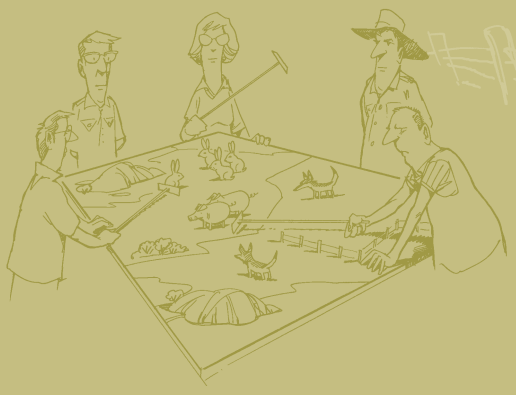

PESTPLAN
TOOLKIT

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A guide to setting priorities and developing a management plan for pest animals

Mike Braysher and Glen Saunders

Natural Heritage Trust

Helping Communities
Helping Australia

PESTPLAN TOOLKIT

'A guide to setting priorities and developing a management plan for pest animals'

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A guide to setting priorities and developing a management plan for pest animals

PESTPLAN

Factsheet 1

It is important that you read and understand these instructions before filling out the Worksheets

Pestplan summary

Welcome to PESTPLAN. You are about to participate in an exciting, challenging and interactive process that aims to help you plan and undertake integrated pest management at the local or regional level. PESTPLAN assumes that pest animal control is just one aspect of an integrated approach to land management. It also recognises that pest animal management will not be practical in some areas because resources are scarce, the economic benefits are not justified or there are limitations to control techniques. PESTPLAN can be applied to primary production or conservation land uses, or a combination of both.

At the end of this process you will be able to:

- Understand the damage caused by pest animals
- Determine the relative importance of pests based on the cost of pest damage and the benefits of control
- Recognise the risks, hazards and barriers to effective pest control in your area and manage for these factors
- Develop and implement appropriate pest management plans based on a sound understanding of all of the above
- Network with different people with a range of skills, ideas and perspectives on pest control and land management.

PESTPLAN involves a 3-Stage process. Stages 1 and 2 are run in a workshop forum and Stage 3 (usually) in smaller, post-workshop groups. Each Stage involves a number of Steps. The three Stages are:

STAGE 1: Planning

STAGE 2: Prioritising key land management units

STAGE 3: Developing and implementing local pest management plans

The success of PESTPLAN relies on participants constantly questioning (often long-held) beliefs and reviewing new information as it is received in various Stages and Steps. It is important that at the end of each Step and Stage, the question is asked

"Should we proceed to next part of the process?"

Developing and implementing an effective pest management plan can be complex, time consuming and expensive. It is important that the groups involved in the process are clear about why they want to manage pests and are sure that any action will be supported by the wider community and with the necessary resources.

By going through the 3-Stage PESTPLAN process, efforts in pest animal management can be concentrated in the most important areas, and where key pest animal objectives can be achieved. This helps to efficiently and effectively use available resources. A consultative approach helps develop agreement to and ownership of integrated pest management plans and greatly assists its later implementation.

A brief outline of the PESTPLAN process follows.

Stage 1 – planning

Planning provides much of the information for decision making in the latter Stages of PESTPLAN. It also helps define the problem, who should be involved and whether there is sufficient support to proceed to Stages 2 and 3.

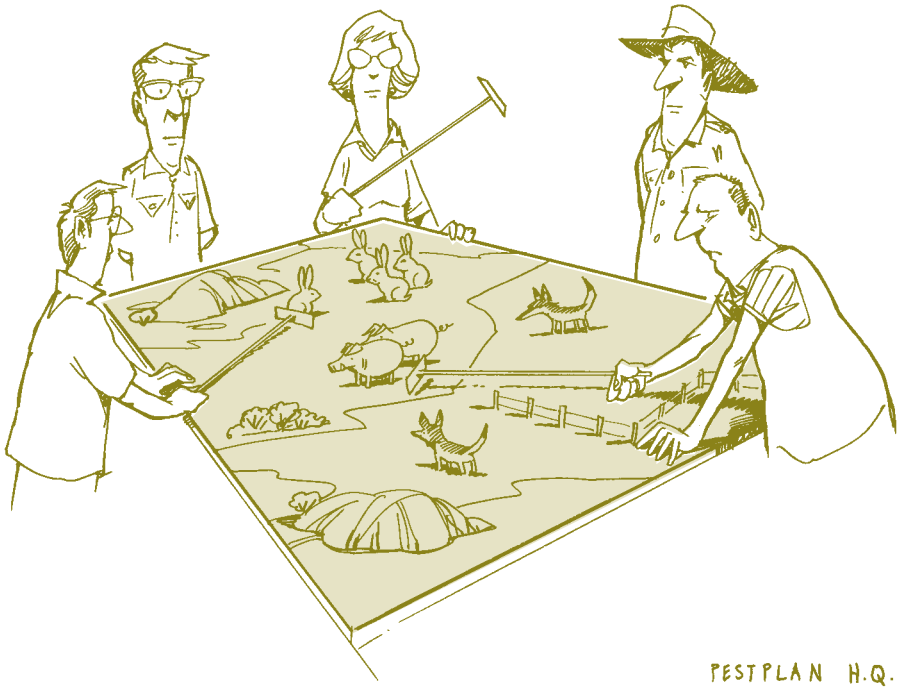
Step 1. What is the trigger for action?

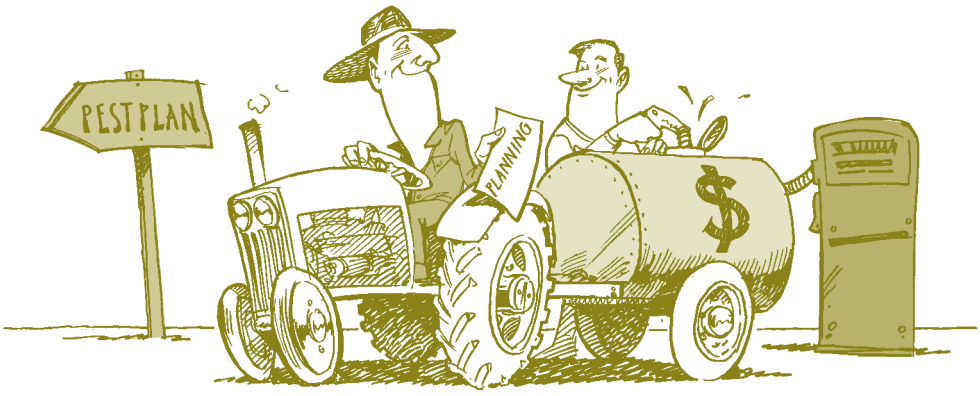
What is the problem? Why are you here? Is there sufficient support for action?

Effective management of pests is difficult unless there is strong community support or political will to take action. There is often a perception that if pests are present, they must be a problem and therefore action must be taken. This is not always the case. The identified pests may be causing little or no damage. The solution to a production or conservation problem might lie elsewhere. Alternatively, the cost of pest control may outweigh the benefits from control.

HINT: Consider the issues that initiate the desire to undertake pest animal management. For example, is there strong community or political pressure for action on pests and an expectation that pest animals should or need to be controlled? In considering this question, it helps to clearly identify and if possible, quantify the production and/or conservation values that are under threat from pests. For example, is there good evidence about the level of damage and the need for action?

Proceed to next Step?





Step 2. Identify and target a key group

A key group is required to drive the process. *Who should be targeted?* There may be general concern or even strong community and/or political will about pest animals and the need for action. However, there is likely to be little progress unless a responsible and accountable group has the commitment, dedication and expertise to undertake and coordinate the initial assessment and follow-up action.

HINT: The key individuals targeted in this Stage will be required to take responsibility for assessing pest animals in the management area. It is not sufficient to name agencies. Individuals need to be identified to drive the process and ensure that plans are implemented. The group may be under the umbrella of the relevant Rural Lands Protection Board,[1] local council, Landcare group, catchment management committee or a bushfire group. The key group, either alone or in conjunction with other key agencies or participants will be involved in all Stages of PESTPLAN.

Proceed to next Step?

[1] Where Rural Lands Protection Board (a NSW agency) is used in the text it is meant to also refer to similar or equivalent agencies that exist in other States and Territories. For example, the Animal and Plant Control Boards of South Australia or the Zone Control Authorities of Western Australia.

Step 3. Identify and describe the area(s) of concern

Where will the boundaries be? PESTPLAN can be used at a State, region, catchment, or local level. For example, PESTPLAN can be used at the State level to identify areas most affected by pest animals. Once these are identified and roughly assessed, it can be applied more specifically for planning actions in key areas. NOTE: less detailed information is needed to assess areas on a broad scale than at the local level.

HINT: Think beyond your local 'patch'. Pest problems usually cross broad geographic areas. Having a broad understanding of the ecology of pest animals in question can also help. For example, it is difficult to manage feral camel damage in a localised situation when the animals may range over many hundreds of kilometres.

Proceed to next Step?

Step 4. Gather the necessary information

What do we already know? Managing pest animal damage alone is unlikely to achieve the desired result e.g. X % increase in lamb marking or the restoration of native wildlife communities. Several other factors that affect the production or conservation system will probably also need to be managed to achieve the desired outcome. So a considerable amount of information is required to adequately assess the production and conservation issues for a system, and then to undertake the PESTPLAN ranking process and to develop an effective pest management plan.

Fortunately, much of this information already exists for many regions, in the form of catchment management plans, government policies, nature park management plans, species recovery plans, property management plans etc. FACTSHEET 2 provides a checklist for groups to ensure they have collected and reviewed the appropriate information.

Proceed to next Step?

Step 5. Review the information to determine the key Land Management Units within the area for further action

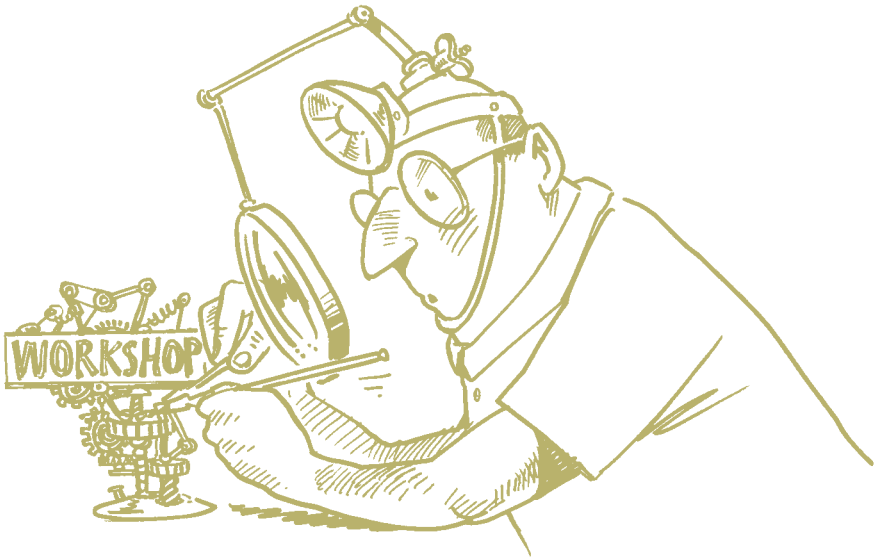
Do common concerns or similarities appear for any areas? Land Management Units (LMUs) are simply smaller (more easily managed) areas of land across a district or region. They may have similar pest problems, land use, land, soil or vegetation types. They may even have a social focus. These LMUs are reviewed in-depth and prioritised in Stage 2.

HINT: The boundaries of the LMUs should be determined by the distribution, movements and impacts of the pest animal rather than by different land tenure (national parks, State forest, private property) boundaries. Tenure boundaries should be removed from the map when planning management strategies and can be added later when deciding who does what and who pays.

Proceed to next Stage?

Deciding not to proceed

The information or the assessment undertaken in Stage 1 may indicate for the moment that it is not necessary or useful to go to the next Stage. For example, the process may show that effort and available resources might be better directed towards weeds, soil acidification, salinity or some other factor that is causing a decline in production rather than pest animals. Alternatively, if pest control is seen to be useful, but there are not enough resources, the planning and documentation from the workshop can help obtain funds. More and more, funding agencies require applicants to demonstrate that they have fully assessed the problem, consulted key players and can show how the pest control program fits into the broader program for managing regional production and conservation resources.



WORKSHOP PREPARATION

Stage 2: Prioritising key Land Management Units

While it might be highly desirable, there are insufficient financial and other resources to simultaneously and effectively manage the damage due to pests across the whole area where they occur in a State or a Territory.

For example, in 1996 it cost between $800 and $2,000 per square kilometre to rip rabbit warrens in Central Australia. Given the average gross margin for cattle production in Central Australia was about $500 per square kilometre, it would not have been economical to control rabbits under these circumstances.

Managers need to decide where they direct their resources to get the most cost-effective return. To make best use of resources it is usually necessary to break up areas into smaller management units and rank the units on their priority for managing pest damage. The following five-Step process helps managers to determine these priority areas.

Step 1. Determine Local LMUs

This is an opportunity to review the results from Stage 1 (Step 5). LMUs may be water bodies, mountain ranges, fences or vegetation units. Boundaries which define the distribution of the pests or which limit appropriate management actions are ideal. Record the LMUs on WORKSHEET 1.

HINT: While it is best if managers can work to boundaries that restrict the movement of pests, this may not be practical. In such cases jurisdictional boundaries, for example, the border of a Landcare group, may have to be used in combination with physical boundaries.

Step 2. Rank LMUs for production and conservation values

Each LMU is ranked according to its production and conservation value. This might be in terms of lambs produced per year, value of crops, presence of threatened wildlife, extent of ecotourism etc. NOTE: even if there is only one management unit, it can help management decisions by considering the questions outlined in the ranking process. Use the tables in WORKSHEET 2 to help determine and rank production and conservation values. Record the results on WORKSHEET 1 against each LMU.

HINT: If the scores for production or conservation values for the LMUs all tend to fall into the lower categories, consider allocating half points or developing sub-categories to give a more even spread of scores. If the group is not satisfied with the final scores, they can modify them until there is general agreement. Remember, the scoring process is only a guide.

Step 3. Rank each LMU for threat from pest animals

Rank each LMU according to the threat from the pest or pests. It is important that the level of threat be checked with relevant stakeholders. WORKSHEET 3 helps determine and rank the threat from pest animals. Record the results on WORKSHEET 1.

HINT: This may be difficult since there is little good information on the level of damage that pest animals cause. At this stage the group should make their best guess based on their knowledge and experience. The information in the BRS pest animal guidelines may also help (see FACTSHEET 8).

Step 4. Determine the overall rank

Determine the overall rank by adding the scores from Steps 3 and 4. Use the total score column in WORKSHEET 1. NOTE: the overall score is only a guide to provide structure to the ranking process. It is not necessary to be precise in allocating scores, nor to put much reliance on the *actual* scores. The group may decide to modify (or adjust) the ranking scores based on their own experiences.

HINT: The workshop should now review the scores for each unit to determine whether they are consistent with the views of the workshop participants. If not modify them as is appropriate.

Step 5. Apply reality check and decide which LMU's go to the next Stage

This Step helps decide which LMUs proceed to the next Stage (i.e. to develop a pest animal management plan for an area). Several factors other than the threat from the pest could influence the priority for management action. These include: community and/or management commitment and motivation; presence of other pest plants and animals; ease of access for control; need for coordinated action on adjoining land; and previous management action. Therefore, the final Step is to review the rankings in light of other management issues within each management unit.

While the scoring process may help identify priority areas, it may not be practical to conduct pest management in some of these. For example, for techniques such as aerial poison baiting there may be too many non-target risks. WORKSHEET 4 details some of the factors to be considered in the 'reality check', but is not intended to be a complete or definitive list.

Deciding not to proceed

Ranking LMUs may make it clear that it is not worthwhile going any further with pest animal management at this time e.g. low scores or inability to decide on ranking. Instead, it may be useful to look at other factors affecting the production or conservation system by referring to the appropriate catchment or property management plan. It may be more appropriate to focus resources on another issue such as salinity control or restoring vegetation. The need for pest animal management can be revisited later if more appropriate techniques are developed or more resources become available. If pest control is considered appropriate, but there are not enough resources, the planning and documentation from the workshop can help obtain additional funds.

Proceed to next Stage?

Stage 3: Developing and implementing local pest management plans

Once priorities for management have been determined (i.e. which LMUs are important), this Stage can be used to plan and implement an effective program to manage the damage due to the pest or pests.

NOTE: The outline of plans can be developed at the workshop, but it is likely that a small group will need to be appointed at the workshop to undertake the detailed planning and to (later) report back to the workshop participants.

Pests are just one of many factors that influence production outcomes and the protection of desired conservation values for an area. Consequently, the pest animal management plan needs to be integrated with other local management plans such as catchment management plans, threatened species action plans, reserve management plans and property management plans. Usually an integrated package of pest control techniques needs to be used with progress toward the desired outcome being systematically monitored and evaluated against stated objectives.

Developing and implementing an effective plan for managing pests within the LMU involves the following four Steps.

Step 1. Define the management problem

In this Step, clear objectives need to be set for each management plan. Objectives are simply a statement of what is to be achieved, defined in terms of desired outcomes, usually conservation or economic benefits. They should state what will be achieved and be linked to the timetable set out in the management plan e.g. improve lamb marking percentages by 20% over 5 years. Much of the work in determining objectives will have been covered in Stage 1. At this point they should be more clearly stated and relate to the particular LMU.

Step 2. Develop the management plan

This defines the actions that will be undertaken: who will do what, when, how and where. It describes how the selected pest management options and techniques will be integrated and implemented to achieve the management objectives. Management options include:

- eradication, containment, sustained management, targeted management, one-off action and taking no action.

The plan should also include an appropriate strategy for monitoring its effectiveness and evaluating its success or failure against the objectives. FACTSHEET 6 provides an example of a milestone table that can be used to keep track of the plan's progress.

HINT: While the pest animal plan should have been developed as a sub-set of higher level plans, it is important to ensure that the proposed actions are not in conflict with actions proposed elsewhere. These include Regional and Catchment Management Plans, Property Management Plans and Threatened Species Recovery Plans.

Step 3. Implement the plan

There is more to this Step than simply "just do it". To be effective and make efficient use of available resources usually requires close cooperation between a number of managers and agencies. Hence it is important to develop and maintain effective communication throughout the

development and implementation of the management plan e.g. hold regular meetings, collate activity or record sheets, report back to the group through an informal newsletter or group e-mail etc.

HINT: Keeping everyone on track is important. Land managers are practical people and usually find this Step in the process the most enjoyable. Their enthusiasm for this Step needs to be managed so that energies continue to be focussed on the pest management plan and not re-directed to other practical activities that may not assist in achieving the plan's objectives.

Step 4. Monitor and assess performance

A good plan is one that works. So to determine a good plan, an assessment of its success is required. This is best achieved by measuring performance against the original objectives.

Performance assessment has two components:

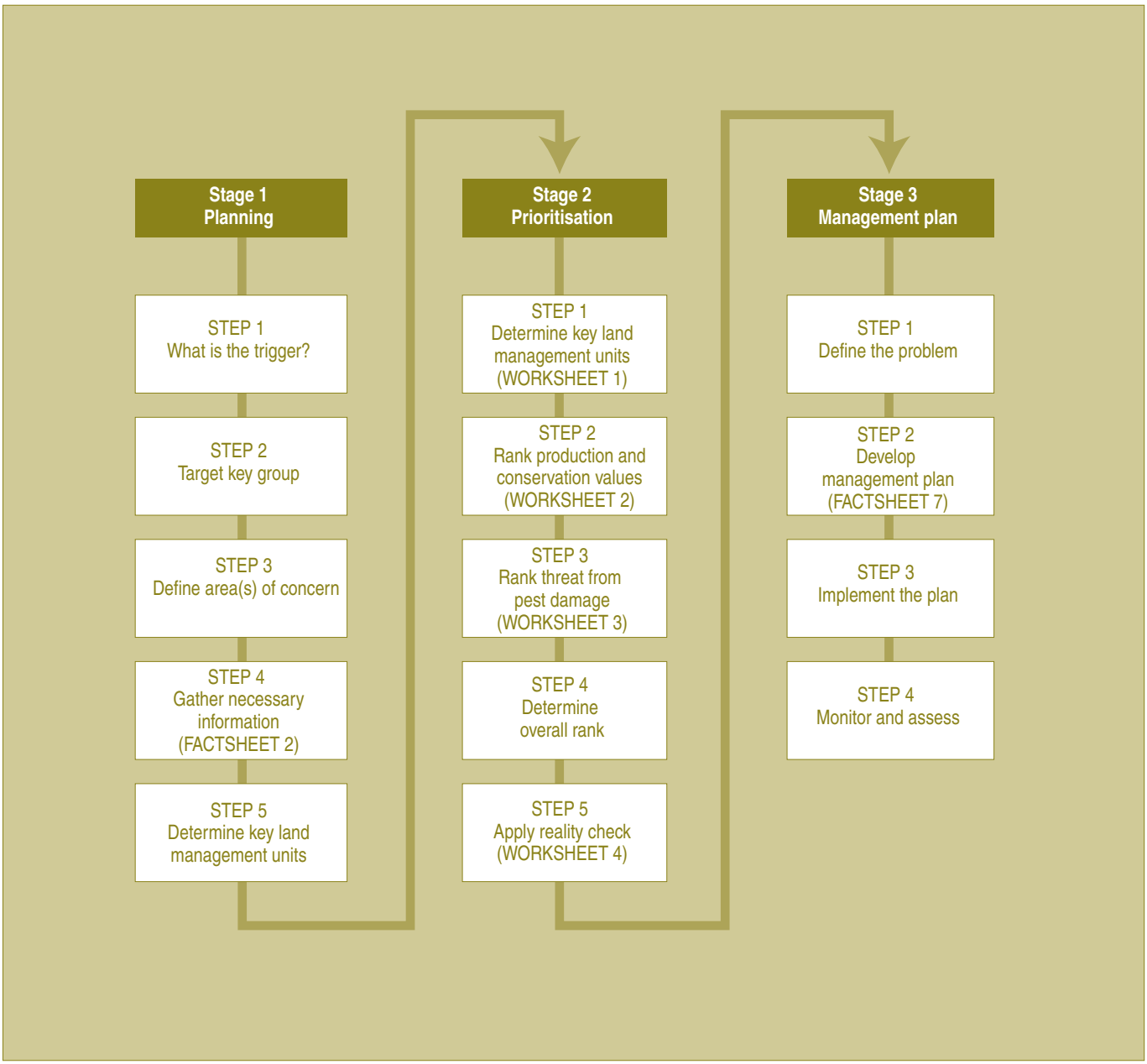
- *operational monitoring* – what was done, when and at what cost. This determines the efficiency of the program.
- *performance monitoring* – were the objectives of the plan achieved and if not why not. This determines the effectiveness of the program.

See FACTSHEET 7 for an outline of a management plan for a hypothetical LMU. If objectives are not met, the management strategy may need to be modified or it is possible that the original 'problem' was poorly or incorrectly defined.

HINT: When developing and implementing a monitoring strategy:

- **Be very clear about what needs to be monitored and why.**
- **Keep it as simple as possible and compatible with other regular management practices.**
- **Make the process quick and easy.**
- **Provide regular feedback to key persons and groups using an appropriate format so they can see that the monitoring has a practical purpose which will encourage them to continue with it.**
- **Display or disseminate the results in a public place.**

Figure 1: PESTPLAN – the model



Checklist for Management Groups

This checklist aims to assist groups that are planning pest management to gather the necessary information to apply the processes contained in the guide.

In the initial assessment of an area, the group may not need detailed maps and other information. However, more detailed information will be required if the group decides to go to the next Stage and hold a workshop of key people and agency representatives to determine priority areas for action on pest animals and to develop and implement management plans. Relevant information includes:

Maps and/or diagrams of the study area

Collect or prepare maps and diagrams of the region that you wish to assess. Maps can vary in their complexity depending on the complexity of the system, the amount of information available and how the maps are to be used. They can be generated from a Geographic Information System (GIS), be bought from your local map supplier or even be a rough hand drawn map of the region.

The offices of most regional government natural resource agencies have maps or ready access to maps of your region and may be willing to lend them. Alternatively, a State lands office or equivalent will be able to supply the data at a cost. Some publications such as the NSW *State of the Rivers* report also contain maps that display different sets of data on a catchment scale. Maps should show land use, access roads, property boundaries, national parks, rivers, reservoirs, and major vegetation types.

Biogeography

This information is usually available. Some 'State of the Environment' or catchment reports will probably provide a broad view, but they may list other reports that can be followed up on. Information should include the distribution and relative abundance of major plant associations, key native fauna and introduced animals, as well as key heritage and other cultural sites.

Relevant plans

A list of relevant plans such as regional plans, catchment plans, threatened species recovery plans, revegetation plans and salinity abatement plans are usually available from the relevant local agency. Contacts include your Catchment Management Organisation, Local Action Planning Group, Rural Lands Protection Board, Local Government, Landcare Group or similar.

Statutory obligations

Tracking down relevant Commonwealth, State and Territory legislation can be difficult. Start with your RLPB, National Parks Agency, State Agriculture office, Local Action Planning Group, or Landcare Group. They may have already compiled a

list. If not, you may have to develop your own. It is best to summarise the information by listing the relevant Act and a few dot points about why it is relevant to pest animal management in your area.

Threatened species

Information on distribution and status of threatened species at a Commonwealth, State and Territory level can be found through the Environment Australia homepage (www.ea.gov.au). Endangered and threatened species also are listed in the relevant National, State and Territory legislation.

Threatened species recovery plans

Recovery plans for threatened and endangered species are prepared by National, State and Territory nature conservation agencies. They list the actions necessary to protect and assist the recovery of these plants, animals and communities. This information needs to be considered along with actions proposed to manage the damage due to pest animals to ensure that there is no conflict.

Key contacts

It is useful to develop a list of groups and individuals that should be consulted in the ranking and plan development process. These groups may include relevant State/Territory agencies, RLPB, local government, catchment management, Landcare, conservation, commercial harvesters, animal welfare and landholder groups in the region.

Hierarchy of planning documents for pest animal management

Overall context for natural resource management is set by the following strategy and planning documents:

- Ecological Sustainable Development Strategy, National Resource Management Strategy, National Strategy for the Conservation of Biodiversity
- State/Territory Sustainable Resource Management Strategy/Biodiversity Strategy
- Regional Management Plan/Catchment Management Plan
- National/State/Territory Species Recovery Plans
- Property Management Plans/Nature Reserve Management Plans

Once priorities are set and pest management is an identified action to achieve desired production and/or conservation outcomes, the following hierarchy of documents can be used to plan pest animal management (see FACTSHEET 8 for references):

- Strategy documents (e.g. Braysher 1993, Olsen 1998) which provide a policy and general natural resource management context to pest animal management.
- Individual species management guidelines (e.g. Bureau of Rural Sciences guidelines and State government information) which provide overview information on the biology, impact and management of key feral animals in Australia.
- Extension guides such as *New approaches to managing pest animals* (a guide to assist managers set priorities for managing pest animals and to develop a management plan).
- State/Territory Pest Animal control/monitoring technique manuals and Standard Operating Procedure documents which take account of local situations and legislation/policy.

Options for managing pest animal damage

Local eradication

Complete and permanent removal of every individual pest animal from a region is rarely possible except on a local scale, and usually at high cost. Nevertheless, it has been conducted successfully in Australia and New Zealand to eradicate rabbits and goats from several small offshore islands.

Before attempting local eradication of a pest, managers should critically assess whether the criteria for eradication can be met (see FACTSHEET 4). For mainland Australia, local eradication is likely to be successful only where a permanent barrier such as a fence can be erected and maintained.

Strategic management

When local eradication is not practical, strategic management is the most usual option. There are three possible forms: one-off management, targeted management and sustained management.

One-off control

Long-term or permanent reduction in the damage caused by some pests may be possible with one action or a set of actions, such as erecting appropriate fencing or modifying habitat so that it is less suitable for pests. For example, in the Riverina District of NSW, myxomatosis and associated habitat changes that made the country much less suitable for rabbits, limited reinvasion and resulted in the virtual loss of rabbits from large areas.

Habitat changes included the collapse of old established warrens and taller vegetation that no longer provided suitable food and prevented rabbits from watching for the approach of predators such as foxes and feral cats.

Sustained management

Sustained management is when pest animal density is reduced and then maintained at or near a threshold density at which there is no increase in benefit from additional control. This option usually involves two steps, an initial knockdown aimed at removing a high proportion of the population, followed by periodic maintenance control to slow or prevent recovery. The threshold density for a pest is likely to vary according to many factors including the relationship between pest damage and density, the region, climate and land use. It is therefore complex and often difficult to implement, not the least because the relationship between pest animal density and the level of damage is rarely known.

A variation of this strategy has been suggested for pests, such as the rabbit, that have a high reproductive potential that enables the population to return rapidly to high densities. At low rabbit densities, the potential for rapid population increase is slowed due to a low breeding base. It has been suggested that a combination of techniques could be used to reduce rabbit density to this slow growth stage, followed by ongoing sustained management.

Such sustained control of rabbit damage may be more cost-effective than if it was used to maintain the population at a higher threshold when the rate of increase is potentially much greater. This approach does not require a good understanding of the pest-damage relationship and is intuitively appealing, but its benefits and costs have not been assessed experimentally.

Targeted management

Targeted management is where action is directed at the individuals or group of individuals that cause most of the damage, or applied at that time when damage is most critical. For example, it is thought that a few more experienced and wily rogue feral pigs may be the primary predators of newborn lambs in western NSW. Control targeted at these problem animals may be more effective than aiming to reduce the overall density of feral pigs. However, a targeted approach is not always practical. Usually it requires a good understanding of the behaviour and biology of the pest to determine which individuals are the key animals to target. In addition, the problem animals are usually more experienced and avoid conventional control techniques. A variation of targeted management is to conduct control only at critical times. An example is to manage the grazing damage of rabbits to a re-vegetation area only until the plants have reached a level where they can survive the damage due to rabbits.

No pest control

Many pest animals, including feral cats, foxes, starlings and feral pigs, are not controlled over much of their range, for example, in large sections of Kosciusko National Park. The techniques available and the resources available to apply them are not sufficient to cause a significant reduction in the impact of the pests. This situation is likely to continue while resources are limited or until new, cost-effective techniques and strategies become available.

Criteria to assess whether local eradication is possible

Eradication of established pest animals is possible only on a local scale. To determine whether eradication is likely to be successful, six criteria can be applied: three are essential for the achievement of eradication and three will help managers decide whether eradication is preferable to ongoing control.

Essential criteria

- *Pests can be killed at a faster rate than they can replace themselves*

This seems obvious but it is difficult to achieve in practice. There are two main reasons. Firstly, many pest populations have a high natural rate of increase. Secondly, as the density of a pest declines, it takes progressively more time and more expense per individual animal to locate and remove the last few animals.

- *Immigration can be prevented*

This criterion can be met for small, islands but is very difficult to achieve over a wide area. If animals can recolonise an area from nearby populations or by escape or release from captive populations, elimination of the pest will at best be temporary. Immigration to a local area may be prevented where a suitable structure and control creates a perfect barrier.

- *All reproductive individuals are at risk from the available techniques*

It is not necessary to remove all pest animals at the first attempt. However, all reproductive or potentially reproductive members of the pest population must be able to be taken by the techniques available. This is rarely possible in part because there is only a limited armory of techniques. If, for example, some animals avoid poisoned baits then those animals cannot be removed and eradication will not be achieved. Trap-shyness and bait-avoidance, and resistance to poisons, are common among pest animals.

Desirable criteria

- *The pest can be monitored at very low densities*

If the animal cannot be detected at very low densities, then there is no way of knowing whether all animals have been eliminated. However, most population assessment techniques cannot detect animals at very low densities. The difficulty in meeting this criterion is illustrated by the attempts to remove rabbits from Phillip Island off Norfolk Island. A small population of rabbits was found on the island two years after it was thought that all of them had been removed.

- *The socio-political environment supports eradication*

Even when all the technical problems can be met, social and political factors may prevent successful eradication. Community attitudes may oppose killing large numbers of animals on moral, emotional or cultural grounds. Also, eradication is expensive. Political factors may withdraw funds from the program before eradication is achieved.

- *The high costs of eradication can be justified.*

It is appealing to think that the value of perpetual freedom from a pest is very high, but this may not be so. Future benefits such as those obtained from eradicating pests have a lower economic value than benefits that are available immediately. This is because the value of future benefits is discounted.

Calculating discount rates involves the reverse of the equation to calculate interest rates on invested money. Using a hypothetical model of the costs and benefits of eradication it was shown that when the discount rate was set at zero, eradication became cost-effective after 28 years. Setting a very low discount rate of 3.5% made eradication cost-effective after 47 years, but, at 10%, eradication never became cost-effective. The practice of discounting the value of future benefits assumes that land managers act in an economically rational manner. However, pests often evoke strong emotional responses to the extent that management aims and expenditure are often far from rational. The resource being protected also has to have a monetary value allocated to it in order to determine whether eradication is economic. Yet the monetary value of conservation and biodiversity is difficult to assess. There are methods to do so, such as contingent valuation, but their usefulness is debatable.

PESTPLAN

Factsheet 5

Adaptive approach to management

Our knowledge about the damage that most pests cause and how best to manage them is poor. For most pests, there is no sure-fire recipe for each situation and often there are limited resources and time to research the problem. In these cases the best management approach is to use each pest management program as an ongoing experiment from which to learn and build on existing knowledge. This is called adaptive management. The key is to be specific about what each program is meant to achieve, to monitor progress and to evaluate results. In doing so it is important to realise that knowledge and insights can come from programs that fail to meet the desired result as well as from those that succeed. Adaptive management allows the knowledge and experience gained in failed programs to be incorporated in future actions and is particularly important given the diversity of situations that require the damage due to pest animals to be controlled. Flexibility is also important – that is, recognising the different circumstances and restrictions at each site and the need to adapt to changing circumstances or conditions.

Where practical, the adaptive management approach should underpin the development of the overall outcomes and objectives of management plans for pest animal control.

Adaptive management addresses the need to:

- accept that knowledge of the system being managed is always incomplete – not only is the science imperfect, but the system itself is a moving target, evolving because of the impacts of management and the progressive expansion of the scale of other human activities;
- develop an integrated experimental design that allows clear separation of the effects of as many changes as possible, so that a sensible balance of management tools and policies can be developed; and
- explore imaginative ways to set priorities for investing in research, monitoring and management.

If the adaptive management approach is to be used as the basis of the management plan, advice should be sought from groups or individuals with appropriate knowledge and experience in its use.

PESTPLAN

Factsheet 6

Milestone table

Milestones	Due date	Performance indicators
2-5 land managers participating	June 2001	
Rabbit density reduced	Aug 2002	All rabbit warrens mapped Nov 2001 Poison laid Jan 2002 Warrens ripped Feb 2002
Fox density reduced	Jun 2002	Fox den fumigation Sep 2001 Fox baiting Mar 2002
Pest damage reduced: • Rabbits: 95% density reduction • Foxes: lamb marking % increase by 20%	Sep 2002	Vegetation photopoints established and measured Sep 2001 Spotlight counts conducted Jan 2002 Warren counts conducted Mar 2002 Spotlight counts conducted Mar 2002 Photopoints revisited Aug 2002 Lamb marking % recorded Jun 2002
Project participants kept up-to-date with results	Sep 2002	Newsletter sent 3-monthly Final workshop de-brief held

PESTPLAN

Factsheet 7

Outline of a management plan for a hypothetical LMU

Land Management Unit (LMU): Arkaroola Reserve and surrounding pastoral land

Main Aim for LMU: To manage the damage due to feral goats on reserve land and to the pasture composition on surrounding pastoral land.

Problems:

- Fouling by goats of permanent waterholes in the reserve
- Poor regeneration of the vulnerable wattle *Acacia arkaroola*
- Combined stock and feral goat grazing changing native perennial pasture to less palatable annual species
- Complaints from bushwalkers about the number of goats in the reserve

Objectives	Strategies / Techniques	Performance Measures	Local Champion	Specific Action by Who and by When
1. Increase wattle regeneration by 20% after 5 years. 2. Eliminate fouling of permanent waterholes by goats. 3. Less than 5 complaints/year received from bushwalkers about goats 4. Less than 1 goat seen on each pastoral bore run (NB goat density used as surrogate measure of pasture recovery because latter will take time)	Adopt strategic sustained reduction of feral goats on reserved and pastoral land. 1. Commercial harvest till uneconomic. 2. Aerial shoot until less than 15 goats shot per hour. 3. Self-mustering traps on property bores. 4. Concentrate goats at main waterholes by temporary electric fencing on others. 5. Recreational hunters at waterpoints to reduce population further.	• All local landholders and NPWS meet to organise control. • 5% increase in wattle regeneration after one year. • Complaints from bushwalkers less than 10 after 6 months. • Goat density on pastoral land less than one per sq km after one year. • Hunters agree to be involved in mop-up.	Arkaroola Landcare Group.	• Landcare Group to convene meeting of key players by Jan 2003. • X of NPWS and Y of pest agency organise commercial harvest by March 2003. • Y of pest agency organises aerial shoot for May 2003. • Z of NPWS organises recreational hunters for summer of 2003-4. • NPWS establish wattle monitoring plots by Jan 2004.

PESTPLAN

Factsheet 8

References and further reading

Books containing detailed information on the strategic approach to pest animal management and individual pest species management are marked *

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For further information

www.affa.gov.au/rural_science_pests

PESTPLAN

Worksheet 1

Recording sheet

Copy this sheet and fill it out after reading the PESTPLAN summary (FACTSHEET 1) and working through WORKSHEETS 2—4

	WORKSHEET 2													W/S 3		WORKSHEET 4				
LMU	A Production Rank (1—6)											A Prod. rank average (1–6)	B Cons. rank (1–6)	C Threat from pests (1–6)	Total Score (A+B+C)	Feasibility and acceptability criteria (Yes / No)				
	The extent of damage	Relationship of pest damage to other issues	Level of community support and motivation	Level of community conflict	Political exposure	Urgency of action	Investment value	Existing management	Effectiveness of existing management	Availability of solutions	Education / Demonstration value	Average	Rounded average of all Production Ranks				Technically feasible	Practical	Economic	Environmentally acceptable	Politically acceptable

HINT: The ranking process is designed to raise the range of social, economic and environmental factors that need to be considered to successfully manage the damage due to pest animals and then to place the management units in approximate order of importance. The value given to each question is only a guide. It does not need to be precise.

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Worksheet 2

Ranking production and conservation values

Production values

Each LMU should be assessed according to the quality of the resource(s) or primary product(s) they contain. Using the issues in Table 1 below as a guide, score from 6 (very high) to 1 (low), for every management unit. Not all issues necessarily have an equal importance, and in fact a very low score does not preclude pest control but might suggest that it may not be cost-effective.

Once the questions in the table below have been considered an overall score is then assigned to the LMU based on the production or land management values using the following:

Very high – score 6;

High – score 5;

Medium to high – score 4;

Medium – score 3;

Medium to low – score 2; or

Low – score 1.

Conservation values

Each LMU should be assessed according to the conservation values they contain. Groups may develop their own scores to suit their particular local environment, LMUs and needs. Using Table 2, score each LMU for the conservation value of its plants and animals. A unit is scored from 6 (high) to 1 (little or no value) depending on its significance as habitat for native plants and animals.

Table 1: Score management units for production or land management values

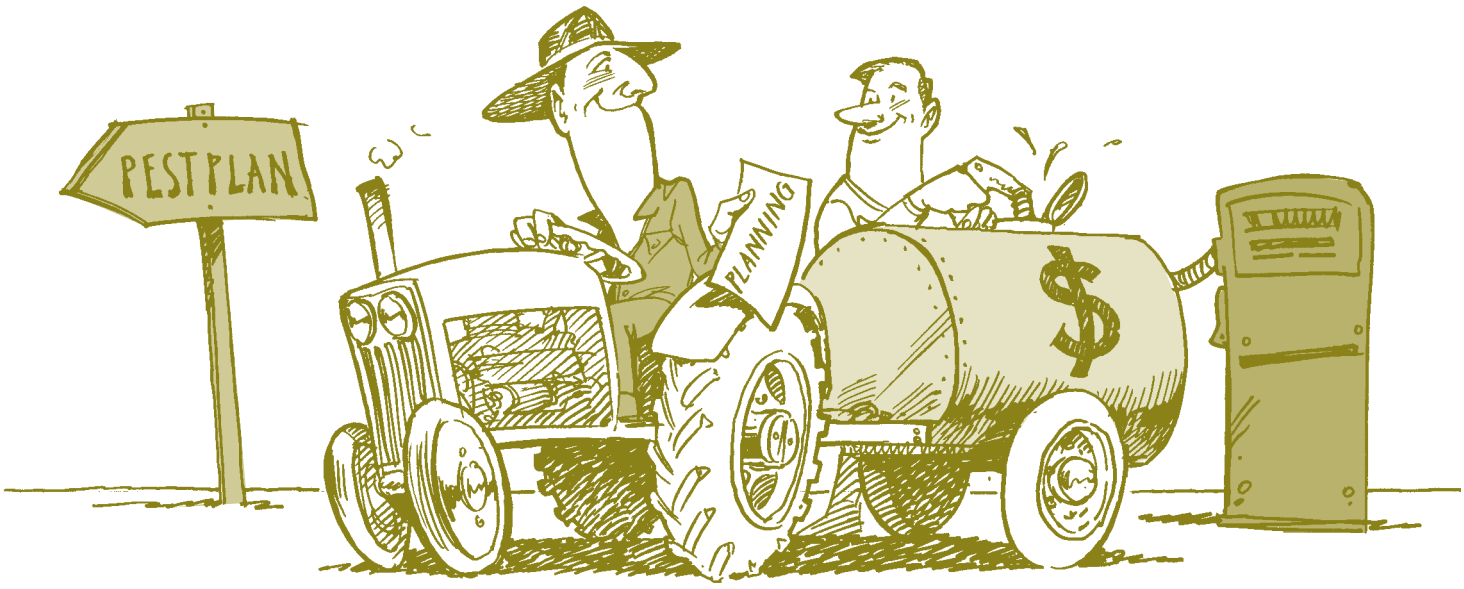
Is the land management system already in poor condition ?	To what extent are social, economic and biophysical (soil, pasture, water etc) aspects of the management unit damaged by pest animals and other factors? It is usually more economic to prevent damage to areas that are in good condition than to try and recover areas which are already highly degraded. (Score high if undamaged, low if very damaged). NOTE: do not consider nature conservation at this stage.
Relationship of pest damage to other issues?	To what extent is the reduced primary production or damaged resource due to pest animals versus other issues? (Score high if pest animals are the only or major cause, lower if several other factors such as, salinity, weeds, poor commodity prices etc. are also a cause).
Level of community support and motivation?	What is the level of community support for restoring resource values or reducing production losses? (Score high if there is strong community support and commitment).
Level of community conflict?	What is the level of conflict within the community regarding the need to address resource and production issues? (Score high if there is little conflict within the community).
Political exposure?	What is the level of political support for the need to protect production and other related resources? (Score high if there is strong political support).
Urgency of action?	At what rate is production or related resources degrading? (Score high if there is an urgent need for action).
Investment value?	What is the level of return to the community from investing time, money and energy in addressing the production or other losses? (Score high if the return for investment is high).
Existing management?	What existing management activities are already addressing production losses and related issues such as pest animal management? (Score high if there has already been considerable action to improve production or to protect declining resources such as soil degradation due to salinity).
Effectiveness of existing management?	How effective is current management in addressing production and related issues? (Score high if current management has been very effective).

Availability of solutions?	What techniques and strategies are available to address production and related resource issues in this management unit? (Score high if there are several techniques and strategies that can be used).
Education/demonstration value?	What is the value of addressing production and/or conservation issues in terms of demonstration and/or education? In other words, will the works encourage other individuals and groups to adopt a similar approach? (Score high if action will have good demonstration value).

Table 2: Score management units for conservation values

Of national importance – score 6	Contains nationally endangered plants and animals or communities that occur mainly in the management unit. Is part of an internationally recognised, high-value area such as a biosphere reserve.
Of outstanding value – score 5	Contains the most significant population or association of a nationally threatened species or community. Contains a wilderness area. Is vitally important to internationally uncommon migratory birds. Is of vital importance to internal migratory species that have limited distribution or abundance. Is a largely unmodified ecosystem or significant example of original Australian habitat not well represented elsewhere?
Of high value – score 4	Contains native species or associations that are threatened or have declined significantly as a result of human influence. Contains habitat of an uncommon, discontinuously distributed species or communities not adequately represented in another management unit. Is an example of a largely unmodified system not represented to the same extent elsewhere? Supports native species that are of limited abundance and at some risk elsewhere.

Of moderate value – score 3	Supports species and/or associations whose habitat has been significantly reduced. Is an important breeding site for native wildlife? Is of exceptional scenic and recreational value such as one that is listed on the national or State heritage register. Contains a large and fairly unmodified site that contains most of the species typical of that habitat. Contains native species that are unusually abundant or unique.
Of potential value – score 2	Has heavily modified habitat of value for native species which if managed and developed, could be of value to native species. Has high scenic and/or recreational value.
Of little or no value – score 1	Is so degraded and impoverished that there is little or no prospect of rehabilitation and minimal conservation value.



PESTPLAN

Worksheet 3

Ranking the threat from pest animals

The following system is suggested for scoring the units, from 6 (high) to 1 (low), according to the threat from the pest animal:

Score management units for production or land management values

Score 6 – Valuable primary production, native wildlife or community resource is likely to be lost in the immediate future as a result of the impact of the pest animal(s).

Score 5 – Valuable primary production, native wildlife or community resource is under severe threat due to the continued presence of the pest animal(s).

Score 4 – Valuable primary production, native wildlife or community resource is under significant threat due to the continued presence of the pest animal(s).

Score 3 – Valuable primary production, native wildlife or community resource is under moderate threat and declining slowly as a result of the continued presence of the pest animal(s).

Score 2 – Valuable primary production, native wildlife or community resource is under low threat from the continued presence of the pest animal(s).

Score 1 – Valuable primary production, native wildlife or community resource is under virtually no threat from the continuous presence of the pest animal(s).

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Worksheet 4

Reality check

Following the allocation of an overall score a reality check can help determine whether pest animal control is likely to be desirable and effective. The questions and factors in the following table should be considered. The list is not meant to be exhaustive nor are the factors in any particular order. Consultation with individuals, agencies and local stakeholders with knowledge of the species and the area may identify other issues and help answer the questions.

REALITY CHECK: assessing the likelihood that pest animal management in the LMU will be feasible and desirable*	
Is pest animal management practical?	It may be technically possible to undertake management action, but it may be impractical to apply it on the scale necessary. The tarbaby# technique to control rabbits is an example of a technique that works well at the experimental scale but not at the management level.
Is it economically desirable?	Are sufficient resources available to effectively manage pest animal damage, both in initial costs and ongoing management? For example, the most effective technique to control rabbits in central Australia may be ripping rabbit warrens. However, the cost per square kilometre to rip rabbit warrens, and long-term follow-up is estimated to be three to four times the gross margin per square kilometre from free-range cattle production. Consider the following: - the cost of implementing the plan in relation to long-term benefits - the relationship with other management actions - resources available for essential follow-up and ongoing maintenance pest management - technical and financial resources available for an adequate monitoring and evaluation program.

* (Modified from Norton 1986)

\# The tarbaby technique for rabbit control involves placing 1080 poison impregnated grease in the entrance of an active rabbit warren. The rabbit ingests the poison when it grooms the grease from its fur. The technique is very effective when applied at the experimental level. However, it was ineffective when applied on the management scale, mainly because workers failed to locate and grease all active entrances to a warren system. Rabbits used the untreated entrances. This is an example of a technically feasible technique that was impracticable at the management level.

Is it environmentally acceptable?

Widespread aerial poisoning for example may have unacceptable impacts on non-target wildlife or domestic animals.

Is it politically acceptable?

Is the proposed action consistent with:

- prevailing government or board policy?

- local landcare or catchment group priorities and issues?

The cost and impact of the proposed management may have such negative consequences that action will be blocked at the political level.

Does the action build on past work, and if so how successful has that work been? Is the action an important initiative that sets the scene for subsequent actions by other key managers such as adjoining landholders?

Is it socially acceptable?

The techniques proposed and the potential impact on other organisms may be unacceptable to parts of the community on conservation and/or animal welfare grounds. Is there:

- local enthusiasm and ownership by management for the proposed pest action?

- commitment to long-term follow-up and maintenance?

- the required neighbour cooperation/support?

Does the work have high demonstration value to encourage similar work in other areas? Does the work improve the awareness and understanding of the local community about the production and/or conservation values of the area? Will the work improve our understanding of the effectiveness and efficiency of pest management to achieve production and/or conservation outcomes?

NOTE: If the answer to any of these questions is no, then effective management of pest animal damage is unlikely or will be difficult. Before effective pest management can proceed, the 'no' should be changed to a 'yes', for example, by gaining the support of a key blocking group through a targeted communication campaign.