



Water quality protection note 96

November 2009

Pest animal management in public drinking water source areas

Purpose

Pest animals impose considerable costs to the Australian economy and natural ecosystems. The economic cost of vertebrate animal pests (see scope) has been broadly estimated at \$720 million per year (McLeod, R. 2004). Impacts caused by pest animals include the predation of native species and stock, including competition for food and territory, habitat destruction, soil erosion and spreading endemic and exotic diseases. In addition, their presence in public drinking water source areas (PDWSA) can pose a risk to drinking water quality through increased pathogens and nutrients, damage to infrastructure, disturbance to riparian vegetation and turbidity problems. Their presence can also pose a risk as a result of unauthorised hunting activities. Pest control programs within PDWSA are therefore important to manage animal population densities and reduce drinking water quality contamination risks.

While pest animal control reduces contamination risks caused by animal activity and illegal hunting, the control activity alone may introduce contamination risks to the drinking water source. Control measures need to be planned and managed properly to avoid further contamination risks.

The Department of Water is responsible for managing and protecting the state's water resources. It is also a lead agency for water conservation and reuse. This note offers:

- our views on minimising impacts from pest animal management on drinking water resources
- guidance on acceptable practices to protect the quality of water resources
- a basis for developing a multi-agency code or guideline that balances the views of industry, government and the community, while sustaining a healthy environment.

This note provides a general guide on issues of environmental concern and offers potential solutions based on professional judgement and precedent. Recommendations made in this note do not override any statutory obligation or government policy statement.

Alternative practical environmental solutions suited to local conditions may be considered. This note shall not be used as this department's policy position on a specific matter, unless confirmed in writing. The note may be amended at our discretion, as new data becomes available.

Regulatory agencies should not use recommendations in this note in place of site-specific conditions based on catchment management programs and environmental risks. Any regulatory conditions should consider the values of the local environment, the safeguards in place and take a precautionary approach.

Scope

This note applies to the control of pest animals (some of which include, foxes, rabbits, wild dogs, feral cats, camels, goats, pigs, feral horses and emus) within public drinking water source areas.

This note does not apply to:

- control of insects or exotic fish, aquatic species such as amphibians, crustaceans or molluscs within PDWSA
- pest animal management outside of PDWSA, but may offer some useful guidance on potential risks to sensitive water resources (Appendix A) and good practice.

Advice and recommendations

Public drinking water source area overview

Public drinking water source area is the collective name given to any catchment area declared for the management and protection of a public drinking water supply source. PDWSA include underground water pollution control areas, water reserves and catchment areas proclaimed under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or the *Country Areas Water Supply Act 1947*.

Within PDWSA, three protection classification areas for land (P1, P2 and P3) are used, based on present land use and vulnerability of the water body to harm. These areas are each managed in a different way to protect water resource quality. Protection classifications are assigned in drinking water source protection plans published by this department. These plans are prepared in consultation with state government agencies, landowners, local government, key industry and community stakeholders.

Protection zones closest to the point where drinking water is harvested or stored generally have additional constraints applied as activities in these locations can pose the highest contamination risk to water sources. These are described as wellhead protection zones and reservoir protection zones.

For additional explanatory information on PDWSA, see our water quality protection note 25 *Land use compatibility in public drinking water source areas*.

Contamination risks posed by pest animals

Pathogens

In PDWSA, pest animals can degrade raw water quality inhibiting water treatment processes, which may lead to public health concerns. Feral pigs, in particular, have the potential to impact on surface water quality due to their wallowing and foraging behaviour. Pigs can harbour and excrete a number of infectious waterborne pathogens that may infect humans.

Protozoan parasites such as *Giardia*, *Cryptosporidium*, *Balantidium coli* and *Entamoeba histolytica* have been detected in pig faeces collected in Perth metropolitan water catchments (Hampton et al, 2006).

These pathogens are termed zoonotic pathogens as they are infectious to humans, causing illness and, in some cases, can be life threatening. Given the tendency of feral pigs to live around the margins of waterways and water bodies, the potential for contamination to a drinking water source is considered a high risk which requires on-going management.

Vegetation destruction and erosion

Foraging behaviour of pest animals can also lead to the destruction of riparian vegetation, which provides important natural protection against contamination and erosion as described below.

An example of this behaviour is observed for male feral goats known as 'pawing', whereby large areas of vegetation can be disturbed or destroyed. Other pest animals such as donkeys and camels cause vegetation destruction.

Erosion by pest animal activity also causes dust, which can be released into the air and deposited or washed into water bodies, resulting in increased turbid water within reservoirs. High levels of turbidity can impede chlorination and filtration treatment processes as particulates can shield micro-organisms from effective disinfection, promote bacteria growth and lead to increased chlorine demand (WHO, 2004).

Infrastructure damage

Large animals such as feral camels, horses and cattle can also damage production bore infrastructure in order to obtain water. Their congregation around drinking water supply bores also has the potential to cause contamination through nutrients from faecal material; particularly if the bores are damaged or bore collars are not adequately sealed.

Illegal animal release and hunting

The risk of contamination by endemic and exotic pathogens to drinking water sources by pest animals is increased in surface water catchments through the introduction of these animals (particularly feral pigs and goats) for recreational hunting.

Under the *Agriculture and Related Resources Protection Act 1976* (section 77) and the *Animal Welfare Act 2002* it is an offence to liberate or attempt to liberate (including for the purposes of hunting) an animal that is declared under these acts ([Appendix B](#)).

Increasing geographical distribution of feral pig populations through our south-west catchment areas from other areas within the state, has been attributed to illegal feral pig translocation and release. Evidence of feral pigs illegally released into previously uninhabited areas was confirmed in a recent genetic study on feral pig populations (Spencer & Hampton 2005). Illegal translocation of pest animals counters control programs by working to maintain or expand populations of invasive animals.

Risks posed by pest animal control

Control methods which require people to stay in PDWSA for long periods, can increase the risk of contamination to the drinking water source. Contaminants include turbidity, nutrients and pathogens introduced through faeces and food wastes. Even small amounts of human waste can cause contamination through bodily contact with a reservoir or a feeder stream. In addition, movement through the catchment (e.g. whilst laying baits, setting traps or hunting) can cause damage to, or destruction by wildfire (cigarettes and campfire initiated) of protective vegetation buffers that would otherwise filter surface water runoff and the contaminants contained in the runoff. This is of particular concern within protection zones and the foreshore areas of reservoirs and their feeder streams. For more information on foreshore areas, see our *Foreshore policy 1 – Identifying the foreshore area* ([Reference 6a](#)).

Vehicles used for pest animal management pose a potential contamination risk. Risks associated with vehicles include wildfire risk from hot exhausts, vegetation damage and soil erosion and hydrocarbon contamination from petroleum products. As a result authorised vehicles used for pest animal management should remain on existing tracks.

Dogs are often used in association with illegal hunting in drinking water catchments, which can lead to an increased risk of pathogen contamination from animal faeces and urine.

Wildfire can destroy large areas of vegetation, also leading to the loss of protective vegetative buffers, and degraded water quality from ash and erosion, and may result in the temporary decommissioning of the public drinking water source.

Animal carcasses in the catchment, particularly those close to reservoirs, feeder streams or production bores also present a pathogen risk to drinking water quality (see carcass disposal section).

Approvals

Within State forest or conservation estate contained in PDWSA, the Department of Environment and Conservation (DEC) manages pest animals in consultation with the Agricultural Protection Board, Department of Water and the Water Corporation.

The use of 1080 and strychnine on private land contained in PDWSA, will be assessed by the Department of Agriculture and Food through the risk assessment process contained within the relevant code of practices ([Reference 4C](#) and [4D](#)).

The risk assessment will identify if the private land is associated with one of the three priority classification areas and impose any necessary relative additional conditions to mitigate the risks.

Advice and Recommendations

Pest animal management methods

- 1 Factors to consider before undertaking pest animal control:
 - a Defining pest animal impacts.
 - b Planning and implementation principles to ensure an efficient and effective control that minimise reinvasion of pest animal species (Reference 4,5 and 8).
 - c Occupational health and safety, including potential risks to the public (available online at <www.commerce.wa.gov.au> WorkSafe) .
 - d Legal obligations based on the relevant legislation summarised at [Appendix B](#).
 - e Animal ownership issues. Have the animals strayed from an adjoining property? Has the land owner been given the opportunity to reclaim the animals?
 - f Problem areas within PDWSA (i.e. areas where pest animals have the potential for the most detrimental effect) should be identified and recognised as priority areas for control efforts.
 - g Assessment on the effectiveness of the pest animal management control measure.
 - h All pest animal management methods should be conducted humanely and guided by the relevant model code/s of practice endorsed nationally for animal welfare. The model codes of practice (Reference 8 for further information) have been written to be applicable across the whole of Australia.

Maintaining vegetation buffers

- 2 During pest animal management operations, riparian vegetation should be maintained and left undamaged where practical. Riparian vegetative buffers provide important protection to reservoirs and feeder streams by:
 - a acting as a bio-filtration mechanism which protects surface waters by reducing pathogen mobility and providing nutrient uptake
 - b slowing water movement into water bodies, allowing time for remedial action in the event of chemical spill
 - c stabilising the soil, and thus helping to prevent erosion and turbidity

- d providing a physical and visual barrier to limit unnecessary human and domestic animal access to reservoirs and feeder streams (additional advice is available our water quality protection note 06 *Vegetated buffers to sensitive water resources*).

Fencing

Fencing to exclude feral pigs is most effective when pig-proof fences are installed before the habituation of an area occurs.

In smaller catchment areas that utilise soaks, small dams or pump back areas, fencing the immediate area surrounding the water body can provide better pest management for that area and further reduce risk of contamination when compared to other control methods over the greater catchment area.

Baiting

The poison most commonly used for feral pigs and foxes in Western Australia is sodium fluoroacetate (commonly known as 1080). Advantages of using 1080 include the tolerance by many native animals to the poison's toxic effects, as they have evolved with native plants that contain 1080. As 1080 is highly water soluble, it is readily leached from baits. Studies in Australia and New Zealand have confirmed that there is no evidence of 1080 persisting in or contaminating soil or waterways. This is because sodium fluoroacetate is readily trapped by cellulose and humus material in soils and is degraded into harmless by-products by a number of species of micro-organisms (Department of Agriculture, Department of Conservation and Land Management and Department of Health, 2002; Australian Pesticides and Veterinary Medicines Authority, 2005).

Very little information is currently available on the environmental fate of pindone (a first generation anticoagulant used to control rabbits in areas where the alternative rabbit poison, 1080, is either impractical or unsuitable , although it is expected to behave similarly to other anticoagulants with similar chemical structures and properties (such as diphacinone and chlorophacinone). Any residues leaching from the bait are expected to be well-retained and degrade at a moderate rate. Based on these assumptions, no significant or persistent contamination of the environment is expected; however, further data is required before this conclusion can be confirmed (National Registration Authority for Agriculture and Veterinary Chemicals, 2002).

The use of Warfarin and yellow phosphorus for baiting feral pigs and strychnine baits for wild dogs and foxes is illegal (not endorsed by the Vertebrate Pests Committee, Reference 9). Therefore these baiting practices should not occur within PDWSA.

- 3 1080 baits and baiting programs within proclaimed and future PDWSA must be conducted according to the Department of Health's 1080 Code of Practice (Reference 6).
- 4 A bait-free buffer should be maintained around the full supply level of a reservoir water body extending for a minimum distance of 100 metres.
- 5 Prominent warning signs at entry points and access paths must be erected prior to baiting programs.

- 6 The Department of Water should, upon request, be provided with access to all relevant details of the proposed baiting operation in areas of interest within any PDWSA.
- 7 1080 baits should be used in preference to pindone within PDWSA.
- 8 Any unconsumed baits and used bait containers must be disposed of appropriately outside the drinking water source area where practical.
- 9 The use of strychnine baits for emus in PDWSA is not recommended, because of the extreme risk to public health. This is due to strychnine's insoluble nature, persistence in the environment and lack of an adequate antidote. Strychnine can only be used with the approval of the Risk Assessor (DAFWA) on advice from the Department of Water.

Trapping

Traps can be an effective and common method of capturing pest animals, in particular feral pigs, goats, cats, donkeys wild dogs, and foxes. From a water source protection point of view, the major advantage of trapping as a method of control is the capability for animals to be trapped, euthanized onsite (see recommendation below) and disposed of off-site.

The use of toothed or serrated steel jaw traps for capturing and restraining pest animals is considered to be an unacceptable practice that is not endorsed by the Vertebrate Pests Committee (Reference 8). Therefore toothed or serrated steel jaw trapping practices should not occur within PDWSA.

- 10 For other than agency managed programs written permission from the Department of Water and other relevant land management agencies is required before a person is allowed to use traps within a PDWSA.
- 11 Where permission is granted, trapping methods should be conducted ethically, by applying best management practice to ensure animal welfare as per the relevant model code/s of practice (see Reference 9).
- 12 Trapping is most effective when available food and water resources are limited. Feral pig traps should be designed to catch multiple animals.

Hunting and shooting on Crown land within PDWSA

Hunting and shooting control methods undertaken by the public or hunting organisations is an incompatible land use within Crown land (including State forest areas) within PDWSA due to the contamination risks posed by the activity. Contamination risks include pathogen introduction from bodily contact within the waters by hunters and fleeing animals.

In addition, there is an increased disease risk associated with the decomposition of animal carcasses that remain in or close to waterways, wetlands and water supply bores. The risk of turbidity also increases with vehicle use close to sensitive areas.

Ground-based hunting and shooting is effective in reducing targeted individuals over a small area or as part of an integrated and coordinated control program and therefore not the preferred option for broad scale pest animal control in large catchment areas.

The reason for this is based on the potential for a greater number of animals to disperse during the shooting and hunting process. In addition, baiting programs can be more effective for pest animal control over larger areas in comparison. When this method has been deemed the most appropriate control option, approval from this department and other land managing agencies will be required.

13 For other than DEC and Water Corporation managed programs, written permission from the Department of Water is required before a person is allowed to hunt or shoot on Crown land within a PDWSA (Appendix B). Where approval is granted conditions may be applied to minimise the risk of harm to water resources.

14 Dogs are prohibited within PDWSA (Appendix B), and is therefore they are not permitted for hunting use within those areas. The use of dogs to assist hunters is also not recommended due to animal welfare considerations and the likely dispersal of pest animals. Disease risk to dogs, native animals and the public is also a concern with this practice.

Carcass disposal

Where practical, the appropriate disposal of carcasses greatly reduces the risk of contamination from pathogens and nutrients associated with carcass decomposition. Best management practice requires that all carcasses be located, removed and disposed of outside of proclaimed catchment areas and water reserves.

Where the removal of carcasses is not feasible, the following guidelines apply:

15 Where possible, all carcasses found should be buried with a distance of at least 100 metres from the centre line of any watercourse or 100 metres from the high water mark of any reservoir.

16 Carcasses should be buried in individual pits with a maximum separation distance above the average annual maximum groundwater level. The pits should be covered with at least 500 mm of earth from the ground surface to avoid predation by other animals.

Other pest control methods

17 Other methods that may be used to control pest animal populations include:

- a Introduction of biological control agents to increase mortality and/or decrease the fertility of the pest.
- b The myxoma virus (myxomatosis) and rabbit haemorrhagic disease (RHD), have been used for the control of rabbits. However, resistance by rabbits to these agents has now rendered them less effective.

- c Fumigation of underground dens and warrens with poisonous gas. The use of Chloropicrin for fumigation is now considered unacceptable (not endorsed by the Vertebrate Pests Committee, Reference 8). The use of carbon monoxide as a humane alternative is currently being trialled for fumigation purposes.

18 The removal of vegetation and/or significant disturbance of the soil whilst controlling pest animals should not be undertaken in PDWSA due to the potential erosion and turbidity issues associated with these methods.

Appendix A - Sensitive water resources

Clean water resources used for drinking, sustaining aquatic and terrestrial ecology, industry and aesthetic values, along with breathable air, rank as the most fundamental and important needs for viable communities. Water resources should remain within specific quality limits to retain their values and therefore require stringent and conservative protection measures. Guidance on water quality parameters that are necessary to maintain water values are published in the Australian Government's *National water quality management strategy guidelines*, available online at <www.environment.gov.au> select *water > water quality > national water quality management strategy*.

The Department of Water strives to improve community awareness of catchment protection measures, for both surface water and groundwater, as part of a multi-barrier protection approach to water resource quality.

Human activity and many land uses pose a risk to water quality if contaminants are washed or leached into sensitive water resources in discernible quantities. These waters include estuaries, waterways, wetlands and unconfined groundwater accessed by water supply wells.

Sensitive water resources support one or more of the environmental values described below:

- 1 Public drinking water sources (i.e. water reserves, catchment areas or underground water pollution control areas) proclaimed or assigned under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909*, the *Country Areas Water Supply Act 1947* or the *Health Act 1911*.
- 2 Private sources, used for the following water supplies:
 - a human or stock (animal) drinking water
 - b commercial or industrial water (requiring specific qualities that support activities such as aquaculture, cooling, food or mineral processing or crop irrigation)
 - c urban irrigation (that could affect people's health or wellbeing).
- 3 Recognised ecological functions in groundwater aquifers, such as soil or cave fauna.
- 4 Social values in natural waterways including aesthetic appeal, boating, fishing, tourism and swimming.

5 Ecological functions of waterways including:

- a those of high conservation significance described in the Environmental Protection Authority's guidance statement 33 *Environmental guidance for planning and development* (section B5.2.2), available online at <www.epa.wa.gov.au> select *EIA > guidance statements*
- b waterways managed by the Department of Water under the *Waterways Conservation Act 1976*, including the Avon River, Peel–Harvey, Leschenault Inlet, Wilson Inlet and Albany waterways
- c waterways managed by the Swan River Trust under the *Swan and Canning Rivers Management Act 2006*.

Engineered drains or constructed water features are excluded as functional and operational factors may outweigh their water quality values.

6 Conservation values in wetlands (assigned or recognised, excluding those highly disturbed unless actively managed to restore specified environmental values), including:

- a Ramsar wetlands, described online at <www.ramsar.org>.
- b High conservation significance wetlands as described in the Environmental Protection Authority's guidance statement 33 *Environmental Guidance for Planning and Development* (section B4.2.2), available online at <www.epa.wa.gov.au> select *Environmental impact assessment > guidance statements*.
- c Wetlands defined by the Australian government in *A directory of important wetlands in Australia*, available online at <www.environment.gov.au> select *water > water for the environment > wetlands > wetlands publications, resources and links > books, reports directories*.
- d Conservation valued and resource enhancement category wetlands identified in the *Geomorphic wetlands of the Swan coastal plain* dataset; all wetlands identified in the *South coast significant wetlands* dataset, and high value wetlands identified in the *Geomorphic wetlands Augusta to Walpole* dataset. The Augusta to Walpole wetland dataset awaits a detailed evaluation process. The Department of Environment and Conservation (DEC) is the custodian of wetland datasets and is responsible for maintaining and updating the information. The datasets can be viewed online at <www.dec.wa.gov.au> search *maps wetlands* or select *management and protection > wetlands > wetlands data*. Guidance on viewing the wetlands is provided on the same website at *water > wetlands > data* or by phoning DEC's nature conservation division for assistance on 08 9334 0333.

Many aquifers, waterways and wetlands in this state still need a detailed scientific evaluation and their value remains to be classified. Unless proven otherwise, any natural waters that are largely undisturbed by human activity, should be considered to have sensitive values.

Community support for water values, the setting of practical management objectives, providing sustainable protection strategies and effective implementation are vital to protecting or restoring water resources for current needs and those of future generations.

Appendix B - Statutory requirements and approvals relevant to this note include:

What's regulated?	Statute	Regulatory office
Land use impacts on wetlands, drinking water catchments and estuaries	<i>Environmental Protection Act 1986</i> , Part III Environmental Protection Policies	Minister for the Environment advised by the Environmental Protection Authority < www.epa.wa.gov.au >
Impact of significant development proposals on the values and ecology of land or natural waters	<i>Environmental Protection Act 1986</i> , Part IV Environmental Impact Assessment	
Prohibited discharge of specified contaminants	Environmental Protection (Unauthorised Discharges) Regulations 2004 <i>Animal Welfare Act 2003</i> and Regulations 2003. Conservation and Land Management Regulations 2002	Department of Environment and Conservation – regional office < www.dec.wa.gov.au >
Declaration of pest animals and their management Animal welfare	<i>Agriculture and Related Resources Protection Act 1976</i> <i>Animal Welfare Act 2002</i> and Regulations 2003.	Department of Agriculture and Food (WA) < www.agric.wa.gov.au >
Land use impacts in PDWSA Animal slaughter Poison, herbicide or toxic substance use Shooting, hunting and fishing restrictions	<i>Metropolitan Water Supply, Sewerage and Drainage Act 1909</i> By-laws 1981 section 4.5.5 <i>Country Areas Water Supply Act 1947</i> By-laws 1957 section 11 By-laws 1957 section 35	Department of Water - regional office < www.water.wa.gov.au >
Management of human wastes Community health issues	<i>Health Act 1911</i>	Local governments Department of Health < www.health.wa.gov.au >
Emergency response planning	<i>Fire and Emergency Services Authority of WA Act 1998</i>	Fire and Emergency Services Authority < www.fesa.wa.gov.au >

Note: relevant statutes are available from the State Law Publisher at <www.slp.wa.gov.au>.

References and further reading

- 1 Australian Department of Environment, Water and Heritage and the Arts (Canberra) – Threat abatement plans – publications available online at <www.environment.gov.au> select *biodiversity > invasive > ferals*
 - a *Review of progress on invasive species* Agtrans Research and Dawson N.,2005
 - b *Draft threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs*
 - c *Threat abatement plan for competition and land degradation by feral goats*
 - d *Threat abatement plan for competition and land degradation by feral rabbits*
 - e *Threat abatement plan for predation by feral cats*
 - f *Threat abatement plan for predation by the European red fox.*
- 2 Australian government – national water quality management strategy – publications available online at <www.environment.gov.au> select *water > water quality > nwgms*
 - a *Paper 4, Australian and New Zealand guidelines for fresh and marine water quality, 2000*
 - b *Paper 6, Australian drinking water guidelines, 2004*
 - c *Paper 7, Australian guidelines for water quality monitoring and reporting, 2000*
 - d *Paper 2, Policies and principles, 1994*
 - e *Paper 3, Implementation guidelines, 1998*
 - f Paper 9, Rural land uses and water quality- *a community resource*, 2000. see <www.awa.asn.au>, email <bookshop@awa.asn.au> or request from a library service.
- 3 Australian Pesticides and Veterinary Medicines Authority – publications, available online at <www.apvma.gov.au> search *1080 > technical report.*

The reconsideration of registrations of products containing sodium fluoroacetate (1080) and their associated labels, volume 2, preliminary review findings – technical report 2005, Canberra.
- 4 Department of Agriculture and Food (WA) – publications are available online at <www.agric.wa.gov.au> search > topic
 - a List of declared animals is available online at <www.agric.wa.gov.au> select *Vertebrate pests > Policy, management and research > Declared animals list (October 2006)*

- b *1080 summary information* Departments of Agriculture, Conservation and Land Management and Health (WA) 2002 are available online at <www.agric.wa.gov.au> select *Publications > Miscellaneous publications*.
 - c *Code of practice on the safe use and management of 1080*; 2008, available online at <www.agric.wa.gov.au> search >1080 code of practice
 - d *Code of practice on the safe use and management of strychnine in Western Australia*; 2009, available online at <www.agric.wa.gov.au> search >Strychnine code of practice
- 5 Department of Environment and Conservation (WA), publications available online at <www.dec.wa.gov.au>
- a *Administrative Instruction 58 Fox baiting on CALM managed land and other CALM programs*
 - b *Fox control manual*
 - c *Draft feral pig management strategy*.
- 6 Department of Water (WA)
- a Water resource management policies are available online at <www.water.wa.gov.au> select *policies*
 - *Foreshore policy 1 – Identifying the foreshore area, WRC 2002*
 - *Statewide policy 2 - Pesticide use in public drinking water source areas, WRC 2000*
 - *Statewide policy 13 - Policy and guidelines for recreation within public drinking water source areas on crown land, states hunting activities are incompatible in PDWSA.*
 - b Water quality protection notes available online at <www.water.wa.gov.au> select *waterways health > water quality > waterways > water quality protection notes*
 - *WQPN 06 Vegetated buffers to sensitive water resources*
 - *WQPN 25 Land use compatibility in public drinking water source areas*
 - *WQPN 65 Toxic and hazardous substances – storage and use*
 - c *Waterways guidelines – water notes* available online at <www.water.wa.gov.au> select *water quality > publications > water notes*
 - *WN 10 – Protecting riparian vegetation*
 - *WN 11 – Identifying the riparian zone.*

- 7 Hampton, J, Spencer, PBS, Elliot, AD & Thompson, RCA, 2006, *Prevalence of zoonotic pathogens from feral pigs in major public drinking water catchments in Western Australia*, EcoHealth.
- 8 Humane pest animal control – *code of practice & standard operating procedures* – NHT & NSW Department of Primary Industries 2005 available online at [www.dpi.nsw.gov.au](http://www.dpi.nsw.gov.au/agriculture/pests-weeds/vertebrate-pests/codes/humane-pest-animal-control) agriculture > pests-weeds > vertebrate-pests > codes > humane-pest-animal-control
- 9 McLeod, R. 2004 *Counting the Cost: Impact of Invasive Animals in Australia 2004*. Cooperative Research Centre for Pest Animal Control. Canberra
- 10 National Registration Authority for Agricultural and Veterinary Chemicals are available online at www.apvma.gov.au/chemrev/chemrev.shtml select *pindone*
 - *The NRA Review of Pindone*, NRA Review Series, Canberra 2002.
- 11 Spencer, PBS & Hampton, J, 2005
Illegal translocation and genetic structure of feral pigs in Western Australia, Journal of Wildlife Management, 69(1), 377–384.
- 12 World Health Organisation 2004 *Guidelines for drinking-water quality* – 3rd Edition – Volume 1, World Health Organisation, Geneva available online at www.who.int/water_sanitation_health/dwq/gdwq3rev/en/index.html.

More information

We welcome your views on this note. All feedback is retained on our file **WT1063**.

To comment on this note or for more information, please contact our water source protection branch as shown below, citing the note topic and version.

Department of Water
168 St Georges Terrace
Perth Western Australia 6000

PO Box K822 Perth Western Australia 6842

Telephone +61 8 6364 7600
Facsimile +61 8 6364 7601
Email waterquality@water.wa.gov.au

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