

**FLORA & FAUNA
GUARANTEE**

FLORA AND FAUNA GUARANTEE - SCIENTIFIC ADVISORY COMMITTEE
FINAL RECOMMENDATION ON A NOMINATION FOR LISTING

**Soil degradation and reduction of biodiversity through browsing and competition
by feral Goats (*Capra hircus*)
(Potentially Threatening Process)**

Date of receipt of the nomination: 8 July 2010 **File No.:** FF/54/3255
Date of preliminary recommendation: 5 May 2011
Date of final recommendation: 15 March 2012

Validity: The nomination is for a valid item

Prescribed Information: The prescribed information was provided.

Name of the Nominator is adequately provided.

Name and Description of the process:

In the opinion of the SAC the process is adequately defined and described.

The nominated process is defined as the 'Soil degradation and reduction of biodiversity through browsing and competition by feral Goats (*Capra hircus*)'

The domesticated goat arrived in Australia with the First Fleet in 1788 primarily as a farm animal, but was also released on to offshore islands as a potential food source for mariners. Since then goats have been dispersed into farmland around Australia. However many escapes and deliberate releases into non-farm areas where the animals often survived and bred successfully have resulted in significant populations of feral goats. The feral goat population in Australia has been recently estimated at 2.6 million (Parkes *et al.* 1996), though that figure is considered conservative (Department of the Environment 2008). Found mainly on public land, the presence of feral goats in national parks has been seen as a major threat to biodiversity (Veitch *et al.* 2007).

Goats are hardy, essentially browsing animals, with a diet similar to that of sheep during drought (Wilson *et al.* 1975 in Ellis 1996), and during severe drought are known to persist longer than other introduced herbivores (Parkes *et al.* 1996) due to their generalist diet. They prefer the more nutritious and palatable floral species, but have the ability to survive on extremely poor quality forage (Coblentz 1977, Parkes *et al.* 1996). Their habitat plays a major role in dictating their dietary intake. Ellis (Ellis 1996) observed in one study that Rosewood (*Heterodendrum oleifolium* now known as Cattle Bush *Alectryon oleifolius* subsp. *canescens*), Mulga (*Acacia aneura*), Belah (*Casuarina cristata*), Sugarwood (*Myoporum platycarpum*) and Wild Lemon (*Canthium oleifolium*) formed part of feral goats' diet. In a study in Murray-Sunset National Park, Cheal (2005) noted that death rates of Broom Baeckea (*Babingtonia behrii*) and Scrub Cypress-pine (*Callitris verrucosa*) were 98% and 10% respectively, attributed to browsing by feral goats in both cases (Cheal 2005). The inclusion of foliage, twigs, bark, flowers, fruit and roots in their diet makes feral goats truly generalist herbivores (Parkes *et al.* 1996).

Goats are often associated with woodland in arid to semiarid areas where there is ready access to water (Fleming 2004), and can have some of their greatest impacts there, although they are quite widespread throughout Victoria (DSE 2011). Their main predators are dingoes and wild dogs where these are present (Department of the Environment 2008). Being social animals, herd sizes in their preferred areas can range anywhere from 2 to 6 goats (Fleming 2004). This statement is backed by findings in the Grampians National Park where 93% of all observations were goat herds of less than 10 animals (Tumney 1989). In favourable conditions though (such as higher rainfall), herd sizes can swell to as many as 100 goats (Hopkins 2000) as they can reach sexual maturity at six months of age and 'kid' twice yearly, producing one to three kids each time (Menkhurst 1995). This can equate to a population increase of up to 75% per year (Henzell 2000, DECC 2008). Over the past seven years, approximately 400 feral goats have been removed in the Grampians National Park via ground shootings and the Judas goat program and still the problem hasn't abated (Stevens pers. comm.). It will come as no surprise then that goats have now established feral herds in all states of Australia, with the exception of the Northern Territory, though they are found on islands off the Northern Territory coast (Parkes *et al.* 1996). Feral goat populations have also been reported from at least five Victorian islands: Lady Julia Percy, French Island, Sunday Island, Hunter Island and Tullaberga Island (Johnston 2008).

Feral goats have several well-established potential effects on natural systems, especially when either goat densities are high and/or drought conditions prevail:

- overgrazing of native herbs, grasses, shrubs and trees, and damage to the soil crust, resulting in habitat damage, including trampling and soil erosion
- debarking of shrubs and trees;

- competition with native herbivores; and
- spreading exotic diseases and weeds.

The flora and fauna known to be affected varies widely, and includes a number of FFG Act and EPBC Act-listed taxa. Apart from those listed above, those affected include:

- lichens, fungi and cyanobacteria in the soil crust,
- herbs such as the Greencomb Spider-orchid (*Caladenia tensa*) and the Spotted-throat Cowslip (*Diuris tricolor*),
- shrubs such as the Grampians Bitter-pea (*Daviesia laevis*) and Whipstick Westringia (*Westringia crassifolia*) and small trees such as Cattle Bush (*Alectryon oleifolius* subsp. *canescens*).

Amongst the affected animals are:

- the Malleefowl (*Leipoa ocellata*) and
- Brush-tailed Rock Wallaby (*Petrogale penicillata*).

A number of other species may also be significantly threatened.

The range of flora or fauna affected or potentially affected was adequately stated in the original nomination.

The significance of the threat which the potentially threatening process poses or has the potential to pose was adequately stated in the nomination.

Eligibility for listing as a potentially threatening process under the Flora and Fauna Guarantee

The nominated item satisfies at least one criterion of the set of criteria prepared and maintained under Section 11 of the *Flora and Fauna Guarantee Act 1988*, and stated in Schedule 1 of the *Flora and Fauna Guarantee Regulations 2001*.

Evidence that criteria are satisfied:

Criterion 5.1 *the potentially threatening process poses or has the potential to pose a significant threat to the survival of a range of flora or fauna.*

Evidence

Available data have provided clear evidence (Parkes *et al.* 1996; Cheal 2005; Bayne *et al.* 2004) that the nominated process poses a significant threat to the survival of a wide range of native plant and animal species through:

- soil degradation;
- competition with native animals for food and shelter; and
- browsing, debarking and trampling of plants.

In addition, Cheal (2005) identified the impact that browsing has on scrub cypress-pine in the Mallee region while Benshemesh (2000, 2005) provided evidence of feral goats' impact on malleefowl through destruction of habitat.

Sub-criterion 5.1.1 *the potentially threatening process poses or has the potential to pose a significant threat to the survival of two or more taxa.*

Evidence

FFG-listed and EPBC-listed taxa which, on the evidence available, may be threatened by feral goats include the Brush-tailed Rock Wallaby, Malleefowl, Spotted-throat Cowslip Orchid, Whipstick Westringia and Grampians Bitter-pea.

Sub-criterion 5.1.2 *the potentially threatening process poses or has the potential to pose a significant threat to the survival of a community of flora or fauna.*

Evidence

While there have been few studies identifying feral goats as the sole contributor to the degradation and survival of communities of flora or fauna, evidence has been provided (Cheal 2005) that the nominated process clearly threatens the Semi-arid Scrubby Pine Buloke Woodland community (SAC 1997).

Criterion 5.2 *the potentially threatening process poses or has the potential to pose a significant threat to the evolutionary development of a range of flora or fauna*

Evidence

Evidence has been provided that links the nominated process to the increased development of thorns and spines as an evolutionary response to browsing pressure (Medley 1991). Increased traces of poisonous chemicals in plant species (Belovsky *et al.* 1991), again an evolutionary response to browsing pressure, is also presented as evidence of the potential threat the nominated process has to evolutionary development.

The nominated process through soil degradation and browsing that could potentially lead to habitat fragmentation and consequently reduced gene flow between remnant populations. This is a threat to the evolutionary development of the Spotted-throat Cowslip *Diuris tricolor*, Grampians Bitter-pea *Daviesia laevis* and the Whipstick Westringia *Westringia crassifolia*.

Advertisement for public comment

In accordance with the requirements of Section 14 of the *Flora and Fauna Guarantee Act 1988*, the preliminary recommendation was advertised for a period of at least 30 days.

The preliminary recommendation was advertised in:

- 'The Herald Sun' - on 2 November 2011
- 'The Weekly Times' - on 2 November 2011
- Government Gazette* - on 3 November 2011

Submissions closed on 5 December 2011.

Further evidence provided:

No submissions were received on this item and no evidence was provided to warrant a review of the Scientific Advisory Committee's preliminary recommendation that the taxon is eligible for listing.

Documentation

The published information provided to the SAC has been assessed. To the best of their knowledge, the SAC believes that the data presented are not the subject of scientific dispute and the inferences drawn are reasonable and well supported.

Final Recommendation of the Scientific Advisory Committee

The Scientific Advisory Committee concludes that on the evidence available the nominated item is eligible for listing in accordance with Section 11 of the Act because primary criteria 5.1 and 5.2 and sub-criteria 5.1.1, 5.1.2 have been satisfied.

The Scientific Advisory Committee makes a final recommendation that the nominated item be supported for listing on Schedule 3 of the *Flora and Fauna Guarantee Act 1988*.

Selected references:

- Bayne, P.A., Harden, R. & Davies, I. (2004) Feral goats (*Capra hircus* L.) in the Macleay River gorge system, north-eastern New South Wales, Australia, I. Impacts on soil erosion. *Wildlife Research* 31(5): 519–525.
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- Henzell, R. (2000) Goat *Capra hircus*. In Strahan, E.R. (Ed.) *The Mammals of Australia*. Reed Books, Sydney.

Hopkins, R.A. (2000) Life history accounts for species in the California Wildlife Habitat Relationships (CWHR), originally published in Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 1988-1990. California's Wildlife. Vol. I-III. California Department of Fish and Game, Sacramento, California.

http://www.dfg.ca.gov/biogeodata/cwhr/pdfs/LHA_A026.pdf.

Johnston, M. (2008) *Introduced animals on Victorian islands: improving Australia's ability to protect its island habitats from feral animals*. Arthur Rylah Institute for Environmental Research Client Report. Department of Sustainability & Environment, Heidelberg.

Menkhorst, P. W. (1995) Goat, pp. 261-262, In *Mammals of Victoria: Distribution, ecology and conservation*. (ed. P. W. Menkhorst). Department of Conservation and Natural Resources. Oxford University Press: Melbourne.

Midgley, J. (1991) Valley Bushveld dynamics and tree euphorbias. In: Zacharias, P.J.K., Stuart-Hill, G.C., Midgley, J. (Eds.), *Proceedings of the First Valley Bushveld/Subtropical Thicket Symposium*, Grassland Society of Southern Africa, South Africa, 55pp.

Parkes, J., Henzell, R., Pickles, G. & Bomford, M. (1996) *Managing vertebrate pests: feral goats, Australia*. Bureau of Resource Sciences. & Australian Nature Conservancy Agency. Australian Government Publishing Service, Canberra.


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Veitch, S., Hart, Q., Robinson T., Miller, J., Kay, B., Crawford, C., Edwards, G., Thompson, J. & Keenan, F. (2007) *Australian Pest Animal Strategy – A national strategy for the management of vertebrate pest animals in Australia*. Natural Resource Management Ministerial Council, Canberra.

Endorsement by the Convenor of the Scientific Advisory Committee

Date


 Assoc. Prof David Morgan
 Convenor

15.3.12