS Pesticide Use Notification Plan can be located on the NPWS web site.

Pesticide Control Orders are orders that: prohibit or control the use of a pesticide or a class of pesticide, or authorise the use or possession of a restricted pesticide eg. 1080.

Use of a pesticide must be in accordance with the Control Order where such exists. Current Control Orders can be found at:

www.environment.nsw.gov.au/pesticides/pco.htm.

Game and Feral Animal Control (Game) Act 2002

The major aim of the *Game and Feral Animal Control Act 2002* (Game Act) is to promote responsible and orderly hunting of game animals and certain pest animals. The public lands that are covered by this Act do not include any national park estate land.

Other Relevant Legislation

- *Environment Protection and Biodiversity Conservation Act 2000* (Australian)
- *Agricultural and Veterinary Chemicals Code Act 1994*
- *Environmental Planning and Assessment Act 1979*
- *Firearms Act 1996*
- *Heritage Act 1977*
- *Prevention of Cruelty to Animals Act 1979*
- *Occupational Health and Safety Act 2000*
- *Wilderness Act 1987*
- *Protection of the Environment Operations Act 1997*

Park Management Program and Policies

The Park Management Program is a series of guides which are being developed to define the values and objectives for park management and to integrate park policy, planning, operations, monitoring, evaluation and reporting. The aims of the guides are to improve park management by:

- providing clear and consistent management objectives and operational procedures, and
- introducing a system to achieve consistent standards in park management and reporting on performance.

The Park Management Program comprises a Policy Guide, a Planning Guide, an Operating Procedures Guide and a Monitoring and Evaluation Guide.

The Policy Guide describes the goals and objectives for park management and the key principles which are applied to guide the achievement of these objectives.

Some specific policies relating to the management of weeds and pest animals are mentioned below.

Policy 2.6 Wild Dogs acknowledges the complexities inherent in the need to conserve native dingoes (and their hybrids) together with the need to control wild dogs.

The NPWS Firearms Management Manual brings together the policy, procedural and technical information required for staff regarding the safety, security and legal procedures for keeping and using firearms. The manual replaced the *NPWS*

Firearms Policy and provides policy and procedures for all aspects of firearms use and management including:

- possession and use of firearms by NPWS staff and other approved users,
- firearms administration and record keeping,
- location and storage of firearms,
- planning and risk management for firearms operations,
- maintenance and modification of firearms,
- animal welfare issues related to shooting pest animals and euthanasing native animals, and
- firearms training.

A statewide policy directive requires conservation risk assessments for the application of pesticides on park to ensure that an appropriate level of environmental assessment is carried out prior to application.

Other plans

Other plans that help direct pest management may include Catchment Action Plans for the Catchment Management Authorities (CMA), state and national strategies, and park Plans of Management. There are also the following regional pest plans:

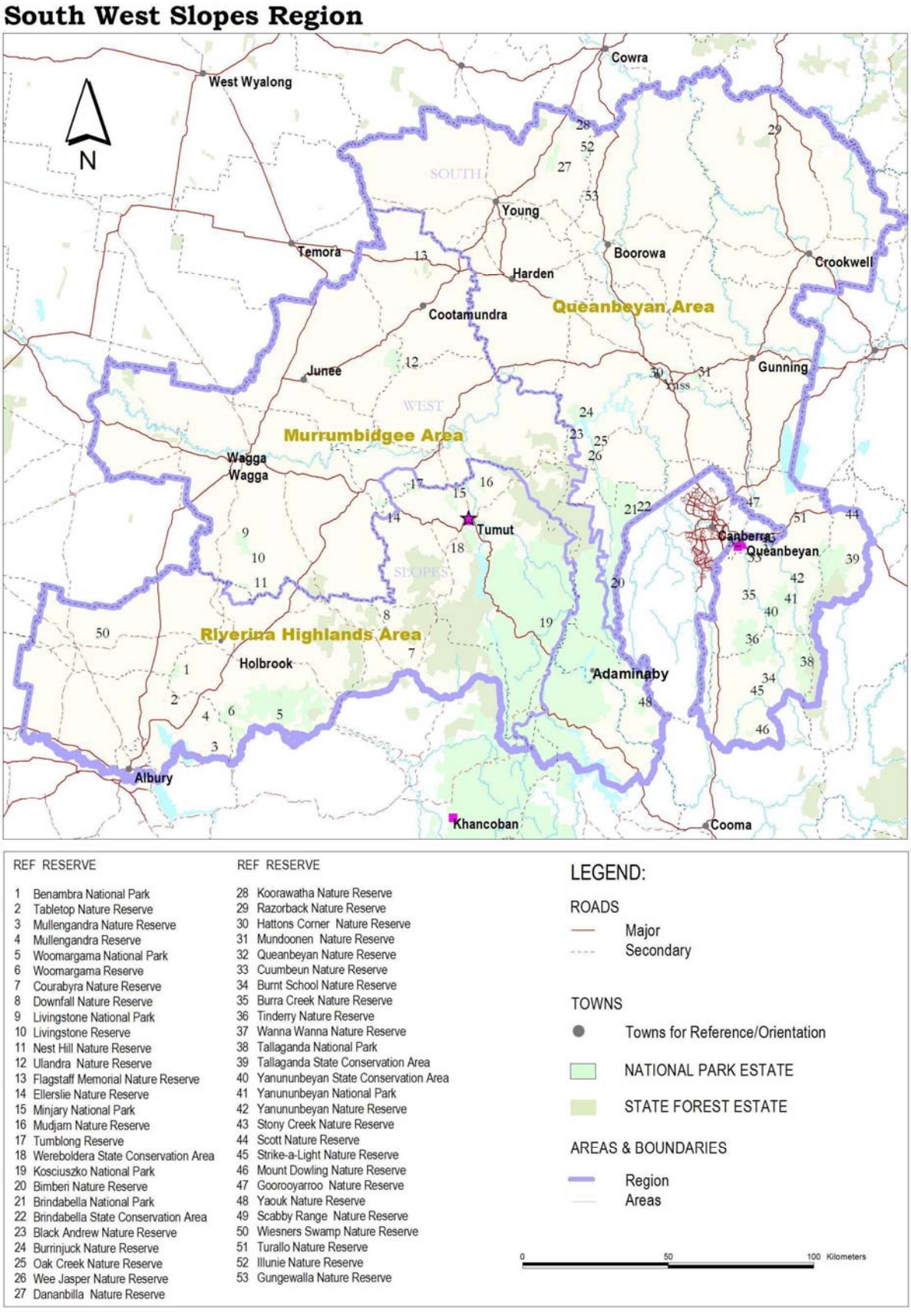
- Murray CMA Regional Weed Strategy,
- Murrumbidgee CMA Regional Weed Strategy,
- Southern Tablelands & South Coast Noxious Plants Committee (ST&SCNPC) Chilean Needle Grass Regional Management Plan,
- ST&SCNPC Serrated Tussock Regional Management Plan,
- ST&SCNPC St Johns Wort Regional Management Plan,
- ST&SCNPC Broom and Gorse Regional Management Plan,
- ST&SCNPC Blackberry Regional Management Plan,
- Riverina Highlands Weeds Working Group (RHWWG) Blackberry Regional Management Plan,
- RHWWG Black Willow Regional Management Plan,
- Adaminaby/ Yaouk Cooperative Wild Dog Plan,
- East Gilmore Cooperative Wild Dog Plan,
- Goobragandra/ Blowering Cooperative Wild Dog Plan,
- Brindabella and Wee Jasper Cooperative Wild Dog and Fox Plan,
- Burrinjuck Cooperative Wild Dog Plan, and
- Hume Cooperative Wild Dog Plan.

4. Regional Overview

The South West Slopes Region is one of four regions within the Southern Branch. The Region spans 432,767 square kilometres across four State (Albury, Burrinjuck, Monaro, Wagga Wagga) and four federal (Eden Monaro, Hume, Farrer, Riverina) electorates and all or parts of 16 government shires and 14 Aboriginal Land Councils. The region is divided into three management areas: Riverina Highlands, Murrumbidgee and Queanbeyan. The estate area comprises approximately 420,000 hectares of National Park, Nature Reserve, Crown Reserve, and State Conservation Area (see Map 1).

A wide and varied range of pests occur throughout SWS Region. A legacy of past actions such as agricultural practices, utility industry (transmission lines), mining, logging, hydro-electric facilities and resorts have resulted in an extensive range of plants and animals being introduced into the area. The region will continue working with local landholders and other agencies such as the Rural Lands Protection Boards, the Snowy Mountains Authority and Councils to increase the number of cooperative pest programs across the landscape.

Map 1. South West Slopes Region



5. Pest Distribution Tables

The following pest distribution tables give a general overview of pest species for each park within the Region. The data derived from a combination of systematic surveys, consultation with staff and other agencies and through planning processes. The tables are not comprehensive lists of all pest species within the Region and they may vary with time.

The relationship between the pest distribution tables and how they relate to the generic NPWS key factors for determining pest priorities are described in section 8. Pest Program Priorities and section 11. Pest Program Overviews.

● Denotes established populations throughout a park
○ Denotes scattered or transitory populations throughout a park
⊙ Denotes isolated populations restricted to a small geographic area of a park
◎ Denotes population present at an unknown abundance

Table 1. Pest Animal Distribution (Murrumbidgee and Riverina Highlands Areas)

MURRUMBIDGEE AREA	Wild Dog	Fox	Cat	Feral Pig	Rabbit	Horse	Goat	Deer
Black Andrew NR	○	◎	◎	●	⊙		●	
Ellerslie NR		◎	◎		⊙		○	◎
Flagstaff Memorial NR		◎	◎		○			
Kosciuszko NP (Ranger Bimberi)	●	●	●	○	○	●		◎
Kosciuszko NP (Ranger Nungar)	●	●	●	○	○	●		◎
Livingstone NP and SCA		●	●		⊙			
Nest Hill NR		◎	◎		⊙			
Scabby Range NR	⊙	◎	◎	○	⊙			
Ulandra NR		◎	◎	⊙	⊙			◎
Yaouk NR	○	◎	◎		⊙			
RIVERINA HIGHLANDS AREA								
Benambra NP		◎	◎		○			
Courabyra NR		◎	◎	○	⊙	○		
Downfall NR	○	◎	◎		⊙			◎
Kosciuszko NP (Ranger Bogong)	●	◎	◎	○	○	⊙	⊙	◎
Kosciuszko NP (Ranger Talbingo)	●	◎	◎	○	○	⊙		◎
Minjary NP	○	◎	◎		○			
Mudjarn NR		◎	◎	○	⊙			
Mullengandra NR & RS	○	◎	◎					
Tabletop NR		◎	◎				○	
Tumblong RS		◎	◎	⊙	○			◎
Weisners Swamp NR		◎	◎					
Wereboldera SCA	○	◎	◎	●	○			
Woomargama NP & RS	○	●	●	⊙	○		⊙	

Table 2. Pest Animal Distribution (Queanbeyan Area)

● Denotes established populations throughout a park
○ Denotes scattered or transitory populations throughout a park
⊙ Denotes isolated populations restricted to a small geographic area of a park
◎ Denotes population present at an unknown abundance

QUEANBEYAN AREA	Wild Dog	Fox	Cat	Feral Pig	Rabbit	Horse	Goat	Deer
Bimberi NR	●	◎	◎	○	⊙	⊙		◎
Brindabella NP & SCA	●	●	●	○	○		⊙	◎
Burnt School NR		◎	◎	○	⊙		⊙	◎
Burra Creek NR		◎	◎	⊙			⊙	
Burrinjuck NR	○	●	●	⊙	○		⊙	
Cuumbeun NR		◎	◎		○			
Dananbilla NR		◎	◎		⊙			
Goorooyarroo NR		◎	◎					
Gungewalla NR		◎	◎					
Hattons Corner NR		◎	◎		⊙			
Illunie NR		◎	◎				○	◎
Koorawatha NR		◎	◎		⊙		○	◎
Mount Dowling NR	○	◎	◎	⊙			⊙	
Mundoonen NR		◎	◎		⊙			
Oak Creek NR		◎	◎		⊙		○	
Queanbeyan NR		◎	◎					
Razorback NR		◎	◎	⊙	⊙		○	◎
Scott NR		◎	◎		○			
Stony Creek NR		◎	◎					
Strike-a-light NR	○	◎	◎	⊙			⊙	
Tallaganda NP & SCA	○	◎	◎	⊙			⊙	
Tinderry NR	○	◎	◎	●	⊙		⊙	◎
Turallo NR		◎	◎					
Wanna Wanna NR		◎	◎					
Wee Jasper NR	○	◎	◎		⊙		○	◎
Yanununbeyan NP, NR & SCA		◎	◎	⊙	⊙		⊙	◎

Table 3. Weed Distribution (Murrumbidgee and Riverina Highlands Areas)

● Denotes established widespread infestation throughout a park; ○ Denotes scattered infestation throughout a park;
⊙ Denotes isolated infestation restricted to a small geographic area of a park (encompassing new weed incursions)

MURRUMBIDGEE AREA	Chilean Needle Grass	Serrated Tussock	African Lovegrass	Sweet Vernal Grass	Introduced Grasses	Black Willow	Other Willow	Tree of Heaven	Pine	Other Non-endemic Tree/Shrub	Blackberry	Sweet Briar	Broom	Patersons Curse	St Johns Wort	Thistle	Cape Weed	Horehound	Mullein	Yarrow	Hawthorn
Black Andrew NR											○	⊙			⊙	⊙			⊙		
Ellerslie NR					⊙		⊙	⊙		⊙	⊙	⊙		⊙	⊙	⊙					
Flagstaff Memorial NR					○									○	○	○		⊙			
Kosciuszko NP (Ranger Bimberi)				⊙	⊙		⊙		○	⊙	⊙	○	⊙	○	○	○		⊙	○	⊙	
Kosciuszko NP (Ranger Nunger)			⊙		⊙		⊙		○	⊙	⊙	○	⊙	○	○	○		⊙	○	⊙	
Livingstone NP and SCA					⊙									⊙	⊙		⊙				
Nest Hill NR																					
Scabby Range NR	⊙			⊙						⊙			⊙	⊙		⊙			⊙		⊙
Ulandra NR					⊙						⊙	⊙		○	○	⊙					
Yaouk NR												⊙		⊙							
RIVERINA HIGHLANDS AREA																					
Benambra NP					⊙			⊙						⊙	⊙						
Courabyra NR					⊙						⊙			⊙	⊙	⊙					
Downfall NR					⊙				⊙		⊙				⊙						
Kosciuszko NP (Ranger Bogong)		⊙			⊙	⊙	⊙		○	⊙	○	○			○	○			○		
Kosciuszko NP (Ranger Talbingo)			⊙		⊙	⊙	⊙		⊙	⊙	○	○	⊙	○	○	○		⊙	○	⊙	
Minjary NP					⊙					⊙	⊙			⊙	⊙	⊙					
Mudjarn NR											⊙	⊙		⊙	⊙						
Mullengandra NR & RS					⊙						⊙			⊙	⊙						
Tabletop NR																					
Tumblong RS								⊙						⊙	⊙		⊙				
Weisners Swamp NR					○									⊙		⊙					
Wereboldera SCA										⊙	○	⊙			⊙						
Woomargama NP & RS					⊙			⊙		⊙	⊙			⊙	⊙						

Table 4. Weed Distribution (Queanbeyan Area)

● Denotes established widespread infestation throughout a park; ○ Denotes scattered infestation throughout a park;
⊙ Denotes isolated infestation restricted to a small geographic area of a park (encompassing new weed incursions)

QUEANBEYAN AREA	Chilean Needle Grass	Serrated Tussock	African Lovegrass	Sweet Vernal Grass	Introduced Grasses	Black Willow	Other Willow	Tree of Heaven	Pine	Other Non-endemic Tree/Shrub	Blackberry	Sweet Briar	Broom	Patersons Curse	St Johns Wort	Thistle	Cape Weed	Horehound	Mullein	Yarrow	Hawthorn
Bimberi NR					⊙				⊙		⊙										
Brindabella NP & SCA					⊙		⊙		⊙		○	○		⊙	○	○			⊙	⊙	
Burnt School NR		⊙		⊙								⊙									
Burra Creek NR											⊙										
Burrinjuck NR		⊙			⊙		⊙		⊙		○	○		⊙	⊙	⊙	⊙				
Cuumbeun NR		⊙						⊙	○	⊙	⊙	⊙			⊙	⊙			⊙		
Dananbilla NR					⊙		⊙							⊙		⊙	⊙				
Goorooyarroo NR					⊙						⊙			⊙		⊙					
Gungewalla NR														⊙			⊙				
Hattons Corner NR					○						⊙	○		○		⊙					
Illunie NR				⊙						⊙				⊙	⊙	⊙	⊙				
Koorawatha NR					⊙			⊙		⊙				⊙	⊙	⊙					
Mount Dowling NR		⊙										⊙		⊙					⊙		
Mundoonen NR		⊙			⊙						⊙	⊙		⊙	○	⊙					
Oak Creek NR					⊙						⊙	⊙		○	○	⊙					
Queanbeyan NR		⊙	⊙		○				⊙	⊙	⊙				⊙	⊙			⊙		
Razorback NR		⊙			⊙						⊙	⊙		⊙	⊙	⊙					
Scott NR		⊙																			
Stony Creek NR		⊙								⊙	⊙	⊙			⊙	⊙					
Strike-a-light NR		⊙										⊙									
Tallaganda NP & SCA		⊙					⊙		⊙	⊙	⊙	⊙									
Tinderry NR		⊙					⊙				⊙	⊙		⊙	⊙	⊙		⊙	⊙		
Turallo NR	○	⊙			⊙					⊙		⊙		⊙		⊙					
Wanna Wanna NR											⊙	⊙									
Wee Jasper NR					⊙				⊙		⊙	⊙		⊙	⊙	⊙					
Yanununbeyan NP, NR & SCA		⊙					⊙			⊙	⊙	⊙				⊙					

6. Pest Management Objectives

The overriding objective of NPWS's pest management programs is to minimise adverse impacts of pests on biodiversity and other park values whilst complying with legislative responsibilities.

Programs also aim to:

- manage pest populations to minimise their impact on neighbours,
- increase community understanding of the adverse impacts of pests on biodiversity and Aboriginal and historic cultural heritage, and
- support cooperative approaches and participation in pest management programs with the community and other agencies.

7. Pest Management Principles

Wherever possible, NPWS adopts an integrated approach to pest management, where more than one control technique is used, across the landscape. Integrated pest management is likely to be more effective because it avoids selecting for herbicide resistant weed biotypes or bait-shy animals. Targeting more than one pest species is important as the control of one species may benefit another eg. control of foxes may benefit rabbits, control of bitou bush often leads to an increase in other weeds. Also, control is usually undertaken at particular times of the year when pests are most vulnerable (eg. translocation of herbicides to growing points is usually greater when weeds are flowering).

So that pest management undertaken by the NPWS is carried out effectively and efficiently, the following principles are generally applied:

- Pest control is targeted to species/locations where benefits will be greatest.
- Development of control priorities are set by clearly defining the problem to be addressed ie. specific impacts are identified so that the purpose of control is clear.
- Where relevant, pest control is collaborative and across tenure, that is, undertaken on a landscape approach.
- Early detection of new incursions and rapid response is considered a high priority as this is the most cost-effective form of pest control (also see Critical Priority 4 in section 8. Pest Program Priorities).
- Priority is given to mitigating the impacts on biodiversity of a pest that has cultural significance, whilst minimising impacts on cultural values.
- The aim of most pest control programs is to minimise the adverse impacts of pests, as many exotic pests are already widespread (eg. foxes, blackberries) and for these species eradication is not possible.
- The focus of control programs is directed towards the values to be protected, because killing pests, by itself, does not necessarily minimise their impacts due to the fact that ecological processes are complex and can be affected by a range of factors.
- Risk assessments are undertaken prior to pest control, where required.
- Pest management strives to strike a balance between cost efficiency, target specificity and animal welfare.
- Where appropriate, pest control employs a combination of control methods and strategies (integrated pest management).

- Pest control programs take a holistic approach, given that the control of one pest may benefit other pests, in that they attempt to control all significant pest threats at a site.
- Pesticide use complies with relevant legislation and is employed in a manner that minimises impacts on the environment.
- Pest management programs are often integrated with other land management activities such as fire management and recreation management.
- Monitoring is being implemented, at varying levels, to demonstrate and improve the ongoing effectiveness of control programs.

8. Pest Program Priorities

NPWS prioritises its pest control programs to focus on those areas where the impacts of pests are likely to be greatest. Resources can then be directed to ensure that the resultant control programs are effective in reducing these impacts. The availability of suitable control techniques and resources (both financial and physical), as well as the practicality and cost effectiveness of control, also influence which programs can be implemented.

Where new pest incursions occur, early detection and local eradication is the most cost-effective way to minimise the impacts. The NPWS will work with other agencies to prevent the introduction of new pests and to respond rapidly when new incursions occur.

The individual pest species distribution within SWS Region parks are analysed against the following generic NPWS key factors to determine the regional pest program priorities. Section 11. Pest Program Overviews outline the SWS Region priority locations identified with potentially adverse pest impacts. These priority locations are to be investigated and control programs implemented where necessary or practically feasible.

Critical Priority

1. Programs targeting pests which are, or are likely to be, significantly impacting on biodiversity, as largely identified in the NSW Threatened Species Priorities Action Statement eg. undertake weed control at known sites of Button Wrinklewort (*Rutidosis leptorrhynchoides*) in Queanbeyan NR;
2. Programs that target pests which impact significantly on human health or are part of a declared national emergency eg. outbreak of foot and mouth disease or control of feral pigs within the ACT domestic water supply catchment area of Brindabella NP & SCA;
3. Programs targeting pests that impact significantly on agricultural production eg. wild dog control where there is potential for significant stock losses as identified in Wild Dog Management Plans; programs to control State Prohibited or Regionally Prohibited Noxious Weeds (Control Class 1 and 2 weeds);
4. Programs addressing new occurrences of highly invasive pest species with potential for significant impacts on park values (subject to risk/feasibility assessment) eg. control of serrated tussock in an area previously free of the weed;

High Priority

5. Programs that target pests (other than those covered in priorities above) that impact significantly on World Heritage or international heritage values, eg. weed control in the RAMSAR wetland of Scabby Range NR;
6. Programs targeting pests that impact significantly on important cultural heritage values eg. control of rabbits undermining a historic hut in Kosciuszko NP;

Medium Priority

7. Programs that target pests (other than those covered in priorities above) that impact significantly on Wilderness, Wild Rivers, national heritage values or other important listed values eg. control of blackberry within the Cooleman Plain karst catchment of Kosciuszko NP;
8. Programs that target pests that impact significantly on recreation, landscape or aesthetic values, eg. control of blackberry on the margins of camping areas; control of weeds in an area of natural beauty that is visited frequently;
9. Community or cooperative programs targeting pests that impact significantly on park values or agricultural production and that have ongoing, proven effectiveness and participation, eg. control of willows with the assistance of an established community group; control of Regionally Controlled Noxious Weeds (Control Class 3 weeds);
10. Community or cooperative programs that are implemented as part of an endorsed state or regional plan (and not covered above in higher priorities), eg. control of blackberry across boundaries as part of a regional control plan prepared by a regional weeds advisory committee and supported by NPWS.

Lower Priority

11. Community programs targeting pests that have localised impacts on natural ecosystems or agricultural lands and that promote community education and involvement with parks, eg. participation in a new bush regeneration project with a local community group; control of Locally Controlled and Restricted Noxious Weeds (Control Class 4 and 5 weeds);
12. Previous programs targeting pests that have localised impacts on native species and ecosystems, and that can be efficiently implemented to maintain program benefits, eg. the maintenance of areas treated previously for serrated tussock to continue keeping them weed free.

In some circumstances, new programs may be introduced, or priority programs extended to target pests where a control “window of opportunity” is identified e.g. where burnt areas become more accessible for ground control of weeds; where drought makes control of feral pigs and feral goats more efficient because they congregate in areas where water is available; or when a new biocontrol agent becomes available.

Future priorities for pest control will need to reflect changes in the distribution, abundance or impacts of pests that may occur in response to environmental changes including climate change. NPWS is supporting research to understand the interaction between climate change, pests and biodiversity.

9. Pest Program Recording and Monitoring

Measuring the response of biodiversity (or other values) to pest control is necessary in order to:

- demonstrate the degree of impacts and hence justify priorities for management, and
- measure the effectiveness of ongoing control and direct resources to those programs with the greatest effect.

Measuring the response of biodiversity can be difficult because populations of native species can vary in space and time for many reasons so that differentiating the effects of pest control from other sources of variation is often complex. Where populations cannot be counted directly, measurement is dependent on using indices of abundance. Rigorous attempts to measure population responses need to consider experimental design (eg. treatment and non-treatment sites, replication, time scale for measurable responses to occur), sampling design (because the entire population can rarely be measured) and standardisation of population measures to allow data to be collated across NPWS (across sites, times and land tenure where appropriate). As a result, measuring the response to pest control is expensive and can be afforded for only a small sub-set of control programs.

Where native populations are rare, cryptic or dispersed, or where a suite of species is predicted to be affected, indicator species, or other indices of relative abundance, can be used to provide an indirect measure of effectiveness. For example, while fox control may benefit a broad range of ground dwelling mammals, monitoring may focus on a particular “indicator” species which may be easy to capture.

The monitoring of response of pest species distribution and abundance provides an interim measure of effectiveness essential:

- to aid comparison between control effort and biodiversity response,
- to provide useful data where biodiversity, other park values or agricultural responses are too difficult to measure or there is insufficient resources to make proper measurement, and
- to provide an interim measure where native species may take some time to respond to pest control.

Where pest incursions have occurred recently, or where their distribution is otherwise limited, the objective of control is usually to locally eradicate the incursion completely or to contain its spread. In these situations, monitoring is required to confirm local eradication or containment and should focus on the pest species rather than the response of native species to control. Such an approach may require methods that are capable of detecting populations at very low densities and prolonged monitoring will be required to ensure that containment or local eradication has been achieved.

Where appropriate, monitoring programs should also include measures to verify the results of research being undertaken to gain a better understanding of the interaction between pests and climate change.

Systems and databases are being developed for the consistent and systematic collection, collation, storage and analysis of data as part of the Monitoring and Evaluation component of the Park Management Program.

10. Regional Coordination and Support of Pest Control Programs

Pest control programs are coordinated by the local NPWS Area and Region in order to ensure that resources are utilised to achieve the best possible outcomes. Area and Regional assistance is also required to efficiently work with neighbours, community groups and other agencies. Education of staff and the broader community are essential requirements in integrated pest management and are also best achieved by centralised coordination.

Regional coordination programs include:

- Providing expert advice and assisting in pest management within SWS Region,
- Strategic planning for improving pest management within SWS Region,
- The collation of pest management records for regional reporting requirements and program evaluation,
- Facilitation and coordination of Cooperative Wild Dog Plans,
- Monitoring of critical weight range species and predators in representative parks,
- Liaison with research bodies and other land management agencies to assist in trialling new pest management techniques,
- Coordination of Regional pest meetings and training,
- Participation in the Australian Alps Natural Heritage Working Group and the Wild Dog Working Group,
- Representation on regional pest committees such as the Riverina Highlands Weeds Working Group, the Eastern Riverina Noxious Weeds Advisory Group, the Southern Tablelands and South Coast Noxious Plants and the NPWS Southern Branch Pest Management Working Group, and
- Preparation of briefing notes, reports and Ministerial's relating to pest management issues.

11. Pest Program Overviews

11.1 Wild Dogs (*Canis spp*.)

Distribution and abundance
The wild dog is a declared pest animal under the *RLP Act 1998.* The *RLP Act 1998, Pest Control Order No. 11* defines wild dogs as:
"…*any dog, including a dingo, that is, or has become wild, but excludes any dog kept in accordance with the Companion Animals Act 1998, the Exhibited Animals Protection Act 1986, or the Animal Research Act 1985 or any legislation made in replacement of any of those Acts*".
In SWS Region, wild dogs are mainly found in the parks within or contiguous with the Snowy Mountains. Abundance appears to vary with the ability of the landscape to support prey.

Impacts
Wild dogs predate upon stock (mainly sheep and goats) on neighbouring pastoral properties. In the larger parks (ie. Schedule 2 Parks under the *Pest Control Order No. 11*) wild dogs also play an important role in maintaining ecosystem function as an apex species or higher order predator.

Priorities for control
All wild dog control programs are a Critical Priority (Key Factor 3). Cooperative wild dog management is implemented in the:

- Adaminaby/ Yaouk Wild Dog Association Area (including the Tantangara and Bugtown sections of Kosciuszko NP, Scabby Range NR and Yaouk NR);
- East Gilmore Wild Dog Working Group Area (including the Wereboldera NR and Minjary NR);
- Goobragandra/ Blowering Wild Dog Working Group Area (including the Blowering and Goobragandra sections of Kosciuszko NP):
- Brindabella and Wee Jasper Wild Dog Association Area (Brindabella NP & SCA, Bimberi NR, Black Andrew NR and Wee Jasper NR);
- Burrinjuck Wild Dog Working Group Area (Burrinjuck NR); and
- the Hume Wild Dog Working Group Area (Woomargama and Mullengandra Reserves).

Control
Cooperation across the broader landscape and differing tenures is essential for successful wild dog control. An example of this is the cooperation between Riverina Highlands Area and Parks Victoria in controlling wild dogs along the Murray River in order to restrict their movement into Woomargama NP.

SWS will be guided by Cooperative Wild Dog Management Plans for all wild dog control. Control methods will comply with the NPWS Wild Dog Policy, the NSW DPI Vertebrate Pest Control Manual and the DEH Model Code of Practice for the Humane Control of Wild Dogs and related Standard Operating Procedures. Routine control will incorporate a variety of methods including 1080 baiting, soft-jaw trapping by experienced operators and opportunistic shooting.

SWS Region is active in assisting with and promoting innovative research into wild dog control. Programs include the trial of attractants, M44 devices and livestock guarding techniques. Other research currently being undertaken includes the investigation into wild dog interactions and home range size and the corresponding effects on these by wild dog control.

Monitoring
Monitoring will be conducted as outlined in the Cooperative Wild Dog Control Plans.

11.2 European Red Fox (*Vulpes vulpes*)

Distribution and Abundance
Foxes are presumed to be widespread in the landscape across SWS Region with an unknown abundance in most SWS Regions parks.

Impacts
Predation by the European Red Fox is a declared Key Threatening Process under the *Threatened Species Conservation (TSC) Act 1995* and the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. Predation by the fox is a major threat to the survival of native Australian fauna, with non-flying mammals weighing between 35g and 5,500g and ground-nesting birds at greatest risk.

The Threat Abatement Plan, Predation by the Red Fox (Fox TAP) provides a strategy for fox control for the conservation of native fauna in New South Wales. In particular, it identifies those threatened species which are most likely to be impacted by fox predation and the sites at which fox control for these species is most critical. SWS contains several threatened species that are at risk from fox predation yet there are no priority sites identified within the region in the Fox TAP.

Priority for Control
Fox populations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Benambra NP (Eastern Pygmy Possum);
- Bimberi NR (Smoky Mouse);
- Cuumbeun NR (Rosenbergs Monitor);
- Kosciuszko NP (Broadtoothed Rat, Eastern Pygmy Possum);
- Mt Dowling NR (Eastern Pygmy Possum);
- Mundoonen NR (Eastern Pygmy Possum, Koala);
- Queanbeyan NR (Grassland Earless Dragon, Striped Legless Lizard);
- Razorback NR (Rosenbergs Monitor);
- Scabby Range NR (Broadtoothed Rat);
- Tinderry NR (Eastern Pygmy Possum);
- Turallo NR (Little Whip Snake, Canberra Raspy Cricket, Earless Dragon, Perunga Grasshopper, Striped Legless Lizard);
- Weisners Swamp NR (Brolga, Bush Stone Curlew); and
- Yanununbeyan Reserves (Eastern Pygmy Possum).

Cooperative fox control programs (mainly associated with lambing seasons) that have ongoing, proven effectiveness and participation are of a Medium Priority (Key Factor 9) and include:

- Brindabella NP & SCA;
- Burrinjuck NR;
- Dananbilla NR;
- Ellerslie NR;
- Illunie NR;
- Koorawatha NR;
- Kosciuszko NP (northern Blowering);
- Livingstone NP & SCA;
- Nest Hill NR;
- Tabletop NR;
- Tumblong R.;
- Ulandra NR; and
- Woomargama and Mullengandra Reserves.

Control
Cooperative control is essential for effective fox control across the landscape. Control methods will include 1080 baiting, soft-jaw trapping, M44 ejectors, opportunistic shooting and cage trapping. Control methods will comply with the NSW DPI Vertebrate Pest Control Manual and the DEH Model Code of Practice for the Humane Control of Foxes and related Standard Operating Procedures.

Monitoring
Coordinated fox control programs during lambing will only be monitored in regards to successfully undertaking the control program within the same time period as the neighbours. Fox control programs implemented for threatened species conservation will be monitored by measuring the response of the threatened species concerned.

11.3 Feral Cats (*Felis catus*)

Distribution and Abundance
Feral Cats are presumed to be widespread in the landscape across SWS Region with an unknown abundance in most SWS Regions parks.

Impacts
Predation by the Feral Cat has been declared a Key Threatening Process under the *TSC Act 1995* and the *EPBC Act 1999.* Predation by Feral Cats has been implicated in the extinction and decline of many species of mammals and birds on islands around Australia and in other parts of the world, and in the early extinction of up to seven species of small mammals on the Australian mainland.

Priority for Control
Feral Cat populations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Benambra NP (threatened woodland birds, Eastern Pygmy Possum, Greater Long-eared Bat);
- Bimberi NR (Olive Whistler, Brown Treecreeper, Smoky Mouse);
- Black Andrew NR (Eastern Bent-wing Bat);
- Brindabella NP & SCA (threatened woodland birds, Yellow-bellied Glider);
- Burrinjuck NR (threatened woodland birds);
- Courabyra NR (threatened woodland birds);
- Cuumbeun NR ((threatened woodland birds, Eastern False Pipistrelle, Rosenbergs Monitor);
- Dananbilla NR (threatened woodland birds);
- Downfall NR (threatened woodland birds, Squirrel Glider);
- Ellerslie NR (threatened woodland birds, Eastern Bent-wing Bat, Squirrel Glider);
- Flagstaff NR (threatened woodland birds);
- Goorooyarroo NR (threatened woodland birds);
- Gungewalla NR (threatened woodland birds, Squirrel Glider);
- Koorawatha NR (threatened woodland birds, Squirrel Glider);
- Kosciuszko NP (threatened birds, Smoky Mouse, Broadtoothed Rat, Mountain Pygmy Possum, Eastern Pygmy Possum ,Rosenbergs Monitor, threatened bats);
- Livingstone NP & SCA (threatened woodland birds, Squirrel Glider);
- Minjary NP (threatened woodland birds);
- Mt Dowling NR (Eastern Pygmy Possum);
- Mundoonen NR (threatened woodland birds, Eastern Pygmy Possum);
- Nest Hill NR (threatened woodland birds);
- Queanbeyan NR (Grassland Earless Dragon, Striped Legless Lizard);
- Razorback NR (Rosenbergs Monitor, threatened bats);
- Scabby Range NR (Broadtoothed Rat);

- Tabletop NR (threatened woodland birds);
- Tallaganda NP & SCA (threatened woodland birds, threatened bats);
- Tinderry NR (Eastern Pygmy Possum, threatened bats);
- Tumblong NR (Common Bent-wing Bat);
- Turallo NR (Little Whip Snake, Canberra Raspy Cricket, Earless Dragon, Perunga Grasshopper, Striped Legless Lizard);
- Ulandra NR (threatened woodland birds);
- Wee Jasper NR (threatened woodland birds, threatened bats);
- Weisners Swamp NR (Brolga, Bush Stone Curlew);
- Wereboldera SCA (threatened woodland birds, Striped Legless Lizard);
- Woomargama & Mullengandra Reserves (threatened woodland birds, Squirrel Glider, threatened bats); and
- Yanununbeyan Reserves (threatened woodland birds, Eastern Pygmy Possum, Eastern False Pipistrelle).

Feral cat populations occur in the Goobarragandra, Bogong Peaks, Bramina and Bimberi Wilderness Areas (Kosciuszko NP and Bimberi NR) and the Kosciuszko NP karst catchments of Yarrangobilly and Cooleman Plain and are of Medium Priority (Key Factor 7).

Control

Current control techniques for feral cat control are highly time consuming and mostly ineffective. No specific programs are planned for feral cat control yet assistance with research to improve control techniques will be a priority within the region.

Cooperative control is essential for effective feral cat control across the landscape. Control methods will include opportunistic shooting, cage trapping or soft-jaw trapping. Control methods will comply with the DEH Model Code of Practice for the Humane Control of Feral Cats and related Standard Operating Procedures.

Monitoring

Feral Cat control programs implemented for threatened species conservation will be monitored by measuring the response of the threatened species concerned.

11.4 Feral Goats (*Capra hircus*)

Distribution and abundance
Feral goats are present throughout the landscape and are predominantly in steep and often inaccessible terrain. Abundance varies with the affected park control history and the ability to recolonise from neighbouring lands.

Impacts
Competition and habitat degradation by feral goats have been declared a Key Threatening Process under the *TSC Act 1995* and the *EPBC Act 1999.* Feral goats present a threat to plant communities given the large number of plant species that are palatable to them. Feral goats can cause significant habitat degradation, decrease soil stability and contribute to erosion. Additionally, feral goat activity significantly alters the habitat of native fauna and flora.

Priorities for control
Feral goat populations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Burrinjuck NR (Box-gum woodland, *Ammobium craspedioides, Caladenia concolor & Grevillea iaspicula);*
- Ellerslie NR (Box-gum woodland);
- Illunie NR (Box-gum woodland);
- Koorawatha NR (Box-gum woodland);
- Mount Dowling NR (*Eucalyptus pulverulenta*);
- Tabletop NR (*Senecio garlandii*);
- Tinderry NR (*Eucalyptus latiuscula);*
- Wee Jasper NR (Box-gum woodland, *Ammobium craspedioides, Grevillea iaspicula, Lepidium pseudopapillosum, Discaria pubescens*); and
- Woomargama & Mullengandra Reserves (Box-gum woodland, *Acacia phasmoides, Diuris pedunculata*).

Feral goat populations that are of Critical Priority (Key Factor 4) and address new or developing occurrences of a highly invasive species are located in:

- Black Andrew NR;
- Burrinjuck NR;
- Oak Creek NR;
- Razorback NR;
- Tallaganda NP & SCA;
- Tinderry NR;
- Wee Jasper NR; and
- Yananunbeyan Reserves.

A feral goat population in Strike-a-Light NR are a Medium Priority (Key Factor 7) due to the having a listed value of high vegetation diversity.

Control
Cooperative control programs are essential for the control of feral goats. Feral goat control techniques will include aerial shooting, opportunistic shooting and trapping. Control methods will comply with the NSW DPI Vertebrate Pest Control Manual, the Feral Animal Aerial Shooting Team Guidelines and the DEH Model Code of Practice for the Humane Control of Feral Goats and related Standard Operating Procedures.

Monitoring
Routine patrols by Rangers and Field Staff monitor feral goat presence in the parks. Aerial shoot records will be utilised to determine if populations are decreasing over time. Feral goat control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.5 Feral Pigs (*Sus scrofa*)

Distribution and Abundance
Feral pigs are widespread across SWS Region and many of the affected parks have associated problems with illegal pig hunters introducing new pigs and disturbing control programs. Abundance in SWS parks is generally low due to control measures yet neighbouring properties may contain higher numbers.

Impacts
Predation, habitat degradation, competition and disease transmission by feral pigs has been declared a Key Threatening Process under the *TSC Act 1995* and the *EPBC Act 1999.* Feral pigs present a significant threat to native species and ecological communities as a result of their behaviour and feeding habits. Feral pigs are a declared pest animal under the RLP Act 1998.

Priorities for control
Feral pig populations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Bimberi NR (Corroboree Frog);
- Black Andrew NR (Booroolong Frog);
- Brindabella NP & SCA (Corroboree Frog);
- Burrinjuck NR (*Caladinia concolor*);
- Kosciuszko NP (Corroboree Frog, Alpine Tree Frog, threatened sub-alpine flora, Broadtoothed Rat);
- Scabby Range NR (Broadtoothed Rat, RAMSAR wetland);
- Tinderry NR (*Eucalyptus latiuscula);*
- Tumblong R (Box-gum woodland);
- Wee Jasper NR (Box-gum woodland, *Ammobium craspedioides, Grevillea iaspicula, Lepidium pseudopapillosum, Discaria pubescens*);
- Woomargama & Mullengandra Reserves (Box-gum woodland, *Acacia phasmoides, Diuris pedunculata*).

Feral pig populations in Bimberi NR and Brindabella NP & SCA are of Critical Priority (Key Factor 2) and have a potential impact on the ACT water catchment and associated human health issues.

Feral pig populations that are of Critical Priority (Key Factor 4) and address new or developing occurrences of a highly invasive species are located in:

- Courabyra NR;
- Kosciuszko NP;
- Ulandra NR; and
- Wereboldera SCA.

Feral pig populations that occur on the locally significant “Doherty's swamps on granites” (Tinderry NR); the Goobarragandra, Bogong Peaks, Bramina and Bimberi Wilderness Areas (Kosciuszko NP and Bimberi NR); and the Kosciuszko NP karst catchments of Yarrangobilly and Cooleman Plain are of Medium Priority (Key Factor 7).

Cooperative feral pig control programs that have ongoing, proven effectiveness and participation are of a Medium Priority (Key Factor 9) and include:

- Burnt School NR;
- Tallaganda NP & SCA (neighbour assistance); and
- Yanununbeyan Reserves (neighbour assistance).

Control
Cooperative control is essential for effective feral pig control across the landscape. Control methods will include 1080 baiting, aerial shooting, opportunistic shooting and cage trapping. Control methods will comply with the NSW DPI Vertebrate Pest Control Manual, the Feral Animal Aerial Shooting Team Guidelines and the DEH Model Code of Practice for the Humane Control of Feral Pigs and related Standard Operating Procedures.

Monitoring
Coordinated control programs for neighbouring agricultural or catchment outcomes will only be monitored in regards to successfully undertaking the control program within the same time period as the neighbours. Feral pig control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.6 Feral Rabbits (*Oryctolagus cuniculus*)

Distribution and Abundance
Feral rabbits are widespread across SWS Region, not only living in warrens but also inhabiting a variety of surface habitat.

Impacts
Competition and grazing by the feral European Rabbit has been declared a Key Threatening Process under the *TSC Act 1995* and the *EPBC Act 1999*. Feral rabbits occupy a wide range of habitats and there is evidence that feral rabbits impact negatively on indigenous species via competition for resources, alteration of the structure and composition of vegetation, and land degradation. Feral Rabbits are a declared pest animal under the RLP Act 1998.

Priority for Control
Feral rabbit populations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Benambra NR (Box-gum woodland, *Senecio garlandii*);
- Burrinjuck NR (Box-gum woodland, *Ammobium craspedioides, Caladenia concolor & Grevillea iaspicula);*
- Cuumbeun NR (Box-gum woodland);
- Dananbilla NR (Box-gum woodland);
- Ellerslie NR (Box-gum woodland);
- Flagstaff Memorial NR (Box-gum woodland);
- Koorawatha NR (Box-gum woodland);
- Kosciuszko NP (threatened sub-alpine flora);
- Livingstone NP & SCA (Box-gum woodland, *Ammobium craspediodies*);
- Mundoonen NR (Box-gum woodland);
- Tumblong R (Box-gum woodland); and
- Woomargama & Mullengandra Reserves (Box-gum woodland, *Acacia phasmoides, Diuris pedunculata*).

Feral rabbit populations that are of Critical Priority (Key Factor 4) and address new or developing occurrences of a highly invasive species are located in:

- Burnt School NR;
- Hattons Corner NR;
- Minjary NP;
- Nest Hill NR;
- Scabby Range NR;
- Tinderry NR;
- Ulandra NR; and
- Wee Jasper NR.

Feral rabbit populations occur in the vicinity of a variety of historic huts and precincts within Kosciuszko NP and are of Medium Priority (Key Factor 6).

Feral rabbit populations that occur in the Goobarragandra, Bogong Peaks, Bramina and Bimberi Wilderness Areas (Kosciuszko NP and Bimberi NR) and the Kosciuszko NP karst catchments of Yarrangobilly and Cooleman Plain are of Medium Priority (Key Factor 7).

Control
Cooperative control is essential for effective feral rabbit control across the landscape. Control methods will include baiting (1080 or Pindone), warren fumigation (Phosphine, Chloropicrin or CO_2), opportunistic shooting, warren destruction or direct infection of a population with a biological control (eg. RCD or Myxomatosis). Control methods will comply with the NSW DPI Vertebrate Pest Control Manual and the DEH Model Code of Practice for the Humane Control of Rabbits and related Standard Operating Procedures.

Monitoring
Coordinated control programs for neighbouring agricultural outcomes will only be monitored in regards to successfully undertaking the control program within the same time period as the neighbours. Feral rabbit control programs implemented for threatened species or ecosystem conservation will be mainly monitored by measuring the response of the threatened species or ecosystem concerned.

11.7 Feral Deer (*Dama sp., Cervus sp. & Axis sp.*)

Distribution and Abundance
Feral deer are generally at a low density but are widespread across SWS Region and are a new and emerging feral animal in the area.

Impacts
Herbivory and environmental degradation caused by feral deer has been declared a Key Threatening Process under the *TSC Act 1995.* Six species of deer have established feral populations in NSW. Impacts of feral deer in conservation parks include overgrazing, browsing, trampling, ring-barking, antler rubbing, dispersal of weeds, creation of trails, concentration of nutrients, exposing soils to erosion/accelerating erosion, and the subsequent degradation of water quality in creek and river systems. Deer are a game animal under the *Game and Feral Animal Control Act 2002*. NPWS estate is excluded from the public lands covered by this Act yet neighbouring Crown or Forests NSW lands may allow licensed hunting activities.

Priority for Control
Feral deer populations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:
- Ellerslie NR (Box-gum woodland);
- Illunie NR (Box-gum woodland);
- Koorawatha NR (Box-gum woodland); and
- Tumblong R (Box-gum woodland).

Feral deer populations that are of Critical Priority (Key Factor 4) and address new or developing occurrences of a highly invasive species are located in:
- Bimberi NR;
- Brindabella NP & SCA;
- Burnt School NR;
- Downfall NR;
- Kosciuszko NP;
- Tinderry NR;
- Ulandra NR;
- Yanununbeyan Reserves; and
- Wee Jasper NR.

Control
Cooperative control is essential for effective feral deer control across the landscape. Control methods will include opportunistic shooting or specific shooting operations targeting identified feral deer populations. Control methods will comply with the DEH Standard Operating Procedures for the Ground Shooting of Feral Deer and the Feral Animal Aerial Shooting Team Guidelines.

Monitoring
Routine patrols by Rangers and Field Staff monitor feral deer presence in the parks. Feral deer control programs implemented for threatened species or ecosystem conservation will be mainly monitored by measuring the response of the threatened species or ecosystem concerned.

11.8 Horses (*Equus caballus*)

Distribution and Abundance
Horses are dispersed within the sub-alpine plains and adjacent woodlands of northern Kosciuszko NP. In April 2005, aerial surveys determined that there were 1120 (+/- 341SE) horses within the study area. There are further horses leading away from this area along trails and powerline easements. A population of 685 (+/- 189) horses are adjacent to northern Kosciuszko NP in Bago and Maragle State Forests.

Impacts
A horse is a large, hoofed, introduced herbivore that follows trails and forms social units. These individual characteristics of a larger horse population lead to an increase in erosion, damage to stream and river banks, trampling of bogs and damage to sensitive vegetation. Horses may also assist in the spread of palatable weeds within their home range. There is considerable debate between environmental groups that are adamant that horses are feral animals that must be controlled, and passionate supporters of the cultural image of wild horses running free in our mountains.

Priority for Control
Control priorities will be determined by the Kosciuszko NP Wild Horse Steering Committee and the Kosciuszko NP Wild Horse Management Plan. These priorities will consider horses that:

- are traffic hazards (Critical Priority - Key Factor 2);
- are new occurrences (Critical Priority - Key Factor 4);
- are occurring in the Kosciuszko NP karst catchments of Yarrangobilly and Cooleman Plain (Medium Priority - Key Factor 7); and
- are occurring in proximity to Namadgi NP (Medium Priority – Key Factor 9).

Control
Control methods will be determined by the Kosciuszko NP Horse Management Community Steering Group and the Kosciuszko NP Horse Management Plan. Control methods will also be guided by the DEH Model Code of Practice for the Humane Control of Feral Horses and the related Standard Operating Procedures and A Report on the Management of Feral Horses in National Parks in NSW (Professor Tony English).

Monitoring
Monitoring of horse control will be determined by the Kosciuszko NP Wild Horse Management Plan

11.9 Introduced Grasses (Chilean Needlegrass, Sweet Vernal Grass, African Lovegrass, Spiny Burr-grass, Other Pasture Grasses)

Distribution and Abundance
Introduced grasses occur throughout the SWS Region. It is possible that introduced grasses occur in more locations within the parks and have not yet been identified.

Impacts
Introduced grasses invade native grasslands, grassy woodlands and riparian environments. The invasion of native plant communities by exotic perennial grasses has been declared a Key Threatening Process under the *TSC Act 1995*. Chilean Needlegrass is a Weed of National Significance.

Priority for Control
General pasture grass infestations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Benambra NP (Box-gum woodland);
- Burrinjuck NR (Box-gum woodland);
- Ellerslie NR (Box-gum woodland);
- Flagstaff Memorial NR (Box-gum woodland);
- Goorooyarroo NR (Box-gum woodland);
- Koorawatha NR (Box-gum woodland);
- Kosciuszko NP (threatened sub-alpine flora);
- Livingstone NP & SCA (Box-gum woodland, *Ammobium craspediodies*);
- Mundoonen NR (Box-gum woodland);
- Queanbeyan NR (Natural temperate grasslands);
- Turallo NR (Natural temperate grasslands);
- Weisners Swamp NR (Box-gum woodland); and
- Woomargama & Mullengandra Reserves (Box-gum woodland).

Other introduced grass infestations also have a potential impact on threatened species (Critical Priority {Key Factor 1}) and are:

- African Lovegrass infestations in Queanbeyan NR (Natural temperate grasslands);
- Spiney Burr-grass in Koorawatha NR (Box-gum woodlands);
- Spiney Burr-grass in Dananbilla NR (Box-gum woodlands);
- Chilean Needlegrass infestations in Turallo NR (Natural temperate grasslands);
- Sweet Vernal Grass infestations in Scabby Range NR (Natural temperate grasslands);
- Sweet Vernal Grass infestations in Kosciuszko NP (threatened sub-alpine flora); and
- Sweet Vernal Grass infestations in Illunie NR (Box-gum woodlands).

New or developing introduced grass infestations are of Critical Priority (Key Factor 4) and are:

- African Lovegrass infestations along the Snowy Mountains Highway in Kosciuszko NP; and
- Chilean Needlegrass infestations in Scabby Range NR.

Sweet Vernal Grass infestations that occur in the Goobarragandra, Bogong Peaks, Bramina and Bimberi Wilderness Areas (Kosciuszko NP) and the Kosciuszko NP karst catchments of Yarrangobilly and Cooleman Plain are of Medium Priority (Key Factor 7).

Control
Control methods will include physical removal and spot or boom spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of routine inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.10 Serrated Tussock (*Nassella trichotoma*)

Distribution and Abundance
Serrated Tussock mainly occurs within the southern Queanbeyan Area parks and control has occurred in those parks. It is possible that Serrated Tussock occurs in more SWS parks and has not yet been identified.

Impacts
Serrated Tussock is a *Weed of National Significance*. It is a major agricultural weed that also invades native grasslands, grassy woodlands, drier forests and rocky shrublands. The invasion of native plant communities by exotic perennial grasses (including Serrated Tussock) has been declared a Key Threatening Process under the *TSC Act 1995*.

Priority for Control
Serrated Tussock infestations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Burrinjuck NR (Box-gum woodland);
- Cuumbeun NR (Box-gum woodland);
- Mundoonen NR (Box-gum woodland);
- Queanbeyan NR (Natural temperate grasslands);
- Stoney Creek NR (Box-gum woodland); and
- Turallo NR (Natural temperate grasslands).

Serrated Tussock infestations that are new or developing occurrences of a highly invasive species are of Critical Priority (Key Factor 4) and are located in:

- Kosciuszko NP (Blowering);
- Mount Dowling NR;
- Mundoonen NR;
- Scabby Range NR: and
- Scott NR.

Serrated Tussock infestations that have localised impacts with effort required to maintain previous program benefits are of a Lower Priority (Key Factor 12) and are located in Razorback NR, Tallaganda NP & SCA, Strike-a-Light NR, Tinderry NR and Yanununbeyan Reserves.

Control
Control methods will include physical removal and spot or boom spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of routine inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.11 Thistle (*Onopordum spp.*, *Cirsium spp.*, *Carduus spp.*, *Sonchus spp.*, etc)

Distribution and Abundance
Thistles are widespread throughout SWS parks and the broader region.

Impacts
There are a variety of thistles that can form dense patches that suppress other ground-flora and restrict the movement of wildlife.

Priority for Control
Thistle infestations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Burrinjuck NR (Box-gum woodlands);
- Dananbilla NR (Box-gum woodlands);
- Flagstaff Memorial NR (Box-gum woodland);
- Goorooyarroo NR (Box-gum woodlands);
- Kosciuszko NP (threatened sub-alpine flora);
- Mundoonen NR (Box-gum woodlands);
- Queanbeyan NR (Natural temperate grasslands);
- Stony Creek NR (Box-gum woodland);
- Turallo NR (Natural temperate grasslands); and
- Weisners Swamp NR (Box-gum woodlands).

Thistle infestations that are of Critical Priority (Key Factor 4) and address new or developing occurrences of a highly invasive species are located in:

- Black Andrew NR;
- Brindabella NP & SCA;
- Ellerslie NR;
- Mundoonen NR;
- Oak Creek NR;
- Scabby Range NR;
- Tinderry NR;
- Ulandra NR;
- Wee Jasper NR; and
- Yanununbeyan Reserves.

Thistle infestations that occur in the Goobarragandra, Bogong Peaks, Bramina and Bimberi Wilderness Areas (Kosciuszko NP and Bimberi NR) and the Kosciuszko NP karst catchments of Yarrangobilly and Cooleman Plain are of Medium Priority (Key Factor 7).

Thistle infestations are located in Hattons Corner NR and Razorback NR and are of a Lower Priority (Key Factor 12) due to having localised impacts with effort required to maintain previous program benefits.

Control
Control methods will include physical removal, biological control and spot or boom spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of routine inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.12 St. John's Wort (*Hypericum perforatum*)

Distribution and Abundance
St. John's Wort is widespread throughout SWS parks and the broader region. The invasive nature of St. John's Wort, the variety of terrain it inhabits and the presence of large infestations throughout the broader region limit the practical ability of chemically controlling heavily infested areas. Biocontrol has been released within key locations in several SWS parks.

Impacts
St. John's Wort forms extensive infestations excluding most other ground-flora and seriously impeding overstorey recruitment. When livestock graze pastures heavily infested with flowering St John's Wort, some can develop clinical signs of hypericin poisoning (ie. photo sensitivity).

Priority for Control
St. John's Wort infestations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Benambra NP (Box-gum woodland);
- Burrinjuck NR (Box-gum woodland, *Ammobium craspedioides*, *Caladenia concolor* & *Grevillea iaspicula*);
- Cuumbeun NR (Box-gum woodland);
- Ellerslie NR (Box-gum woodland);
- Flagstaff Memorial NR (Box-gum woodland);
- Illunie NR (Box-gum woodland);
- Koorawatha NR (Box-gum woodland);
- Kosciuszko NP (threatened sub-alpine flora);
- Livingstone NP & SCA (Box-gum woodland, *Ammobium craspediodies*);
- Mundoonen NR (Box-gum woodland);
- Queanbeyan NR (Natural temperate grasslands, *Rutidosis leptorrhynchoides*);
- Stony Creek NR (Box-gum woodland);
- Ulandra NR (*Senecio garlandii*); and
- Woomargama & Mullengandra Reserves (Box-gum woodland, *Acacia phasmoides, Diuris pedunculata*).

St. John's Wort infestations that are of Critical Priority (Key Factor 4) and address new or developing occurrences of a highly invasive species are located in:

- Black Andrew NR (trails, powerline);
- Brindabella NP & SCA (trails & campgrounds);
- Downfall NR;
- Ellerslie NR;
- Kosciuszko NP (sub-alpine locations; Goobarragandra, Bogong Peaks, Bramina and Bimberi Wilderness; Yarrangobilly and Cooleman Plain karst catchments);
- Mudjarn NR;
- Mundoonen NR;
- Oak Creek NR;
- Tinderry NR;
- Tumblong NR;
- Ulandra NR;
- Wanna Wanna NR;
- Wee Jasper NR;
- Wereboldera SCA; and
- Woomargama & Mullengandra Reserves.

St. John's Wort infestations occur at Yarrangobilly Caves (Kosciuszko NP) and are of Medium Priority (Key Factor 8) due to having a significant impact on landscape values.

St. John's Wort infestations are located in Burrinjuck NR, Black Andrew NR (foreshores), Brindabella NP & SCA (Mitchells Ringings), Minjary NP, Kosciuszko NP (Snowy Mountains Hwy, Boundary Rd, along powerlines, Elliot Way, Fire Trails) and Razorback NR and are of a Lower Priority (Key Factor 12) due to having localised impacts with effort required to maintain previous program benefits.

Control
Control methods will include physical removal, biological control and spot or boom spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.13 Great & Twiggy Mullein (*Verbascum spp.)*

Distribution and Abundance
Mullein occurs in several SWS parks and limited control has occurred.

Impacts
Mullein colonises sites of low fertility, particularly disturbed areas. The rosettes cover a large area and suppress other ground flora.

Priority for Control
Mullein infestations have a potential impact on natural temperate grasslands in Queanbeyan NR and threatened sub-alpine flora in Kosciuszko NP. They are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible.

Mullein infestations that are of Critical Priority (Key Factor 4) and address new or developing occurrences of a highly invasive species are located in:

- Black Andrew NR;
- Cuumbeun NR;
- Mount Dowling NR;
- Scabby Range NR;
- Tinderry NR; and
- Yaouk NR.

Mullein infestations that occur within Kosciuszko NP in the Goobarragandra, Bogong Peaks, Bramina and Bimberi Wilderness Areas and the karst catchments of Yarrangobilly and Cooleman Plain are of Medium Priority (Key Factor 7).

Control
Control methods will include physical removal and spot or boom spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of routine inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.14 Paterson's Curse (*Echium plantagineum*) and Viper's Bugloss (*Echium vulgare*)

Distribution and Abundance
Paterson's Curse is widespread throughout SWS parks and the broader region (with Viper's Bugloss occurring at higher elevations). The invasive nature of Paterson's Curse, the variety of terrain it inhabits and the presence of large infestations throughout the broader region limit the practical ability of chemically controlling heavily infested areas.

Impacts
Paterson's Curse and Viper's Bugloss establish large populations rapidly on disturbed areas, competing vigorously with smaller indigenous plants and impeding overstorey regeneration.

Priority for Control
Paterson's Curse and Viper's Bugloss infestations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Benambra NP (Box-gum woodland);
- Burrinjuck NR (Box-gum woodland);
- Dananbilla NR (Box-gum woodland);
- Ellerslie NR (Box-gum woodland);
- Flagstaff Memorial NR (Box-gum woodland);
- Goorooyarroo NR (Box-gum woodland);
- Gungewalla NR (Box-gum woodland);
- Hattons Corner NR (Box-gum woodland);
- Illunie NR (Box-gum woodland);
- Koorawatha NR (Box-gum woodland);
- Kosciuszko NP (threatened sub-alpine flora);
- Livingstone NP & NR (Box-gum woodland);
- Mundoonen NR (Box-gum woodland);
- Queanbeyan NR (Natural temperate grasslands);
- Turallo NR (Natural temperate grasslands):
- Weisners Swamp NR (Box-gum woodland); and
- Woomargama & Mullengandra Reserves (Box-gum woodland).

Paterson's Curse and Viper's Bugloss infestations that are of Critical Priority (Key Factor 4) and address new or developing occurrences of a highly invasive species are located in:

- Black Andrew NR;
- Brindabella NP & SCA;
- Kosciuszko NP (Rock Flat, Yarrangobilly Village, Snowy Mountains Hwy);
- Mt Dowling NR;
- Mudjarn NR;
- Mundoonen NR;
- Razorback NR;
- Tinderry NR;
- Tumblong NR;
- Wee Jasper NR; and
- Woomargama & Mullengandra Reserves (Tin Mines and Fire Trails).

Paterson's Curse and Viper's Bugloss infestations that occur within Kosciuszko NP in the Goobarragandra, Bogong Peaks, Bramina and Bimberi Wilderness Areas and the

karst catchments of Yarrangobilly and Cooleman Plain are of Medium Priority (Key Factor 7).

Paterson's Curse and Viper's Bugloss infestations that have localised impacts with effort required to maintain previous program benefits are of a Lower Priority (Key Factor 12) and are located in Burrinjuck NR, Hattons Corner NR and Kosciuszko NP (ie. control at Blowering foreshores using mainly revegetation and biological methods).

Control
Control methods will include physical removal, biological control and spot or boom spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of routine inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.15 Other Herbaceous Weeds

Distribution and Abundance
There are a variety of other herbaceous weeds that occur within SWS parks.

Impacts
Herbaceous weeds exclude other ground-flora and seriously impede the growth and regeneration of overstorey plants.

Priority for Control
The following herbaceous weeds have a potential impact on threatened species (Critical Priority {Key Factor 1}) and are to be investigated and control programs implemented where necessary or practically feasible:

- Bathurst Burr in Weisners Swamp NR (Box-gum woodlands);
- Bokhara, Wintercress and Yarrow in Kosciuszko NP (threatened sub-alpine flora);
- Erodium and Capeweed in Dananbilla NR (Box-gum woodlands);
- Erodium and Capeweed in Illunie NR (Box-gum woodlands);
- Capeweed in Gungewalla NR (Box-gum woodlands);
- Capeweed in Livingstone NP & SCA (Box-gum woodlands); and
- Horehound in Flagstaff Memorial NR (Box-gum woodlands).

New or developing herbaceous weeds infestations are of Critical Priority (Key Factor 4) and include:

- Blue Periwinkle, Hemlock, Lupins, Noogoora Burr, Ox-eye Daisy and Yarrow in Kosciuszko NP;
- Capeweed and Fireweed in Tumblong NR; and
- Horehound in Tinderry NR.

Horehound infestations occur within Kosciuszko NP in the Goobarragandra, Bogong Peaks, Bramina and Bimberi Wilderness Areas and the karst catchments of Yarrangobilly and Cooleman Plain and are of Medium Priority (Key Factor 7).

Tutsan infestations occur at the karst catchments of Yarrangobilly (Kosciuszko NP) and are also of a Medium Priority (Key Factor 7).

Control
Control methods will include physical removal, biological control and spot or boom spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of routine inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.16 English Broom (*Cytisus scoparius*) or Cape Broom (*Genista monspessullana*)

Distribution and Abundance
English and Cape Broom are highly invasive species in cooler, higher rainfall districts. Broom is found scattered throughout Kosciuszko NP and Scabby Range NR and is found in proximity to Brindabella NP, Bimberi NR, Yanununbeyan Reserves and Tallaganda NP & SCA.

Impacts
Broom is a devastating species capable of totally transforming invaded habitats. It simplifies the structure and diversity of the ground-flora, and crowds or shades out shrubs and tree seedlings, eventually preventing overstorey regeneration. Dense stands seriously impede movement and act as harbour for feral pigs.

Priority for Control
Broom infestations that have potential impact on threatened sub-alpine flora in Kosciuszko NP are of Critical Priority (Key Factor 1). These infestations are to be investigated and control programs implemented where necessary or practically feasible.

Broom infestations that are new or developing occurrences of a highly invasive species are of Critical Priority (Key Factor 4) and are located in Kosciuszko NP and Scabby Range NR.

Control
Control methods will include physical removal, stem inject/cut stump and spot spray.

Monitoring
Monitoring of all known Broom locations occurs annually. An aerial survey of infestation locations is recommended every 5 years. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.17 Sweet Briar (*Rosa rubiginosa*)

Distribution and Abundance
Sweet Briar is widespread throughout SWS parks and the broader region. Chemical and physical control has occurred within accessible areas on affected parks.

Impacts
Sweet Briar occurs primarily in light shaded and sunny positions on well-drained soils. Plants commonly form thickets that prevent movement through areas, crowd out competing shrubs and prevent most overstorey regeneration.

Priority for Control
Sweet Briar infestations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Burrinjuck NR (Box-gum woodland, *Ammobium craspedioides, Caladenia concolor & Grevillea iaspicula);*
- Cuumbeun NR (Box-gum woodland);
- Ellerlsie NR (Box-gum woodland);
- Mundoonen NR (Box-gum woodland); and
- Turallo NR (Natural temperate grasslands).

Sweet Briar infestations that are of Critical Priority (Key Factor 4) and address new or developing occurrences of a highly invasive species are located in:

- Brindabella NP & SCA;
- Burnt School NR;
- Hattons Corner NR;
- Kosciuszko NP;
- Mount Dowling NR;
- Mudjarn NR;
- Mundoonen NR;
- Oak Creek NR;
- Razorback NR;
- Scabby Range NR;
- Strike-a-Light NR;
- Tinderry NR;
- Ulandra NR;
- Wee Jasper NR;
- Wereboldera SCA;
- Yanununbeyan Reserves; and
- Yaouk NR.

Sweet Briar infestations that occur in the Goobarragandra, Bogong Peaks, Bramina and Bimberi Wilderness Areas (Kosciuszko NP and Bimberi NR) and the Kosciuszko NP karst catchments of Yarrangobilly and Cooleman Plain are of Medium Priority (Key Factor 7).

Sweet Briar infestations are located in Stoney Creek NR and are of a Lower Priority (Key Factor 12) due to having localised impacts with effort required to maintain previous program benefits.

Control
Control methods will include physical removal, stem inject/cut stump/basal bark and spot spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of routine inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.18 Blackberry (*Rubus fruticosus spp. agg.*)

Distribution and Abundance
Blackberry is widespread throughout SWS parks and the broader region. The invasive nature of Blackberry, the variety of terrain it inhabits and the presence of large infestations throughout the broader region limits the practical ability of physically or chemically controlling all Blackberry infestations within the larger parks. Biocontrol has been released within key locations in several SWS parks.

Impacts
Blackberry is a Weed of National Significance. It is a widespread, highly invasive species generally found in areas with annual rainfall above 700mm. Blackberry forms dense, impenetrable thickets that exclude all indigenous vegetation. It provides harbour to pest animals such as foxes and rabbits and can increase the fire hazard of infested bushland.

Priority for Control
Blackberry infestations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Burrinjuck NR (Box-gum woodland, *Ammobium craspedioides, Caladenia concolor & Grevillea iaspicula);*
- Cuumbeun NR (Box-gum woodland);
- Goorooyarroo NR (Box-gum woodland);
- Kosciuszko NP (threatened sub-alpine flora);
- Queanbeyan NR (Natural temperate grasslands, *Rutidosis leptorrhynchoides*);
- Stony Creek NR (Box-gum woodland); and
- Woomargama & Mullengandra Reserves (Box-gum woodland, *Acacia phasmoides, Diuris pedunculata*).

Blackberry infestations that are of Critical Priority (Key Factor 4) and address new or developing occurrences of a highly invasive species are located in:

- Bimberi NR;
- Black Andrew NR;
- Burra Creek NR;
- Courabyra NR:
- Ellerslie NR;
- Hattons Corner NR;
- Kosciuszko NP (sub-alpine plains);
- Minjary NP;
- Mudjarn NR;
- Mundoonen NR;
- Oak Creek NR;
- Razorback NR;
- Tallaganda NP & SCA;
- Tinderry NR;
- Wanna Wanna NR;
- Wee Jasper NR;
- Wereboldera SCA (north-west); and
- Woomargama & Mullengandra Reserves.

Blackberry infestations that occur in the Goobarragandra, Bogong Peaks, Bramina and Bimberi Wilderness Areas (Kosciuszko NP and Bimberi NR) and the Kosciuszko NP karst catchments of Yarrangobilly and Cooleman Plain are of Medium Priority (Key Factor 7).

Blackberry infestations that have a significant impact on recreation, landscape or aesthetic values are of a Medium Priority (Key Factor 8) and are located at Brindabella NP & SCA (campgrounds and firetrails), Kosciuszko NP (firetrails, Yarrangobilly Caves, Log Bridge Camping Area) and Wereboldera SCA (firetrails).

Blackberry infestations in Ulandra NR are part of a cooperative regional plan and are of a Medium Priority (Key Factor 10).

Blackberry infestations are located in Burrinjuck NR and Kosciuszko NP (Blowering, Buddong Falls, Tumut River, Yarrangobilly River, Ravine) and are of a Lower Priority (Key Factor 12) due to having localised impacts with effort required to maintain previous program benefits.

Control
Control methods will include physical removal, biological control (blackberry leaf rusts), stem inject/cut stump/basal bark and spot spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of routine inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.19 Willow (Salix spp.)

Distribution and Abundance
Willow occurs throughout the riparian areas of SWS Region

Impacts
Willows are a Weed of National Significance and have invaded riverbanks and wetlands of temperate Australia. Willows compete vigorously for space, water and nutrients eliminating virtually all indigenous vegetation within an infestation. They alter the shape of banks, streambeds and channels through the capture of enormous amounts of sediment.

Priority for Control
Willow infestations that have potential impact on threatened sub-alpine flora in Kosciuszko NP or within Box-gum communities in Ellerslie NR are of Critical Priority (Key Factor 1). These infestations are to be investigated and control programs implemented where necessary or practically feasible.

Willow infestations that are new or developing occurrences of a highly invasive species are of Critical Priority (Key Factor 4) and are located in:

- Brindabella NP & SCA;
- Burrinjuck NR;
- Dananbilla NR;
- Ellerslie NR;
- Kosciuszko NP;
- Tallaganda NP & SCA;
- Tinderry NR; and
- Yananunbeyan Reserves.

Control
Control methods will include physical removal, stem inject/cut stump/basal bark and spot spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of routine inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Aerial surveys may be required to identify any further infestations (possibly in conjunction with the Broom aerial surveys). Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.20 Pine (*Pinus spp*.)

Distribution and Abundance
Pine occurs on numerous parks within SWS Region.

Impacts
Pines establish in both disturbed and undisturbed bushland. Incursions generally develop along the margins where established pines abut bushland, then gradually spread deeper into natural areas. Stands radically simplify the composition of ground-flora vegetation, shade or crowd out most overstorey species and prevent almost all regeneration. Pines may also establish in the frost hollows (inverted tree lines) of Kosciuszko NP where eucalypt growth is impeded.

Priority for Control
Pine infestations that have potential impact on threatened species are of Critical Priority (Key Factor 1) and are to be investigated and control programs implemented where necessary or practically feasible. These occur in the vicinity of:

- Burrinjuck NR (Box-gum woodland);
- Cuumbeun NR (Box-gum woodland);
- Kosciuszko NP (threatened sub-alpine flora); and
- Queanbeyan NR (Natural temperate grasslands).

Pine infestations that are new or developing occurrences of a highly invasive species are of Critical Priority (Key Factor 4) and are located in:

- Bimberi NR;
- Brindabella NP & SCA;
- Downfall NR;
- Kosciuszko NP (general);
- Wee Jasper NR; and
- Yanununbeyan Reserves.

Pine infestations that have localised impacts with effort required to maintain previous program benefits are of a Lower Priority (Key Factor 12) and are located in Burrinjuck NR and Kosciuszko NP (Jounama).

Control
Control methods will include physical removal, stem inject/cut stump/basal bark and spot spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of routine inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.

11.21 Other Non-endemic Trees or Shrubs

Distribution and Abundance
There are a variety of non-endemic trees and shrubs that occur within SWS parks.

Impacts
Non-endemic trees and shrubs have a major impact on bushland habitats, shading out ground-flora and seriously impeding the growth and regeneration of overstorey plants.

Priority for Control
The following non-endemic trees and shrubs that have a potential impact on threatened species (Critical Priority {Key Factor 1}) are to be investigated and control programs implemented where necessary or practically feasible:

- African Boxthorn in Koorawatha NR (Box-gum woodlands);
- Elms, Fruit Trees and Poplars in Queanbeyan NR (Natural temperate grasslands);
- Hawthorn in Stoney Creek NR (Box-gum woodlands);
- Hawthorn in Turallo NR (Natural temperate grasslands);
- Tree of Heaven in Benambra NP (Box-gum woodlands);
- Tree of Heaven, Poplars and Elms in Ellerslie NR (Box-gum woodlands);
- Tree of Heaven in Koorawatha NR (Box-gum woodlands); and
- Prickly Acacia in Illunie NR (Box-gum woodlands).

New or developing non-endemic trees and shrub infestations are of Critical Priority (Key Factor 4) and include:

- Cootamundra Wattle in Cuumbeun NR;
- Cotoneaster, False Acacia, Firethorn, Fruit Trees, Hawthorn, Holly and Poplars in Kosciuszko NP;
- Fig in Minjary NP;
- Fruit Trees in Tallaganda NP & SCA;
- Tree of Heaven in Tumblong NR;
- Hawthorn in Scabby Range NR;
- Poplar and Fruit Trees in Yananunbeyan Reserves;
- Peppertrees in Koorawatha NR; and
- Poplars and Tree of Heaven in Woomargama NP & R.

Hawthorn in Wereboldera SCA is impacting on Aboriginal Cultural Heritage sites and is a High Priority (Key Factor 6).

Control
Control methods will include physical removal, stem inject/cut stump/basal bark and spot or boom spray.

Monitoring
Monitoring of the success of control programs will be by the Ranger responsible for that management area and will consist of routine inspections that will be summarised into Area and Regional Annual Reports and the review of the Pest Management Strategy. Control programs implemented for threatened species or ecosystem conservation will be monitored by measuring the response of the threatened species or ecosystem concerned.