Pest Animal Management Plan 2006
Central Region

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Forests NSW

Central Region

Pest Animal Management Plan

2006 – 2011

Approval

This Pest Animal Management Plan is based on the 'model' Pest Animal Management Plan that Forests NSW developed in consultation with the Department of Environment and Conservation, Department of Primary Industries - Agriculture and Fisheries, and Department of Infrastructure, Planning and Natural Resources.

This Pest Animal Management Plan for Central Region is approved for implementation.

Submitted by:

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Forests NSW

Central Region

Pest Animal Management Plan

Implementation Requirements

Assemble data on Pest Animal Occurrence and Impacts:

- Field staff will use standard forms as shown in Appendix 3 to record pest animal activity encountered on State forests;
- Receive reports from other stake holders including neighbours, other agencies and local government organisations;
- Monitoring data from previous pest animal programs;
- Add information about new pest species as they are declared;
- Enter records into the regional database which will be linked to Forests NSW GIS system;
- Review, annually, pest animal occurrence and activity.

Develop an annual pest animal management program using the proforma contained in Appendix 4 and based on:

- Cooperative consultation with stakeholders described in 4.1 about pest animal occurrence and impacts for consideration in 4.2;
- Regional priorities identified in 4.10;
- Collaborative programs with the local Rural Lands Protection Boards, Wild Dog / Fox Control Groups, Land Care Group or other committee;
- Available resources (business planning and annual budgeting) identified in 4.7.

Develop Pest Animal Control Operations Plans for each species and/or treatment area:

- Use proforma in Appendix 5;
- Identify the Pest Animal problem, location and anticipated control techniques;
- Identify any special precautions necessary to protect environmental values;
- Identify any special Occupational Health and Safety issues;
- Identify any warnings or neighbour advice necessary;
- Record information required under the Pesticides Amendment (Records) Regulation;
- Record certification and briefings undertaken.

Monitor and record implementation of each Pest Animal Operations Plan including:

- Pest Animal species occurrence and activity;
- Area treated;
- Management methods;
- Timing of the operation;
- Success of the program;
- Pesticides Register updates where appropriate.

1 Scope and approval

1.1 Activity covered by this Plan

Management of pest animals on State forest in Central Region. See Figure 1 on following page for regional extent and Rural Lands Protection Board boundaries.

1.2 Duration of this Plan

Five years: 2006 – 2011.

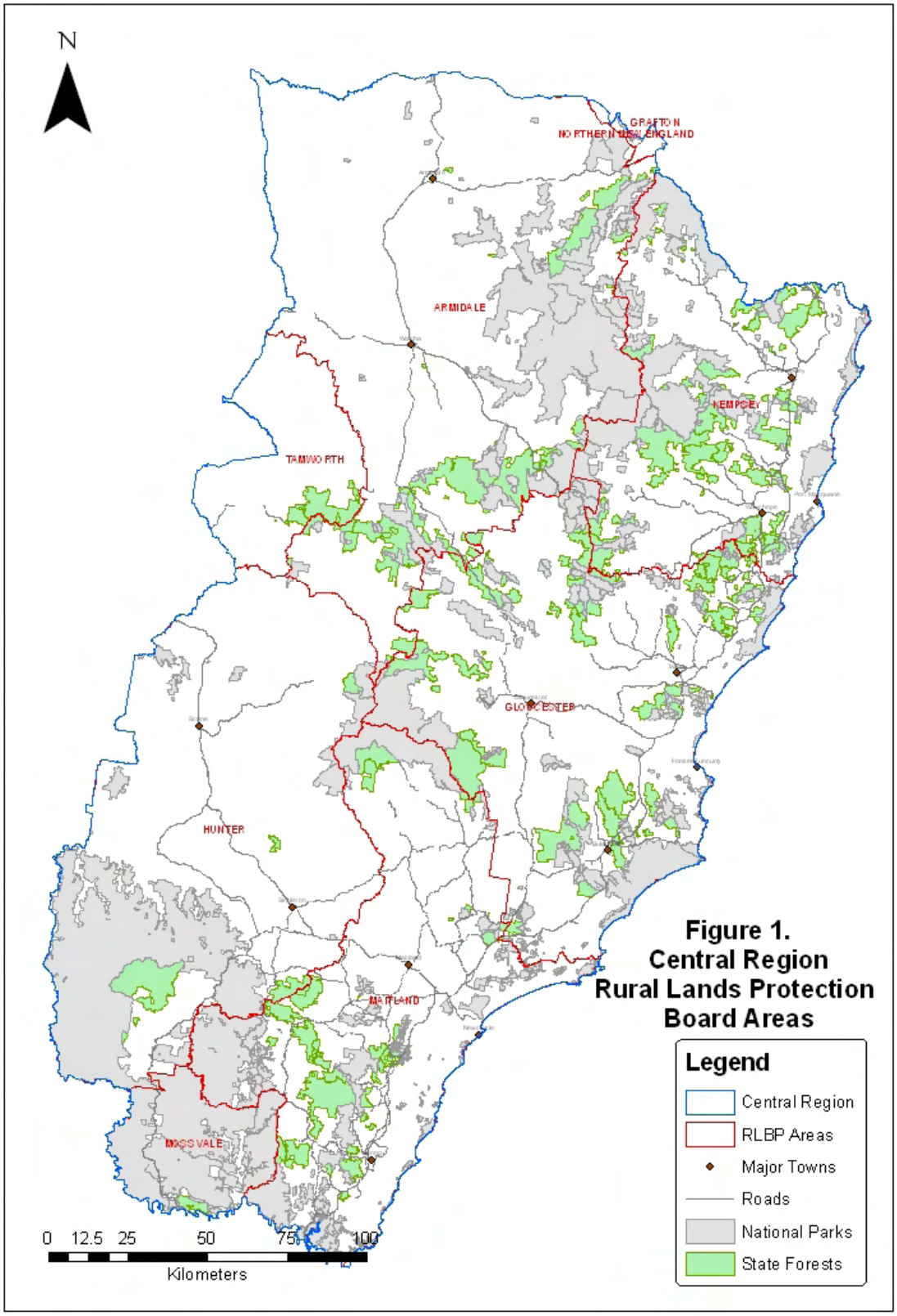
1.3 Revision

This Plan will be reviewed in 2010.

1.4 Approval

Signed Approval located on Cover Sheet

Figure 1 – State forests and Rural Lands Protection Boards within Central Region



2 Background and context

2.1 Ecologically Sustainable Forest Management

The *National Forest Policy Statement* requires ecologically sustainable development in forests to maintain ecological processes, maintain biodiversity and optimise benefits to the community from all uses of the forest within ecological constraints. The statement also identifies that, to meet the principles of environmental care in the planning and conducting of timber growing and harvesting operations, forests should be protected from the introduction and spread of pest animals.

The Ecologically Sustainable Forest Management (ESFM) plan for Central Region states, in the Forest Health Strategy, that a supplementary plan will be developed to address pest animal management. This Pest Animal Management Plan provides the context and strategic direction for pest animal management and requires the development, implementation and monitoring of an Annual Pest Animal Management Program for State forests of the Central Region.

This plan sets out the strategy for pest animal management proposed by Central Region, identifies how management programs are to be planned and implemented, and how pest animal occurrence and management programs are to be monitored, recorded, reported and used to inform future decisions to allow continuous improvement.

2.2 Policy and legislation

This plan gives consideration to local management issues and is consistent with the concepts of:

- National Feral Animal Control Program;
- NSW Biodiversity Strategy including the *Threatened Species Conservation Act, 1995*;
- Rural Land Protection Board Strategies.

2.3 Pest animals on State forests – Aspects and Impacts

Pest animals have potential to impact on plantation productivity, the natural environment and agricultural production in both State forest and adjoining lands by damaging crop trees and other vegetation, competing for food resources and directly preying on desired animal species. Pest animals include feral animals which developed from domestic stock living and breeding in the wild, animals that have been deliberately introduced for biological control programs but which themselves have become pests, and native animals which, under certain conditions, interfere with neighbours' interests and land management objectives.

Damage to plantation trees
Rabbits sometimes browse and kill newly-planted trees, deer cause damage by browsing and breaking branches during the rut, and some native animals such as wallabies and possums strip bark and ringbark trees.

Predation
Predator pest animals which impact directly on desired animal species include feral cats, foxes, wild dogs and, to a lesser extent, feral pigs which are also involved in habitat destruction and economic impacts in cereal crops and livestock. Native carnivores such as the quoll and brush tailed phascogale are unlikely to build up to populations that will significantly impact on populations of native species but may suffer from competition for prey and may themselves be preyed upon by introduced carnivores such as foxes and wild dogs.

Competition
In addition to the carnivores, herbivorous pest animals that compete directly for forage include rabbits, kangaroos, feral goats, feral deer and feral horses. Competitive impacts will generally be exacerbated in times of hardship when forage is severely reduced by extensive wild fires or drought. Although

large native herbivores such as kangaroos and wallabies may have reproduction inhibitor mechanisms to deal with climatic influences on food abundance, boom populations are relatively slow to react, cause intense grazing pressures and can impact on ground cover and forage for other threatened species.

Habitat Modification
Habitat modification can include destruction of ground cover and subsequent accelerated erosion (land degradation), changes in ground cover species composition (perennial grasses to annual weeds), physical modification of stream profiles and water quality and physical destruction of individual plants. Herbivores such as rabbits and goats impact on ground vegetation whereas horses and pigs also impact on riparian zones, stream bank stability and water quality.

Browsing of regeneration
Natural seedling regrowth of native tree species following harvesting is rarely browsed to the extent that forest regeneration is threatened. Where planting is undertaken to ensure regeneration, these plants may often be subject to more intensive browsing than normal.

Browsing native grasses
Native grasses suffer most under continuous heavy browsing, particularly in times of stress, eg droughts, and summer when seeding is occurring. This is generally only of concern when grazing of domestic stock is inappropriate or grazing pressure by a combination of feral animals and native animals causes an overstocking situation.

Harbour for mobile species
Some animals shelter in forests and forage on more abundant or more palatable food resources on neighbouring lands. Feral pigs, where they are present, and kangaroos often invade improved pastures and cereal crops and can be a threat to agricultural production. Wild dogs and foxes prey on livestock, particularly during droughts and lambing and calving periods when prey is scarce in the forest or more abundant and more vulnerable on the neighbouring lands. Apart from the economic impacts, they can also cause emotional trauma for livestock owners.

Native fauna impacts
There is much evidence that introduced predators have an impact on populations of native species, however there is some evidence to suggest that predator populations stabilise at levels consistent with the available food resources (Website, Dept Agriculture, Fisheries and Forestry – Australia 2003). The Fox Threat Abatement Plan indicates that, even in these instances of coexistence, the impact of pest species is shown by increases in populations of native species when the pest animal is excluded.

Pest animals of concern in NSW and in Central Region are identified in Appendix 1. As new pest animal species are identified, they will be added to Appendix 1 as an addendum.

3 Objectives

In general, Forests NSW objectives will be to:

- Minimise the social, environmental and economic impacts of the occurrence of pest animals on State forests within resource constraints;
- Ensure pest animal control operations are carried out in the context of the National Strategy for pest animal management, the *Rural Lands Protection Act, 1998*, the *Threatened Species Conservation Act, 1995* and cooperative coordinated programs developed by local Rural Lands Protection Boards.

In particular, Forests NSW will:

- Develop and implement operational plans in accord with the requirements of this plan;
- Base annual pest animal management programs on up to date information about the legal status, ecology, dispersal and importance of pest animals and the most appropriate management strategies;
- Maintain a database of areas treated and success in meeting objectives;

- Ensure implementation of operational programs comply with the Pesticides Act, 1999;
- Operate within budgetary constraints.

4 Strategy

Forests NSW is committed to a coordinated regional approach to pest animal management where programs are more successful if undertaken in cooperation with neighbours, other government agencies and local organisations.

Forests NSW in Central Region will undertake control activities consistent with the national strategy and in a cooperative and coordinated manner to reduce predation on livestock, reduce the destruction of agricultural crops and reduce the threat of pest animal predators to populations of threatened species,.

Components of this strategy on State forests will include;

- Cooperative arrangements with neighbours, other stakeholders and agencies;
- Standardised data collection to locate pest animal damage;
- Identification of potential environmental damage sites - Threat Abatement Plan sites, high integrity sites for fox prey threatened species, high integrity sites for other threatened species;
- Dingo presence as a potential control constraint;
- Pest animal control techniques and considerations for their use;
- Resource, training and accreditation needs to undertake control works;
- Types of pest animal management programs and the priority order in which they will be undertaken to maximise benefits from limited resources;
- Forest lessee/permittee involvement, where appropriate;
- Annual pest animal management objectives and programs;
- Operational implementation;
- Monitor and evaluate the success of programs;
- Modify the management plan and/or objectives based on evaluation.

The presence of pest animals may not be a true indication of their impacts so the focus of programs will not be in killing pest animals *per se,* but a sustainable reduction of their impact.

4.1 Co-operative arrangements

Effective pest animal management relies on cooperation between stakeholders with control responsibilities. This cooperation includes the preparation of regional control programs, data sharing, field research and joint control programs.

Central Region will continue to work in close cooperation with the following stakeholders, agencies and organisations in the development and implementation of this plan:

- Kempsey, Armidale, Gloucester, Hunter, Tamworth, Maitland, and Moss Vale Rural Lands Protection Boards;
- Jeogla, Yarrowitch/Tia, Niangala, Nowendoc, Barnard River, and Rookhurst Wild Dog Associations.
- Dept of Primary Industries - Agriculture and Fisheries;
- Crown Lessees and Occupation Permittees on State forests;
- Dept of Environment and Conservation;
- Forests NSW Planted Forests Division;
- Other land management agencies and stakeholders, including local government and Dept Lands and the Game Council.

- Forest neighbours.

Forests NSW will carry out pest animal control programs in cooperation with these individuals and organisations and use a coordinated approach, where necessary, to maximise program delivery across the landscape. Liaison will be documented in minutes of meetings and correspondence.

4.2 Data Collection

Consistent with Federal programs Forests NSW intends that pest animal management programs should be concentrated in areas where there are actual impacts or a high risk of impacts on agricultural production or the natural environment.

Central Region will collect data on pest animal occurrence and their impacts or likely impacts on agricultural resources and environmental values.

Integral to the successful implementation of this Plan is the collection, storage and retrieval of data describing the whereabouts and nature of pest animal populations, the impacts they are having on agricultural production and native species populations and habitat, and the location, extent and success of past programs.

Forests NSW will obtain **pest animal presence** information from:

- Reports from Rural Lands Protection Boards, Wild Dog Associations and Neighbours

  Forests NSW maintains close contact with field officers of the various Rural Lands Protection Boards and participates in the Wild Dog Associations listed in section 4.1. Reports indicate type and location of pest activities and the impacts on agricultural production – stock losses, damage to pastures and crops. Information may also include known paths of pest animals through the landscape. The Northern Region Feral Animal Advisory Committee (FAAC), of which Forest NSW Central Region is a member, typically meets quarterly and each agency and member group provides a report on pest animal activity and stock losses in the region on an agreed form.
- Soil plots
- Results from hunter returns from Game Council.
- Results from control programs
- Incidental sightings and pest animal inspection reports

  Incidental sightings reported by Forests NSW staff and members of the public will be recorded on the form identified in Appendix 3 and be reported with the regions pest animal data.
- Fauna Surveys

This information will be recorded in a regional database which will be linked to the geographic information system to allow analysis of temporal and spatial distribution of pest animal populations and impacts on agricultural production and native species and habitat.

4.3 Conservation Kernels

Forests NSW has developed a concept of “Conservation Kernels” to guide concentration of survey effort and environmental pest animal management programs where they are likely to be most beneficial (See Meek and Kirwood, 2003). The concept relies on identifying the most valuable ecological sites where predator control will achieve positive outcomes for prey populations. At present this concept applies particularly to Red Fox predation.

The high integrity sites for prey species are identified in the GIS by identifying modelled habitat areas for a selection of threatened species for which predation by the fox has been identified as a key threatening process that actually contain populations. Species selection for identifying Conservation Kernels will be based on expert knowledge, the NSW Fox Threat Abatement Plan, NSW recovery plans, and scientific literature as identified in Meek and Kirwood.

As the nature and extent of the impacts of other pest animals and their control methods become better known Forests NSW will consider extending this methodology to those other species.

Threatened species at risk of predation by foxes have been identified in the Fox Threat Abatement Plan and are detailed in Appendix 2 of this plan together with other threatened critical weight range species that are considered at risk of predation.

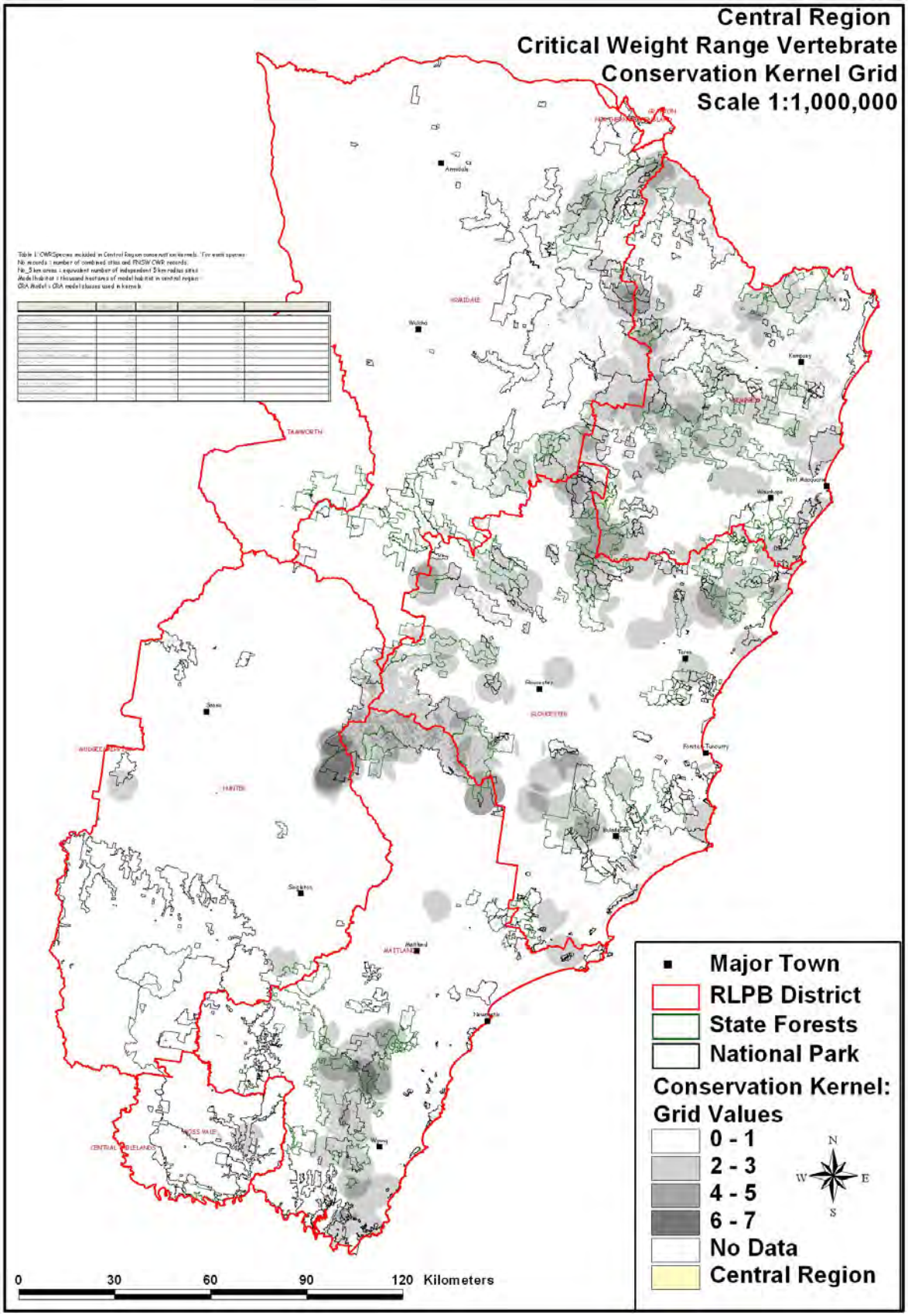
Actual **presence of threatened species** is obtained from:

- Pre-logging fauna surveys
- Incidental sightings
- Soil plots established to survey for pest animal activity and bait stations established in pest animal control work
- Research projects
- Fox threat abatement Plan projects
- Dept of Environment and Conservation Wildlife Atlas and Species Recovery Plans

This data is amalgamated into a GIS layer which shows the spatial distribution of threatened species records.

Central Region has developed a Conservation Kernel map by overlaying modelled habitat layers with presence data for relevant critical weight range species in the region. This map (Figure 2) identifies that high concentrations of threatened CWR species or their habitat occur in Styx River, Carrai, Mount Boss, Doyles River, Bulga, Lansdowne, Mernot, Chichester, Forsterton, Myall River, Heaton, Watagan, Onley and Strickland State Forests.

Figure 2 Conservation Kernels within Central Region

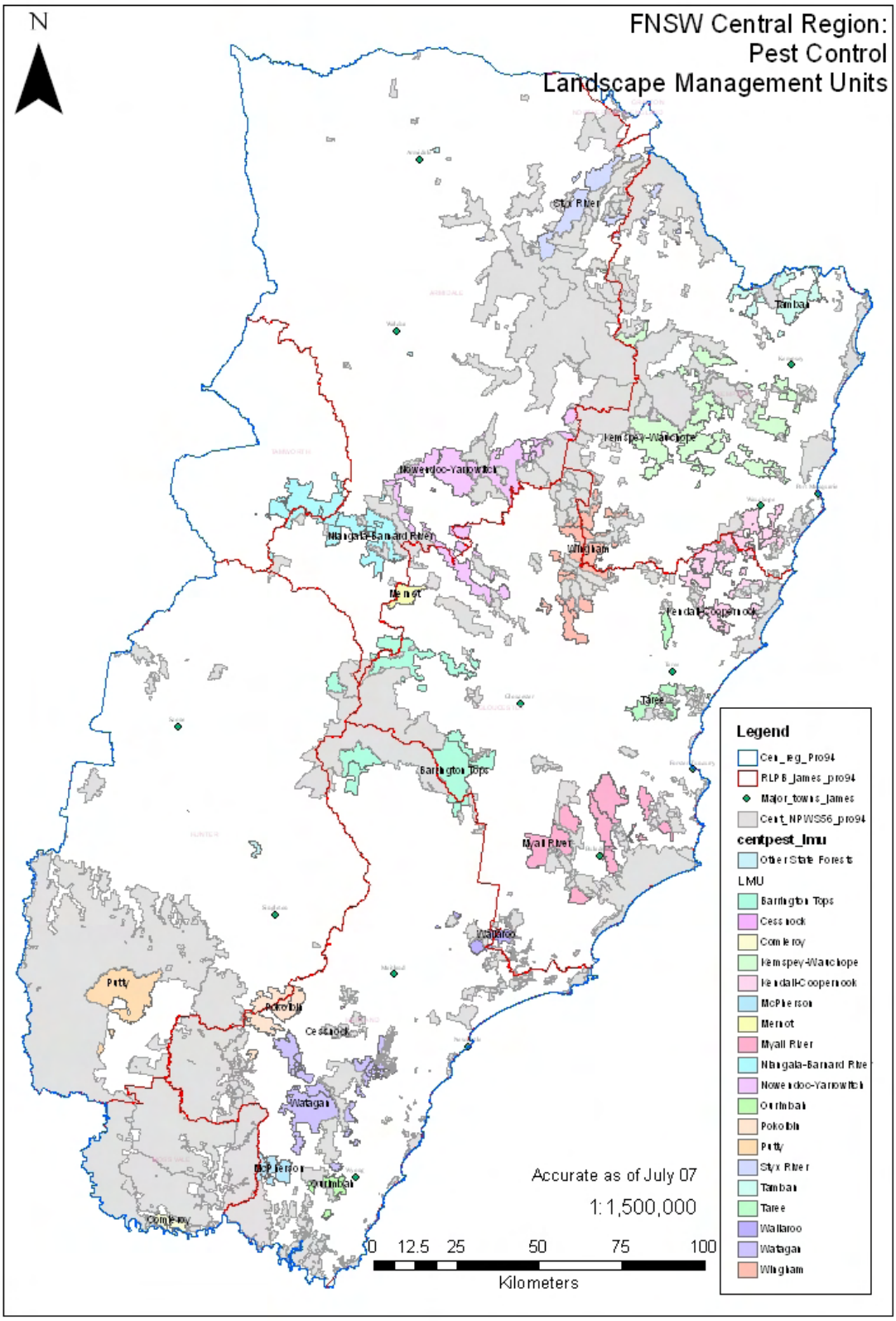


4.4 Land Management Units

The forest estate will be broken up into large geographically identified blocks called “Land Management Units” for the purpose of planning, implementing and monitoring annual programs for pest animal control. Land management units will vary in size and will be formed by amalgamating a number of compartments, which are the standard administrative units used by Forests NSW. Landscape Management Units within Central Region are shown in Figure 3.

Intersection of conservation kernels (figure 2) with land management units (figure 3) will indicate management units with populations of threatened species at risk of predation and be used with predator presence and activity information to determine control programs.

Figure 3 Landscape Management Units within Central Region



4.5 Dingo Management Areas

Dingos (*Canis lupus dingo*) and feral dogs (*Canis lupus familiaris*) are collectively known as wild dogs, however the dingo is considered a native animal and, while not protected under the *National Parks and Wildlife Act 1974*, there is pressure to manage the species in its natural environment.

The *Pest Control Order for Wild Dogs* issued under the *Rural Lands Protection Act 1998* applies over all lands in NSW. The Order does however allow for the destruction obligation for publicly managed lands listed in Schedule 2 of the Order to be satisfied through a wild dog management plan that has been approved by the Rural Lands Protection Board for the district.

The Minister has consented to an application from Forests NSW; Dept of Environment and Conservation; Department of Infrastructure, Planning and Natural Resources and the Sydney Catchment Authority for a number of large areas containing high quality dingo habitat to be included on Schedule 2 of the Order. In these areas, close cooperation with neighbours, local Wild Dog Associations, Rural Lands Protection Boards and other agencies will ensure that wild dog control activities will be targeted to where agricultural production is, or is likely to be, impacted by wild dogs. In dingo management areas within State forests, wild dog control activities will be limited, preferably, to the perimeter which interfaces with neighbouring lands but may, where necessary, be deep within the dingo management area.

4.6 Pest Animal Control Techniques and Considerations

All pest animal control work will be carried out in accordance with the Dept of Primary Industries - *Vertebrate Pest Control Manual*, and must comply with the *Rural Lands Protection Act, 1998*, *the Pesticides Act, 1999* and the *Prevention of Cruelty to Animals Act, 1979*.

Control Techniques generally include:

Fencing
Netting fences have been used for wild dogs and rabbits for over 100 years and more recently fencing has been implemented for cats and foxes. Pest animal management fences are more expensive than normal stock fences to erect and, to remain effective, must be inspected and maintained regularly which again is expensive. Fencing to exclude pest animals is generally only successful where the area to be protected is small and/or the terrain is accessible.

Trapping
Traps comprise conventional cage traps, soft-jawed or soft-catch traps or yards built on regular pathways – steel jawed traps are now illegal in NSW. Traps are generally set in a string with daily checks to ensure animals are treated as humanely as possible. Trapping is generally target specific but requires specialist skills, is suited to small rather than large areas and with some animals being trap shy, success is often limited while cost is high. Strict procedures are outlined in the Vertebrate Pest Control Manual by DPI – NSW.

Poisoning
Pesticides, even though they may be used to protect ecological values, have a high potential for human and environmental harm and their use is therefore highly regulated. Poisoning of pest animals, such as wild dogs, foxes, rabbits and pigs, often uses sodium monofluroacetate, commonly known as 1080, dissolved in water and applied to meat, carrot and oat baits. Where there is a high risk of bait take by non-target species various precautions are used, such as varying the poison dose and bait size, exact bait placement, free feeds and monitoring, burying baits and dying baits with distinctive colours.

Meat baits are buried and covered by soft earth, distributed along tracks by vehicle or aerially by helicopter if the program is to be extensive. Aerial baiting by fixed wing aircraft is not practised in State forests in NSW. Grain and carrot baits are generally placed on the ground surface but where in bait stations due consideration must be given to non-target impacts.

Preliminary best practice guidelines for construction and management of bait stations are detailed in the Fox Threat Abatement Plan. Techniques are being researched and results, where appropriate will be incorporated into future programs and practices.

Shooting
Shooting is sometimes used to control pest animals, such as horses, pigs, goats and "rogue" wild dogs. It is not generally effective as the primary control agent for dogs and foxes.

Where locations are remote, rugged or extensive, helicopters may be used as the shooting platform. Although target specific and often the most humane method – avoiding stresses associated with mustering, yarding and transport – shooting can be expensive with the drawback of not being able to "confirm the kill" in rugged forested country.

Biological
Biological control involves natural predators, parasites, disease causing bacteria or viruses. Myxomatosis and Calicivirus for rabbits have been the most successful. Disease as a control technique runs into problems when the feral animal is also important as domestic livestock. Current research is looking at immunocontraception in an effort to suppress fertilisation and produce fewer young. As biological control techniques are perfected and become available, Forests NSW will investigate whether they are appropriate for use in forests.

Other considerations in developing control programs may include:

Drought and extensive fire
While drought and fire are not considered control techniques their impact must be taken into account when considering management of pest animals. During droughts, once food resources are depleted, animals tend to have low breeding rates and high infant mortality and populations tend to crash, with only the fittest individuals surviving. If populations can be reduced by 90% it will take five years for populations to reach pre-drought levels. This is an opportune time to carry out control work to achieve more sustainable pest levels. Fires during droughts are often extensive, of high intensity and destroying vegetation, and in some cases consuming animals, over large areas. This accelerates the drought affect.

Timing
Seasonality for predator control work will be scheduled based on the value to be protected and the most effective control period for the technique and the predator. General times are shown in Appendix 6.

Stock protection work is best conducted in mid to late autumn and winter to minimise dog and dingo number preying on stock during the calving and lambing periods over winter and spring.

Fox control will be conducted at a minimum of twice per year with an optimum frequency of four times per year.

Integration of methods
While best control is only possible with coordination of effort it may also require an integration of techniques, eg a coordinated baiting program over all tenures may succeed in reducing the number of dogs but the killing of local stock continue because of the activity of a "rogue" dog. The success of the program can only be assured by integrating some other control techniques such as tracking and trapping or shooting to deal with the "rogue" animal.

Program proponents should also consider the interaction of the target species with other pest animals and what might happen to their populations. For example if foxes are to be controlled it may be necessary to consider what will happen to rabbit populations, the potential for environmental degradation and whether there is a need for a joint rabbit control program.

Social Responsibility
Maintaining environmental values and protecting agricultural productivity requires, from time to time, the control and culling of pest animals. Killing of animals brings with it a social responsibility to act as humanely as is possible. The general public must be kept fully informed about the reason, nature and extent of activities that are to be undertaken.

Buffers
The real extent of pest animal management work will be influenced by the mobility, migration and replacement of the pest species, the real extent of the values identified and the frequency and efficiency of the control technique. Pest animals will need to be managed in adjacent lands (buffers) to the areas where values are being protected. It has been suggested that the buffers need to be twice the width of the home range of the targeted pest species.

Appropriate Control Techniques
Species profiles available from the Environment Australia website (http:/www.deh.gov.au/biodiversity/invasive/pests) identify the different control techniques appropriate for that species. In selecting the appropriate control technique for a given pest animal control program, Forests NSW will give due consideration to the issues outlined in Table 1.

Table 1 – Considerations in determining appropriate Control Techniques

Issue	Consideration
The efficacy of available techniques	Consider proven ability of available techniques.
The impacts on the environment of different control techniques	Select techniques with minimal environmental (non-target) impacts, consistent with control objectives
Techniques agreed upon in other control strategies (eg TAP's)	Comply with agreed techniques.

Forests NSW will maintain an active awareness of new technology, methods and information for predator control. Improved techniques will be used to modify the strategic and operational plans as appropriate to ensure best management practice.

4.7 Available Resources, Training and Accreditation

Pest animal management budgets will be funded from revenue and grants from Treasury as part of Forests NSW' community service obligations. As is common to all agencies with pest animal management responsibilities, there is limited funding available for control programs. Forests NSW has committed over $1million over five years to implementing the *Fox Threat Abatement Plan*. Further control activities must be effectively targeted and appropriate priorities determined, to ensure maximum control effort is achieved within available resources. Effective pest animal control requires consideration of the pest animal's ecology, the economics of the control exercise, the agricultural pursuit to be protected or the distribution of the taxa to be protected from the predator.

Operator training and accreditation is an essential component of implementing this Plan. Field staff, who undertake pest animal control work, are appropriately trained, and participate in relevant field days and seminars with other agencies to maintain currency. Where pest animal control work involves 1080 baits, Forests NSW staff will be appropriately instructed in safe use by NSW DPI or Rural Lands Protection board Authorised Control Officers as directed in the appropriate *Pesticide Control Order* under Section 38 of the *Pesticides Act 1999*. Forests NSW does not hold stocks of 1080 poison in either powdered form or mixed in solution and will use commercial baits or baits that are prepared by qualified Rural Lands Protection Board officers.

As from 1 September 2005 any officer handling pesticides needs to be qualified under the *Pesticides Amendment (User Training) Regulation, 2003*. The purpose of the training is to protect workers who use pesticides, their families, the community and the environment. The Regulation allows a two year transitional period for training.

4.8 Pest Animal Management Programs

While programs will often be reactive Forests NSW intends that they be targeted where impacts are actual or perceived - based on historical or interpreted evidence - to be of a high risk of occurring, be cooperative and coordinated and be designed to give sustainable reduction in the impacts of pest animals across the landscape.

Plantation Protection Program
To ensure adequate tree survival rabbits must be controlled in new plantation areas. Control is normally achieved with the use of ground laid 1080 baits.

Agriculture Production Protection Program
The aim of agriculture production protection programs will be to control pest animal numbers in an effort to minimise agricultural losses.

Agriculture production protection programs will be cognitive of historical and predicted agricultural losses – stock, pastures and crops - with a commitment to monitor pest animal movements through a series of soil plots. They will be part of a cooperative and coordinated control program developed in conjunction with other stakeholders and will be targeted to pest animal activity and current or predicted losses. Generally pest animal impacts will be on neighbouring properties and programs will be on the edges of the forest, involve known routes of pest animals, "through" roads or trails or be more extensive throughout the forest if activity information suggests this is warranted.

Any proposed aerial baiting programs will be approved by Forests NSW prior to submission to Dept of Primary Industries for Director General approval.

Reactive programs may still be necessary in isolated instances and will be in response to verified damage. Reactive programs will be implemented following consideration of Rural Lands Protection Board substantiation of the claim ("once off" or "ongoing" concern) and of the action the neighbour has taken to address the loss (contribution to freehold program when pest animal activity increases and before losses occur).

Natural Environment Protection Program
The aim of natural environment protection programs will be to maintain the integrity of threatened species populations.

Natural environment protection programs will generally be in response to declared emergencies, identified high predation of, competition with or habitat destruction of threatened species or identified risk of high predation on, competition with or habitat destruction of threatened species. Some reactive control programs may be undertaken where pest animal populations are low and the opportunity to protect high conservation values from animal pests or to prevent environmental damage at minimal cost is presented.

Pest animal management will be focussed in modelled threatened species habitat areas where the modelled species are actually present and the presence of animal pests or other evidence indicates the threatened species is or will be impacted by the animal pest.

Threat Abatement Plans
The aim of threat abatement plan programs will be to meet Forests NSW commitments within the plan.

Programs, including location, control techniques, timing and operational intensities, are determined by interdepartmental committees set up to run the project.

Research
The Dept of Environment and Conservation has identified that measurement of the effectiveness of management programs in reducing the impacts of pest animals on native plant and animal species or populations, requires complex experimentation and is cost prohibitive in most treatment areas.

Forests NSW, in conjunction with the Dept of Environment and Conservation, has set up a number of monitoring sites. Two such sites – Kumbatine and Tamban State forests have been established in Mid North Coast Region as trials. Both programs have been running since 1999 and aim to identify if introduced predator control programs can have a positive effect on populations of specific threatened species. The Kumbatine site is a Fox TAP priority site. Appendix 7 contains a summary and recommendations from these programs.

4.9 Liaison with Lessees on State forest

The holders of Crown Leases over which State forest has been dedicated and the holders of Occupation Permits in State forests have the same obligations and responsibilities under *the Rural Lands Protection Act 1998* and the *Threatened Species Conservation Act 1995* as any land owner. Central Region will continue to maintain close liaison with those Lease and Permit holders to ensure they are aware of their obligations and that they are actively exercising their responsibilities.

Where it is necessary for Forests NSW to develop a pest animal management program over an area covered by a Crown-land tenure (lease) or occupation permit, Forests NSW will liaise with lessees and permittees to achieve the pest animal management objectives.

4.10 Determining priorities

Forests NSW has an obligation to respond to Commonwealth and State declared emergency situations involving pest animals and forested lands and has made a commitment to participate in the Fox Threat Abatement Plan implementation. Additionally, Forests NSW has identified three types of pest animal management programs – plantation protection, protection of environmental values and protection of agricultural production, in which it will be involved to varying degrees.

Central Region's priorities will generally be:

1. Emergencies declared by NSW DPI;
2. Plantation protection programs;
3. Coordinated cooperative programs to protect agricultural production;
4. Commitment to any Fox Threat Abatement Plan program;
5. Maintaining research trials dedicated to monitoring the efficacy of control;
6. Natural environment protection program in high species diversity where surveys demonstrate predation, or a high risk of predation on threatened species;
7. Continuation of previous programs to maintain populations at low levels;
8. Opportunistic, once off, programs to prevent threatened species habitat loss or predation in limited areas;

Reorganisation of priorities may occur should additional funding become available for research, additional threat abatement plan implementation, or natural environment protection.

5 Annual Pest Animal Management Program

This plan provides the framework for pest animal management across Central Region, and is implemented in the field through the development, implementation and monitoring of Annual Pest Animal Management Programs and specific Pest Animal Control Operations Plans.

Each Annual Pest Animal Management Program will specify:

- Priority for pest animal control programs;
- The type of program to be undertaken;
- Targeted species and areas with program justification;
- The control methods to be adopted for each targeted species;
- Estimated program costs;
- Annual monitoring requirements;
- Other relevant matters.

Central Region will develop an Annual Pest Animal Management Program from 2006 using the proforma in Appendix 4 and based on:

- **A review of the results of previous control programs;**
- **Cooperative consultation with Rural Lands Protection Board, Wild Dog/Fox Control Groups, other agencies and stakeholders identified in 4.1;**
- **Regional priorities identified in 4.10;**
- **Collaborative programs undertaken with Rural Lands Protection Boards, Wild Dog/Fox Control Groups, other agencies and stakeholders;**
- **Appropriateness of available control techniques;**
- **Available resources.**

6 Pest Animal Control Operations Plan

Central Region, prior to any operations being undertaken, will develop for each pest animal species or treatment area a Pest Animal Control Operations Plan that will use the proforma in Appendix 5 and will:

- **Identify the Pest Animal problem, location and anticipated control techniques;**
- **Identify any precautions necessary to protect environmental values;**
- **Identify any special Occupational Health and Safety issues;**
- **Identify any necessary warnings or neighbour advice;**
- **Record information required under the Pesticides Amendment (Records) Regulation;**
- **Record certification and briefings undertaken.**

All individual pest animal control operations will be in accord with an approved Pest Animal Operations Plan.

The Pest Animal Control Operations Plan will instruct competent operators about where and how the control work is to be carried out.

The Pest Animal Control Operations Plan will comprise two pages of text and a map at an appropriate scale.

The Operations Plan will be certified by the preparer and Operations Officer and be acknowledged by the operators or contractors.

When fieldwork has been completed, the Operations Plan will be returned to the Regional Office for processing and filing.

7 Monitoring, Continuous Improvement and Reporting

Monitoring the implementation and effects of this Plan is an essential component to ensure continuous improvement in managing the impacts of pest animals. Monitoring is aimed at testing the effectiveness of control programs in reducing impacts on plantation, agriculture and natural environment values, the effectiveness of control techniques, planning and operational compliance and the distribution of desirable species and pest animals across the landscape (see Table 2 on the following page for details). Monitoring will inform adaptive management decision making, future programs and the review of this plan.

The Regional ESFM Report will document the implementation of the Pest Animal Control Operations Plans and will include:

- Results of the monitoring program;
- Area treated by species;
- Annual expenditure on control;
- Continuous improvement initiatives;
- An assessment of the success of this Plan in meeting objectives.

Table 2 - Monitoring and Reporting Elements

Monitoring and Reporting Element	Purpose	Feedback to Planning Process
Pest Animal Abundance - continuous updating of GIS database of pest animal distribution	To assess pest animal species abundance and distribution to: • Enable long term monitoring of program effectiveness; • Assist in developing annual programs.	Generation of a spatial and temporal picture of the abundance and distribution of pest animals and environmental values across the landscape. Share data with regional stakeholders to improve appreciation of pest animals in the landscape and developing appropriate control programs. The rate at which pest animal populations recover to pre-treatment levels may be an indicator of the sustainability of control programs.
Pest Animal Impacts – Agricultural Values: crops, pasture and livestock	To assess impacts of pest animals on agricultural values to: • Identify the need for control programs; • Fix priorities for control programs.	Identify the type, location and extent of pest animal control program. Operational review to determine program variation required. Feed back to annual planning.
Pest Animal Impacts – Natural Environment: species predation, competition or habitat destruction	To assess impacts of pest animals on natural environment features to: • Identify need for control programs; • Fix priorities for control programs.	Identify the type, location and extent of pest animal control programs. Operational review to determine program variation required. Feed back to annual planning.
Effectiveness of Control Technique - pest animal reduction or impact reduction to acceptable levels	To assess and report on: • Efficacy of treatment; • Non-target effects; • Reduction in agricultural impacts; • Reduction in environmental impacts.	Review the success of past treatments in developing new programs. Assessing the sustainability of the treatments. Reviewing control techniques if it appears the program has not been successful in reducing pest animal impacts.
Compliance – Forests NSW audit will monitor pest animal control planning and operations	To ensure: • Planning of annual programs and operational plans is in accord with this plan; • Operations are implemented in an effective and safe manner.	Review application of planning procedures in developing annual programs and operational plans to identify potential improvements to be incorporated into this plan. Review documentation of completed operations to ensure they have been adequately recorded, that implementation has been monitored by supervisors and that any non-compliance has been addressed using adaptive management principles. Pesticides register is accurate and complete.
New Developments – Maintain awareness of pest animal species and control techniques	To ensure that cumulative corporate expert knowledge about pest animals and their control is current.	Modify pest animal profiles and preferred control techniques when reviewing this plan. Include any new control techniques in annual programs. Update GIS data layers for pest animal distribution and consider in developing annual programs.

Monitoring and Reporting Element	Purpose	Feedback to Planning Process
Annual Expenditures on Pest Animal Management Programs	To assess: • expenditure trends; • program efficiency; • Triple Bottom Line accounting.	Identify ability to meet high priority control programs within available budget. Pursue opportunities for external funding for unfunded priority programs.
Review of this Plan	To ensure: • Pest animal management objectives and strategy remain appropriate; • Planning and treatment continually improves to meet the objectives.	Amend the plan to reflect more appropriate objectives or strategies. Amend planning and scheduling procedures for annual programs and operations.

References

Catling, PC and Burt, RJ (1994). *Studies of the Ground-dwelling Mammals of Eucalypt Forests of South-eastern New South Wales: the Species, their Abundance and Distribution*. Wildlife Research **21**, 219-39

Forests NSW Operations Circular 96/12 (5/6/1996) *Management of Wild Dogs on State forests.*

Forests NSW Operations Circular 96/15 (2/9/1996) *Management of wild Dogs on State forests.*

Commonwealth of Australia (1992) *National Forest Policy Statement*

Government of NSW (2002) *Pesticide Control (1080 Wild Dog) Order 2002* Government Gazette No. 225, 22 November 2002.

Meek PD and Kirwood RA. *Generating Conservation Kernels to select areas to control red fox (*Vulpes vulpes*): Potential implications for pest management practice in State forests*. Ecological Management and Restoration Vol 4 Supplement Feb 2003

NSW Agriculture (1996). *Vertebrate Pest Control Manual*

NSW National Parks and Wildlife Service (2001). *Threat Abatement Plan for Predation by the Red Fox (*Vulpes vulpes*).* NSW National Parks and Wildlife Service, Hurstville.

Further information is available at:

NSW Dept of Primary Industries website www.dpi.nsw.gov.au

WorkCover NSW website www.workcover.nsw.gov.au

Dept of Environment and Conservation website www.nationalparks.nsw.gov.au

Dept of Environment and Conservation website www.environment.nsw.gov.au/home.htm

Appendices

Appendix 1 – Pest Animal Species of Concern in State forests of Central Region

Common Name	Scientific Name	Commonwealth Feral	Commonwealth TAP	NSW Noxious	NSW Threat Process	NSW TAP	Central Region
Feral Rabbit	*Oryctolagus cuniculus*	Yes	Yes	Yes	Yes		
European Red Fox	*Vulpes vulpes*	Yes	Yes		Yes	Yes	Yes
Feral Cat	*Felis catus*	Yes	Yes		Yes		Yes
Feral Pig	*Sus scrofa*	Yes		Yes			Yes
Feral Goat	*Capra hircus*	Yes	Yes				Yes
Feral Horse	*Equus caballu*	Yes					
Mosquito Fish	*Gambusia holbrook*	Yes			Yes		
Cane Toad	*Bufo marinus*	Yes					
Wild Dog	*Canis familiaris*			Yes			Yes
Emerging Pests							
Feral Deer	various						Yes
Wild Cattle	*Bos taurus*						Yes

Note: Pest animals of concern in State forests of the region are identified. Some pest animals are present in low numbers and appear to be having little impact on agricultural production or environmental values and have not been listed of concern to Forests NSW in Central Region.
TAP = Threat Abatement Plan developed and approved.

Appendix 2 – Species at Risk from Fox Predation and Priority for Fox Control

Species	Common Name	Species Code	TAP Risk	Central Region
Mammals				
Cercartetus nanus	Eastern Pygmy Possum	EAPP		Y
Aepyprymnus rufescens	Rufous Bettong	RUBE	H	Y
Petrogale penicillata	Brush-tailed Rock-wallaby	BTRW	H	Y
Macropus parma	Parma wallaby	PAWA		Y
Thylogale stigmatica	Red-legged pademelon	RELP		Y
Mastacomys fuscus	Broad-toothed Rat	BRTR	H	Y*
Potorus tridactylus	Long-nosed Potoroo	LONP		Y
Dasyurus maculatus	Spotted-tailed Quoll	SPTQ	M	Y
Phascogale tapoatafa	Brush-tailed Phascogale	BRTP	M	Y
Planigale maculata	Common Planigale	COPL		Y
Pseudomys gracicilicaudatus	Eastern Chestnut Mouse	EACM	M	Y
Pseudomys oralis	Hastings River mouse	HARM		Y
Birds				
Burhingus grallarius	Bush Stone-curlew	BUSC	H	Y
Esacus neglectus	Beach Stone-curlew	BESC	H	Y*
Haematopus longirostris	Pied Oystercatcher	PIOC	H	Y*
Strena albifrons	Little Tern	LITE	H	Y*
Botaurus poiciloptilus	Australasian Bittern	AUBI	H	Y*
Grus rubicunda	Brolga	BROL	H	Y*
Reptiles				
Elseya Belli	Bell's Elsya	ELSBEL	H	
Emydura macquarii (Bellinger River sub sp)	Bellinger River Emydra	EMYMAC	H	
Amphibians				
Mixophyes balbus	Stuttering Frog	MIXBAL		Y
Mixophyes iteratus	Giant-barred Frog	MIXITE		Y
Litoria aurea	Green and Golden Bell Frog	LITAUR		Y*
Heleioporus australiacus	Giant burrowing Frog	HELAUS		Y

Note: * occur in the region but not recorded from forest estate.
Note: Some threatened frog species may also list predation as a threatening process.

Appendix 3 – Pest Animal Inspection and Incidental Sighting

Note: Central Region will record Incidental Sightings and the outcomes of Pest Animal Inspections on the attached Pest Animal Inspection/Incidental Sighting form for entry into the fauna database. This information will be used to develop an historical record of pest animal activity to be able to track impacts both spatially and temporally to assist in monitoring the success of programs.

Central Region –
Pest Animal Incidental Sighting/Pest Animal Inspection

STATE FOREST		M.A.		COMPT
INSPECTORS(S)		DATE:		REGION CODE
SURVEY NAME/FILE NUMBER				
INFORMANT			DATE RECEIVED	
INSPECTION INSTIGATED BY	☐ Forests NSW ☐ Dept of Lands ☐ RTA	☐ RLPB ☐ DPI - Ag ☐ OTHER……	☐ DEC ☐ Wild Dog Control Association	
TARGET SPECIES	☐ DOG ☐ PIG ☐ CATTLE	☐ FOX ☐ GOAT ☐ HORSE	☐ CAT ☐ RABBITS ☐ OTHER……	
ABUNDANCE	☐ NIL No tracks and sign or sightings	☐ LOW Few tracks and signs, few sightings	☐ MEDIUM Obvious tracks and sign, occasional sightings	☐ HIGH Abundant tracks and signs, regular sightings
POTENTIAL/CURRENT IMPACT/S	☐ THREAT TO INDIVIDUAL SAFETY ☐ POTENTIAL COLLISION ON ROADS	☐ LOSS/DAMAGE OF LIVESTOCK/POULTRY ☐ IMPACT ON LOCAL BIODIVERISTY	☐ LOSS/DAMAGE TO CROPS ☐ OTHER ☐ PLANTATION DAMAGE	
NOTES				
RECOMMENDED ACTION	☐ UNDERTAKE CONTROL	☐ FOLLOW UP INSPECTION IN …… MONTHS	☐ NO CONTROL REQUIRED	
SIGNATURE OF INSPECTING OFFICER			DATE	

Appendix 4 - Annual Pest Animal Management Program

Central Region Prioritised Annual Pest Animal Management Program – (Year)

1. Proposals

Priority	Program	LMU	Target species	Control Method	Area to treat (see attached map)	Estimated total cost (see part 2)	Justification

2. Costs

Sub-region	Program	LMU	Time (days)							
			Set up	Run	No of Visits	Subtotal cost (time)	Subtotal cost (vehicle)	No of Mounds / feed sites	Subtotal cost (sand & baits)	Total Cost
	GRAND TOTAL									

Note: *Toyota Hilux – (assuming 25,000 km) $18660 (per year), $72 (per day)*
Fieldworker 5.2 - $48,000 (per year), $185 (per day)
Ecologist DPO11 - $73150 (per year), $281 (per day)
Dogone - $1.00 per bait
1080 Meat Bait - $6.00 per 20 baits
Fieldworker 6.1 - $53,250 (per year), $205 (per day)
Forest Assistant G2 - $66,000 (per year), $253 (per day)
Soil Plot Sand – $1.50 per plot
foxoff - $1.00 per bait

Appendix 5 – Pest Animal Control Operations Plan

Central Region will use the format for the Pest Animal Control Operations Plan shown on the following pages. It can be copied out of the document for routine use.

Central Region – Pest Animal Control Operations Plan

State forest:	**Compartment(s):**	**Rural Lands Protection Board Area:**
(Year) Annual Program Priority:	**Target Species:**	
Pest Animal Infestation Description: Land Management Unit(s), Neighbouring Properties, (Map at appropriate scale attached)		
Pest Animal Control Technique(s): (if baiting – type, origin and poison dose of baits)		
Locality of Pest Animal Work: Roads, Trails, Registered Bait Stations (Map at appropriate scale attached)		
Operator(s):		

Information to be addressed prior to operations taking place are:

Protection for threatened flora species: Identify protection measures relevant to control technique and species	
Protection for threatened fauna species or habitat: Identify protection measures relevant to control technique and species	
Protection for water ecosystems: Identify protection measures relevant to control technique and ecosystem	
Site Safety Plan has been prepared: Covers OH & S issues	
Personal Protective Equipment available and appropriate: Assessed by supervisor	
Neighbours Advised: Indicate how	
Rural Lands Protection Board Advised: Also Wild Dog Association if relevant	
Other Agencies: DEC, DoL, Agriculture NSW	
Media Advertising: 1080 poisoning in 2 weeks in advance	
Warning Signs Displayed: Every road entrance and every kilometre	
Proximity to Residences: Not closer than 500 metres	
Unused Bait disposal: Bury at least 500mm deep	

Pest Animal Control Operations Plan – Central Region

CERTIFICATION

Plan prepared by: Date: _____ Signature: _____

Approved by Operations Officer Date: _____ Signature: _____

PRE-OPERATION BRIEFING

I acknowledge that I have received a copy of the Pest Animal Operation Plan for XXX Program Priority XXX and that I have been briefed on the conditions of the Plan and understand the supervision and operational control requirements as explained to me by the person who prepared the plan or his/her delegate.

Plan Preparer/delegate

Name	Signature	Date

Forests NSW Operator

Name	Signature	Date

Pest Animal Control Contractor Acknowledgment

I acknowledge that I have received a copy of the Pest Animal Operations Plan for XXX Program Priority XXX and that I understand the conditions of the Plan as explained to me by a State forest officer. I will brief other operators not present at this briefing prior to them starting operations.

Signature: …… Name: ……..

Position: Principal Contractor/Other (explain): …….
Date:……..

Personnel Attending Briefing

Contractor Personnel	Date	SFNSW Personnel	Date

This is a true record of the work undertaken:	Operator Signature:…….. Date ……/……/……

Upon completion of the work identified, this Operations Plan must be returned, with the plan map and any recording sheets, to Regional Office for processing.

Appendix 6 – Timing of Pest Animal Control Programs

The timing of pest animal control activities is general only and can be influenced by additional windows of opportunity such as floods, drought and fire, and other seasonal conditions.

Pest Animal	Control Method	Summer			Autumn			Winter			Spring		
		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Feral Cat	Trapping	Y	Y	Y				Y	Y	Y			
	Ground Shooting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wild Dogs	1080 Baiting						Y	Y	Y	Y	Y	Y	
	Trapping	Y	Y	Y				Y	Y	Y			
	Ground Shooting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fox	1080 Baiting						Y	Y	Y	Y	Y		
	Ground Shooting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Feral Goat	Aerial Shooting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Ground Shooting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Feral Horses	Aerial Shooting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Feral Pig	Aerial Shooting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Ground Shooting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	1080 Baiting	Y	Y	Y									
	Trapping	Y	Y	Y				Y	Y	Y			
Rabbit	1080 Baiting	Y	Y	Y									
	Ripping	Y	Y	Y									
	Fumigating							Y	Y	Y			
	Ground Shooting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

After NPWS Pest Management Strategy, Northern Plains Region

Appendix 7 – Predator Control and Monitoring, July 2000

Note: This appendix includes the Summary and Recommendations from the SFNSW – NPWS Mid North Coast Regions Joint Predator Control and Monitoring Exercise – Initial Results. July 2000 Report to indicate the way in which research results can be incorporated into standard operating procedures and planning of programs.

SFNSW-NPWS MID NORTH COAST REGIONS JOINT PREDATOR CONTROL AND MONITORING EXERCISE – INITIAL RESULTS

SUMMARY

The development of techniques suitable for mitigating the impact of Red Fox (*Vulpes vulpes*) on critical weight range vertebrates (CWRV) (Kinnear *et al*. 1998; Priddel and Wheeler 1997) and Wild Dogs (*Canis lupus familiaris*) on domestic stock (Thomson 1986) while minimising the risk of control techniques to non-target species have been identified as management priorities in recent times (Belcher 1998; Mansergh and Belcher 1992; Murray 1998, Murray *et al*. 2000). This report describes the results from a mound-baiting control program and soil plot monitoring that was found to be effective at reducing target predator populations on the Mid North Coast of New South Wales. The report also describes how the risks to non-target species were minimised and describes and reports on monitoring the relative abundance of predator and groups of prey species before and after control. This report is part of a larger, ongoing project aimed to identify if a positive response from CWRV can be achieved from such a introduced predator control program in Northern New South Wales.

The baiting technique generally followed that described by Dexter and Meek (1998) with a modified bait station distance of 500-1000 m rather than 300 m. Use of an 8-10 day free-feed period with bait replacement appeared to maximise take of baits by target species.

Parts of the predator control sites from these projects were identified to have moderate to high populations of Spotted-tailed Quolls (*Dasyurus maculatus*). Spotted-tailed Quolls were found to find and take buried meat baits from sand mounds on 15 occasions and are clearly susceptible to poisoning programs. Undertaking regular monitoring during the free-feeding period and closing down stations with and adjacent to quoll visits or otherwise known quoll activity in the immediate area (eg active Latrine or den sites) along with not poisoning in mounds with any previous activity appeared to be successful in not poisoning quolls. It is recommended that 1080 poising programs in areas with quolls present include an appropriate free-feed monitoring period to reduce the risk of poisoning quolls.

(See Report for details of methodology, results and discussion)

RECOMMENDATIONS

The following predator control strategies particularly apply to fox and wild dog programs undertaken in environments with known medium-high quoll densities such as the Bellangry/Kumbatine and Mount Boss area on the Mid-North Coast.

- Use 8 – 10 day free-feed prior to poisoning to maximise bait-take and identify non-target species.
- A 3-4 day poisoning period after an intensive free-feeding period may be sufficient to reduce target predator populations.
- Bait stations should be checked every day if possible to confirm species visiting stations. The ability to be confident in identify species is progressively lost if checking frequency is reduced. Frequencies greater than three days produce a coarse result in terms of species identification. Daily checking is particularly beneficial during the initial control exercises when identification of all species that visit mounds at a particular site, as well as where about in the site at risk non-target species occur, is of most value.
- High quality mound maintenance is essential for successful identification of species visiting mound stations.
- No poisoning should occur at quoll active mounds or those within 1 km (ie, adjacent mound in a 1km grid setup)
- Use small, pre-prepared baits to minimise effect of caching with the minimum 1080 concentration suitable for the target species. Where possible use baits with 3 mg of 1080 or less.

- Bait mounds at 1km+ intervals for dog control programs. Where high fox densities exist 500 m spacing is likely to be more efficient.
- Bait covered by around 100mm of mound material.
- Further investigation of quoll activity at buried-earth bait stations is required at sites with medium-high density quoll populations to identify the true risks of this strategy should be made a priority. Initial results indicate the risk is substantially less than for sand mounds.
- A practical logistical limit for checking of stations is about 30 - 50 mounds for one person to maintain in an escarpment program, and a limit of about 60 - 90 mounds for a coastal program